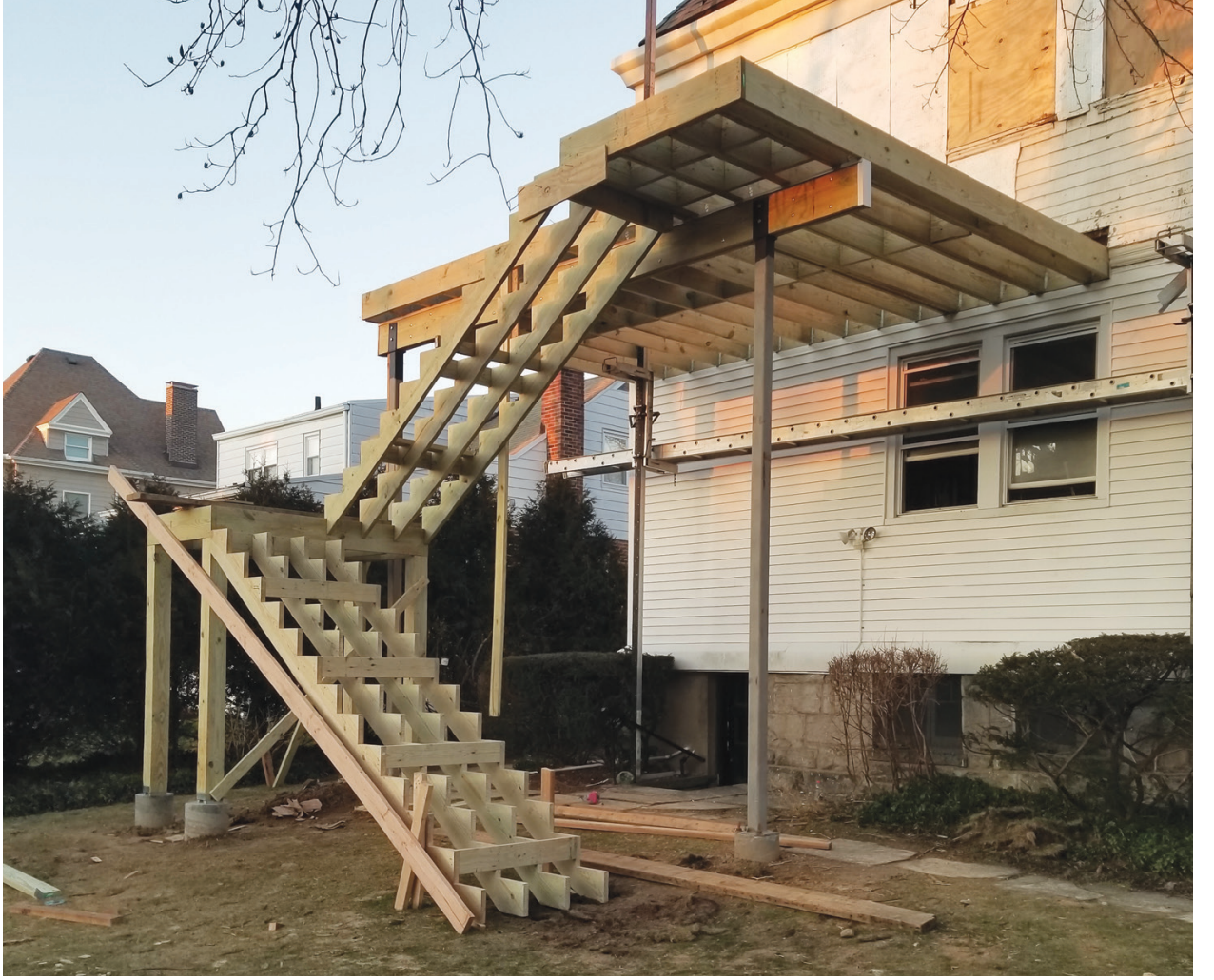

PHOTOS BY MIKE GELSOMINO

Stairs for a Tall Deck

A top-down approach ensures that the stairs begin—and end—in the right place

by Mike Gelsomino

Recently, we needed to add an elevated deck and tall set of exterior stairs for access to a second-floor apartment to keep a much larger, three-story renovation project moving. Normally we'd schedule this exterior work later in a big project like this, but we needed the stairs for bringing cabinets and appliances up to a space that was otherwise accessible only via a narrow interior staircase.

Reference Elevation

This home was built in the late 1800s, and we were working from a set of plans that were a little unreliable. That's not uncommon, especially in a case like this where there's no real way for the architect to know exactly what's going on behind all those layers of lath and plaster. In order to figure out how to align the finish deck height with the second floor, I decided to use SketchUp to make my own 3D model of the staircase and deck with more accurate measurements.

I enjoy using software to draft plans for our projects, because it's much less expensive to fix mistakes when the screw-up is on paper. In projects like this one, where elevations play a large role, I find that this approach is indispensable.

First, though, we needed a reference elevation, so we drilled a ¾-inch-diameter hole through the wall from the second floor's interior, where a new door that opened onto the deck would eventually be located. This was our "finish line," and from there I could figure out all of my measurements down to the top of the Sonotube footings, which I used as another reference point.

Working from my model and with the help of a makeshift story pole, I

determined the deductions for the various pieces of hardware and framing members and calculated the exact length of the steel 4x4 columns that would support the deck.

Midpoint Landing

With the footings poured and the columns bolted into place, we wrestled the heavy girder—which consisted of two 18-foot-long 2x12s sandwiched around a ¾-inch-thick steel flitch plate—into place on top of the columns and framed the upper deck. Then I started working on the staircase layout.

The plans called for two stairs separated by a midpoint landing. Typically, I try to start with the landing platform location and work my way up or down, adjusting the elevation as needed. For this project, there wasn't a question of where the platform would land, because of the layout work that I'd done in SketchUp earlier (**Figure 1**).

That being said, I'm still an analog man living in a digital world, and I opted to hang the first stringer temporarily to double-check my measurements before framing the midpoint landing. After verifying the location with a quick measurement from the bottom step to a plumb bob hanging from the upper deck, I made a 1½-inch-deep notch in the bottom of the stringer where it would meet the platform. This ensured that the height of the first step would be correct, and it also made for a solid connection between the stringer and the landing. The notch in the stringers also meant that I had to make the landing platform 1½ inches wider, which pushed the bottom of the staircase out slightly farther.

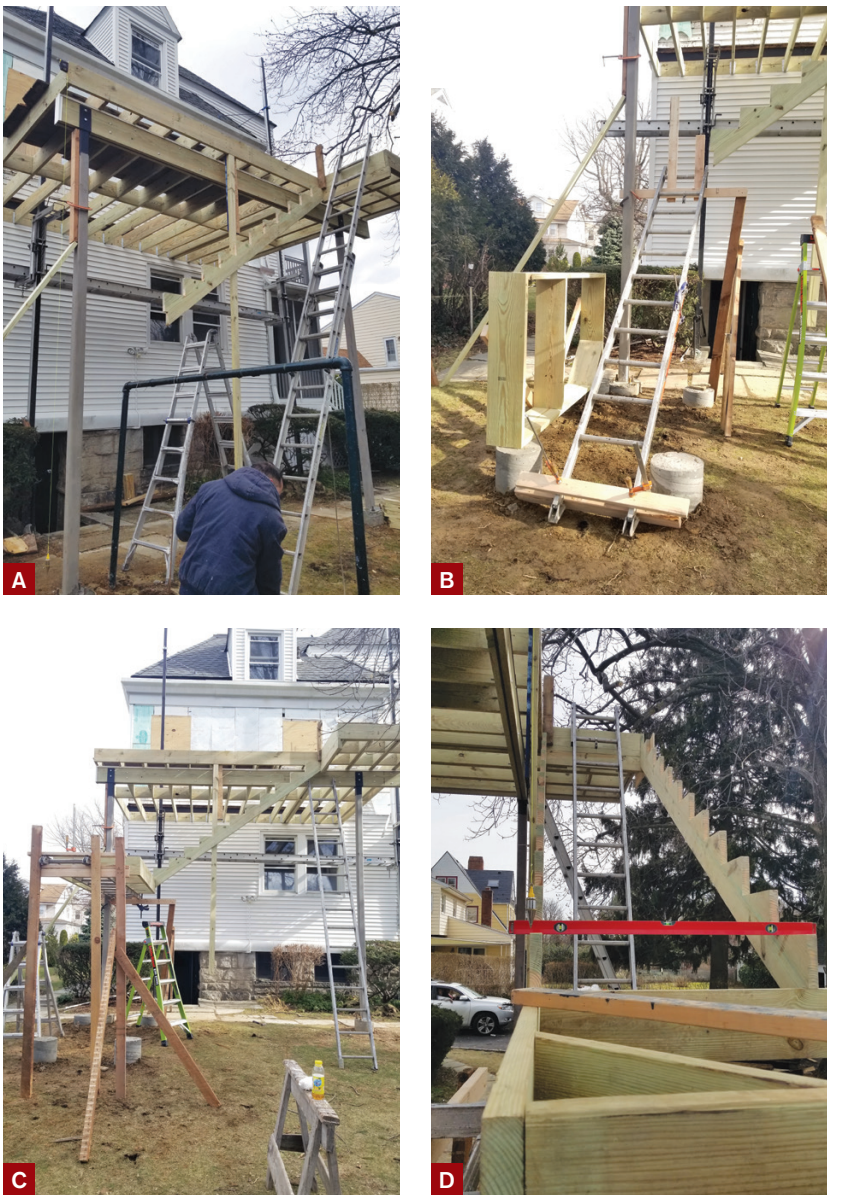

Figure 1. The second-story deck is supported by a double 2x12 steel-reinforced beam that bears on 4x4 steel columns (A). After cutting the first stringer, the author used it to determine the elevation of the midpoint landing (B), which was framed on the ground, then lifted into position on temporary supports (C). The outside stringer was then used to fine-tune the orientation of the landing (D).

With the first inside stringer supported, I could install the landing platform, which I framed on the ground as a 2x10 pressure-treated (PT) box with a single joist and some supports to keep it square while I worked (installing all the joists at that point would have made the platform heavy and hard to lift up into position). Then, with the platform lifted more or less in place and temporarily supported, I started to install the second outside stringer. At this point, it was easy to tell if the platform needed to be rotated slightly to move it into the right position. Once the second stringer fit tightly against the framing, I knew the platform was squared up with the landing above.

I hung a plumb bob from the deck's rim joist to help make sure the upper deck and midpoint landing were in final alignment. Then I cut all my 6x6 PT posts to length, adding a 1½-inch-by-5-inch

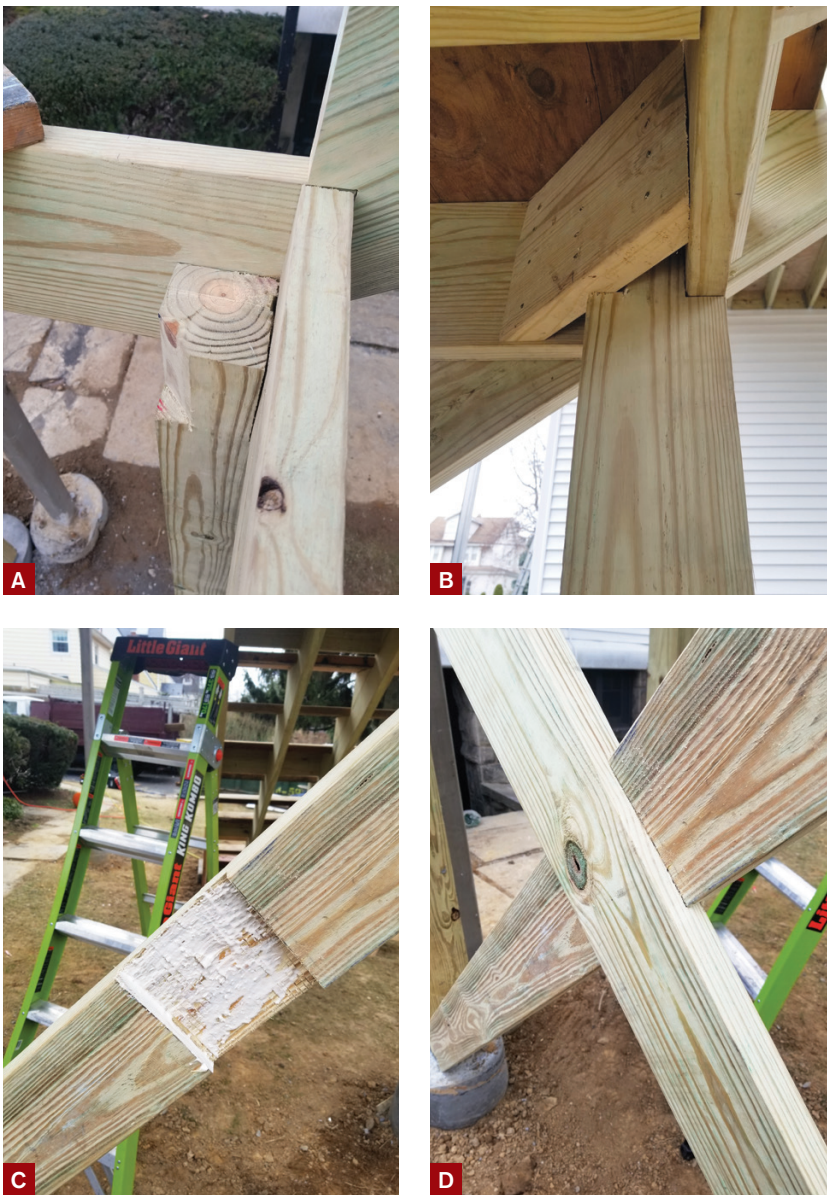

Figure 2. To help reinforce the landing platform, the author notched the back of the 6x6 support posts (A), then installed diagonal blocking (B). He also installed cross-bracing, fitting together a pair of 2x6s with a glued half-lap joint (C). After adding mechanical fasteners to the assembly, he fastened it to the inside support posts with structural screws (D).

notch to two sides at the top to give the platform a solid bearing all the way to the foundation. Before installing the posts, I also cut a 45-degree notch on the back of each one at the top to accommodate diagonal blocking that would be installed later.

Blocking and Bracing

To help stabilize the landing, I installed diagonal bracing from the footing all the way up to the bottom of the platform. I cut the braces from 2x6 PT lumber, and at the intersecting points of both boards, cut a half-lap joint. I added a little exterior-grade wood glue to the joint and clamped the boards together, allowing the assembly to set overnight before installing it. Though not specified on our plans or required by the building department, the bracing completely eliminates any side-to-side wobble in the landing platform (**Figure 2**).

The hanger board detail is something I picked up from several places, and I've added my own touches to it over the years. I know many builders like to hang their stringers from PT plywood fastened to the rim joist, but I prefer to hang a 2x6 underneath the 2x10 rim joist, connecting the two together with vertical 2-by blocking to provide solid bearing for my plumb-cut stringers.

After fastening the stringers to the hanger and rim with structural screws, I installed 2x8 blocking between all of the stringers where they met the hanger board. When all the pieces were in place, I fastened the assembly together using nails, ThruLok bolts, and structural screws through the entire stack of blocks above and below the hanger board. I reinforced the stringer-to-hanger connection with steel angles, then added self-adhering flashing tape at the top of the meeting points to keep water out of the assembly (**Figure 3**).

Added Reinforcement

The original plans for this deck called for the installation of three stringers with equal spacing, creating a span of almost 18 inches between stringers for the treads. Adding an additional stringer allowed us to keep the on-center spacing for the treads to under 12 inches.

Anytime you have a long set of stringers, the span's center can (and will) tend to get a bit bouncy. By the time you cut your steps out of the 2x12, you have only about 5 1/2 inches of material left in the throat of the stringer (the minimum throat required by code in our area is 5 inches). Increasing the number of stringers helps to take out some of the

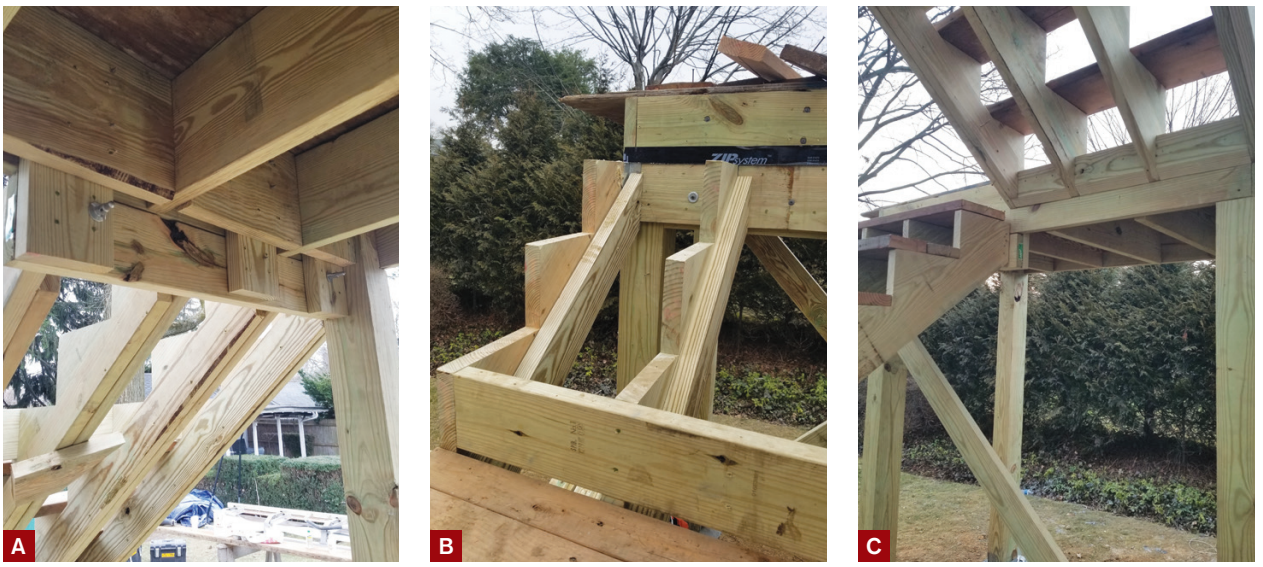

Figure 3. The stair stringers were hung from a 2x6 connected to the rim joist with vertical blocking and a combination of structural screws and ThruLok bolts (A). The author reinforced the stringers with sistered 2x6s (B) and reinforced the connection between the upper stringers and the landing platform with blocking (C).

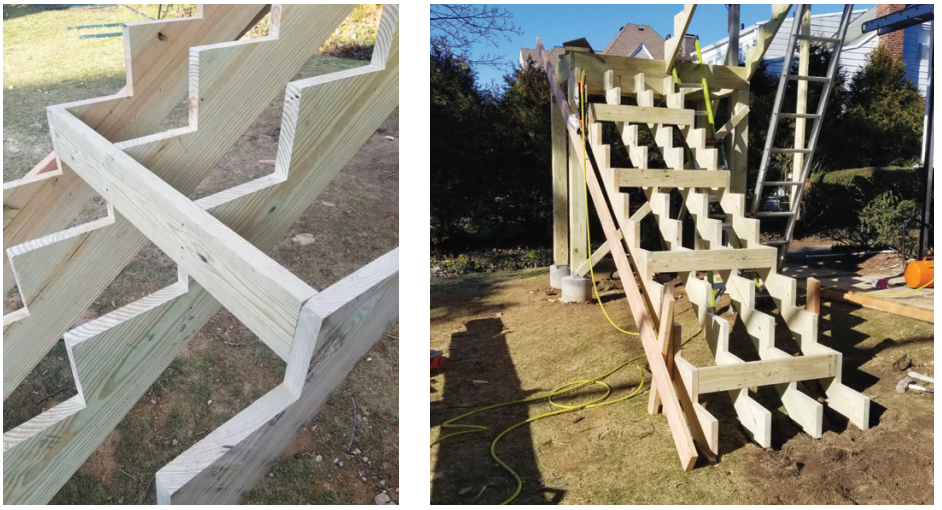

Figure 4. To make the stringers straighter and stronger, the author notched the middle stringers and installed 2x6 blocking (far left). Located every few steps, the stringer blocking keeps the tops of the treads aligned and ties the assembly together into a solid unit (left).

bounce, but so does fastening a 2x6 to the throat of each stringer (in our area, we refer to this as scabbing). We cut the scabs at the same time we cut the stringers, then sister them together after stringer installation using structural screws and galvanized framing nails.

Another step we take to reinforce stairs is to connect the stringers together with continuous blocking. We do this by cutting 1½-inch-by-5½-inch notches into selected risers of the center two stringers, then nailing 2x6 blocking to the notches and the outer stringers. This helps keep the tops of the stringer treads aligned, is easier to install than individual blocking between stringers, and makes for a solid support system. I usually install this blocking every three or four steps (or every quarter of the way up a stair span), but more or less can be added depending on site conditions (**Figure 4**).

Our clients have yet to make finish selections for the decking, staircase, and railing. But by completing this phase of the project last fall, we were able to work on the interior renovations all winter long, and we will have a solid frame in place when it comes time to complete the deck this spring. ❖

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