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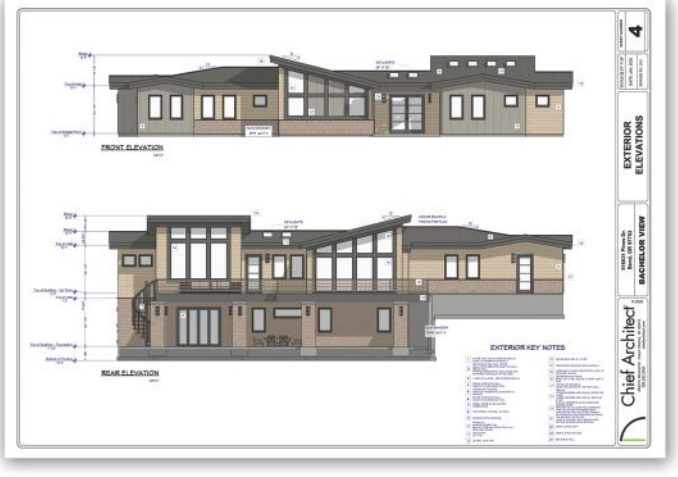

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Under Deck Upgrades

How to Optimize the Space Beneath a Deck

Outdoor living space and ample storage are two of the most sought-after amenities by homeowners and prospective homebuyers. In both cases, the space beneath an elevated deck can offer an ideal solution, provided you can keep it dry. With the addition of an under-deck drainage system, this space can be kept dry and become usable for a multitude of purposes and activities.

PROTECTION FROM THE ELEMENTS

Using a network of troughs and downspouts, a deck drainage system captures and diverts water away from a deck to protect the substructure from moisture damage and create dry, usable space underneath. But it's important to keep in mind that not all drainage systems are created equal.

Above-the-joist systems. For maximum protection and longevity, opt for an 'above-the-joist' system with poly or rubberized membranes that drape over the joists to ensure that the joists and beams of the substructure are shielded from moisture penetration. This type of system also helps to hold screws in place longer and acts as a shield between galvanized metal and wood. Compared with metal, vinyl or PVC, a poly or rubberized membrane accommodates a broader range of ceiling options for homeowners seeking a finished aesthetic.

Below the joist systems. Systems that install below the joists leave wood and metal exposed to the elements and more susceptible to water damage and corrosion. This type of system can trap moisture in the core supports of the substructure, especially if there is a ceiling beneath the deck. In warmer months, rising temperatures 'cook' the trapped, wet wood and accelerate rotting. Over time, this combination of moisture, heat and lack of ventilation can create a potentially dangerous formula for deterioration.

LIMITLESS POSSIBILITIES

Once protected, the dry space beneath a two-story deck can be used like any room inside a house. Homeowners can add electricity, water and gas lines, as well as furniture, lighting, ceiling fans and entertainment components, depending on how they plan to use their new-found space.

For homeowners who like to entertain, suggest adding a fully appointed outdoor kitchen or bar area. For those who prefer an open air retreat, create a cozy patio with plush seating situated around a fire table, or perhaps build a luxurious warming hut around a hot tub. For enhanced comfort, add screens to keep out unwanted critters without shutting out the scenery.

Another popular way to use the space beneath a deck is for storage. Ideal for stowing everything from lawn and garden equipment, pool supplies and off-season patio furniture to bicycles, boats and ATVs, this area can eliminate the need for a freestanding shed and keep the garage from becoming overcrowded.

The possibilities are limitless, and the installation is simple. Trex RainEscape, for instance, is a high quality, affordable, above-the-joist deck drainage system that can be installed using just a stapler, utility knife and caulk. Each trough is clearly labeled with staple markers to expedite the installation process. And, the system is backed by a 20-year warranty.

For more information about under-deck drainage, visit www.trexrainescape.com.

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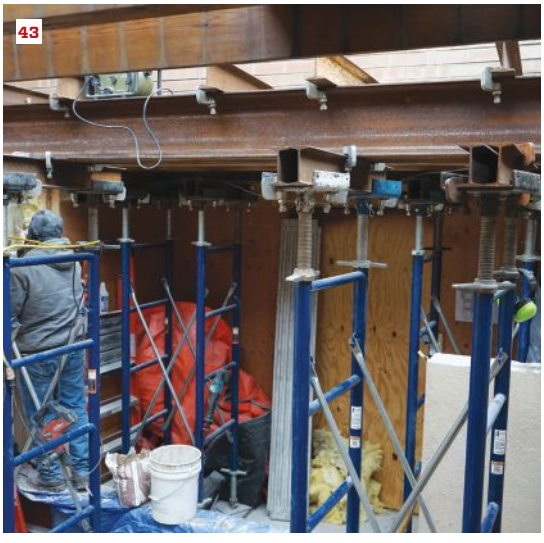

On the cover: Tom O'Brien, of Milford, Conn., uses borate-based wood preservatives and epoxy in this restoration of Italianate trim details that rotted away. See the story on page 19. Photo by Tom O'Brien.

FEATURES

DEPARTMENTS

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Chief Editor, JLC Group Clayton DeKorne, cdekorne@hanleywood.com
Executive Editor, JLC Group Andrew Wormer, awormer@hanleywood.com
Senior Design Director Tina Tabibi, ttabibi@hanleywood.com
Managing Editor Laurie Elden, lelden@hanleywood.com
Senior Editors Ted Cushman, tcushman@hanleywood.com;
Tim Healey, thealey@hanleywood.com;
Roe Osborn, rosborn@hanleywood.com
Assistant Editor, Products Symone Garvett, sgarvett@hanleywood.com
Freelance Designer Melissa Krochmal, mkrochmal@hanleywood.com
Contributing Editors Mark Clement, David Frane, Dave Holbrook, Tom Meehan, Matt Risinger, Emanuel Silva, Gary Striegler, Tim Uhler

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Editorial & Advertising Offices:
The Journal of Light Construction,
Hanley Wood LLC
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INFORMATION DIRECTORY

CONTACT INFORMATION

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JLC
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SALES OFFICES

HEADQUARTERS

Ron Spink
Executive Vice President, Build / Design Group
202.736.3431
rspink@hanleywood.com

Dan Colunio
Vice President, Sales, Remodeling & Distribution Groups
617.304.7297
dcolunio@hanleywood.com

EAST / SOUTH

Paul Pettersen
Strategic Account Director
516.252.8020
ppettersen@hanleywood.com

MIDWEST / SOUTH CENTRAL

Kay Ross-Baker
Strategic Account Manager
773.824.2576
krossbaker@hanleywood.com

WEST COAST

Carol Weinman
Senior Strategic Account Director
831.373.6125
cweinman@hanleywood.com

CANADA

John Magner
York Media Services
416.598.0101
jmagner@yorkmedia.net

NEW BUSINESS

Phil Hernandez
Vice President, Sales Administration and Emerging Accounts
202.736.3381
phernandez@hanleywood.com

Life During Pandemic

Readers picking up last month's issue of *JLC* may have been surprised to see not a single word about the coronavirus outbreak. When the hammer fell in early March—presaged for many of us by the cancellation of JLC Live, and thereafter consuming every minute of our lives at work and home—the April issue had already gone to press. What we have witnessed after that has been without a doubt the biggest event of our careers: The complete disruption of our world, as loved ones have fallen and our industry, our nation's economy, and our everyday life has been transformed. As I write this, we are all staring into a completely blank future. No one knows when this pandemic will subside. There are glimmers of the virus's rage receding in a few places, but no predictable sense of when life will return to "normal" and business will re-emerge. All this unknown means you're not going to see much mention of the pandemic, and how it has indelibly altered our world, in this issue either. Anything we can report now will likely be obsolete by the time this gets to you.

We have moved to JLConline.com to make sense of this pandemic. Namely, we have stood up the "Coronavirus Construction Tracker" as a way to keep tabs on which readers are affected by the closing of nonessential businesses and to help navigate whether or not construction has been deemed "essential" and therefore exempt from stay-at-home mandates issued at city, county, and state levels. This work has been coupled by a weekly webcast, in partnership with our sister publication BUILDER, in which we have provided ongoing analysis of what is happening for construction business owners and brought in a host of industry leaders to make sense of emerging new workflows to keep workers and clients safe; manage crushing economic blows; guide you through a labyrinth of help (namely from the Small Business Administration's stimulus programs), and begin to crystal ball how business owners will have to reinvent themselves and reposition their finances, personnel, trade relationships, selling options, and every other aspect of building and remodeling homes.

Another important JLConline asset is the "Builder's Guide to COVID-19," where we collect and regularly update what we are learning about the rapid changes and insights gleaned from the *JLC* network of readers and contributors. Editors Ted Cushman, Vincent Salandro, and Andrew Wormer have led this reporting effort, bringing to light information as it evolves on how your fellow business owners and trade workers are learning to work safely, get jobs inspected, work remotely with designers and clients, and scrape together new work to keep their businesses solvent ... if they are allowed to work. Many readers are holed up with their families, making the best of it, meeting up online, and boning up on what they need to learn for that time to come when they can get back to work. It's towards this latter effort that this issue, those to come, and the deep well of information in the *JLC* archive will serve you best. We have made the archive of past articles online available free of charge (though you will still have to register if you haven't already). We hope the information you find here and online is helpful. The time will come when this deep well of knowledge will be relevant to everyday life again. We can't say when that will be, but it will come.

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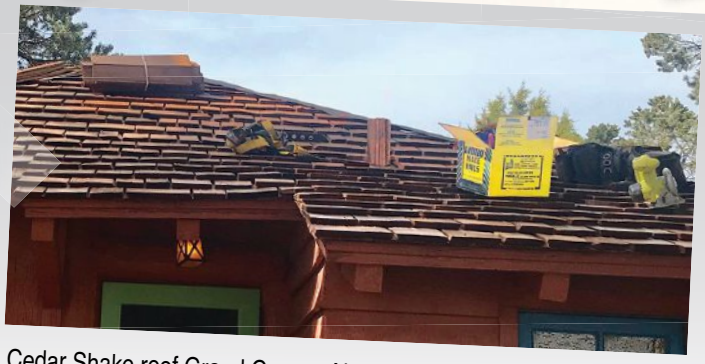

Cedar Shake roof Grand Canyon National Park, circa 2018

Redwood fencing, circa 1998

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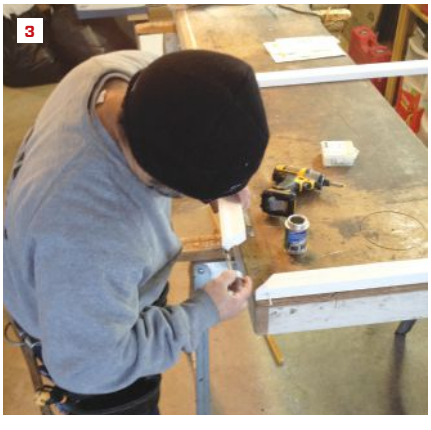
BY EMANUEL SILVA

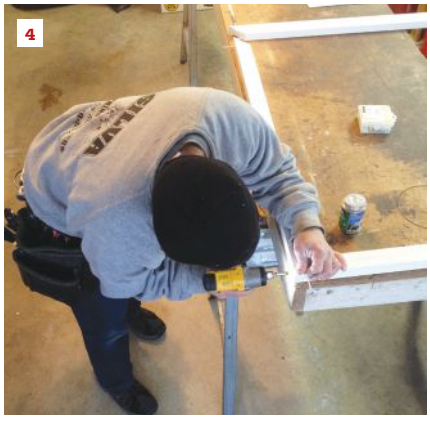
Durable Exterior Window Trim

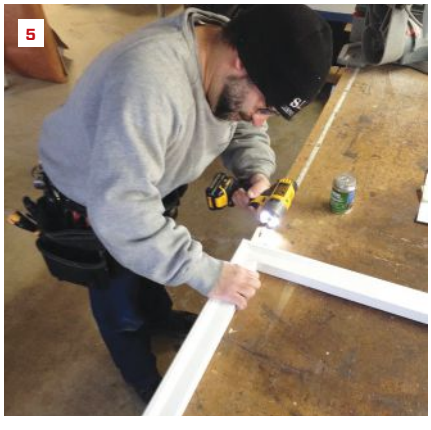
When most folks hear the term window trim, they think of beautiful interior casing and sill details around a living-room window. While the interior trim is traditionally a place to showcase finish carpentry, most windows also have trim on the outside, which plays a part in defending the windows and the home against the elements. So proper execution and installation of exterior window trim is probably more important than that of the flashier interior trim and is something just about every house carpenter will be asked to do on a regular basis.

Trim material. Wood was typically used as exterior trim on houses for centuries, but wood trim demands regular care to keep it protected from exposure to the elements. In the last couple of decades, synthetic materials have taken over as a more durable choice for exterior trim, and I have switched over to these materials almost entirely. Synthetic trim materials come as flat stock or in conventional stock profiles. For the trim in the photos, I used standard PVC brickmold for the jamb and head casing. I fabricated my own sills from PVC flat stock (see "Windowsill Retrofit," Apr/20).

Before the window goes in, the author takes accurate measurements of the height and width **(1)**. He includes a 3/8-inch gap on the sides of the window and a 1/2-inch gap at the top of the window when calculating the overall size of the window trim. He begins by cutting the bottoms of the jamb casings to the angle of the sill, or about 14 degrees **(2)**.







For longevity, the author uses synthetic trim material for his exterior window trim kits. For this window, he opted for standard brickmold in PVC. When all the pieces for the trim kit have been cut, he applies PVC cement to the first mitered corner **(3)** and screws the joint together from both directions **(4)**. He repeats the process, gluing and screwing the opposite miter **(5)**.

Photos by John Simmons

To attach the sill to the trim kit, the author first predrills holes on each side of the sill for the attachment screws **(6)**. Then he applies PVC cement to both the top of the sill and the end of the jamb casing on the first side **(7)** and drives stainless steel screws to secure the joint **(8)**. On the other end of the sill, he glues both surfaces and screws that joint together as well **(9)**. Before taking the assembled trim kit to the window for installation, the author drills and partially drives Cortex screws around the perimeter of the trim **(10)**.

Measuring and cutting. It's possible to install window trim in place one piece at a time, but it's quicker and more efficient if you preassemble the trim as a picture frame that is installed in one piece—what I call a trim kit—and the result looks much better. Before installing and flashing the window correctly in its opening (see "Retrofitting New Windows," Apr/15), I take accurate measurements of the window width and height **(1)**. For the inside dimensions of the trim kit, I add 3/4 inch to the width of the window (for a 3/8-inch gap on either side) and 1/2 inch to the height, which keeps the sill snug to the underside of the window and makes room on top to adjust the trim kit for level during installation. The width of the brickmold is 2 inches, so I add 4 3/4 inches to the width of the window to find the overall width of the trim kit. For the overall height of the trim above the sill, I add 2 1/2 inches to the window height.

I typically make the sill about 1/2 inch deeper than the side trim. The brickmold I used here was 1 1/4 inches deep, so for these windows I ripped my sill stock (at a 3/12 slope, or 14-degree angle) to 1 3/4 inches wide. Armed with the measurements, I begin by cutting the bottoms of the jamb pieces to the windowsill angle **(2)**. The top corners of the kit are mitered, so I cut the two jamb pieces (with the angled bottoms) to the overall height measurement—the long point of the sill angle to the long point of the miter. Next, I miter both ends of the head trim, cutting that piece to the overall width of the kit (long point to long point). Finally, I cut my sill stock to that same length.

Assemble the kit. I used PVC material for these windows, so all the joints could be chemically welded together with PVC cement. To assemble the kit, I first apply PVC cement to the mating sides of one set of miters **(3)**. I then join the corners together and drive a screw in from each direction to secure the miter joint **(4)**. I repeat the process for the opposite mitered corner **(5)**.

When I'm finished assembling both upper corners of the kit, I predrill holes through the bottom face of the sill **(6)** and apply cement to the bottom end of the jamb piece on one side, as well as to the upper face of the sill where the jamb will land **(7)**. After mating the faces together, I drive the screws through the bottom of the sill and into the end of the jamb trim to secure that side **(8)**. After

On site, the author caulks the back of the trim **(11)**, then centers it on the window and levels it **(12)**. After driving the screws **(13)**, he makes sure the trim is flat **(14)**. He then drives Cortex plugs to fill the screw holes **(15)** and flashes the trim **(16)**.

completing the process on the opposite side **(9)**, the kit is complete and ready to install. Before taking the kit to the window for a test fit, I predrill and insert screws along the kit's outer perimeter **(10)**. I used the Cortex screw and plug system for these windows.

Installation. When I'm ready to install the kit, I apply a bead of caulking to the back surface of all the molding pieces in the kit **(11)**. I press the kit into place around the window, centering it side to side. I slip a couple of spacers between the flashing over the window and the head casing to hold it in place at the proper height. After setting a level on the head jamb, I adjust it if need be **(12)** and sink the screws one at a time **(13)**. I take care not to overdrive the screws, using a level as straightedge along each length to check that it's perfectly straight, flat, and not distorted by the fasteners **(14)**. I can back out or tighten the screws in any area that needs adjusting.

When I'm happy with how the trim fits, I tap the Cortex filler plugs into the screw holes **(15)**. I finish the installation with a length of aluminum drip cap over the trim, and then apply self-adhering flashing tape over the vertical leg of the cap **(16)**. The WRB folds down over the flashing and I'm ready to install the siding.

Emanuel Silva, a JLC contributing editor, owns Silva Lightning Builders in North Andover, Mass. Follow him on Instagram: @emanuel.a.silva1996.

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Q On a current kitchen remodel, the sink has an S-trap instead of a P-trap, which my plumber says does not meet code. Why is an S-trap bad, and what's the best way to retrofit a P-trap?

A John Smith, a licensed plumber in Harwich, Mass., responds: Your plumber is correct in his assessment. In simplest terms, an S-trap is shaped like an "S" and a P-trap is shaped like the letter "P" if both are lying on their side (see S-Traps Vs. P-Traps, below). With an S-trap, the drainpipe drops down from the sink and into a conventional trap. It then loops over and exits downward. In a P-trap configuration, the drain also comes down from the sink and into the trap, but instead of looping over and back down, the drain enters a horizontal run before exiting downward.

Before discussing the drawbacks to an S-trap, we first need to understand how sink traps operate. A plumbing trap is supposed to stay full of water to seal the pipe and block sewer gases from escaping through the drain. The trap (and drain) can't work properly without a properly installed vent in the system (see "Plumbing Vents Explained," Jun/99). A vent allows air to move freely in the system, which in turn allows the trap to maintain that water seal. As water flows from the sink into the drain, air is pushed out of the pipe via the vent. When the sink is empty, water flows back into the trap from the pipe and air is sucked back in through the vent, equalizing the pressure to keep the trap full of water.

The horizontal run of a P-trap allows water to drain and air to move in the pipe to maintain the trap seal. But an S-trap loops back down with no way for air to get into the pipe. If enough water (say a sinkful) drains through an S-trap, a siphon can be created that sucks water out of the trap, leaving it partially open and unable to seal out sewer gases. Another potential problem is that when draining, other plumbing units can cause a vacuum that will suck the water out of an S-trap.

Have your plumber remove the S-trap and install a P-trap that exits through the back of the cabinet and into the wall. He can then either tie into an existing vent or run a new vent up through a stud bay and through the roof. If rerouting the drain isn't feasible, you may be allowed to install an air admittance valve. Check to make sure that these devices are allowed in your local jurisdiction.

S-Traps Vs. P-Traps

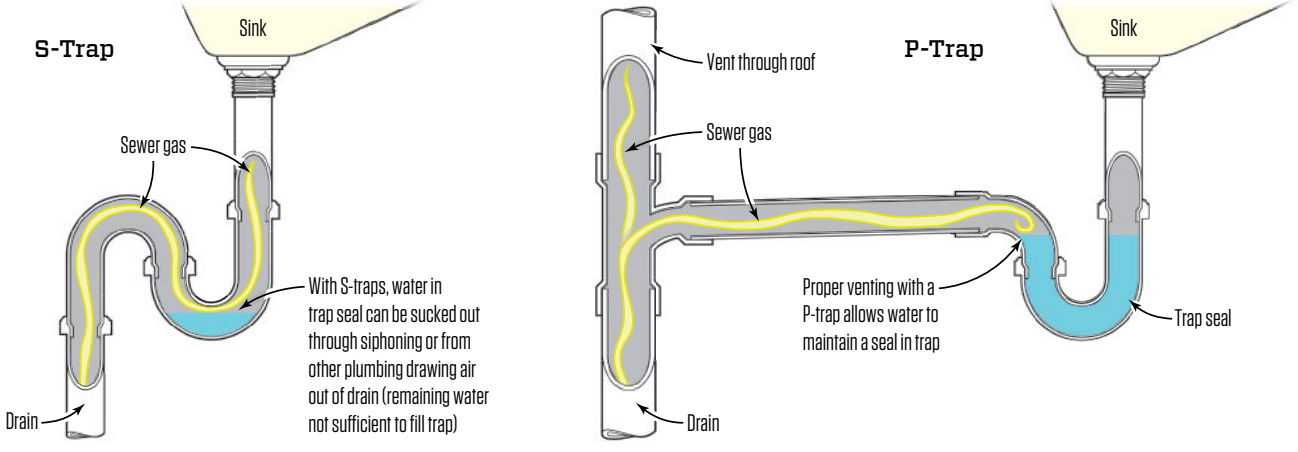

Illustration by Tim Healey

The water in a plumbing trap creates a seal to keep out sewer gases. S-traps are not allowed because they can create a siphon that leaves that seal partially open. A P-trap works with a vent to equalize air pressure and allow the trap to remain full of water.

Q What is the correct way to paint the mitered corners of window casing to avoid brush marks?

A Scott Burt, owner of TopCoat Finishes in Jericho, Vt., and a presenter at JLC Live, responds: Generally speaking, when painting window or door casings (mitered or butt jointed), it is best to work from the top of the window down and to always brush with the grain or in the direction of the wood.

Painting corners of trim is a game of avoiding the look of the brush marks crossing over the joint. In either case (miter or butt), you can begin by brushing through the joint in one direction or the other. Then go back and "point and pull" brush strokes from where you crossed through. With butt joints, it's easy to go back and brush straight out from the joint line.

A mitered joint where the wood ends in a point is a little trickier. Here, you point, or lightly press, the wet brush bristles onto the surface so that they extend into the point of the miter (see photos, right). Then you pull the brush back horizontally for the head casing and vertically for the side casing. As with any fine finish skill, the technique of pointing and pulling takes a bit of practice to master.

One thing to keep in mind when painting trim is that all the brush strokes have to happen while the paint is good and wet—as in, immediately. If the paint starts to dry before your final brushing, the areas where you've crossed over the joint will flash (change luster and stand out from the rest of the finish). This is a particular risk with the new generation of latex and waterborne trim paints—they tack up quickly. You can use a product such as Floetrol that keeps trim paint wet longer for brushing out.

All of this points to having a good eye, the right brush (size and style), and the ability to lay the paint out properly and leave it. Overbrushing is one of the most common mistakes people make when painting trim.

Photos by Scott Burt

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Exterior Molding Repairs That Last

BY TOM O'BRIEN

Exterior trim elements are what make a "house" a "home." Rip the ornate porch and corbeled soffit off of a classic New Orleans Shotgun, for example, and what you're left with might as well be a trailer. Giving these beautiful, vulnerable pieces the fortitude to stand up to the constant onslaught of nature is labor intensive and requires occasional maintenance. But experience has taught me that if you do it right the first time, they will enjoy a long and happy life.

As a case in point, I was recently asked to repair a handrail on the front porch of a 19th century Italianate home in our town's central historic district **(1)**. A unique feature of this rail was how it wrapped around the porch column, rather than simply butting up to it. Although the design was beautiful, the manner in which it was assembled had left it vulnerable to moisture intrusion; the joint where the rail sections attached to the column was obviously problematic, but it wasn't until I excavated the damage that I discovered that the bullnose edges were separate pieces, nailed and glued on. With all of those vertical joints solely dependent on caulk or glue to shed water, it's no surprise that rot eventually found a foothold **(2)**.

Fortunately in this instance, the rot was limited to the area immediately surrounding one of the columns. In consultation with the homeowner, we decided to make the necessary repairs as durable as possible and come up with a plan to inspect the remaining porch parts on a regular basis to prevent further damage.

After digging out all the loose, punky decay using a painter's 5-in-1 and a scratch awl, we determined that two mitered rail sections that formed an outside corner and two short lengths of bullnose on the opposite corner would have to be replaced **(3, 4)**. The other soft spots we found were prime candidates for epoxy repair. After we excavated all the rot and cleaned it out using compressed air, we tented the column with plastic sheeting and left it to dry for a week or so.

In the meantime, I went about replicating the molding profiles and pretreating them to prevent moisture intrusion and rot.

I don't have a woodworking shop, but whenever I've needed a short length of a molding that's not readily

1

The porch trim on a historic 19th-century Italianate home wraps around the porch column, rather than simply butting up to it. Although beautiful, the design is vulnerable to moisture intrusion, which inevitably led to rot. This prompted the author to use epoxy as part of a long-term solution.

Photos by Tom O'Brien


2


3


4

New England's volatile climate took its toll on this porch trim **(2)**. A few severely damaged pieces had to be replaced **(3)**. But those with minor deterioration, such as this column **(4)**, which would have been prohibitively expensive to replace, could be stabilized with borate-based wood preservatives and repaired with epoxy.


5

6

The author cut replacement moldings to size on a table saw, then primed them on their reverse sides **(5)**. As soon as the primer was dry, he immersed the end grain in a borate solution to prevent rot formation **(6)**.

Before the miters are assembled, the author drills a hole and inserts a Bor8Rod that will provide an extra measure of insurance against rot **(7)**.

Marine epoxy adhesive ensures that miter joints that are exposed to the elements won't separate **(8)**.

With two coats of paint and an annual inspection, this repair should last indefinitely **(9)**.

available from a supplier, I've always been able to get there by some combination of portable planer, table saw, router bits, and profile sander. For this project, it turned out that the bullnose was exactly the same shape as a $1^{5}/_{16}$-inch closet pole, so all I needed was a table saw **(5)**.

After I shaped and rough-cut all of the pieces to length, I treated all surfaces that wouldn't be cut or glued with a coat of fast-drying primer. Then, I dipped the end grain of each into a borate solution (Wood Care Systems; ewoodcare.com) that soaks into the wood and kills rot spores before they have a chance to multiply **(6)**.

Back on the jobsite, the old handrail pieces that we decided to save were given a double shot of borates. First, I sprayed the liquid solution on all of their porous (unpainted) surfaces. Then I drilled a $^{23}/_{64}$-inch hole through the mitered ends and the edges that would be covered by the replacement bullnose, and I inserted a $^{1}/_{3}$-inch-by-1-inch Bor8Rod into each hole **(7)**. This crystalline tube of boric acid, which is available in a variety of sizes, serves like a time-release capsule that stays dormant unless it gets wet, whereupon it dissolves and kills any rot spores that attempt to gain a foothold.

The installation process was straightforward carpentry work, although slightly messier and more time-sensitive because I used epoxy to repair the minor rot damage and assemble the joints, all at the same time. (For more information about epoxy wood repair, see "Beating Wood Rot," Feb/09).

I began the assembly process by setting up a miter saw on the stoop, cutting all of the pieces to size, then clamping and dry-fitting to ensure that everything would come together smoothly at the same time. Then I donned a pair of latex gloves and mixed up a small container of two-part marine epoxy (West System; westsystem.com). Using a flux brush, I applied the liquid epoxy, as if it were a primer, to the areas in the old trim that had suffered minor rot damage and to the cut edges of the new moldings.

As soon as the wood was saturated with epoxy, I added West System #407 Low-Density Filler to the remaining liquid and stirred enough of it in to create a gap-filling adhesive roughly the consistency of mayonnaise. After spreading a thin layer of this concoction on one side of each joint **(8)**, I assembled the pieces and fastened them with stainless steel air nails. Then I wiped the squeeze-out from each joint and covered the repair with plastic to keep the heat in overnight.

The following day, after I sanded the rough spots, all the railing would require from then on was primer, caulk, paint, and (hopefully) an annual inspection **(9)**.

Tom O'Brien is a freelance writer and carpenter in New Milford, Conn.

Leveling a Bathroom Floor

BY WARREN O'SHEA AND CHRIS HOVIOUS

It is not uncommon for a building more than 100 years old to have floors that are out of level, but to have those floors be out of level more than 2 inches is a challenge to fix. In this particular three-story, three-unit building, the load-bearing center beam had dropped, while the brick exterior perimeter walls had remained in place. The resulting 2-inch-plus drop is evident in all three of the stacked units, each owned separately.

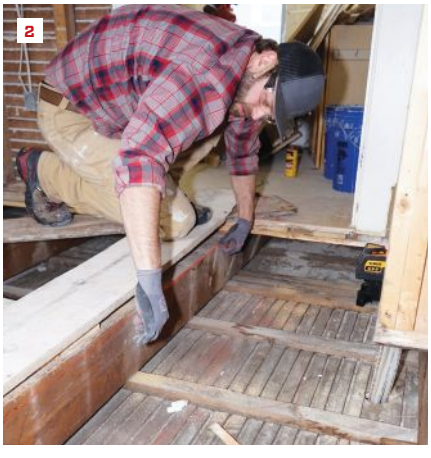
Attempting to jack the center beam in a building this old would likely cause severe and unpredictable consequences. The most benign of these would be that interior doors might not operate and plaster would crack; the worst-case scenario would be brick-wall failure and plumbing breaks. At the same time, there is no guarantee that 100 years of sagging could ever be corrected by jacking.

So we had a 2-inch drop down the center of the building. This might be interesting character in living rooms and bedrooms, but in kitchens and baths, it's a big problem. Tubs, vanities, and toilets need to be placed on a level surface. Imagine what your tub would look like with a 1 1/2-inch taper from left to right. Or envision a furniture-style vanity with more than an inch cut off one side of its legs. People certainly do it, but that doesn't make it right.

In this bathroom remodel project, the floor dropped 2 1/4 inches in 8 feet. To level from the highest point (the exterior wall) would leave a 2 1/4-inch step up at the bathroom door threshold. Sure, this would yield a level floor, but a step that large would create an obvious and unacceptable tripping hazard. Instead, we chose to remove material from the uphill side of the existing joists.

Doing this requires increasing the load capacity of the remaining framing. In our case, we sistered additional support to the existing joists and added new framing between them. Because the renovated bath would have electric radiant heat, extra material was removed to account for the added finish-floor height.

Original structure. The original floor joists were full-dimension 3x8 hemlock. The joists were spaced roughly 32 inches on-center (some were spaced about 31 inches, some about 33 inches).



A level laser line shows 2 inches of wood to be removed at the high end of the joists **(1)**. Chris Hovious snaps a cut line along the laser line **(2)**, screws a ledger guide to the joist **(3)**, and rips the joist level with a long angle cut using a circular saw **(4)**.

Photos by Ted Cushman and Chris Hovious; illustration by Tim Healey

Instead of being supported by wood framing such as a rim or band joist, the floor joists were installed directly into the inner wythe of the exterior brick wall and locked into place with mortar. The joists spanned the entire 20-foot width of the building, supported by one load-bearing center wall.

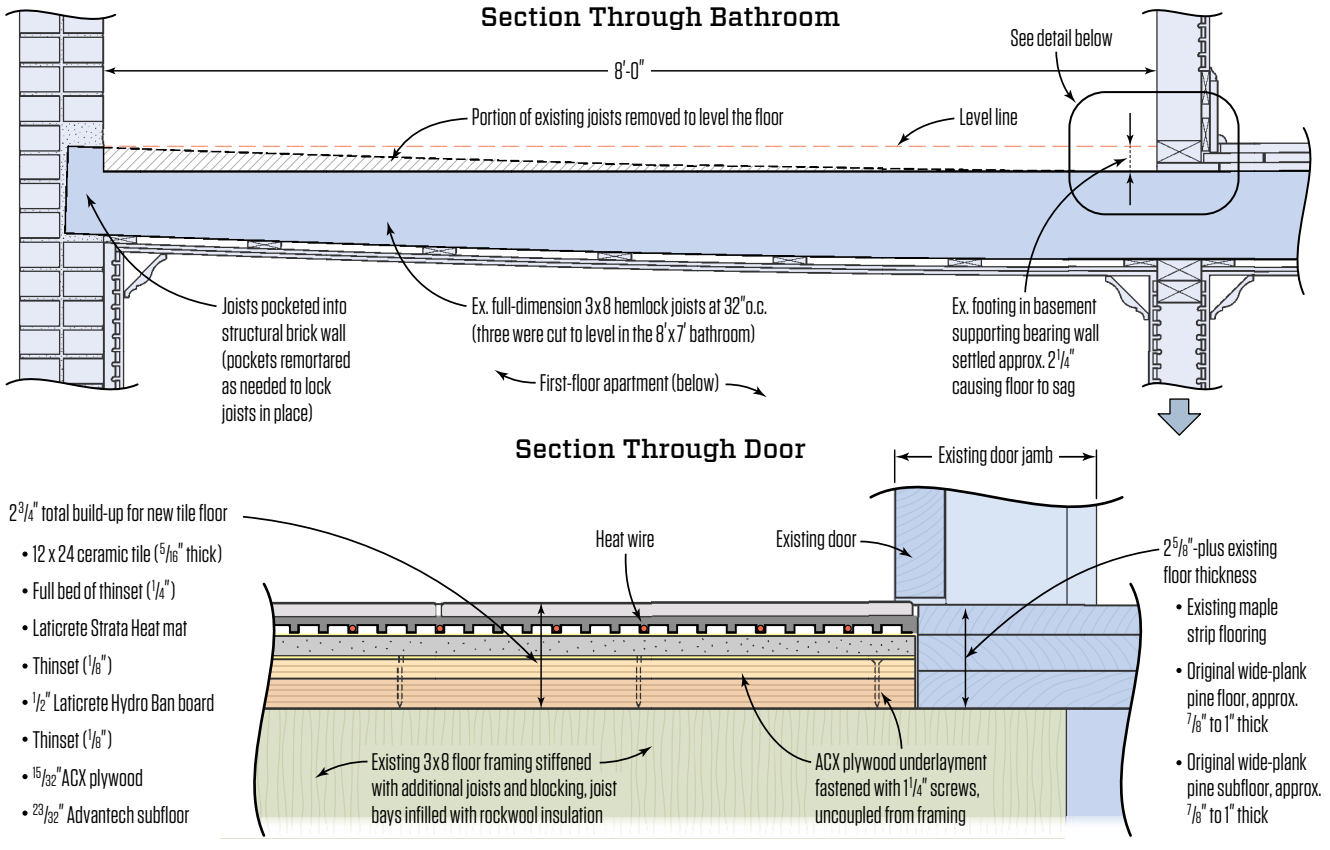
The existing subfloor was 7/8-inch-thick random-width plank flooring, presumably originally 1 inch thick, run perpendicular to the floor joists. The flooring was random-width wide-plank softwood (probably hemlock), also run perpendicular to the joists. Everything was installed with hand-cut nails.

Deflection. At a rough calculation, the original framing had a deflection rating of about L/600—surprisingly stiff. Technically, this would qualify the floor to support ceramic tile, when installed properly. (Natural stone requires L/720 or better, while ceramic tile requires only L/360).

However, just walking on the floor was enough to deter us from installing tile with anything but a taillight warranty: There was significant bounce and movement between the joists. But when we were done ripping down and sistering the joists and reinforcing the floor system with additional joists, its deflection penciled out at roughly L/1000—stiff enough for us to feel comfortable.

Cutting down. Because the joists were so far out of level, we

Leveling a Bathroom Floor



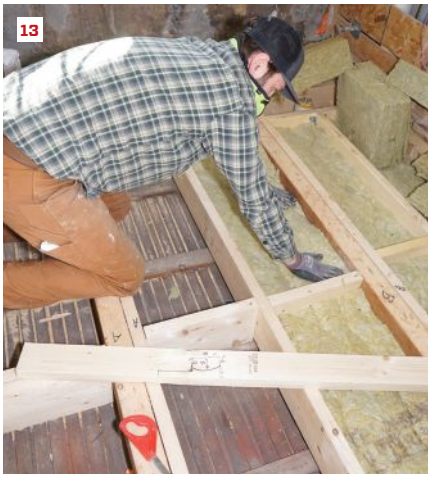
By ripping the joists back instead of packing them up, the authors were able to bring the bathroom's final floor system flush with the existing floor in the adjoining living room. The final buildup, including two layers of subfloor, a layer of Laticrete Hydro Ban board, Laticrete Strata heat mat, thinset mortar, and ceramic tile, came to 2 3/4 inches.

The circular-saw blade did not cut all the way through the 3-inch joist. Here, Warren O'Shea finishes the cut with a recip saw **(5)**. O'Shea applies construction adhesive to a ledger header **(6)** and screws the header to the existing joist **(7)**. Hovious scribes a 2x8 sister along the existing joist **(8)**. Carpenter Mike Raulston attaches the sister **(9)**. Hovious checks the framing for flatness **(10)**.

decided to remove material at the high side and taper down to zero inches, creating a level and flat base to build from. Using a laser level and various beam levels, we found the lowest common point and marked that as zero inches. From there we found level at the far end of each joist, marked and snapped lines, and used jointed lumber as a straightedge and ledger. The ledger was temporarily screwed to the existing joist. We cut as deep as possible with a circular saw, running along the ledger. We finished the cuts with a recip saw, then used a belt sander to fine-tune the cuts.

Rebuilding. Regardless of finish, our typical buildup beneath tile involves minimum 2x8 floor joists, two layers of plywood totaling 1 1/4 inches, and an uncoupling membrane. Cutting down the joists gave us enough room for this typical tile buildup, as well as in-floor electric radiant heat. The finished-floor height at the doorway over the center wall was 2 1/2 inches above the joists. Total buildup will be around 2 3/4 inches (see illustration, page 23).

After cutting down the joists, we remortared the original joists into the brick wall, and then sistered them with 2x8s ripped down to the same taper. We installed blocking and framing to bring our joist spacing to 16 inches on-center or less, screwing headers between the original joists to catch new mid-span joists (for good measure, we glued the headers to the original brick). We added new joists under existing walls for support. We screwed and glued all framing with GRK framing screws, 3 1/8 inches or 2 1/2 inches, and PL Premium urethane construction adhesive and used joist hangers where possible. We added blocking at roughly 32 inches



Hovious cuts Rockwool insulation to fit a cavity **(11)**, splits a batt for thickness **(12)**, and installs a batt into the cavity **(13)**. He applies subfloor adhesive to a reinforced joist **(14)**, slides the AdvanTech subfloor into place **(15)**, and fastens the AdvanTech down to the floor framing with 2 1/2-inch GRK screws **(16)**.

on-center to stiffen the floor and create a unified system.

To improve the efficacy of the in-floor heating, we insulated the voids with R23 and R15 Rockwool insulation. We should achieve roughly R35 below the floor system. (In some places, we had to peel the R15 in half because of the ripped-down joists.) We then installed AdvanTech 3/4-inch subflooring, again using PL Premium urethane construction adhesive and 2 1/2-inch GRK framing screws.

Next, using shorter, 1 1/4-inch screws, we applied 1/2-inch ACX plywood as underlayment over the 3/4-inch subfloor, running the opposite direction. (We did this to provide a layer of uncoupling from the joists. Uncoupling helps to minimize framing movement telegraphing through to the tile and potentially causing failures.)

All plywood was screwed 6 inches on-center in the field and 3 inches on-center around the perimeter. Once both layers of plywood were finished, new walls were framed in as necessary.

Next steps. When the plumbing and electrical rough-in was complete, we moved on to the finish process: first setting the tub, then installing drywall and backerboard, and then finally installing the tile buildup. We first thinset and screwed Laticrete Hydro Ban board to the ACX as a thermal break. Then we embedded the heat mat in thinset mortar. After that, we installed the heat wire and skim-coated with thinset. Finally, once all of that was dry, we installed the tile.

Warren O'Shea runs O'Shea Builders, based in Windham, Maine. Chris Hovious runs Pinewood Concepts, based in Gorham, Maine.

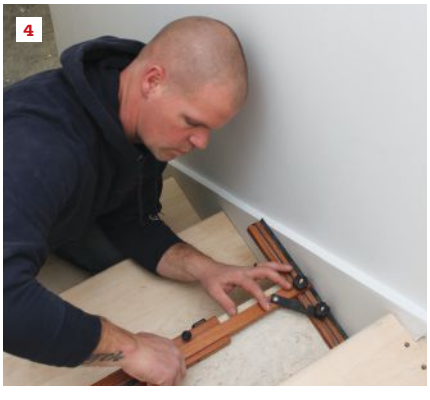
Efficient, Squeak-Free Stairs

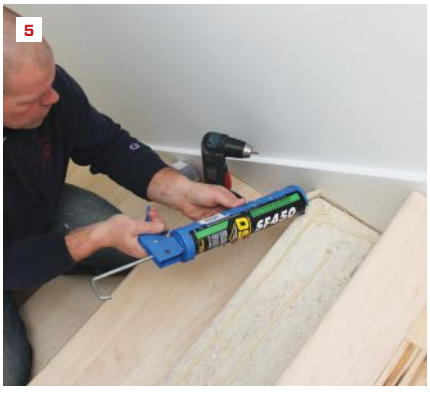
BY JOSH GIRARD

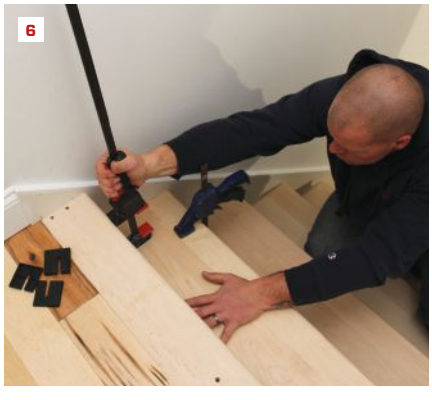
Most of my homes I build on spec—on single lots or in small tracts of land I develop—or I work for other developers. For all these projects, I have to deliver a solid, durable building with appealing finishes that will attract home buyers, and stairs are one of those interior finish details that buyers always notice. It doesn't pay to skimp here, but with my business model, it also doesn't pay to fuss over details, waste any time, or overspend on material; I have to work out efficient production systems and strive towards simple, elegant craftsmanship. With stairs, I have developed a system that provides a clean look and a rock-solid carriage. No squeaks allowed or my reputation dies.

Site-built solution. Arguably the fastest set of stairs would be prefab units, but these can be problematic. We can't install them until the house is dried in, so we have to rely on ladders for the framing phase. Once installed, they must be protected, and wet boot traffic and falling point loads present ongoing risks. Any custom detail, such as having the first step wrap around the wall, is extremely difficult on prefab units, whether you try to preorder this level of detail or retrofit the unit in the field. Instead, we build the carriage at framing to use throughout the build, and then complete it during the finish phase. We typically build our stairs 3 feet 6 inches wide. This is wider than code requires but is more comfortable, and we don't have to worry about a wall-mounted handrail projecting into the walk-line of the stair, which the inspector might flag as a violation.

We cut three stringers from 2x12 SPF. Each stringer that runs along the walls we secure to a 2x4 that runs along the rake of the stairs. This 2x4 creates a space so we can slide drywall and a skirtboard past the ends of the treads and risers—finishing off the stairs without having to scribe skirtboards. The skirts are simply ripped







The author applies gel-foam adhesive on both sides of the 2x4 stringer spacer **(1)**. He uses the same adhesive on the carriage **(2)** to secure subtreads before nailing them off **(3)**. A Stair Wizard proves essential for laying out custom-cut treads between finish stringers **(4)**. Working from the top, he applies construction adhesive to the subtread **(5)**, and then clamps the finish treads **(6)**.

Photos by Tim Healey

to width so the plumb cuts at the top of the stairs match the height of the baseboard used throughout the house.

Stair squeaks can happen with any wood-to-wood contact in the carriage. To eliminate these, all of the framing for the carriage—every wood-to-wood connection—is glued together with the same AdvanTech gel-foam adhesive we use for gluing down subfloor. This includes gluing the 2x4 runner to the studs and gluing the stringer to the 2x4, and gluing down our 3/4-inch AdvanTech subtreads to the rough stringers. We install these subtreads permanently. Yes, these are used throughout construction, but we don't bother tearing them out when we're ready for finish. Instead, we install our finish treads right over them.

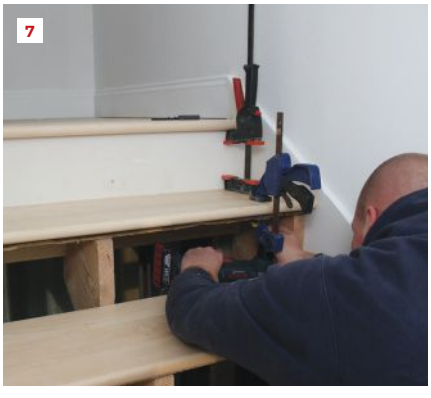
Fast finish. Finish treads and risers butt the skirtboard, which means we have to be dead-on with our end cuts. For this, we rely on the Stair Wizard (from DNB Tools for about $200 on Amazon). This is an adjustable template that has ends that swivel. It's a precision tool with a lot of adjustment and nice, non-marring contacts, so we can create exact cuts to butt the painted skirtboards. We use well-seasoned, 1 1/8-inch maple treads, which the painter prefinishes with polyurethane. I have built stairs this way for years and never had a callback. I also built the stairs in my own house this way and have had the chance to watch them after several years of seasonal changes and have never witnessed joints opening up.

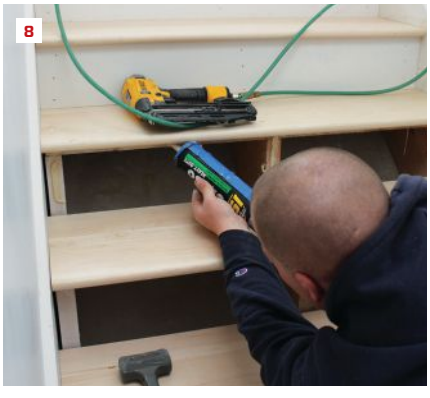
We secure the finish treads to the subtreads with either OSI SF450 or Loctite PL Premium construction adhesive. I prefer the Loctite if I can get it. We typically work from the top of the stairs, gluing the treads to subtreads and clamping them in place, then screwing from below through the subtread with a right-angle drill. We typically use epoxy-coated decking screws. Here, the screw finish doesn't matter; we're inside. But these screws slide in easily and are made to drill into the wood without predrilling.

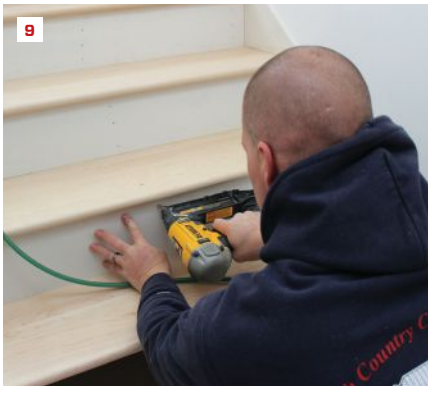
Prepainted risers go in after each tread. We glue these with construction adhesive, as well, before nailing them off.

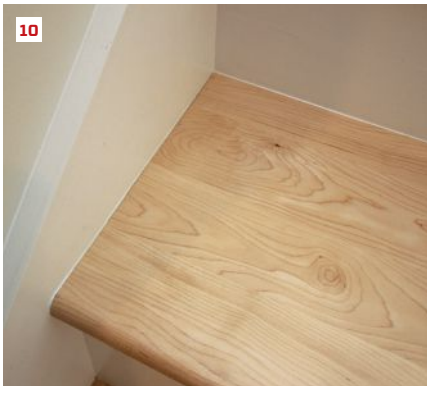
Securing treads from underneath saves all the time of having to countersink, cut, and install plugs, which can be a slow process if you pay attention to match and align the grain. I vastly prefer the clean look of no visible fasteners. Crisp, clean, and well executed is what we strive for throughout the house.

Josh Girard owns North Country Construction, in Jericho, Vt.









Finish treads are secured with screws from underneath, eliminating the time to countersink, cut, and finish wood plugs **(7)**. Risers also get construction adhesive **(8)** before they're nailed in place **(9)**. The result is a clean hardwood tread married seamlessly to painted trim and risers **(10)**. The marriage of hardwood to bright, painted surfaces carries through to floor, handrail, and walls **(11)**.

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BY MELANIE HODGDON

Job Pricing Blunders

Author's note: In the throes of the current pandemic, it's hard to focus on best practices when your business is shut down or your work has dried up. Focus is and should be on how to maintain some degree of work and normalcy in the face of so many limitations and disruption of life as usual. Despite all the accommodations currently required, the basics of how to run a sustainable business do not change. This article was written prior to the COVID-19 crisis yet remains relevant. When the time comes to ramp up business again, whenever that should be, it will be especially important to price jobs accurately.

Over the years, I have observed my clients struggling with a number of obstacles to pricing their work right. First, let's define "right."

To me, pricing right means that you have determined and achieved targets for one or more of the following measurable objectives (which are also shown on the sample Profit and Loss statement, below):

Profit and Loss/Income Statement

Income	$1,000,000	
Production Costs (Cost of Goods Sold)	$698,500	
Gross Profit (in dollars)	$301,500	
Gross Margin (Gross Profit/Income)	30.15%	1
Overhead (Expense)	$235,000	
Net Income	$66,500	2
Net Margin (Net Income/Income)	6.65%	3

1. Achieved gross margin expressed as a percentage (of income)
2. Bottom line (net profit) dollar figure
3. Net-margin amount expressed as a percentage (of income)

The causes of failure typically fall into two distinct categories—not knowing how to use financial information to generate pricing strategy, and being reluctant to charge what is required. Let's look at each one of these separately.

FINANCIAL CURVEBALLS

It's extremely easy to calculate what you need to charge if you have accurate financials that are organized correctly, and I have covered this topic in great detail in previous articles. However, there are some common curveballs that tend to invalidate or degrade the process. These include the following:

- Basing charge-out rates (on T&M work) on partially burdened labor (leading to loss of profit when invoices fail to cover the fully burdened cost of labor)
- Basing estimated labor costs (on fixed-price work) on partially burdened labor (leading to adding markup to partially burdened labor, which leads to loss of profit when invoices fail to cover the fully burdened cost of labor)
- Neglecting to add sales tax to materials costs when estimating (if not using a tax-exempt number). Consult your state's regulations to find out what kind of costs on which category of jobs are subject to sales tax; your state will expect to receive sales tax revenues whether paid at time of purchase or charged to and collected from your customer.
- Failing to include workers' comp costs on uninsured subs when estimating (fixed price) or charging out (T&M)
- Neglecting to charge for consumables (saw blades, bits, sanding disks, batteries, paint supplies, and the like) and the repair and replacement of small tools; these things will always be used on jobs but are rarely accounted for in estimates, or charged out on T&M jobs
- Not accounting for nonproduction (no nail banging) time required of lead carpenters, whose responsibilities include "administrative" or "management" duties such as ordering and checking in materials, supervising subs, writing up change orders, and dealing with customer questions and concerns; this is time that should be added in estimates of fixed-price work, and charged for in T&M jobs

Missing these costs or invoiceable charges can mean underestimating a fixed-price job or underinvoicing a T&M job.

As soon as your production costs are higher than allowed for, your gross profit (in dollars) and achieved gross margin (% of income) will be lowered.

Bear in mind that the only dollars you can use to pay for overhead and contribute to profit are those left over after you've produced jobs. If your invoiced costs fail to adequately cover your production costs, your bottom line will suffer. That's because every sales dollar will be distributed in only one of three ways (see pie chart based on our Profit and Loss statement, page 30).

If your production costs exceed what you expect, then what will "give" is net income. That slice will shrink and your profit target won't be met. Similarly, if you have failed to account for overhead accurately, or have added a new expense (such as the salary for a

full-time estimator) without planning sufficiently far in advance to allow time to increase markup, then your overhead will expand and your net income will shrink.

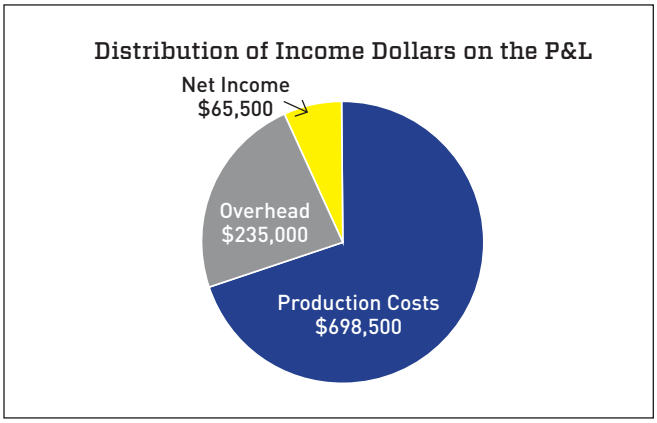
Another way of stating this is that production and overhead costs are "non-negotiable" (they are what they are), while net income is "negotiable." In other words, the net income will be what takes the brunt of cost overruns.

RELUCTANCE TO CHARGE ENOUGH

But perhaps a company is successfully creating estimates that are all-inclusive and that accurately define what that job will cost. Maybe that company has even done the required math and uses historic data to identify a markup that will lead to the right net profit. But even this company may fail to pull the trigger and actually charge enough. Why? This is where a business owner's emotions kick in, and it's not uncommon. I see two general problem areas—fear and what I call the "generous craftsman" effect.

FEAR OF CHARGING TOO MUCH

Let's take fear first. The knee-jerk reaction to any suggestion that prices need to be raised is, "I'm already one of the highest-priced companies around; if I raise my prices, I'll never sell any work."



The very fact that the contractor's "go to" place is price suggests that jobs are being sold with an emphasis on price. If, during the sales process, your emphasis is on price rather than painting a picture for the prospect of how their experience with your company will be different from what they would experience elsewhere, then the prospect's focus will be on price also. Shifting the focus means that you separate yourself from the "competition." In fact, if you do it right, you will appear to have no competitors who deliver what you do.

When I ask other contractors why they believe customers choose them, I often hear two things:

1. We do high-quality custom work
2. We have a reputation for honesty

When I know for a fact that the company is undercharging (I know this when they became a client because they are unhappy with the amount of money they're making in relation to the amount of effort they're expending), and I ask them why they aren't considering the possibility that maybe they're getting work because they're good and they're inexpensive, the result is usually a stunned silence. My point is, if your reputation is that good, why not see what happens if you raise your prices? Aren't you worth it? If you don't know exactly why you're different (and better), how can you communicate this to prospects and make them happily embrace a price that's a bit higher but offers a world of difference? In my experience, contractors who are brave enough to test the waters of higher pricing usually see virtually zero drop-off in sales.

THE "GENEROUS CRAFTSMAN" EFFECT

One of several reasons that I have chosen contractors to be my market niche is that I find the vast majority to be the total opposite of those bad apples who have, sadly, given the industry a bad reputation. In general, I find that contractors:

- Are honest
- Are people-centered
- Take enormous pride in creating beautiful and lasting work
- Consider their work to be a form of legacy
- Do whatever it takes to "make it right" (including doing lots of additional work without creating change orders, because "it has to

be done," or "it will look better")

- Bend over backwards to make their customers happy (often in the face of outrageous demands, I might add)
- View what they charge from the standpoint of their own personal budgets ("How can I charge that when I couldn't afford to pay it?")
- Judge the "value" of a job not by its profitability but by how beautifully it turned out; this tendency can be amended to include pride regarding the design, the use of new or "trendy" materials or methods, or the fact that the project won an award (even when doing so caused them to go over budget)
- Assume a paternalistic relationship with employees, subs, and suppliers, often to the extent that they will hold off paying themselves in order to take care of others
- Implement their personal value system through company policy (including pricing!)
- Emphasize being "fair" to their customers
- Undervalue what their company provides

Sadly, the very characteristics that make contractors incredible neighbors all too often lead to decades of hard work with little to show for it. Equally unfortunately, I am often called in only when things have gotten to a fairly desperate or discouraging point or when it's time to pass the company on to the next generation. I have heard from more than one worn-out contractor that what was good enough for him or her to subsist on just wasn't good enough to pass on to the kids. It is often only when their concern for their kids' welfare (there's that wonderful, generous spirit) overrides their concern for their customers' welfare and their passion for being "fair" that they can even consider pricing realistically. And for those "living" their value system through the service they deliver, this can be traumatic.

SUMMARY

Pricing right means understanding your production costs (all of them), having a handle on overhead (including any upticks in costs due to planned increases of staff, marketing, insurance, and so on), and being realistic about the profit you feel you deserve based on the effort you expend.

Once you have your target numbers, the next step is to actually implement a strategic pricing plan that will hit those targets. This may require you to take a fresh look at the most important things your company delivers. You will probably find that customers are far more impressed by your staying on budget, sticking to a timetable, communicating clearly and frequently, and holding your crew to dress, language, performance, and jobsite cleanliness standards than about how perfect those outside miter joints are on the crown.

When you have calculated what you need to charge and identified those characteristics of your company that you feel justify your pricing, the final step is to deal with reluctance, regret, and fear. One client said to me, "If I'd met you 10 years ago, I'd be rich by now!" He felt bad that he'd been underpricing and undervaluing work for years. That was then, this is now. Focus on embracing new ways of thinking about your company and the manner in which you express your value system through your company, and reconcile to the fact that you may need to start favoring the good of the company (including you, your family, your employees, and their families) over the good of the customer.

Melanie Hodgdon, president of Business Systems Management, provides management consulting and coaching for contractors. She co-authored A Simple Guide to Turning a Profit as a Contractor *with Leslie Shiner.*

BY TED CUSHMAN

Insulating Parapets and Balconies

Effective high-performance building envelopes are challenging enough in spread-out suburban areas where low-rise wood-frame construction is the norm. But designing and building a high-performance building shell is even tougher in the context of dense urban infill, where projects commonly stand shoulder to shoulder and strict fire codes are in force. Builders working in older urban areas can learn a lot from the experience of New York City's Passive House community.

As it turns out, builders in New York City will have to step up their building-performance game this year as the city implements its 2020 building energy code, which takes effect in May. In a bid to hit toughening carbon standards, New York City is making its code stricter. Two noteworthy aspects of the new code are tougher insulation standards for balconies and for parapets (elements that are common in low-rise and mid-rise buildings in the city). The new code specifies that both balconies and parapets have to be continuously insulated.

What does that mean in practice? To find out, *JLC* got in touch with architect and Passive House consultant Ed May of bldgtyp in Brooklyn, N.Y. May has extensive experience with Passive House projects in the city, many of which have involved insulated parapets and balconies. May was also involved in the code development process, helping city code officials figure out what sort of requirement would be feasible in the field.

The significance of parapets and balconies "changes dramatically as you move towards higher-performance construction," May explains. "In a low-performance concrete building with no insulation, a concrete balcony or a concrete parapet doesn't have much effect. Because the whole building is not very good, those isolated disruptions don't make much difference. But as the building code has started to improve things like insulation levels, airtightness, and the rest, all of a sudden these weak spots become really impactful."

Photo: Ted Cushman/JLC

Parapet walls for low-slope roofs can be insulated with a rigid-foam wrap that integrates into the wall insulation and the roof insulation of the building, as shown here in a Passive House project from 2016.

"We find that they matter in two different places," May says. "They certainly matter on the energy side. If you have a really well-insulated building, but you have a bunch of uninsulated slab edges or parapets, all of a sudden those matter a great deal. But much more importantly, we have found that if you don't pay attention to them, you end up with cold spots on the interior of the building. And anywhere that you have a cold spot, you have moisture. And so you have mold, and you have discomfort, and you have potential condensation issues."

Downsizing the heating equipment—part and parcel of creating high performance—affects the equation, May explains. "We don't put giant radiators in buildings any more. As we

The Isokorb thermal break from Schöck creates an insulated structural connection between a balcony and the main floor slab of the building. The engineered connection is installed before concrete is poured, and it's integrated into the rebar mat of the slab.

minimize the heating system, we have to be careful about passively insuring against any mold or moisture damage in the envelope of the building, because we don't have these gigantic, oversized heating systems anymore in these buildings to combat those problems."

Insulating parapets. For parapets, says May, the go-to solution is a relatively straightforward insulation wrap. "In New York, you've mostly got concrete-masonry-unit construction, and so you're going to have a parapet that in most of our projects is going to be built of three or four courses of CMU," says May. "And if you're doing an exterior insulated building, you just take that insulation and run it right to the top of the parapet, over the top of the parapet, and then down the inside face of that parapet, so that it connects to the roof insulation. (We try to do exterior roof insulation on every project that we can.)"

It's simple enough, says May, "but the complexity comes in things like 'OK, how do I mount a handrail bracket, or how do I mount my parapet cap? How do I mount a satellite dish?' So often we're doing a layer of either plywood or some sort of topping board in order to cover that insulation, and that gives you something to attach to." The plywood is adhesively applied to the exterior insulation, which is itself adhesively applied to the CMU wall, May says.

Heavier items such as satellite dishes may require pre-positioned blocking, says May. "It's like doing kitchens," he says, "where you build with an eye towards hanging cabinets. You put blocking where you need it. You build out the structure in a way that you can fasten those components later on. But you need to plan for it ahead of time."

Isolating balconies. Decks in a low-rise wood-frame building are simple enough to isolate from the main building, simply by constructing a freestanding self-supported platform. But cantilevered balconies in typical urban concrete buildings are a more difficult problem. In theory, you could wrap insulation out over the balcony, down the front, and under the underside, but May says that approach is problematic. "There are huge waterproofing issues with that, never mind the basic threshold issues." Instead, May prefers the approach of isolating the balcony from the main structural slab using a premanufactured insulating component such as Shöck's Isokorb or Halfen's HIT. These components are designed to be installed at the floor slab edge before concrete is poured. They consist of an insulating foam core, stainless steel rebar, and a concrete or steel bearing surface. "The companies make many lines of product," says May. "You just have to find the right one. The different prices and capacities will depend on the situation."

"The stainless steel rebar is still a thermal bridge, but it's much less conductive than mild steel," says May. "It's not perfect. It doesn't eliminate the thermal bridge entirely. But it does a good job—certainly good enough that we don't worry about things like surface temperature or condensation or mold growth."

The technique is far from a no-brainer, says May. "It has to be done by a structural engineer. It has to be specified carefully, and the team has to understand the install details, to tie in the stainless steel to the rebar mat of the main building. So it's certainly not something you would slide into the plan five minutes before you build. But it's definitely doable, and we've done it on quite a few projects."

Evolving codes. Going forward, May expects to see the city's code sharpen its focus on thermal bridges. "I think in the next couple of code cycles, they'll start to introduce limits on it. I think first they will be loose limits, and then the code cycle after that, they'll start to be really intense limits. I think that's the trajectory that we're on."

Ted Cushman is a senior editor at JLC.

Photo courtesy Schöck North America

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Shear Wall Basics

Details for sheathing walls in seismic and high wind zones

BY TIM UHLER

When we construct a building, we "typically intend it to stay where we build it." This is a quote from an APA-The Engineered Wood Association webinar on shear walls and load paths that speaks to an issue we have become increasingly aware of in this country—building for resilience. Whether we are designing for hurricanes, tornadoes, or earthquakes, one of the most basic structural elements that helps resist the forces a building sees during such events is the shear wall.

WHY SHEAR WALLS?

A shear wall (called a "braced wall" in the prescriptive world of the International Codes) is a building element that will resist the racking forces caused by high winds or earthquakes. When we stand an unbraced wall, it is easy to push it parallel to the top and bottom plates and cause the wall to collapse. Shear walls are designed to resist the lateral loading caused by wind pressure or ground movement in an earthquake and transfer those loads to the foundation. Imagine a perfect square that isn't designed to meet lateral loads: It deforms to the shape of a parallelogram until it collapses.

Here in the United States, the most common method for constructing shear walls involves attaching structural sheathing to framed walls. The APA (apawood.org) has published guidelines to meet the requirements in the code, calling for "continuously

Photos by Tim Uhler; Illustration: Tim Healey

1

The panel stamp on structural OSB and plywood reveals key details. These are the ones you need to understand for shear walls:
Panel grade: For walls, look for a "Rated Sheathing" designation.
Span rating: This is tied to the "strength axis" and is relevant to roof and floor decking, not walls.
Exposure rating: Sometimes called the "bond classification" in reference to the adhesive used to bond plies, "Exposure 1" indicates that panels will withstand normal construction delays without affecting the panel's structural properties.
DOC product standard: U.S. building codes require structural panels to comply with either PS 1 or PS product standards. PS 1 applies to structural plywood; PS 2 to OSB.
Strength axis: This refers to the panel when used on floors and roofs; it is not relevant to lateral loads.

sheathing with OSB or plywood." There are basically three elements to the shear wall—the framing, the fasteners, and the "method of resisting lateral forces," which is structural plywood or OSB "Rated Sheathing."

The rigidity of the sheathing directly contributes to the strength of the shear wall, but only if it is attached properly. When we construct shear walls, we must use the right sheathing—defined in terms of thickness and rating—and the right nail size and nail spacing. In this article, I will look at each of these in detail.

STRUCTURAL PANELS

We build in seismic country and therefore we typically build from engineered plans that include a shear panel schedule. This table lists the shear panel thickness—usually listed as 15/32-inch CDX (plywood) or 7/16-inch "APA Rated Sheathing" (OSB). The schedule also calls out the attachment of sheathing to framing as well as the attachment of the wall to the foundation and roof.

To make sure we have the right sheathing for the application, framers should know how to read a panel stamp. Besides the manufacturer's name and brand, this panel marking will include a number of lines (shown above) that are critical to its performance as a shear wall.

Panels used for walls and roofs will be marked "Rated Sheathing" or "Structural 1." Struct 1, as it's sometimes called, is a subcategory that is sometimes required for shear walls but not always.

"Sized for Spacing" (listed under the span rating) means the panels are undersized slightly to allow for a 1/8-inch gap between them when they are installed. This gap allows the panels to expand without buckling when they get wet.

The Department of Commerce (DOC) product standard (indicated under the mill number on the panel stamp) also deserves attention because U.S. building codes require structural panels to meet either

One advantage to OSB is the availability of lengths over 8 feet. Here **(2)**, 4x10 sheets vastly simplify the shear wall on side walls. The author balloon frames gable-end walls and installs 4-by fire blocking for easy nailing of the tight edge nailing required for the shear panel **(3)**.

the PS 1 or PS 2 standard. PS 1 applies to plywood; PS 2 to "wood-based structural-use panels," including OSB. (You may see this listed as PS 1-19 or PS 2-18; the last two numbers identify the year the standard was adopted.) In addition to compliance with the nailing schedule, this will probably be what an inspector will look for first on shear walls.

Panel lengths. One advantage with OSB is the availability of lengths longer than 8 feet. Panels are commonly available in 9- and 10-foot lengths, with some manufacturers offering 9 feet 1 1/8 inches and 10 feet 1 1/8 inches. Norbord even offers sheathing in lengths up to 12 feet 1 1/8 inches.

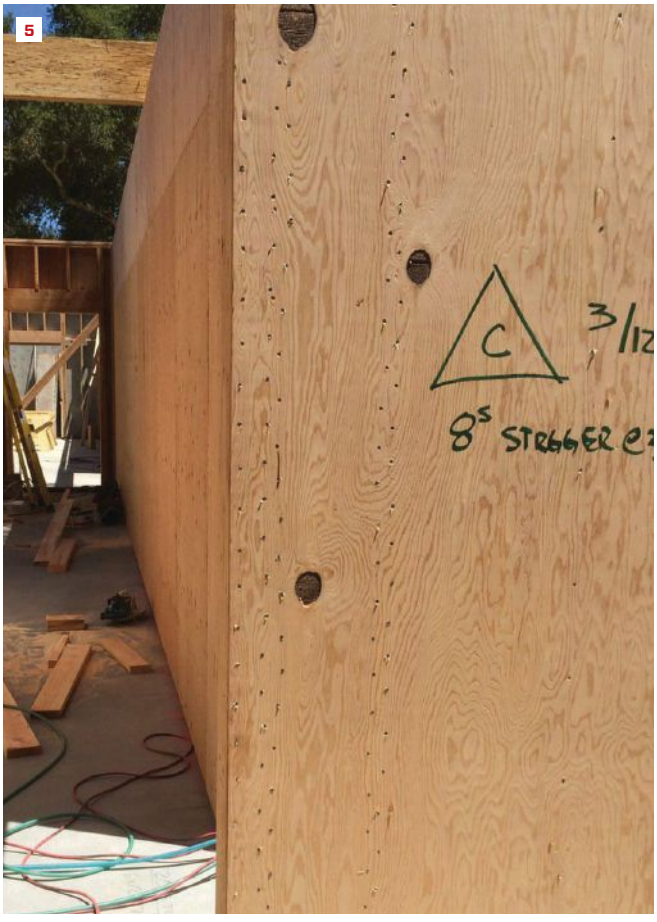
For us, the primary advantage of longer sheathing panels is a big reduction in labor. Longer panels mean less blocking in the walls and a lot less edge nailing. And when the engineer has designed for combined shear and uplift requirements, longer panels that span the rim joist between floors can eliminate metal straps or other uplift connectors.

Horizontal vs. vertical installation. The panel labeling includes a "strength axis," which is often misunderstood. It typically runs parallel to the length of the panel, and in floor and roof installations, this axis must be perpendicular to framing for the span ratings to apply. This is used only for floors and roofs, not for lateral loading. Here in the West, panels are typically installed vertically to save labor and (because less blocking is required) to increase the thermal resistance of the wall.

All panel edges must be blocked with nominal 2-inch or wider framing. We typically install blocking at wall-to-ceiling or wall-to-floor intersections. This panel-edge blocking also acts as fire blocking.

FASTENERS

Proper fastener size is crucial for the shear wall to perform as designed. The actual nail size called out might not be what the box of fasteners says. Sometimes the box will say 8d nails, but the nails aren't the right diameter. For example, an 8d common nail is 2 1/2 inches (length) x .131 inch (diameter), whereas an 8d box nail is 2 1/2 inches (length) x .113 inch (diameter). When I order nails for wall sheathing, I



Tight edge nailing that matches the plans' shear wall schedule and a 1/8-inch gap are details that a building inspector will look for first **(4)**. The nailing schedule can vary from wall to wall, so some framers mark up panels so it's clear to the crew exactly what the nailing should be. Here **(5)**, 3/12 refers to edge and boundary nailing every 3 inches and nailing in the field every 12 inches along studs.

don't order them by penny weight; instead, I order by the length and diameter.

FASTENING

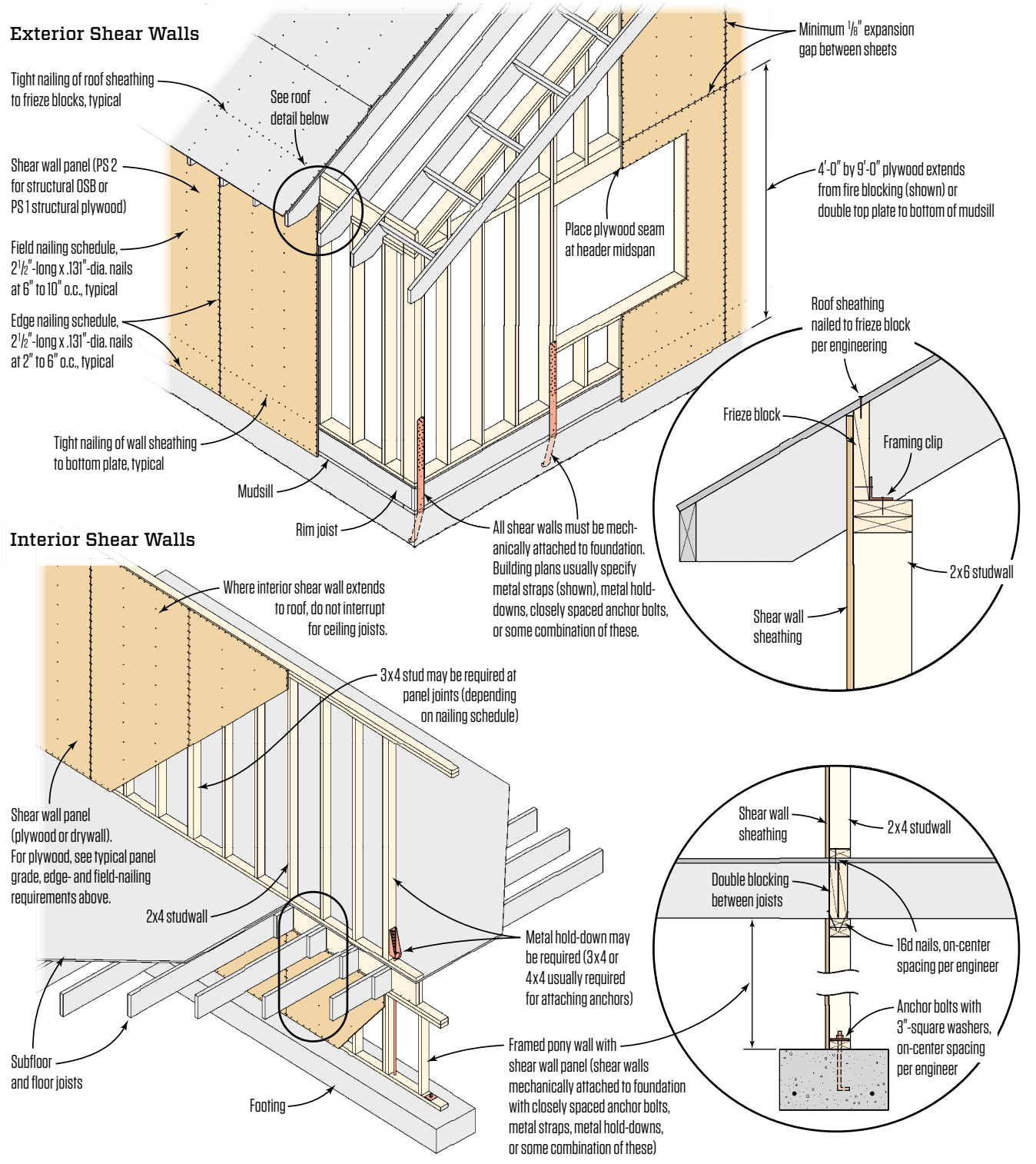
For a panel to be fastened correctly, it must be nailed off at the correct spacing and the nails set properly. The shear wall schedule provided by the designer or engineer typically includes nail size and spacing. It will specify both edge nailing and field nailing. For example "6/12" means nails are spaced every 6 inches on-center along edges and boundaries (edges of windows and doors) and every 12 inches along intermediate studs. It's not uncommon to see 3/12 and even 2/12 on shear walls, and the schedule can vary throughout the building, so some framers will label the walls on site so it's clear exactly how each wall should be nailed off, as shown above.

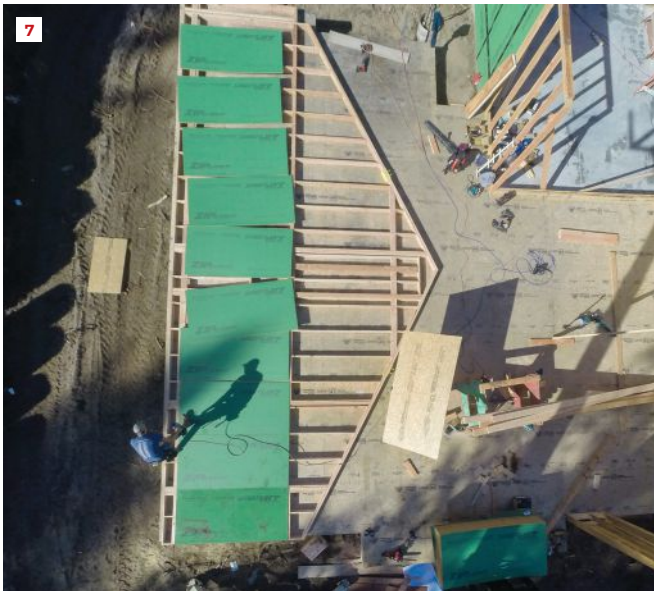
Typical nailing should be positioned 3/8 inch from panel edges and the head of the nail should be flush with the panel. It is a fact of life that not every nail will be perfectly set. In my experience, the number of overdriven fasteners can be greatly reduced by adjusting the depth of drive on the gun conservatively. I'd rather drive a few proud nails than fail a nailing inspection with too many overdriven nails.

I've found that there always seems to be one gun that does better than others at the same pressure. We designate that gun for sheathing.

If you have some overdriven nails, though, don't panic. According to an APA technical brief, there is no appreciable reduction in shear capacity if less than 20% of the fasteners around the perimeter of panels are overdriven by no more than 1/8 inch . Sometimes, the panel will swell somewhat, giving the appearance of overdriven

Typical Shear Wall Details





For the required connection of a shear wall to the roof structure, the author uses a Quik Stick to drive structural screws through the top plate into rafters **(6)**. He typically installs shear panels on the deck before standing walls **(7)**, sheathing over window and door openings and routing them out afterward **(8)**.

fasteners, but we find that most inspectors can tell the difference.

Metal connectors. All shear walls must be mechanically attached to the foundation. The plans usually specify metal straps, hold-downs, closely spaced anchor bolts, or some combination.

At the top of the wall, metal "hurricane" clips or structural screws are typically called for to connect the shear wall to the roof structure. Structural screws install twice as fast as a hurricane clips with a tool like Simpson Strong-Tie's Quik Stik (see "Racing Through Rafter Connections," May/19).

INSTALLATION TIPS

The actual installation is simple. As often as possible, we sheathe our walls before standing them up (a square wall on a level floor will be plumb when it is in place). We always place panels on the center of studs and leave a 1/8-inch gap. While you can use a 16d common nail to create this space, we do it by eye because it's faster. As mentioned earlier, the panel should say "sized for spacing."

As you tack panels in place, make sure they lie flat. Any warping or tension in the panel can cause buckling later. The standard on my crew is to sheathe over windows and doors and rout out the openings. This is fast and clean.

Tim Uhler is lead carpenter for Pioneer Builders in Port Orchard, Wash. Follow him on Instagram: @awesomeframers.

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Photos by Jake Lewandowski

Opening Up a Masonry Wall

Have all the materials ready to go before shoring the wall

BY JAKE LEWANDOWSKI

Our company, Great Lakes Builders, was recently called in to widen a door opening in an exterior wall of a masonry home by 4 feet. The area outside the opening was to be roofed over and weathered in to expand a finished basement.

The walls of the house were concrete block with a brick veneer, and we had to support the wall before installing a new header beam for the expanded opening. To make matters worse, the floor of the house above the opening was supported by web trusses that we'd have to work around as we set up our shoring for the wall. With limited space in front of the opening, we'd have very little room once the shoring was in place. So we had to position the beam that would support the expanded opening on the concrete floor just outside the opening before we could set up the shoring.

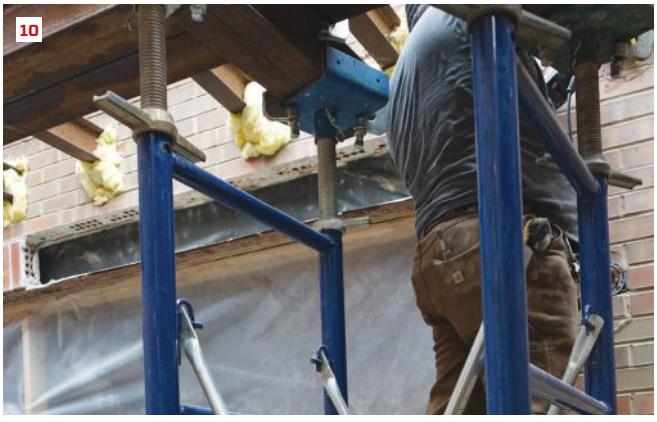
To support the masonry wall, we began by installing four shoring towers, two on each side of the wall. The towers were outfitted with adjustable-length U-heads that held pairs of short S5x10 beams running perpendicular to the wall. On top of those beams were a pair of W10x22 spanner beams, one on each side of the wall, which in turn supported six needle beams that we had inserted through openings cut through the masonry wall.

Using the adjustable heads on the shoring towers, we snugged the short beams up against the floor trusses inside the wall and raised the outside towers to the same level. Then we packed non-shrink grout between the needle beams and the masonry. When the grout cured, the wall was fully bearing on the shoring assembly, and we could begin expanding the opening.

Jake Lewandowski is a construction manager with his family's business, Great Lakes Builders (greatlakesbuildersinc.com), specializing in structural repairs in Elk Grove Village, Ill. Follow him on Instagram: @jakemlewandowski.

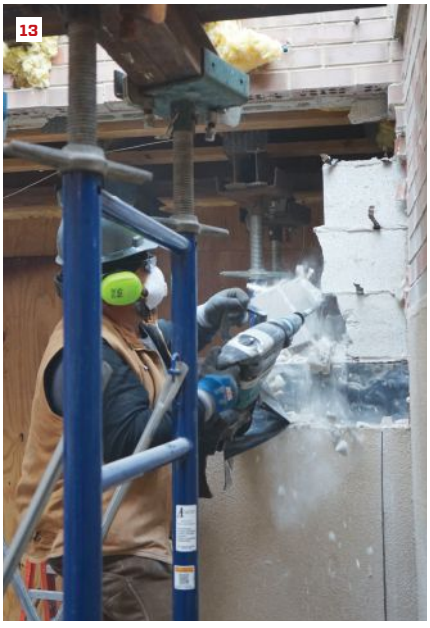
OPENING UP A MASONRY WALL

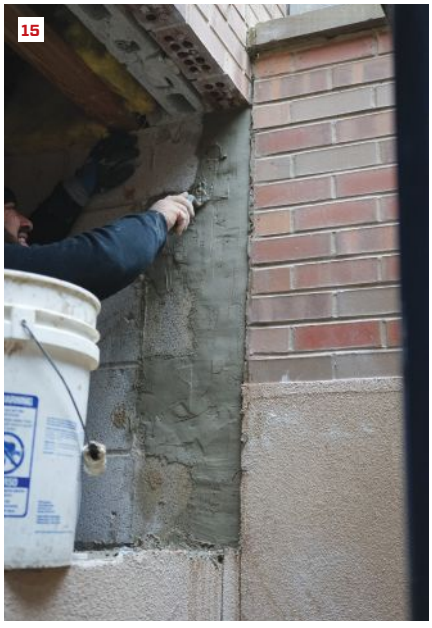
Working with engineered drawings, the crew cuts six openings through the brick veneer and the concrete block wall **(1)**. Then they set up four shoring towers (steel support scaffolding), two inside the wall and two outside, measuring to position each one exactly **(2)**. To the adjustable U-heads on each corner of the towers, they clamp a pair of short S5x10 beams perpendicular to the wall **(3)**. On top of those beams, they set W10x22 spanner beams parallel to the wall, bridging between the tops of the towers on both sides **(4)**. After threading six S5x10 needle beams through the holes in the wall, the crew raises the adjustable heads until the needle beams are level on the spanner beams **(5)**. Then they secure the needle beams with beam clamps **(6)**.



With the needle beams and spanner beams level **(7)**, the crew packs the openings above the needle beams with non-shrink grout. To ensure good adhesion, they first spray water on the masonry **(8)**, then they pack grout into the holes **(9)**. The non-shrink grout has high compressive strength to provide support for the wall during the project.

After stuffing the rest of the needle-beam holes with insulation, the crew removes the masonry across the width of the opening **(10)**. A crew member cuts the original lintel beam in half to make it easier to remove **(11)**. With the entire width opened up, the crew can prepare the masonry on both sides before lifting the new support beam into place **(12)**.





The existing masonry details differed between the sides of the original opening; the right side had a stem wall, and the brick veneer extended farther down than on the left side. The crew removes the concrete block down to the brick-veneer line **(13)**. Note the vertical saw cut for the concrete section that will remain in place to support a column on that side. Next, they cut back the end of the old brick veneer as well **(14)**. They then parge the entire surface with mortar **(15)**. On the other side of the opening, removal of the lintel beam left a void in the masonry that had to be supported structurally **(16)**. The crew begins by parging the masonry below the void with non-shrink grout. Then they layer flat concrete blocks into the void **(17)** and finish coating the infill masonry with grout **(18)**. The repair ensures that the masonry wall will be structurally sound on both sides of the new support beam.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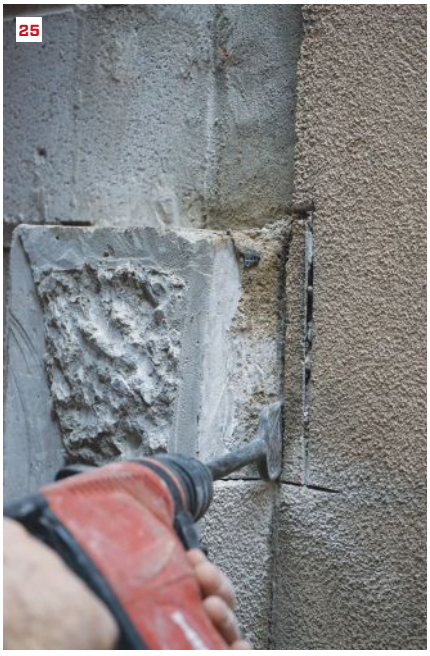
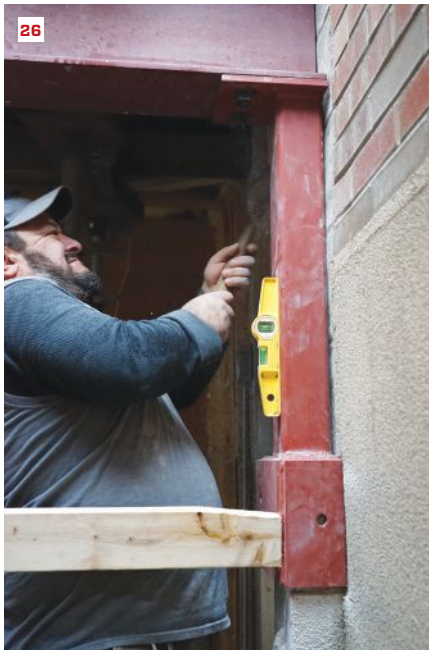
The crew had placed the W12x35 beam that would support the new opening on blocks inside the shoring towers before shoring up the wall and preparing the opening. When ready, they use a crank lift on rollers to raise the beam **(19)**. They roll the beam into position directly under the masonry wall **(20)**, and then raise it the final distance **(21)**. The crew supports the beam in the opening using a shoring tower with the ends spread farther apart **(22)**. This time, wooden cribbing blocks span between the U-shaped heads for the beam to rest on while the crew installs support columns. The crew levels the beam in the opening despite the out-of-level brick courses (as seen in the ever-widening gap over the left end of the beam). That gap was filled with structural mortar before the supports were removed. With the beam in place and properly supported, the crew removes the rest of the masonry stem wall over to the saw cut **(23)**.





After preparing the masonry on each side, the crew installs specially fabricated steel columns to support the beam. On the right side of the opening, a sleeve on the column base fits over the section of concrete wall that was left in place. A crew member slides the column into place and checks the fit **(24)**. To allow the column to fit tight against the wall, he removes a section of the stucco coating **(25)**. He then inserts the column under the beam, tapping it level with a hammer **(26)**. To hold the column in place while it is being attached, the crew braces it back to the shoring tower with a length of 2x4. While the column is held stationary, a crew member uses a tuck pointer trowel to push structural mortar into the void between the column base and the masonry support **(27)**. On the left side of the opening, the column base wraps over the masonry support below **(28)**. As with the column on the opposite side, a 2x4 brace keeps the column plumb and stationary while the structural mortar under the base cures.

Once the structural mortar cures, the crew drills holes for $^{5}/_{8}$-inch attachment bolts, which are epoxied in place per the engineer's specifications **(29)**. After the epoxy cures, the crew threads nuts onto the bolts and cuts the ends with a grinder **(30)**. Three bolts secure the right-side base **(31)**, and hardened steel bolts attach the tops of the columns to the support beam **(32)**.

When the crew finishes installing the columns with the weight of the masonry wall loaded onto the new beam, they dismantle the shoring that supported the beam and wall. After removing the beam clamps, they back off the adjustment screws on the shoring towers **(33)**. With the area cleaned, the space is ready to be roofed and weathered in to expand the basement living space **(34)**.

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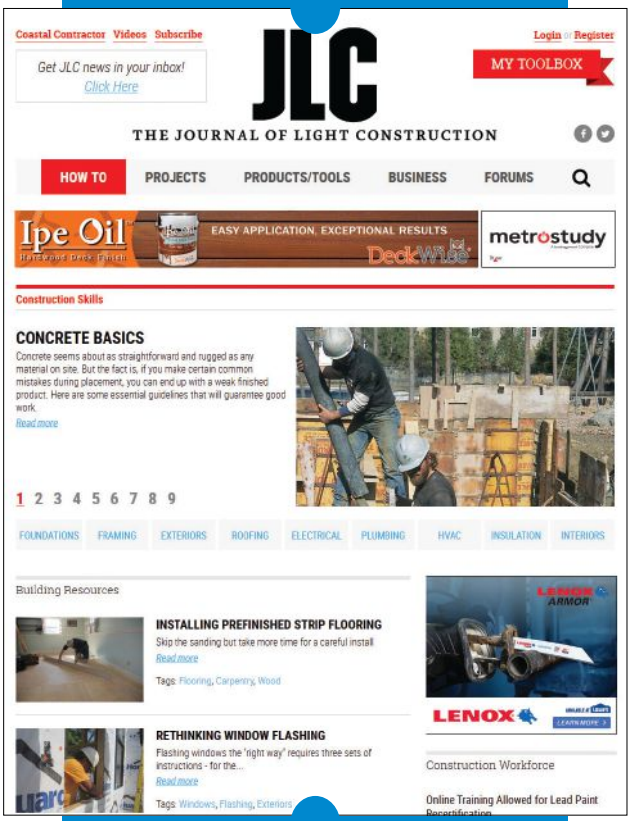

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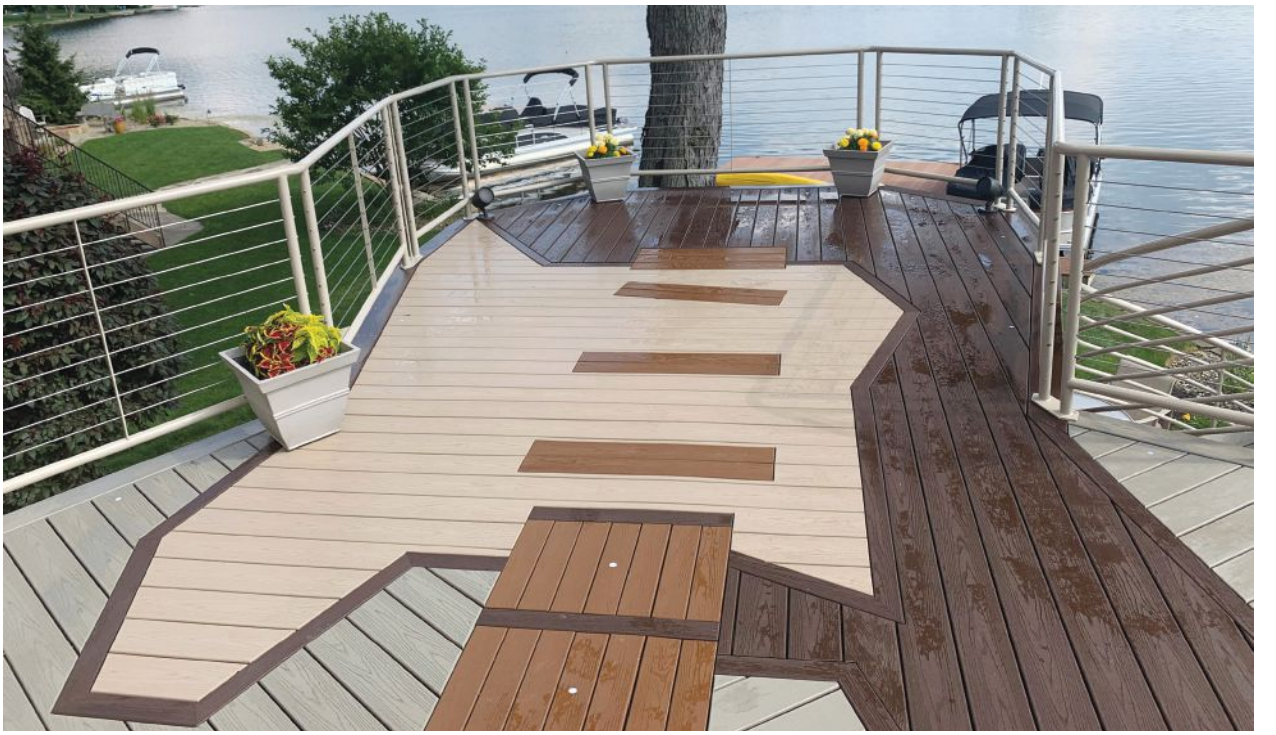
The Guitar Deck

by Andrew Henley



PHOTOS BY ANDREW HENLEY/HEN-HOUSE DECKS

You may recognize this guitar—it's a depiction of Fender's famous Stratocaster, executed both in the shape of the deck and in the layout of the multicolored decking. Drawn by architect John Patrick Picard, the design for this lakeside deck remodel was inspired by the owner's love of rock-n-roll music and by one of his favorite guitars—a Stratocaster, of course. Our goal for this example of "Duck" (or novelty) architecture was to highlight as many of the details on his guitar as possible, including the distinctive shape of its body, the neck, frets, and strings, the pickups, and even the change of colors in the body.

Of course, our main objective on any deck project is to build a safe and comfortable space for the owner to relax and entertain friends and family. But with the guitar deck, creating an artful conversation piece that highlighted the owner's interests became the true driving force behind the partnership that developed between the architect, my lead carpenter Ken Baldwin and the rest of the crew, and myself.

Foundation and Framing

The deck was replacing an existing elevated deck, and we were able to reuse the three steel columns that had been supporting it, as well as a stainless steel spiral staircase that provided outside access to the deck. After dismantling the old decking and framing and carefully setting the staircase aside, we removed enough of the stone pavers from the patio below the deck to dig a pair of holes for two new footings. We dug down below frostline (48 inches in my area), then placed a pair of 24-inch-diameter tube forms in the ground and filled them with concrete. When the concrete cured, we anchored 4-inch-diameter steel columns to the footings, welded custom-fabricated brackets to the tops of the columns to match the existing supports, and began framing.

Because of the relatively long spans between columns, we chose to support the joists with pressure-treated glulams rather than sawn built-up beams. At the house, the glulams connect to the house framing at the same locations as the original deck framing, through beam pockets in the stone veneer cladding. Essentially, the frame is freestanding, except at those two connection points.

To accommodate the irregular shape of the guitar, we dropped the glulams on the expanded part of the deck. That way, we could cantilever the joists and

The steel columns, stainless steel spiral staircase, and custom-fabricated handrails from the original deck (above left) were repurposed on the new deck, which needed additional steel columns and PT glulam beams (above right).

Custom-fabricated brackets were welded to the steel columns to support dropped beams (above left). Cantilevered joists were then installed to create the shape of the guitar body (above center). Extensive blocking was also needed to execute the elaborate inlay required to create the guitar design (above right).

install blocking as needed to conform to the shape of the guitar's body. Since the decking would be laid out to supply the details of the guitar, we had to follow a pretty intricate blocking detail, and we installed more blocking as needed in the field as we installed the decking.

We used four different colors in the Trex Earth Tones line of decking to create the design. We used vintage lantern and rope swing to create the body, tree house for the neck and pickups, and gravel path for the parts of the lakeside deck outside the guitar design.

In addition to reusing the spiral stairs and the columns, we tried to repurpose as many of the original deck's other components as possible to maintain the aesthetics already established by the house. For example, we re-installed the spiral stairs in the same location, avoiding costly changes to the patio below. We also reused the existing custom-fabricated railing, adding new sections as needed to enclose the expanded deck. We also refinished the stairs and all of the existing and new railing components to match.

Lighting

We used three types of lighting in the design of the deck: uplighting, downlighting, and round lights recessed into the deck boards.

The uplighting is placed in the deck boards where the deck connects to the house so it points upward toward the large windows. The goal for this light is to wash the exterior of the house with light, highlighting the home but also limiting the amount of the interior that can be seen at night from the lake.

We used a similar technique on the

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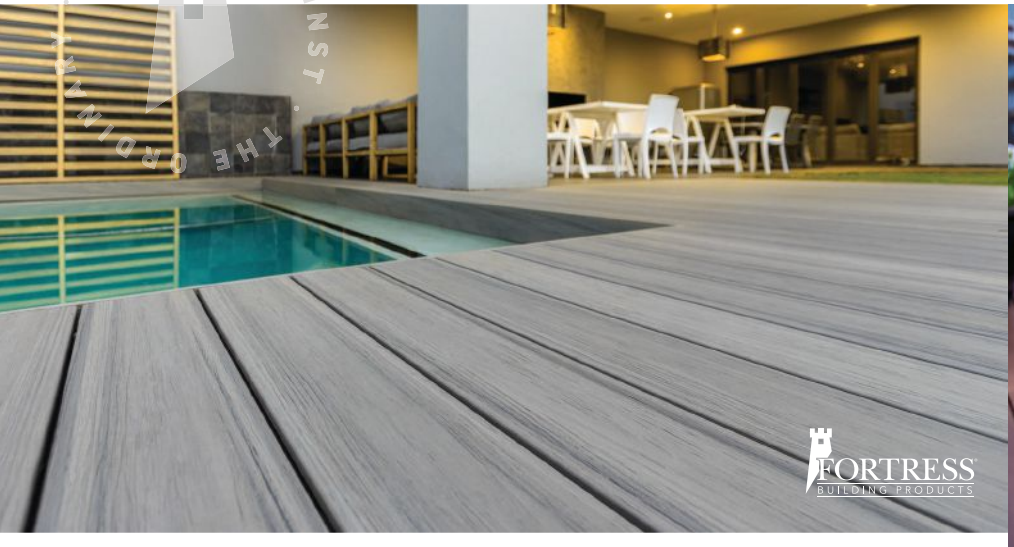

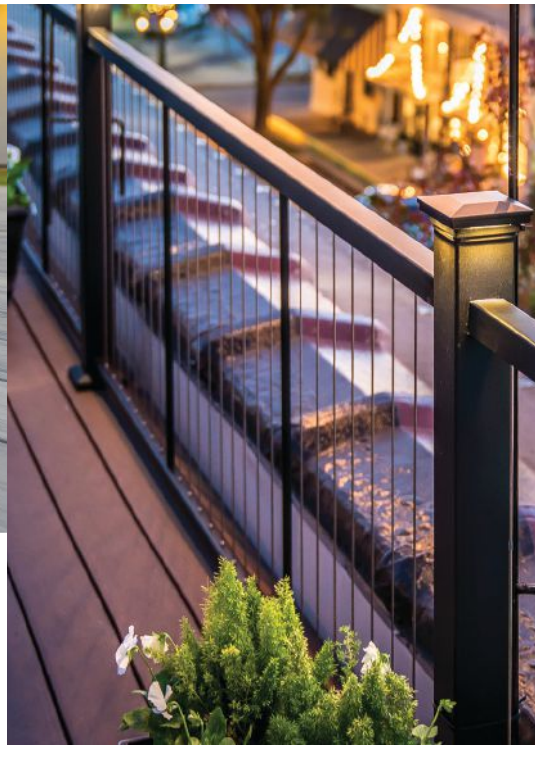

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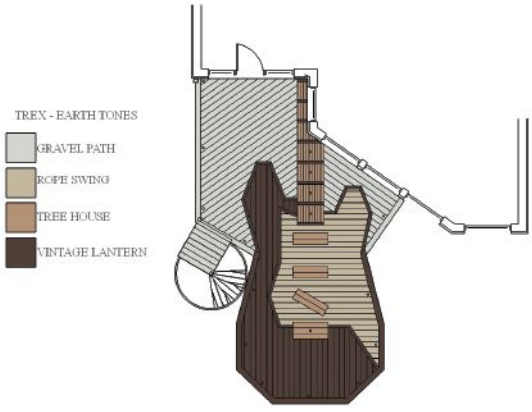

Four different shades of decking were used to create the design of the guitar.

underside of the deck, with downlighting pointed at the stone wall, windows, and door beneath the deck.

We used round recessed lighting fixtures to outline the edge of the deck, as well as to add the detail of the dot inlays on the neck of the guitar. ❖

Andrew Henley owns Hen-House Decks in Uniontown, Ohio.

The design is highlighted by recessed lights installed around the deck's perimeter and in the guitar's fret board.

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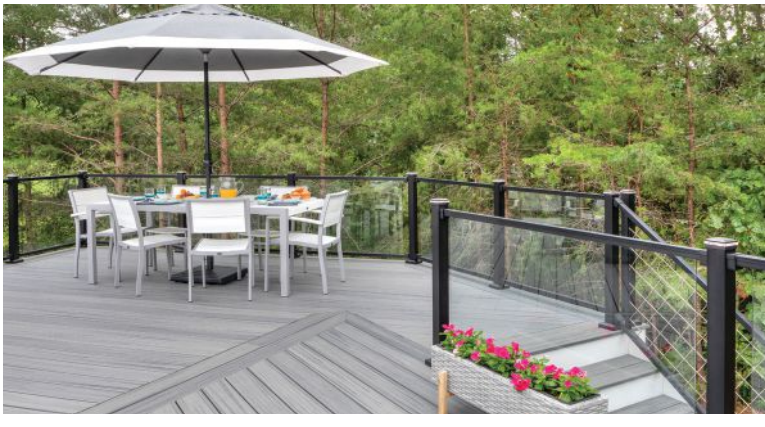

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Engineering What's Next in Outdoor Living®

Creating Separation: A Simple Recipe for Growing Your Business

by Bobby Parks

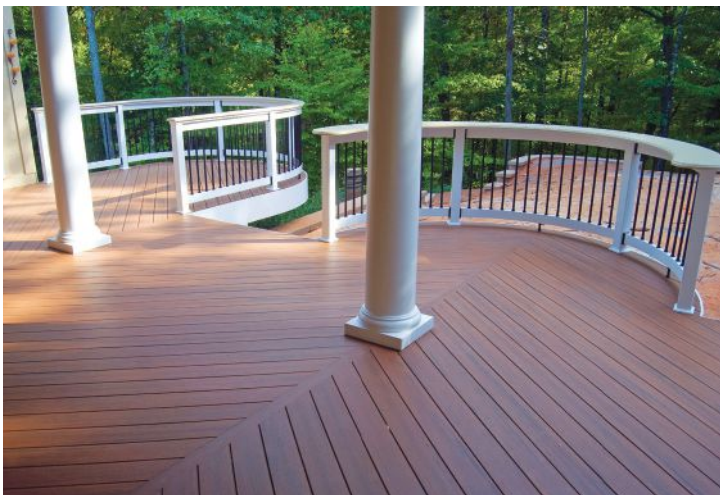
When you're bidding against other contractors for a job, what is it about you and your company that makes you different or better? What benefits do you offer to your prospective client that the others don't, and what impressions are you making that increase the chances you'll get the job? What kind of credibility do you reflect and what kind of risk do you represent? Why would a customer choose you?

If your company is perceived as average in your market, with little to differentiate it from your competitors, the customer's decision is likely based strictly on price. If you can stand out as one of your market's top contractors, however, pricing may still be a factor, but your company is going to be chosen for reasons other than price.

Being recognized as one of the top operators in your market is not about your company's size or the size of your jobs. It's about the quality of your company's delivery history, production skills, and capabilities. It's about your reputation, the perception in your market of who stands out as one of the best and—cost aside—who would be chosen for the job 80% to 90% of the time. This is the category for those who can communicate to their customers who they are and what they are about, and then back it up with how their company performs. If you're not content to go through the motions and be average, but want to elevate yourself and your company, this is the category for you.

When you are in this group, you will be able to charge more for your company's services. This is the approach that I took with my deck building company while operating in a competitive Atlanta market. By focusing on margin growth instead of production growth, our company's operations ran more smoothly, and we were able to charge between 5% and 15% more than we had before we added the following simple ingredients to our business recipe.

PHOTOS BY BOBBY PARKS



Regularly incorporating details such as curved railings and finished columns (rather than bare PT posts) into your designs will help differentiate your deck building company from your competitors.

A Simple Business Approach

Rising in the rankings doesn't have to be complicated. Moving the needle in your favor means focusing on fine-tuning your communications so that you project your company's image, brand, and reputation in your market. For some, it may require an adjustment to their building philosophy in terms of what they offer and how they deliver it. It's a simple recipe that requires you to work more on your business than within it.

Create separation. One key step in this process is to not appear to be like everyone else; instead, you want to separate your company from your competitors, to create excitement with your designs and options, and to stand out in the right ways. It's about effectively communicating with your customers so that your company's credibility is extremely high, and potential clients see zero risk in hiring you for the job. Less risk equals more dollars.

Understand that if you appear to be like everyone else, your pricing will have to be similar, as there's no justification for it to be higher. If a prospect is trying to decide on a company to use for a job and there's no noticeable separation between contractors, it becomes a decision primarily based on price. In the prospect's mind, the chances for a successful project outcome and the risk associated with each of the contractors they're meeting with are the same, so it comes down to which one they can hire at the least cost. Competing on cost is a race to the bottom.

Company philosophy. If someone asks you to explain what your company is all about in 30 seconds, what is your answer? Whether you can articulate it or not, your company's building philosophy is your contractor identity and what you as a contractor will be known for. It's your foundation and the bowl all other influential ingredients are mixed into. It's the motto of operation that you'll build from that includes your style of details, products, and process.

It doesn't have to be complicated; it just needs to be honest and make sense. It's your elevator speech of what your company does and stands for, and it's what's recorded in a prospect's mind. Use simple messaging on websites and when you're having that first phone conversation with a potential customer. It's one of the first of two impressions you make with a potential customer.

To illustrate, here's the philosophy of my former Atlanta deck building company: "We don't build the stained PT wood decks and porches that are widely accepted in our market. We combine products that we believe will perform and stand the test of time. We design and build projects that look like true extensions of the home and that we know will reflect well on our reputation for years to come." It was a simple message, but it communicated what I wanted potential customers to hear in that first 30 seconds when I spoke to them, or to take away after a visit to our website.

Quality matters. To even begin to compete with other companies for preferred status, quality craftsmanship and excellent customer service have to be a given. Your goal should be to continually improve your company's operations and the products your company delivers.

You should be looking for answers to questions like these: Are past deliveries helping or hurting your company's reputation? If you build using lower-grade materials, does your customer experience buyer's remorse after a summer or two? If your customer has a dinner party on a deck that you built a year or so ago, what kind of impression does the deck make on their guests? Have the joints opened up? Has the decking warped and checked, or weathered and lost that new look? When they ask who the builder was, are those guests going to be impressed enough to give you a call, or do you get checked off the list of potential contractors they'd be interested in meeting with? Unless you used materials and techniques that stand the test of time and delivered a quality job, you'll never even know the conversation occurred.

To shoot for a ranking near the top of your market, making the decision to not offer the least expensive solutions to customers is a big first step. The message we tried to send to customers looking for the cheapest option is that they should shop somewhere else.

Easy doesn't pay. Whether you are a contractor or an employee, the easier a job is to do, the more people are qualified to do it and the less it pays. The same holds true with your job offerings; in most cases, the simpler jobs offer the least

amount of profit compared with a "better and best" approach. In addition, the types of projects you deliver either separate you from the others or place you in the same category.

Many contractors never leave their comfort zone, but almost all of us need to in order to raise our game and find stability as a business. Otherwise, we are just one of many. High-end finish details don't have to be complicated, though overall these jobs are generally more complex. If you have the ability to deliver and price them properly, these details can not only provide better profitability but also help you to build your company's reputation for quality. And, again, the better the reputation, the easier it is to sell.

As you and your crew members become accustomed to building them, what are considered to be custom details at some point simply become your company's standard details. Offering these details in simple designs using quality products as your standard, and not as an upgrade, will raise you up in the rankings. That is, what you deliver to your customers affects your company's margin, reputation, and brand.

Value of trust. Will prospective customers choose you to do a job when your estimate is $31,000, while another contractor seems to be offering a similarly sized project at $28,000? Would they pay you 10% more? There are risks associated with any contractor when a customer makes a choice. Often, a customer has multiple proposals, and the contractor who makes the strongest impression is the one they'd typically choose if prices were equal. But when the price isn't the same, the customer has to weigh the investment risk of each contractor. If a contractor is lower in cost but isn't able to communicate a strong delivery history for the type of job the customer thinks they want, there is an element of risk associated with that contractor. Maybe the customer will get the kind of project they hoped for, but there's uncertainty; it could turn out to be a nightmare. The customer may hope that they can save money with this lower-priced contractor, but then realize that hope is a risky way to make a decision.

Hiring a contractor who is able to communicate multiple layers of credibility lowers the risk factor for customers who want to make a safe investment. They will be willing to spend an extra 10% to have no doubt that you will deliver exactly what they want, rather than risk throwing away $28,000 on a contractor who may not come through. ❖

Bobby Parks is a former deck builder, frequent PDB *contributor, and owner of BP Consulting and Design. You can connect with him on Instagram: @bobbyparks007.*

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 3/4-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.

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 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).

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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

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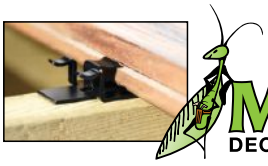

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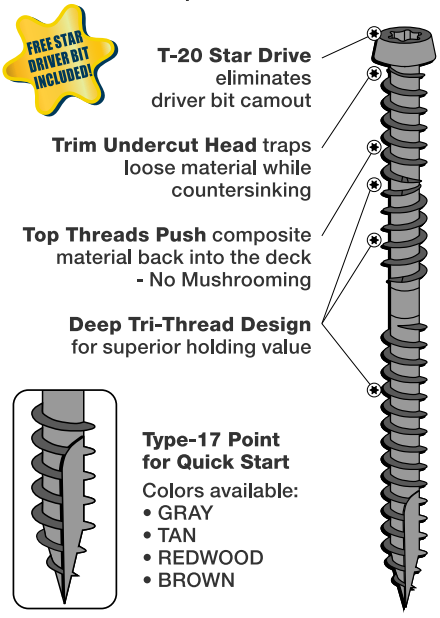

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Figure 3. The stair stringers were hung from a 2x6 connected to the rim joist with vertical blocking and a combination of structural screws and ThruLok bolts (A). The author reinforced the stringers with sistered 2x6s (B) and reinforced the connection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

Mike Gelsomino is a second-generation carpenter in New Rochelle, N.Y. @mikebuildstuff.

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ELECTRICAL CORDS CAN BE SUCH A DRAG.

PHOTO: TYLER VANKATWIJK

Designing With Decking

Elevate the style of your decks by adding borders and inlays

by Andrew Wormer

I built my first deck about 35 years ago, and remember that—given the tools I was working with and my level of expertise—it was all I could do to keep the ends of the 5/4x6 pressure-treated (PT) decking trimmed to length evenly. I was learning about ledgers and joists, and not thinking too much about borders and inlays then.

Now, of course, it's rare to see a deck without some sort of design detail that the builder created using decking, at least in the pages of *PDB*. That's mostly due to the skill level of the builders who are designing and building these decks, who in turn are inviting their clients to expand the scope of their projects and ask for these details. But I also think that it's partly in response to the wide range of hues available in composite and synthetic decking, which makes it easier to feature contrasting borders, patterns, and inlays. In many cases, the same techniques can be used on a wood deck by weaving together various wood species to create the design.

Blocking

Most of these design details require blocking between the joists for support, which must be installed during the framing stage. This is especially true when you're installing composite decking, which typically requires closer joist spacing for support than wood decking. In addition, most decking—wood or composite—should overhang end supports by no more than 3 inches. When planning and pricing an inlay or other decking design detail, be sure to include a generous allowance for the labor needed to install this blocking.

The fastest and easiest way to install 2-by blocking is on the flat, but Tacoma, Wash., deck builder (and frequent *PDB* contributor) Kim Katwijk points out that blocking is a lot stronger when it's oriented vertically, like a mini-joist. Vertical blocking is also better able to shed water and less likely to trap moisture between the blocking and the decking (**Figure 1**).

Whether the blocking is installed vertically or horizontally, covering the top surface with a self-adhering flashing membrane before installing the decking will help to protect it from water damage. Doubled rim and end joists,

Figure 1. Vertically oriented for drainage, blocking has been added to the deck framing in preparation for installing a picture-framed border.

Figure 2. A herringbone pattern formed by decking installed on the diagonal helps define a sitting area on a large composite deck (A). On a deck with multiple levels, contrasting borders, seam boards, and treads can be used to define transitions between areas and make the deck safer (B).

which often support a picture-frame border detail, also benefit from flashing installed over the top surface of the assembly.

Simple Borders

Picture framing a rectangular deck with a simple border is a great way to conceal the ends of the decking and to add visual interest to the deck. Doubling-up the size of the border with another course of decking will double the visual impact; using different-colored decking for the border can take the deck to the next level.

Picture-framing isn't limited to the borders of a deck. On larger decks, picture-framed decking can be used to visually define specific areas on the deck, such as dining areas and outdoor kitchens. Picture-frame details also improve safety, by helping to define deck edges, transitions between levels, and stairways (**Figure 2**).

One technique that Rhode Island builder Mike Valente uses to add interest to his picture-frame borders is to turn the field decking on the diagonal. By installing a contrasting double seam board in the middle of the deck (a common technique for avoiding butt joints in wide decks) and installing the field decking diagonally, Valente creates an interesting chevron pattern.

Installing decking on the diagonal can be fussy work—measuring the lengths of individual boards (accounting for the gaps between boards) and getting the mitered end cuts perfectly aligned—if the boards are cut to length prior to installation. To speed up the process while ensuring perfectly straight cut lines and an accurate layout, Valente installs the field decking first, allowing the ends of the decking to overlap the border areas that he has identified on the deck. Then he uses a track saw to cut out the areas where the seam boards and borders will be installed, setting the depth of the saw

FIGURE 1: BAYN WOOD; FIGURE 2: CALVIN CERILLI/BLUE CHIP DECKS

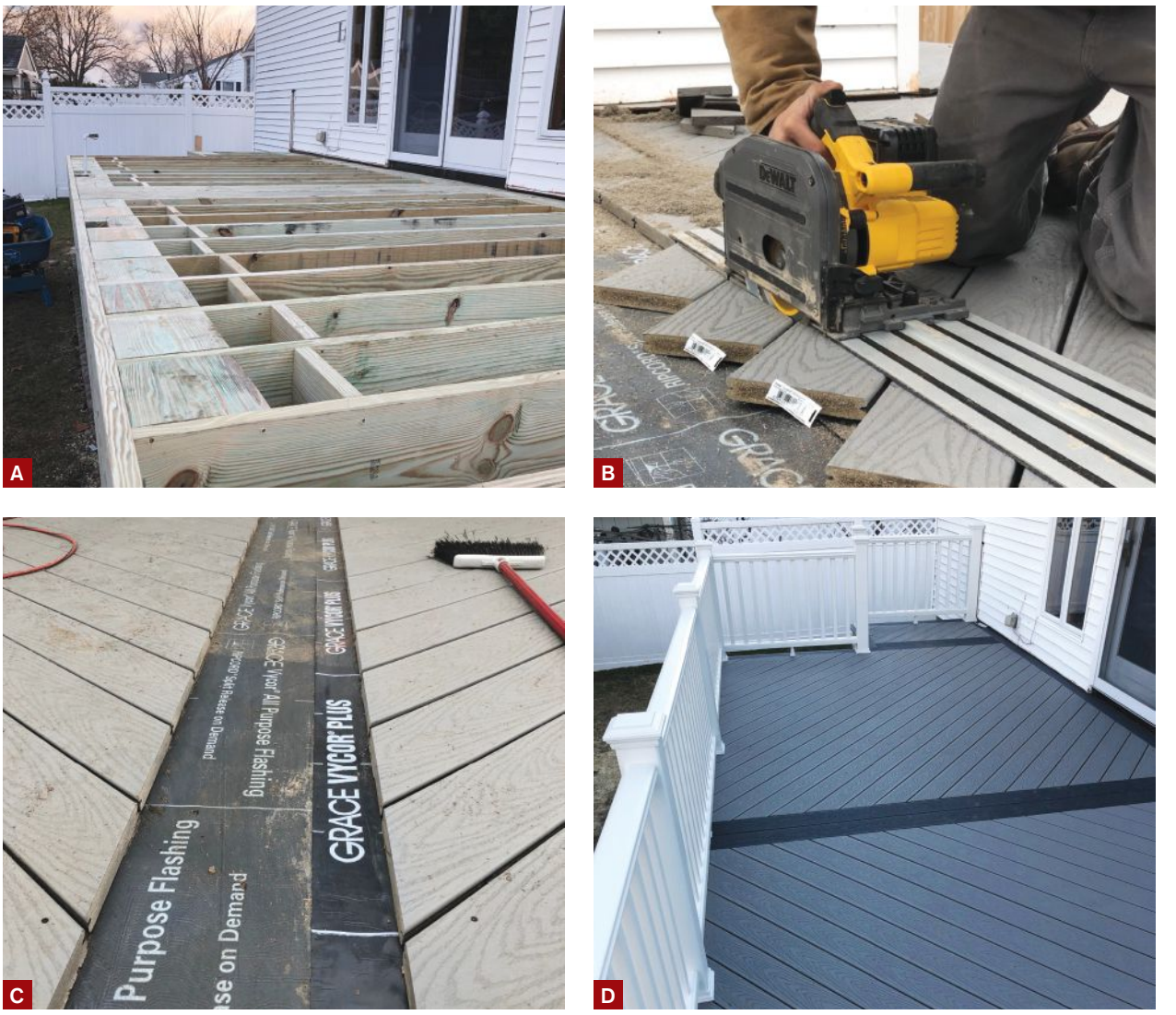

Figure 3. Blocking installed on the flat (A) doesn't drain as well as vertical blocking, so it should be protected with self-sealing flashing. When you're trimming the ends of decking installed on the diagonal (B), the depth of cut should be slightly less than the thickness of the decking to avoid cutting through the flashing membrane (C). By installing a seam board and chevron pattern, builder Mike Valente was able to avoid butt joints in the decking (D).

FIGURE 3: MIKE VALENTE

blade a hair less than the thickness of the decking to avoid cutting through the flashing that's on top of the framing and blocking underneath.

On the project shown here, Valente used Tiger Claw hidden fasteners to install the field decking and used FastenMaster's Cortex system, color-matched for Trex decking, to install the seam boards and the picture-frame border (**Figure 3**).

Patterns in Wood

Picture-framing designs aren't limited to composite decking. Even a standard builder-grade deck with 5/4x6 PT decking looks better when the cut edges of the decking are framed by a border. But Maryland deck builder Brendan Casey took this technique one step further on a recent tropical hardwood deck by mixing and matching decking species to create both a border and a basket-weave inlay pattern in a compact space (**Figure 4**).

The design suited a practical purpose. Some decking species are available only in shorter lengths, and certainly usually not available in anything approaching the 20-foot lengths of some composite decking materials. So to efficiently use shorter boards without creating a lot of unsightly butt joints, Casey designed the deck with a double picture-frame border and a matching crisscross inlay.

Figure 4. Ipe decking installed in a herringbone pattern adds an interesting twist to this wood deck's classic look (A). On a low deck (B), builder Brendan Casey framed the Brazilian teak decking with a Brazilian tigerwood inlay, fascia, and border. On another Brazilian teak and tigerwood deck, Casey installed a double picture-frame border and a matching crisscross inlay with a basketweave pattern in the center (C).

Figure 5. Special heating blankets make synthetic decking hot enough—around 220°F—to be pliable; here, Jeff Blotsky of Artistic Decks molds the hot decking around a wooden form (A). Once the boards cooled, he used them to create the unique curved picture-frame borders and inlays on this stylish deck (B, C).

FGIURE 4: BRENDAN CASEY; FIGURE 5: TYLER VANKATWIJK

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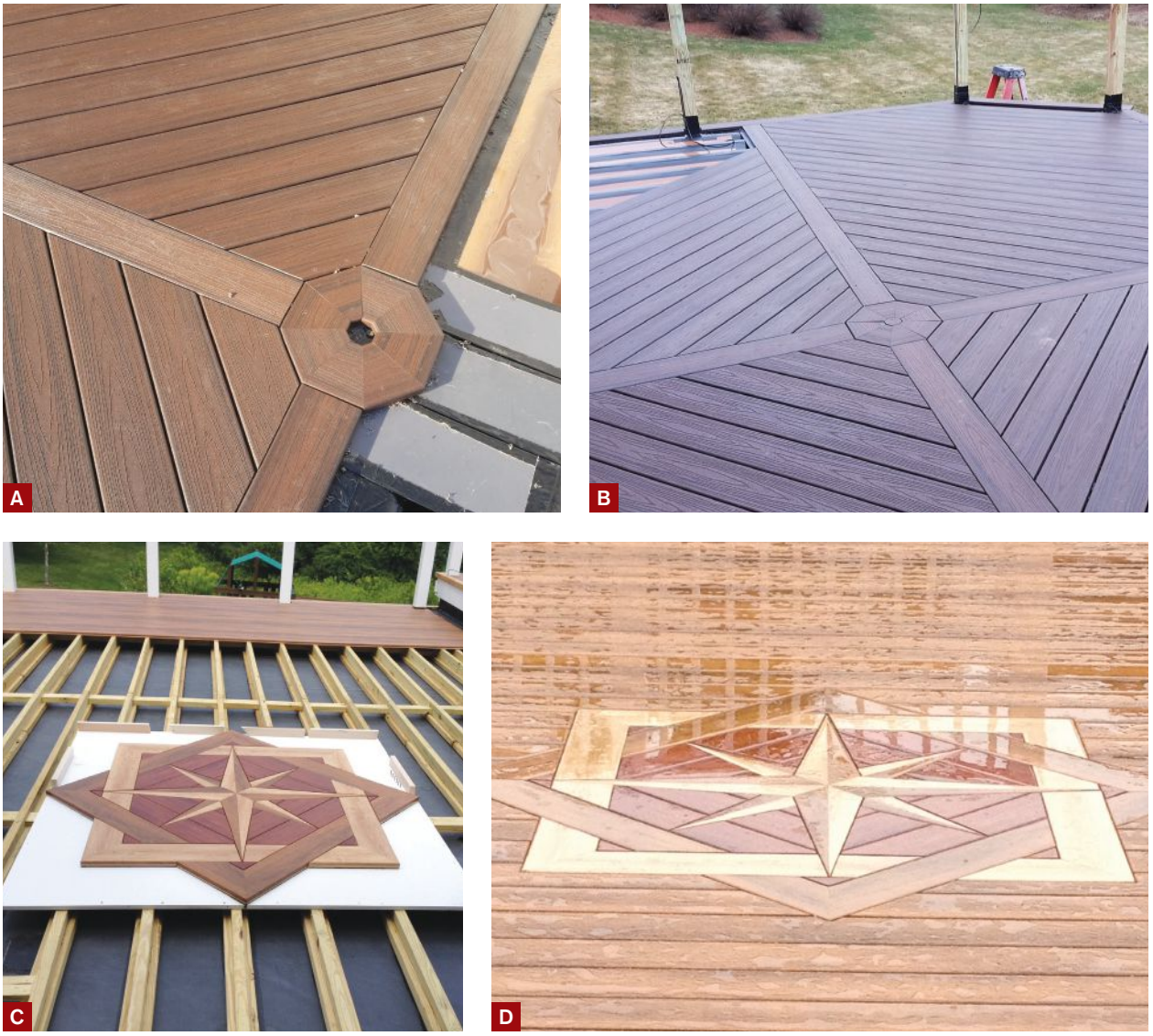

Figure 6. Whether simple or complex, inlays add an effective accent to any deck. On the deck at top (A, B), New Hampshire builder Pete Ciaraldi crafted a site-built octagonal centerpiece out of the decking. On the deck above (C, D), John Solari installed a prefabricated compass rose on inset framing, then filled in the field decking around the design.

FIGURE 6: A AND B, PETER CIARALDI; C AND D, JOHN SOLARI

To emphasize the design, Casey installed Brazilian teak decking in the field and created the basket-weave pattern in the center with Brazilian tigerwood decking. Before installing the decking, the crew prefinished the boards on all four sides and sealed all of the end cuts with wax.

Curves and Inlays

For the adventurous, curved borders and inlays are always an option. The key to this approach is uniformingly heating composite or synthetic decking so that it becomes pliable without being damaged structurally, then forming it to various shapes and patterns. Once cooled, the boards become rigid again and can be installed, often first serving as a template to transfer the pattern to the field decking (**Figure 5**).

It isn't necessary to invest in heat-forming blankets to add inlays to your repertoire (**Figure 6**). From simple geometric patterns to compass roses and other more elaborate designs, inlays can be custom-fabricated on site using contrasting decking colors. Prefabricated inlay kits are also available that are ready to install. ❖

Andrew Wormer is the editor of Professional Deck Builder *magazine.*


A

A Sublimated Texas Oasis

by Andrew Wormer

One of the surprising things about the cantilevered waterfall deck (**A**) overlooking this backyard oasis is that the decking—which looks like wood—is aluminum. Contractor Jamie Turrentine of Southwest Fence and Deck explains that a local fabricator makes the aluminum panels used for the decking and the privacy wall behind the deck, powder coating them to give them their color. Next—in a process called sublimation—each powder-coated panel is wrapped with a thin wood-grain transfer film, and after a vacuum is applied to remove air trapped between the powder coating and the transfer film, the aluminum panels are baked to fuse the decorative coating and volatilize the transfer, forming the panel's realistic grain and color.

Another feature in the design, by Randy Angell Designs, of Plano, Texas, is the sunken sitting area situated at one end of the pool, which has a drain and built-in sump pump in case of waves. Overhead, Turrentine built a remotely controlled sliding trellis supported by powder-coated steel columns (**B, C**). Custom-fabricated from powder-coated aluminum, the trellis folds out of the way when family and friends want to do some stargazing.

Cast-in-place concrete slabs act as geometric stepping stones for access to the sitting area (**D**). Cast concrete was also used as a hardscaping element and for coping around the gunite pool, which was built by Pool Environments, also of Plano. ❖

Andrew Wormer is editor of PDB.


B


C


D

PHOTOS COURTESY SOUTHWEST FENCE AND DECK

JOE HAGEN
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Cincinnati, OH

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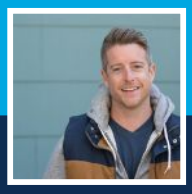

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[1] When used with ZIP System® sheathing or R-sheathing in roof and wall applications and in accordance with ZIP System® sheathing and tape Installation Manual instructions. See 180-Day Exposure Guarantee and 30-Year Limited Warranty for details.
[2] When applied in accordance with ZIP System® sheathing and tape Installation Manual instructions.

No two jobs are alike, and, whether big or small, every job presents its own set of challenges to troubleshoot. Whether you're trying to simplify recessed window flashing or ensure a snug, watertight fit around windows and door frames, achieving continuity of air and water barriers is always a stage that deserves attention to detail. Since 2006, ZIP System® products have been streamlining the way teams reach rough dry-in and ensure protection against water and air leaks in high-performance builds. Now with 10 different integrated sheathing solutions and 13 flashing options, ZIP System® building enclosure products offer a full spectrum of combinations so builders can find the right integrated system for their job.

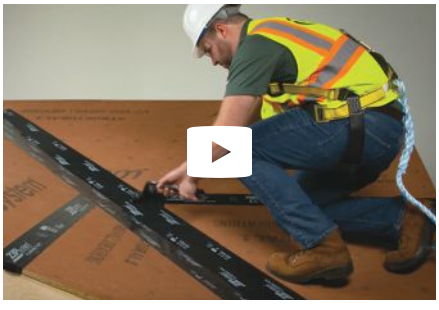
With a recent expansion of its ZIP System™ sealing solutions line, the ZIP System brand now offers five ZIP System stretch tape options and five ZIP System flashing (straight) tapes as well as ZIP System™ liquid flash products. In addition to new widths and lengths of tape, the company enhanced the tape formula to provide an even stronger bond in a broader range of temperatures.

"While builders and framers may not notice much of a visual difference to our flashing tapes, with this formula enhancement, we now warrant application of ZIP System™ tapes down to 0 degrees Fahrenheit," said ZIP System product director Allen Sealock.

The new tape sizes in varying lengths and widths provide a solution for multiple scenarios on the jobsite. For example, shorter rolls can be used for smaller remodeling projects while wider rolls can help easily seal roof valleys with a single piece of tape.

For added peace of mind, all ZIP System tapes are backed by a 180-day Exposure Guarantee and a 30-year limited warranty[1], and all tapes can be applied between 0 degrees and 120 degrees Fahrenheit[2].

"True to Huber Engineered Woods' innovation philosophy, these new products are a direct result of customer requests," said David Wescott, product director of accessories at Huber. "They have also been put through the rigorous R&D process our customers expect from our products."



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BY SYMONE GARVETT

3

4

1. Floating Floor System
Daltile's RevoTile system adapts the company's porcelain tile offerings to a new floating floor system designed to reduce installation time. Contractors follow three steps: Place underlayment, with no need to apply mortar; click tiles together over the underlayment; and grout immediately. The system may be installed over existing flooring and is easily removed when necessary. It is available in three sizes—12 inches by 24 inches, 6 inches by 24 inches, and 6 inches by 36 inches—and in a variety of marble, wood, stone, and concrete looks. Contact a local distributor for pricing. daltile.com

2. Thin, Lightweight Brick
Made of real fired clay, Authintic Brick from Meridian Brick is 3 inches thinner and 70% lighter than traditional brick. The product can be installed nearly anywhere, including on vaulted ceilings, as fireplace facings, and for backsplashes. It's offered in 23 standard colors and in three sizes: 7 7/8 inches by 2 1/4 inches, 7 7/8 inches by 2 3/4 inches, and 9 5/8 inches by 2 5/8 inches. Contact a local distributor for pricing. authinticbrick.com

3. Tankless Unit With Scale Prevention
According to A.O. Smith, the proprietary X3 Scale Prevention Technology in its new line of residential gas/propane tankless water-heater units eliminates the need for regular scale-related maintenance (as well as the need for costly isolation valves) and extends the life of the units. The new line is available in three sizes, with maximum Btu/h inputs of 160K, 180K, and 199K. Units operate on a 1/2-inch gas line and vent with 2-inch PVC. They include an integrated recirculation pump and are Energy-Star qualified with UEFs up to 0.93. We found the AT-160X3P for about $2,300. hotwater.com

4. Energy-Efficient Radon Fan
Fantech is following up its first electronically commutated radon fan with a new model, the Rn2EC. According to the manufacturer, because of variations in soil densities, different homes require different fan flows and pressures to prevent radon infiltration. The Rn2EC motor's versatility lets radon mitigators accommodate more soil types with a single unit, optimize the unit's energy efficiency and lifespan, and lower noise and vibration levels. Pricing starts around $300. fantech.net

5. Composite Board Cladding
Trex Co. is expanding beyond composite decking with the launch of Trex Cladding, a composite-board cladding system derived from square-edge Trex Transcend deck boards. The boards are made from 95% reclaimed wood scrap and recycled plastic and are available in three board lengths and 10 color options nationwide. The boards, which may be applied horizontally or vertically, feature an open-joint façade system designed to provide airflow over a rainscreen assembly. Contact a local distributor for pricing. trex.com

6. Compact Polyurethane Foam
Icynene-Lapolla offers its new low-pressure, low-density, two-component spray polyurethane foam in two sizes: OC-450 covers a maximum of 450 board feet and OC-1350 covers a maximum of 1,350 board feet. According to the manufacturer, each option provides a compact size for contractors looking to complete touch-ups on the job. The material provides an initial R-value of 7.2 and aged R-value of 6.0 when applied at a 1-inch thickness. Contact a local distributor for pricing. icynene-lapolla.com

7. One-Man Hole Digger
The 242H one-man hole digger in General Equipment Co.'s new Epic Series has a "Power-Grip" operator handle to maximize control, strength, and balance while dampening vibrations and an "Auger-Lok" system for removing stuck augers. Powered by an all-position, four-stroke Honda GX35 engine, it offers 1.3 horsepower with a maximum digging torque of 51 foot-pounds and can dig holes up to 8 inches in diameter. It weighs 28 pounds without an auger. The manufacturer says it will be available in the second quarter of 2020. Suggested retail price is about $950. generalequip.com

8. Wood-Grain Rail Finishes
Feeney has added a new series of wood-grain top-rail finishes as a custom option for its Design Rail series. The finishes are available in three wood grains: cherry, walnut, and weathered gray. Like all Feeney powder-coat finishes, the Wood Grain Top Rail adheres to AAMA 2604 standards for impact and weather resistance and color retention. It can be used with any standard or custom DesignRail frame color and matched to the wood used in a deck. Contact a local distributor for pricing. feeneyinc.com


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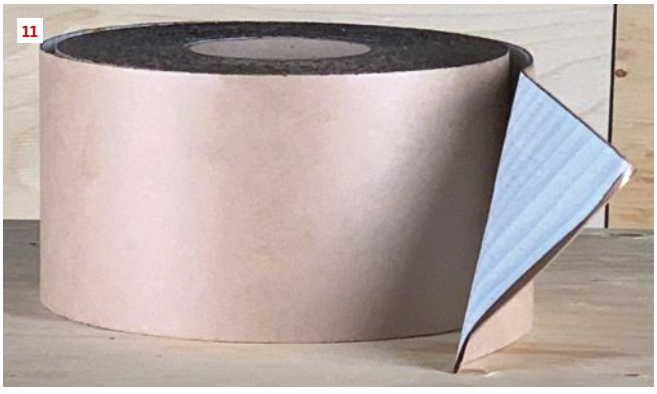

9. Bidet Toilet and Seats

America Standard's SpaLet system of personal hygiene options includes the Advanced Clean 100 SpaLet Bidet Toilet and Advanced Clean SpaLet Bidet Seats. Customizable features include nozzle position, water temperature, seat temperature, and spray strength. Each SpaLet product is equipped with self-cleaning dual nozzles that direct water to both the front and rear areas. The extra convenience is ideal for pre- and post-partum, seniors, or anyone with mobility issues. Pricing for the toilet ranges from $2,600 to $4,000. americanstandard-us.com

10. Vertical Cable Railing

DSI's Westbury VertiCable railing comes in pre-assembled sections with the thin, vertical, steel cables pretensioned to minimize the need for adjustments. Available in multiple standard colors and textures, VertiCable is powder coated with DSI's 10-step process to provide low maintenance and long-term durability. The components are lightweight and engineered for easy installation, according to the manufacturer. A 5-foot-by-36-inch section costs about $320. diggerspecialties.com

11. Multipurpose Roof Tape

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12. Concrete Repair Epoxies

Designed for concrete-crack repairs, Simpson Strong-Tie's new line of structural epoxy products have an improved viscosity range, with accelerated cure times, and can be installed at temperatures between 40°F and 110°F, according to the manufacturer. The products have been formulated for retrofit and repair work in light-frame, tilt-wall, water treatment, bridge and marine, and other types of construction. An upgraded suite of dispensing tools and injection systems also helps make applications fast, easy, and clean. Contact a local distributor for pricing. strongtie.com

A Prime Cordless 12-Inch Miter Saw

BY MARK CLEMENT

My work runs the gamut from trim, decks, and light framing to maintenance and service work, and a miter saw is usually at the center of my operations. My measure of a "good" saw is one that can stand tall all over the place, whether I'm setting up a cutting station for trimming out a room or lugging the saw into a backyard for a quick service call setup. Milwaukee's new M18 Fuel dual bevel 12-inch sliding compound miter saw fits that definition, and then some.

I've been using this big saw for a couple of months on all kinds of jobs, giving me an opportunity to become familiar with the saw's bevel adjustments, blade guard and LED blade light, and battery exchange. I looked at dust collection; I checked the saw's accuracy; I changed blades, not only to see how well the saw cuts with different blades, but to see how easy—or hard—the blade-change operation is.

OUT OF THE BOX

After pulling the saw out of the box (I tested the kit version, or 2739-21HD, which includes a battery, charger, bag, and blade) and cutting away the packaging (no assembly required), I found that it wasn't just accurate; it was sublimely accurate. And while I didn't cut crown on the flat, the bevel detent tabs are dead-on and easily deployed. I've had saws that required launching an investigation to tune them up—and even then they were finicky. Milwaukee's screws and tabs are easy to see and operate, and intuitive to tune up, if needed.

The Milwaukee M18 Fuel 12-inch sliding compound miter saw, available in kit form (with multi-voltage charger and 12-Ah battery) or as a bare tool, has a compact footprint and weighs about 50 pounds (with battery).

This kit comes with the M18 Redlithium high-output HD12.0-Ah battery and M18/M12 multi-voltage charger—sweet if you're not on the system and sweet if you are because the battery charge lasts so long. It also includes a high-quality 60-tooth blade—easily a hundred bucks at retail and miles better than your average "included blade."

The adjustments are excellent. Detents are solid and positive; handles don't stick; and overriding a detent is a snap. The pointers are big, keenly visible, and sharp. They point; they don't suggest.

TRIM AND TALL STOCK

I've been in the 10-inch-miter-saw universe a few years, all the while ruing the day I let my previous 12-inch saw go. The Milwaukee's 12-inch size alone was refreshing enough simply cutting 5 1/2-inch ogee base nested. But the fact that the blade housing is notched to cut up to 6 3/4-inch vertical stock (7 1/2-inch nested crown) is gold-standard good. Mickey, the legendary trainer in the movie "Rocky," says (yells) something about something that "weakens legs." Tipping a 10-inch SCMS and cutting basic trim flat "slows cutting" just as dramatically, in my opinion.

Whether cutting southern yellow pine PT decking, 2-by framing, or finger-jointed and primed trim, the blade delivered little to no tear-out and glass-smooth end grain. The saw started smoothly and ran with a pleasant hum. After the cut, the electric brake eased the blade to a safe, smooth stop, a nice feature in a big saw like this.

POWER

A miter saw is central to my setups, where I turn to it over and over again to cut 2-bys for framing and blocking, 4x4 posts, decking and trim, and even small parts. In all cases, the Milwaukee delivered. I really looked for a difference—some kind of bog-down, resistance ... anything—where I could call the saw out as cordless and cool, but not quite ready for prime time. I couldn't. This saw is definitely ready for prime time.

I don't use any saw "all day," so I can't claim it can cut framing or 4x4s all day on a single charge, though it probably could get darn close (Milwaukee says to expect "up to 330 cuts per charge"). On the

Photos by Mark Clement

Weigh In!
Want to test a new tool or share a tool-related testimonial, gripe, or technique? Contact us at tools@hanleywood.com.

Precise cuts are easy, thanks to the visibility offered by the louvered blade guard (left) and fine-tuneable 22.5-degree and 33.9-degree bevel detents (above).

other hand, I would know if I were constantly changing batteries. In trim mode, I went days before I was at two bars and needed a lunch-break recharge. In rough carpentry mode, the duress is greater, but a lunchtime charge (or spare battery, which I have from my Milwaukee string trimmer; also awesome) makes running out of lithium-ion magic unlikely, except *maybe* on a high-production site.

OTHER FEATURES, WELL DONE

Dust. Unless hooked up to dust collection, all miter saws let the powdery stuff past the bag. The Milwaukee channels the big stuff into its ample, formed dust bag really well. On exterior sites, it ejects dust in an impressive rooster tail.

Blade change. The guard rolls up high on the blade housing, exposing the arbor for easy blade changes. The saw has an easily-accessible push-in spindle lock and a hex wrench for tightening and loosening the blade bolt.

Mobility. The 2739-21HD is the same shape and has the same footprint as a corded model, but it's noticeably lighter (Milwaukee says 15%). It comes with a pair of screw-on side handles, but I find its built-in top handle offers a nice balance point for holding onto the saw during transport. I still use two hands: one on the handle, and one under the saw.

Guard and blade light. The guard is clear plastic and—thank you—louvered. It took a little practice to locate the louvers, but they're there and they're great for sighting the blade precisely at the cut line. Additionally, the Shadow Cut Line LED light is both terrific and accurate, though I used the saw for a week before figuring out there's also a switch to turn it on without engaging the blade.

Whether you're a dedicated trimmer, someone who mainly uses miter saws to cut blocking for framing, or a deck builder looking for one saw that will do a little bit of everything without being tied to AC power, this saw is a winner from frame to finish, and at all stops in between. $850 (kit). milwaukeetool.com

Mark Clement is a carpenter, member of the JLC Live build team, and author of the novel The Carpenter's Notebook. *Find him on Instagram: @myfixituplife.*

The blade guard rolls up and out of the way for access to the arbor during blade changes (top). There's a push-button spindle lock on the right-hand side of the blade (above).

Classifieds

May Advertising Index

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BY CLAYTON DEKORNE

Review: 'The Remodeling Life'

In his recent book, Paul Winans—with 20 years as a business owner and 20 years as a facilitator for Remodelers Advantage under his belt—serves up a thoughtful read for remodeling business owners. Once I began reading *The Remodeling Life*, I couldn't put it down. It's a brutally honest memoir in which Paul artfully interweaves his own experience with analysis of what he learned along the way.

He has organized this evolution of self and business into three parts—"First, Remodeling Yourself," "Remodel Your Team," and "Remodel Your Business"—and into each of these sections, he sifts

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revelations from a variety of resources (both books and people) that he has drawn from over his career and lessons learned while counseling a wide range of other company owners. The result is a highly entertaining but profound resource. It's not a prescription for how to grow a business. Nor is it purely inspirational. Rather, this small volume offers guidance by providing models to adapt to your own personality, market, and company trajectory. Among the guiding imperatives it offers, I found the following most engaging:

Be honest. At the beginning of his book, Paul quotes General Colin L. Powell: "There are no secrets to success. It is the result of preparation, hard work, and learning from failure." Though profoundly true, this is much easier to say than to live. The crux is in knowing how to prepare and what one should work on. Paul shows us that it's in the last part—"learning from failure"—where the right plan and a focused understanding of work are revealed. Learning to be a better business leader starts with being honest about our own failures.

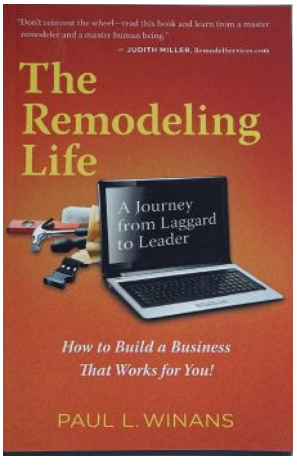
I won't go into detail describing Paul's failures. They are, in some respects, moot. Not entirely, of course, because in revealing them, Paul is modeling what we each need to do to "get out of our own way" to allow our fellow workers and our company to flourish. Suffice to say, you will be compelled to be honest in order to succeed.

Build a team. Paul's own path to being an effective leader took off once he learned to get out of his own way, learned to face his limits, and put systems and personnel in place to complement his strengths and make up for his weaknesses. Watching that unfold for Paul on the pages of this book, you gain a clear sense of what it means to build an effective team.

Part 2 ("Remodel Your Team") of this book brings into sharp focus a much-discussed problem in our industry today: the need to hire good labor and build a strong company culture to attract and retain workers. The practical insight Paul brings to the topic—showing what hiring poorly looks like for an individual, how it impacts the company, and how this cycle is shaping the industry as a whole—gives me hope that the current lack of skilled labor is solvable, one company at a time.

Certainly, there are other ways to measure business success than the ways that work for Paul. (Not everyone needs the overhead of a separate office or shop, for example. But Paul is sensitive to individual differences and gives ideas for keeping separation between work and home life with an in-home office.) Nor will everyone have the same long-term goals or necessarily need to sell their business in order to succeed. However you measure success in business—whether in profits or awards or the impact on others as an employer and craftsman, or some combination of these—contemplation of Paul's journey will awaken an important dialogue you need to have, not just with your business partners, but with yourself. Meaningful change always begins from within.

Clayton DeKorne is chief editor of JLC.



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