Building Bracketed Deck Stairs

Build wider, stronger deck stairs using just a pair of solid stringers and metal brackets

by Mike Guertin

PHOTOS BY MIKE GUERTIN

I don't see many deck stairways built with bracketed stringers, but they're a good alternative to notched stairs in certain situations. The design is similar to housed stringers—where dadoes are routed into the framing to provide shoulders for the treads and riser boards to rest in—but is simpler to build. And bracketed stairs are stronger than stairs with notched stringers because the 2x12 stringers aren't weakened by notches that effectively leave only 2x6s to support the loads on the stairs.

I like to use solid stringers and brackets whenever a design calls for wide stairs or long spans. Notched stair stringers have a limited unsupported run of 6 feet, according to the AWC's DCA6 (*Prescriptive Residential Wood Deck Construction Guide*). Compare that with solid stringers, which can span more than twice that distance—13 feet 3 inches—without intermediate supports.

DCA6 also limits the width of 2-by treads between solid stringers to 36 inches, but that can be increased substantially by installing structural risers. Incidentally, this also satisfies the building code requirement to block openings that are greater than 4 inches—including underneath the treads—when the stair is more than 30 inches above grade.

Metal Brackets

On this project, the stairs access a landing for a storage building. I built them using ordinary pressure-treated lumber rated for ground contact (AWPA UC4A). For a more finished look, the stringers, treads, and risers could be made from any finish-grade, naturally decay-resistant lumber, such as cedar or a suitable tropical hardwood.

The treads are 2x12s that I ripped down to 11 1/4 inches. Because the risers are structural to help support the 4-foot span of the treads, I used 2x10s for them.

DCA6 provides a tread-support detail that features 2x4 PT cleats fastened to the solid stringers, but on this project, I used metal stair angles. While stair angles look like ordinary angle brackets, they are made of thicker-gauge steel and are stronger. Stair angles are made by both Simpson Strong-Tie (TA9Z and TA10Z) and MiTek/USP (SCA9-TZ and SCA10-TZ) and are weight-rated depending on how many structural screws or lag screws are used to mount them to the stringers.

Another option is to use EZ Stairs (ez-stairs.com) metal support brackets, which have a right-angle design that supports both the treads and the risers. According to the manufacturer, this system can be used with a single pair of stringers to build exterior deck stairs that are as wide as 7 feet.

Figure 1. A dropped 2x6 header fastened to support posts provides a solid attachment point for the stairs (above left). Rise and run—and therefore the size of the risers and treads—is determined by marking a level line from the top of the decking, and then measuring out from the front edge of the decking and up from the end point of the stairs on the landing (above right).

Stringer Layout

To avoid overloading an end joist or a rim joist, I prefer to support the head of the stair independently of the deck frame. On this project, I began by fastening a 2x6 dropped header to the 4x4 posts with structural screws. The 2x6 is also supported by a pair of 2x4 jack studs that are screwed to the posts and bear on the footings supporting the posts. The 2x6 is in plane with and provides additional support to the end joist of the deck (**Figure 1**).

Stair layout starts as it does for cut stringers. First, I determine the rise—the height from the top of the finish deck to the point on the landing where the bottom step will fall. Then I find the run—the distance from that point back to the deck. Of course, these two measurements are necessary for calculating the width of the treads and the height of the risers.

When laying out the treads and risers, I mark the tops of the finish treads, rather than the bottom, or cut line. Screwing a 1-by strip of wood to my framing square instead of using stair gauges or lining up the framing square by eye allows me to mark the tread and riser heights with more accuracy (**Figure 2**).

Figure 2. For laying out treads and risers on a pattern stringer, a 1-by straightedge screwed to a framing square provides more accuracy than stair gauges (A). To locate the metal stair brackets, mark both the tops and bottoms of the treads (B). Tilt the two stringers on edge to transfer the tread-riser intersection to the other stringer (C), then lay out the remaining stringer so that it is a mirror image of the pattern (D).

I draw heavy pencil lines for the treads and light lines for the risers. This is because the marks aren't cut out, as they would be for notched stringers, and the actual position of the risers will be 3/4 inch behind the stringer nose. This makes it easier to erase the light riser lines later.

After the primary stringer layout, I make a second pass to scribe the bottom lines for the treads using the 1 1/2-inch tongue of the framing square. This lower line is where the top of the tread brackets will be aligned.

To transfer the layout onto the mating stringer, I square a line where each of the riser and tread marks meet along the top edge of the pattern stringer. Then I align the pattern stringer with its mate flush across the top edge and transfer the edge marks to the mate.

With the two stringers positioned so that they mirror one another, I use the framing square to mark the mate with the light riser line and the top-of-tread and bottom-of-tread lines. This ensures that the same face isn't marked on both stringers.

The top stringer cut is one straight line with the top ear clipped for the decking to pass over. At the bottom, I cut both the heel line and the riser line, but the riser-line cut is optional. The stringer can be left to run out onto the landing, but it looks better when it terminates with the nose of the tread.

Figure 3. When installing the metal brackets, be sure to provide clearance for the structural riser (A). Before installing the treads, drill pilot holes for the structural screws that will be driven through the stringers and into the treads and risers (B). Structural screws are used to fasten the treads to the brackets (C).

Installing the Brackets

It's easier and faster to install the hardware when the stringers are resting across a pair of sawhorses, but hardware can also be screwed in place when the stringers are in position. In either case, orienting the bracket along the line at the bottom of the tread is important. Don't place it too far forward or the bracket will interfere with the riser installation (**Figure 3**).

On these stairs, I wanted the tip of the tread nosing to line up with the top of the stringer. I positioned a section of 2x12 at the tread line and measured back 2 1/4 inches along the bottom from the face of the tread: 3/4 inch for the tread

Figure 4. Five-inch-long structural screws driven through the risers into the back edge of the treads 12-inches on-center reinforce the treads (above left). The front edge of the treads and the top edges of the risers are also fastened together with long structural screws (above right).

Figure 5. Flat-head structural screws driven through pilot holes in the stringers and into the treads and risers draw the assembly together (A). After the author slides the stairs over into position, he uses stair-stringer connectors to hang the stairs from the rim board and 2-by header (B). ThruLok screws and a hefty blocking detail fasten the guard post to the stringer and the structural riser (C). The final tread is notched to fit around the post, then fastened in place with structural screws (D).

nose overhang (code requires a minimum projection of $^{3}/_{4}$ inch and a maximum projection of $1^{1}/_{4}$ inches) and $1^{1}/_{2}$ inches for the 2x10 riser thickness.

After screwing the brackets to the stringers, I drilled pilot holes for structural screws to be driven through the outside of the stringers and into the end of the treads. Then I installed the treads, driving $1\,^{1}/_{4}$-inch-long structural screws up through the metal brackets into the treads.

The risers perform a structural function, turning the treads into small beams. So I used structural screws driven about a foot apart through the back of the risers and into the back of the treads to beef up the assembly. I also drove structural screws down through the front of the treads into the structural risers at 12 inches on-center (**Figure 4**).

Even though the tread brackets are screwed to the inside face of the stringers, driving 5-inch long structural screws through the outside face of the stringers and into the treads and risers really tightens up the stair assembly. Here, the stairs run next to a wall, so I had assembled the staircase about a foot and a half or so away from its final position, far enough to be able to drive the screws through the outside face of the wall-side stringer. Then I slid the stairs over into place and fastened them to the header with metal hangers (**Figure 5**).

This technique leaves a lot of screw heads exposed, which was not a problem on a set of utility stairs like this. I used black HeadLok flat-head structural screws, which probably stand out more than would Simpson Strong-Tie's SDWS screws, which have tan heads. Another option might be to trim the stringers with separate skirtboards that conceal the fasteners (though this would present other trimming challenges).

Post Assembly

Bracketed stringers are taller and provide more attachment surface than cut stringers, so they tend to be more stable front to back. To keep the lower guard post from moving side to side, I used a FastenMaster-designed ThruLok block-and-screw system. For that detail, the 4x4 post and blocking (which is cut to the height of the riser board) are both ThruLok'd to the structural riser. Longer ThruLok screws are then driven through the stringer, the post, and the block.

Finally, after notching the bottom tread around the 4x4 post, I screwed it into place like the other treads, and finished up the railing. ❖

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