# Two Decks, Many Lessons

by Bruce Greenlaw

## Codes, materials, and techniques have changed a lot since the 1980s

I have to admit, when I was hired last October to replace a dilapidated deck and give a small adjacent one a face-lift — a welcome job in light of my suddenly dormant writing career — I was nervous. While I'd been a carpenter for 12 years and spent the intervening years working at construction magazines, I hadn't built a deck since Ronald Reagan was president. Back then ledgers were nailed, joists weren't always pressure-treated, decking was redwood or western red cedar, and guardrail posts were bolted or lagged to the rim and side joists with no regard for reinforcement.

To get up to date, I talked with the local building department and studied its literature — though no permit was required because the decks would be less than 30 inches high. I crunched through Simpson Strong-Tie's C-2009 connector catalog and its *Deck Framing Connection Guide*. I read books and magazine articles and watched a video.

But there's no substitute for on-the-job retraining. For the new deck, I used pressure-treated framing lumber, of course, and installed composite decking and western red cedar guardrails. The refurbished deck got the same decking and guardrails plus some extra joists to support them. Nothing exotic here, but careful attention to detail would help make the decks pop. That was important because the deck side of the house serves as its informal main entrance. The bottom line? The customers are happy, and I'm anxious to build on my experience. Here are some of the things I learned.

### Beware of 2x6 Joists

The original decks were framed with 2x6 joists, and I saw no reason for change. That size would handle the spans, and I could salvage some blocking from the joists I removed.

Too late I learned that 2x6 deck joists make it more complicated to meet the IRC requirement that guardrails be able to resist a concentrated lateral load of 200 pounds, which is accomplished by securely anchoring each guardrail post to at least one inboard joist. That seems to be true even if you use the latest guardrail-post connectors from Simpson Strong-Tie (800/999-5099, strongtie.com) or USP (800/328-5934, uspconnectors.com). As David Finkenbinder, branch design engineer for Simpson Strong-Tie, says, "Prescriptive solutions are not currently available to builders for anchoring guardrail posts to 2x6 joists, primarily due to the large forces that develop when attaching a guardrail post to a 2x6."

If I had used 2x8 or larger joists instead, I could have, for example, pulled a solution right out of the *Prescriptive Residential Wood Deck Construction Guide: Based on the 2009 International Residential Code,* which is a free download from the American Wood Council at awc.org. But the

guide doesn't even mention 2x6s in its joist-span tables.

Stuck with my 2x6 quandary and no time to lose, I spaced the guardrail posts close (no more than 52½ inches apart) and installed Simpson Strong-Tie's DTT2Z railing-post connectors, centering the bolt-holes the minimum allowable 1¾ inches below the joist tops to limit the tension load (**Figure 1**). My guardrails might not withstand a wrecking ball, but they're far stronger than the ones I replaced (which included posts that were toe-nailed to the decking). And if I'm correctly interpreting the authoritative article "Strong Rail-Post Connections for Wooden Decks," in the February 2005 issue of *JLC* (jlconline.com), they're stronger than they would have been had I anchored the posts with any traditional combination of bolts and blocking.

**Figure 1. Simpson Strong-Tie's DTT2Z connectors anchor the guardrail posts to 2x6 joists, but deeper joists would have made the guardrails even stronger.**

**Figure 2. The guardrail posts anchor to the outside of the rim joists, so only one course of decking had to be notched at the rims. Installing the decking from the rim toward the house placed a full-width board above the rim for easy notching and attachment.**

**Figure 3. EverGrain deck boards must be spaced at least 1/8 inch apart from side to side, but this larger, 7/32-inch gap is less likely to clog with debris. GRK's star bit drove more than 1,000 Kameleon composite-deck screws with no cam-out.**

## Composite Thinking

Having lived with redwood decking for years, the homeowners chose to switch to 1x6 EverGrain composite decking (Tamko Building Products; 800/253-1401, evergrain.com) so the deck would require less maintenance — aware that they still would have to clean it regularly. They settled on the cedar color from the Classic Collection, hoping the light hue would help prevent summer overheating.

I installed the decking working from the rim joists toward the house to ensure that I would have full-width boards above the rims for easy notching and fastening and good looks (**Figure 2**). I found no drawbacks to this approach and will repeat it next time.

Like many of its competitors, EverGrain recommends a minimum side-to-side spacing of 1/8 inch. I could imagine 1/8-inch gaps quickly filling with dog hair and dirt, so I called EverGrain's technical services department about it. I happened to connect to someone who had installed the decking on his own house with the boards spaced 1/8 inch apart and has regretted it ever since because the gaps clog and are hard to clean. So I spaced the boards using nominal 1/4-inch plywood spacers for consistency (**Figure 3**). I rounded the ends of the boards up top with a trim router for a finishing touch.

The EverGrain installation manual warns that composite decking feels more flexible than wood, mainly

during summer heat. For a more rigid feel, it suggests reducing the maximum recommended joist spacing by 4 inches. Well, my 2x6 joists are spaced the maximum recommended 16 inches on-center on the new deck and 12 inches on-center on the refurbished one. Although the joists span about 6 inches farther on the former than on the latter and add a cantilever, this still sets up an easy, if unscientific, comparison.

Maybe this summer we'll wish all the joists were spaced 12 inches on center, but as I write this it's 54° at the site and Joe — a tough customer who weighs 215 pounds — just reported that he doesn't feel "any spring at all" when walking on either deck and can feel just a slight difference between the two decks when he jumps up and down.

### It Pays To Be Picky

Although this project was built on a modest budget, I treated the western red cedar guardrails as outdoor furniture. With that mind-set, I sanded all the parts before assembly and used type 305 stainless steel screws throughout because they'll be virtually immune to corrosion and won't cause ugly black streaks on the cedar, the way galvanized fasteners tend to. Maybe that's overkill, but my customers are calling the finished product "breathtaking" and, trust me, will take great pains to maintain the finish. In fact, they applied oil-based Superdeck "Century Redwood" exterior transparent stain and sealer (Duckback Products; 800/825-5382, superdeck.com) to the parts as fast as I installed them to prevent the intermittent raindrops from touching bare wood.

I even took extra pains at the lumberyard, which let me hand-pick my guardrail stock and 20-foot rim joist (**Figure 4**). That burned a couple of hours, but it turned out to be a key step because the quality of the western red cedar was wildly inconsistent from one stack to the next. For instance, I needed several 10-foot-long 2x6s, but the 10-footers were gnarled. The 20-footers stacked nearby were pristine, which solved the problem.

Figure 4. Hand-picking western red cedar at the lumberyard made it possible to build a furniture-grade guardrail.

### Lucky Stars

Square-drive screws were invented in 1908 to prevent cam-out (that is, to prevent driver bits from twisting out of screw sockets), which can damage screws, driver bits, and workpieces. That's why I started using them about 25 years ago and planned to use them this time for everything from securing blocking and rim joists to assembling the guardrails. My stainless steel screws were unhardened, so I would drill pilot holes to prevent breakage and make the job easier.

After driving about 200 screws for the blocking and the rim joists, I knew I needed a new plan for the guardrails. Despite the square drive, I surprisingly had to lean hard on my cordless driver in an exhausting and futile attempt to prevent cam-out. I wore out a few driver bits and tore up a bunch of screw sockets, leaving sharp burrs on the screw heads (**Figure 5**). No problem under the deck, but what about on top of the guardrail cap, where the deformed heads would look bad and inevitably draw blood?

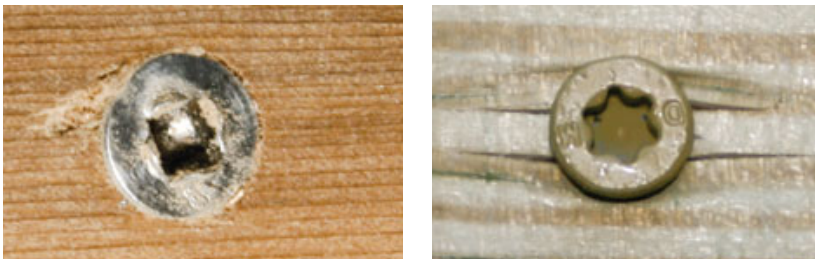

**Figure 5. Square-drive, stainless-steel screws were a chore to drive because the driver bits constantly cammed out, which trashed bits and left sharp burrs on the screw heads (left). Star-drive screws didn't have that problem (right).**

Luckily, my next step was to install the composite decking using GRK's star-drive Kameleon screws, which I drove with GRK's T20 star bit (800/263-0463, grkfasteners.com). Although GRK's drive system doesn't carry the Torx trademark, it mimics the Torx drive system invented in 1965 for the auto industry. Like the square drive, the Torx drive is designed to prevent cam-out.

I drove all 1,028 case-hardened, polymer-coated Kameleon screws using a single star bit, with zero cam-out. That inspired me to try star-drive, stainless steel screws for the guardrails, which required a T25 star bit. The result: One bit, zero cam-out, and no sharp burrs to worry about. Consider me converted.

By the way, before using GRK's T20 bit to drive the Kameleon screws, I tried a T20 star bit from another manufacturer. I had to force that bit into the screw sockets, while the GRK bit fit perfectly. The lesson? Unless I'm using authentic Torx screws and bits, which are made to tight specifications by licensed manufacturers, I won't assume compatibility between different manufacturers.

### Guardrail Posts Out, Rails In

In the past, guardrail posts were frequently notched at the bottoms, but those notches can eventually cause cracks that weaken the posts. Conscientious builders no longer do it.

Posts are often attached to the inside face of the rim and side joists. That way, you can use single posts at the corners and shim posts inconspicuously into perfect alignment. It's also the only way to accommodate the post sleeves included with many synthetic guardrail systems. However, it normally forces you to notch two courses of decking above the rim to fit around the posts.

On this job, I installed my posts on the outside because I like that look. It moved the guardrail 5 inches out, which added 26 square feet to the decks; another benefit to this approach was that I had to notch only one deck board above the rims. The trade-off was that I had to install double posts at the corners, and I couldn't shim to my heart's content, because the shims would be in plain sight.

To limit the need for shims on the new deck, I used a layout square to guide my wormdrive saw when cutting the cantilevered joists to length. As a result, the rim joist is almost perfectly plumb and so are my guardrail posts. I had to use some shims on the refurbished deck, but that deck is attached to the far end of the house and is accessible only from inside, so they'll rarely be seen.

On most of the basic wood guardrails I see, the 2-by top and bottom rails are cut to fit between the posts. I wonder why. Granted, if you use a 2x6 rail cap, the infill approach gives you wider overhangs along the cap's edges that are more forgiving if your guardrail posts don't quite line up.

On the downside, the rails demand a lot of extra cutting and fitting, are harder to fasten to the posts, and introduce more end grain that can soak up and retain water. I recently repaired an old coastal fence that was

## Symmetry Wins

Guardrail-post connectors such as I used on this deck can make it challenging to space posts evenly. Instead of uniform post spacing, I focused on a symmetrical layout. From either end, the next post is 48 inches in. The two center spaces, however, are 50½ inches. That meant if I maintained a consistent baluster spacing, the gaps on the opposite sides of the second post from each end would be unequal (photo, left). In the end, however, everything looks fine, because of the overall symmetry (photo, below). Next time I won't worry about it.

built that way, and almost every rail was severely rotten at the ends.

Instead, I simply screwed my 2x4 top and bottom rails to the deck side of the posts. It's faster and probably stronger, it looks just as good, and I have yet to discover any drawbacks.

### Butts Versus Miters

With double guardrail posts rather than single ones in the corners, I had the easy option of butting rather than mitering the 2x6 rail caps (**Figure 6**). Miters hide the end grain and can look great when you first install them, but they almost always open up unevenly later, at least in softwoods (see *Question & Answer*, page 16). Using a biscuit joiner to reinforce the joints might help, but I wonder if that might eventually cause stress cracks. Butt joints will also move, but any gaps will be uniform and therefore less noticeable.

**Figure 6. Unlike single corner posts, double corner posts make it easy to butt rather than miter your guardrail caps at the corners. Miter joints can look great at first, but butt joints can look clean and sturdy and tend to age more gracefully than miters do.**

Although the customer and I worried that butt joints might look boring, we decided to take the plunge. To refine their appearance, I rounded over the butt ends up top and used no screws beyond the corner posts. The joints haven't seen their first summer yet, but so far, so good.

One caveat about double corner posts. If you space them apart as I did, be prepared to adjust a post up or down slightly to make ends meet. Some carpenters place double corner posts as close together as possible, which can help, but that looks crowded to me.

**Figure 7. These short stairs don't require guardrails or a handrail, but two stainless-steel grab bars were quickly installed to provide a stylish assist.**

### A Gripping Tale

My stairs have just two risers, so they technically don't need guardrails or a handrail. In fact, with stairs that short, guardrails can be an awkward detail. These stairs, however, will sometimes be used by a woman with Down syndrome, and they can also get icy in winter, so my customers hoped for an elegant alternative. It turned out that one of their neighbors is a commercial contractor, and he happened to have a couple of leftover stainless-steel grab bars on hand. Voilà! I screwed one to each side of the stair opening with stainless steel screws (**Figure 7**), and my customers are happy. ❖

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