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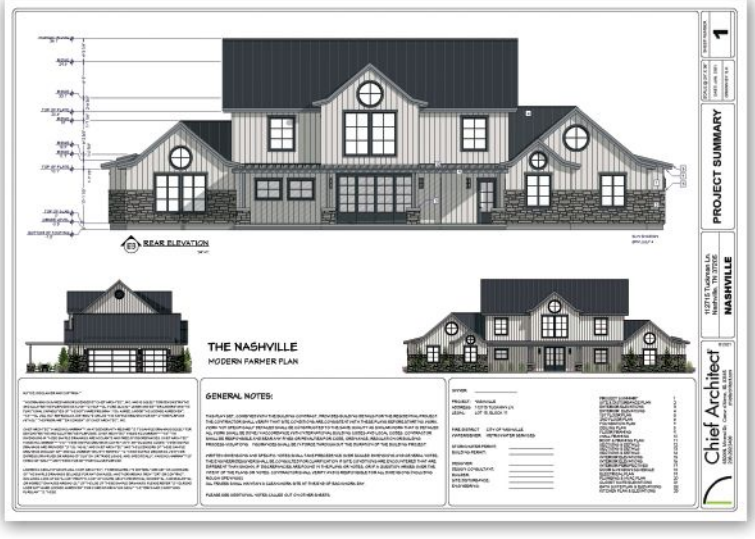

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On the cover: Carl Dudley, of C.D. Construction's Home Calls, in Fletcher, Vt., clads a large, three-story home with panelized fiber-cement shingles in Northern Vermont. Photo by Tim Healey. See the story on page 15.

FEATURES

DEPARTMENTS

THE JOURNAL OF LIGHT CONSTRUCTION (ISSN 1056-828X), Volume 39, Number 7, is published 10 times per year (January, February, March, April, May, June, July/August, September, October, November/December) by Hanley Wood, 1152 15th St. NW, Suite 750, Washington, DC 20005. Annual subscription rate for qualified readers in the construction trades: $39.95; nonqualified annual subscription rate: $59.95. Frequency of all magazines subject to change without notice. Double issues may be published, which count as 2 issues. Publisher reserves the right to determine recipient qualification. Canada Post Registration #40612608/G.S.T. number: R-120931738. Canadian return address: IMEX, PO Box 25542, London, ON N6C 6B2. Periodicals postage paid at Washington, DC, and at additional mailing offices. POSTMASTER: Send address changes to JLC, Box 3530 Northbrook IL 60065-3530.

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BY DAVE HOLBROOK

Getting the Most Out of a Track Saw

Track saws offer precise cutting of sheet goods **(1)**. To avoid splintered veneer, first make a shallow pass **(2)**, then recut at full depth. Black friction strips on the guide rail grip the cutting surface; the splinter guard edge (white, at right in photo) can drift and delaminate in use **(3)**. The author bolsters the splinter guard with vinyl flashing tape to help prevent dislocation **(4)**. For parallel cutting, measure to the back edge of the rail instead of to a time-worn splinter guard **(5)**.

Photos by Dave Holbrook

Considering the accessories you're likely to end up wanting once you've bought a track saw, it can quickly become one of the pricier tools in your arsenal. However, I soon found it to be one of those tools you wonder how you did without. I bought my current Festool saw, along with a pair of 55-inch guide rails, in 2013, and it has since joined the basic lineup of my traveling tool kit.

Track saws vs. table saws. Some of the hype claims a track saw will put your table saw out to pasture; I wouldn't go that far. It's a great companion tool to a table saw, for sure. Lay the guide rail at one edge of a piece of live-edge or curved lumber, slice it straight, and run your new edge against the table saw fence to make a flawlessly straight board. Arguably, a track saw beats a table saw for processing cumbersome sheet goods, from sheathing to finish plywood **(1)**; sheets can be cut into manageable pieces lying flat on sawhorses, or on the floor, with complete precision. A parallel rip, though, is best performed on the table saw, because for repeat and truly parallel cuts, a locked-in fence position is more reliable than a track that's set with your tape measure and eye. So, I'll lighten a sheet by making a substantial initial rip using the track saw, but make subsequent, accurate parallel rips on the table saw.

Cutting. A variety of saw blades are available, depending upon the task—including crosscutting and ripping—and material. I stick with one blade 99% of the time, a proprietary 48-tooth ATB (alternate tooth bevel) blade. I don't cheap out when it comes to tools, and there's little difference in cost between these typically 6 1/2-inch blades and their 10- and 12-inch compatriots. But cutting plywood, which is probably 80% of my application, is successfully done with a single blade type, given one caution: To avoid tear-out when crosscutting, I always first make a shallow cut **(2)**, severing only the top veneer, and then I reset the blade depth to complete the cut. This is quick and simple to do with a track saw.

I don't count solely on the vinyl strip—allegedly the "splinter guard"—at the edge of the rail to prevent or subdue tear-out. In fact, I've come to rely less on the splinter guard even for initial cut alignment, its equally touted application. When it's new, it is reliable referenced against your tick-mark. But with repeat use and attendant abuse, the strip becomes frayed, dislocated, and partly detached, especially at either end **(3)**, which is typically where you line up your cut. Plywood, along with every other material, isn't dropping in price, and spoiling a sheet is all too easy. So, when my edge is in weathered condition, I make a slight, exploratory entry nick to make sure the blade is lined up on the mark and adjust the track position accordingly.

Replacement guard strip is only slightly south of $50, so if you're replacing yours, first thoroughly clean the old adhesive from the


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Friction strips are grippy, but track clamps ensure the line is held **(6)**. Safety is enhanced by the fully housed saw blade **(7)**, exposed only during plunge-cutting. Bevel cuts track along the rail edge without any adjustment to position. Here, the author miter-cuts 10-foot black walnut plywood using a 118-inch stock rail **(8)**. A TSO guide rail square converts a rail into a 90-degree crosscutter **(9)**. Without a vacuum hookup, sawdust quickly gums up the rail; constant clearing is needed **(10)**.

track with mineral spirits, followed by denatured alcohol, which, unlike mineral spirits, leaves no chemical trace of its own to compromise adhesion. I've taken to reinforcing replacement strips with a band of vinyl tape **(4)**. Make your first cut to trim the new edge, then enjoy the renewed precision while it lasts.

When I make parallel cuts using a track saw, I first register the entry position with a test nick, then measure from the opposite edge of the material to the back edge of the track **(5)**, rather than referencing the strip edge. I then position the far end of the track to that exact back-edge dimension, double-check both end dimensions, and make the cut. While the friction strips on the underside of the rail do a fairly miraculous job of anchoring it to the material, an accidental bump or shift is still possible. Track clamps instill peace of mind and should be an early buy on your accessory list **(6)**.

Avoiding kickbacks. When I was first familiarizing myself with a track saw, I neglected to ensure that its shoe groove was correctly engaged with the rail, and I managed to saw a small kerf into the rail itself. Since then, I've gotten in the habit of sliding the saw back and forth on the track to check engagement before pulling the trigger. And once you do pull the trigger, wait for the saw to come up to speed, about one second, before plunging into the cut. If you don't, it'll kick back. Plunging is how the saw is engaged and is ergonomically intuitive. When you are done cutting, the spring-loaded retrieval allows you to set the saw down just about anywhere, as the blade is completely and safely enclosed **(7)**.

Splinter guard. The saw can be dialed in to snugly fit the rail, eliminating lateral movement. I'm commonly on jobsites where more than one carpenter has a saw and rails, and we interchange equipment on occasion. This highlights the odd fact that one saw of the same make can trim the splinter guard slightly differently from another, so it fits the rail tighter or looser. Finding a splinter guard thus altered is annoying, but ultimately adaptable. It's just something to be aware of when a 1/64-inch difference matters to your work.

Bevel cuts. Track saws are designed to enter the cut line at the exact same point whether the cut is square or beveled **(8)**, so there is no adjustment needed in approach. Although the body of the saw is heeled out over the track edge during the cut, it remains smooth and stable in action and delivers a glue-ready miter. A mild back-bevel of 5 degrees or so is a great aid to executing scribed cut lines, whether you're prepping a board for scribing or actually cutting to the scribed line, depending upon its complexity. I'll often shift the track along a scribe line and remove 99% of the waste material with the track saw before final planing or belt sanding to the line.

Similarly, door edges are easily beveled along the closing edge with a track saw, and door bottoms trimmed just as readily. Again, to avoid chipping the edge when trimming a door to length, I'll first make a shallow cut through the surface veneer only.

Accessories. Among the several accessories available that maximize this tool's versatility, a parallel guide kit promises quick setup and controlled accuracy for repeat parallel rips. Maybe I'll get one. Rail clamps, as already stated, are basic essentials.

I recently acquired a GRS-16 guide rail square **(9)** that cam-clamps

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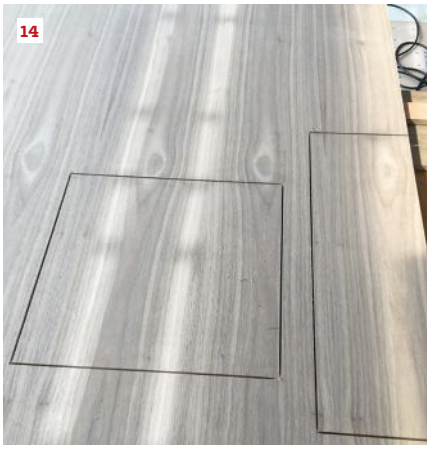

Rail connectors allow for longer guide rails but don't guarantee perfect alignment. Keep a slight gap between segments and confirm true alignment with a separate straightedge **(11)**. Proprietary set screws become distorted with repeat use; the author replaces them with 5x5-mm hex-socket screws **(12)**. This limit stop slides and clamps onto the rail at any selected position, preventing accidental advancement of the cut **(13)**. Precise, interior plunge cuts are quickly made **(14)**. Having a selection of rail lengths enhances the flexibility of the track saw system **(15)**.

onto the rail edge and sets you up for accurate 90-degree crosscuts. I've found that the accuracy is best on narrower cuts, but double-check with a good square when you're cutting across something as wide as a 24-inch panel. Apparently, using a guide rail square at both ends of the rail ensures total accuracy, but I haven't tried it or bought a second rail square; that seems a little fussy, and expensive for the perceived convenience. Festool also offers a similarly functioning adjustable protractor for angle cuts.

A guard rail deflector helps ease the vacuum hose over the end of the rail, which can otherwise drag and resist forward momentum.

A tool-actuated vacuum or a dust collector should be considered a primary accessory, since it beautifully controls sawdust, which otherwise accumulates on the track and jams the slide action **(10)**. When I'm making a few quick cuts, I sometimes skip the vac hookup, but then I end up needing to sweep the rail clean between every cut. Bluetooth-equipped batteries actuate paired dust collection with Festool's cordless saw, but, for me, the vacuum hose is a bigger drag on movement than the cord.

Guide rail connectors allow you to assemble multiple rails to unlimited lengths **(11)**, with the caution that a continuous straight edge isn't automatically provided; I always check the connection against a reliable, second straightedge. The slots in the set screws provided by Festool also quickly strip out; I've replaced mine with 5x5-mm hex-head units **(12)**. A limit stop **(13)** is useful when you want to prevent overtravel, say in an interior cutout operation **(14)**. While blade progress remains visible during cutting, a stop firmly guards against the oops factor.

If you're careful about ensuring straight connections, a selection of shorter rails **(15)** will serve just about all your needs; single rails up to nearly 10 feet in length are quick and perfectly straight but almost painfully expensive.

Dave Holbrook is a freelance carpenter and a JLC *contributing editor, in South Orleans, Mass.*

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Q My client has a failing concrete porch deck with a crumbling surface. A recent effort to fix it with a layer of stamped concrete failed, and the owner is looking for advice on what to do next. Would tile be a valid solution?

A *Bill Palmer, editor of woc360.com, a Fellow of the American Concrete Institute, a licensed professional engineer, and former editor of* Concrete Construction, *responds*: There are two failures here: the spalling stamped-concrete topping, and the original surface of the concrete matrix.

The reason for the original surface failure could be freeze/thaw cycling. If the concrete at the surface doesn't have the proper air-void system, then it will scale or spall, especially if de-icing chemicals are used. Unless the concrete had a good air-void system initially, there's no way to create one, so you will need to prevent moisture from getting in. If the failure is more of a dusting problem, then the cause could be overfinishing of the surface, finishing the bleed water into the surface (or "blessing" the surface with water while finishing), or a lack of curing. Understanding the cause of the problem will help you decide on the best way to move forward.

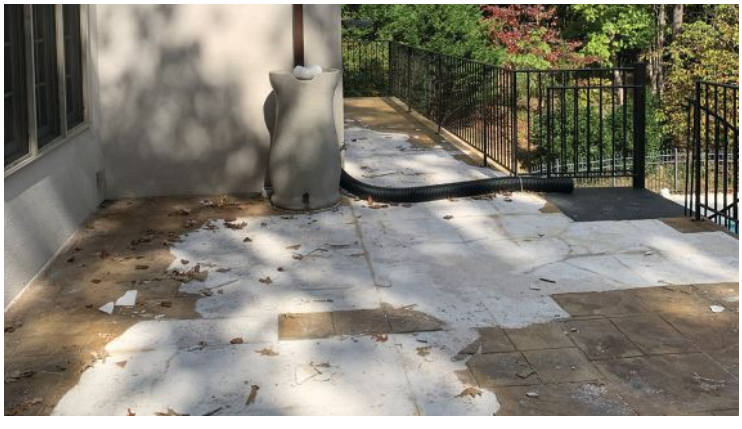
If the problem is only with the surface of the original concrete matrix and the underlying concrete is sound, then one good approach would be a concrete topping. Toppings (or overlays) come in two forms, bonded or unbonded. A bonded topping can be much thinner, but it does need to be completely bonded to the underlying concrete. A so-called partially bonded topping is a disaster waiting to happen, perhaps like the decorative concrete topping that failed. More on that in a bit.

An unbonded topping is basically a completely new slab placed on top of the old slab. Since it's atop concrete, it has a nice strong subbase, but that base must be relatively flat and stable, and there must be a definitive way to prevent bonding. The bond breaker could be a vapor retarder, which would both prevent bonding and act as a slip sheet for the new topping to help prevent random cracking from shrinkage. The unbonded topping needs to be designed as if it were a new slab, which means thick enough to manage the loads and properly jointed.

Despite the failure of the decorative topping, a bonded topping could still be a good solution. Obviously, the substrate concrete must be sound—any loose or spalling surface must be removed, and there must be no contaminants on the surface and no moving cracks. Since a bonded topping doesn't carry any significant load on its own, it must be fully bonded to the base slab. To assure that bond, a good, rough surface is needed, which can be accomplished with a sandblaster. Next, you must thoroughly clean the surface, typically by vacuuming the surface to remove all dust, prior to installing the overlay. Then pre-wet the surface to prevent it from absorbing water from the topping mix. Finally, a bonding grout can improve your success—either a cementitious material or an epoxy. Finish by cutting joints into the topping to exactly match those in the base concrete; otherwise, the joints will reflect through.

From the photo of this project (below), it's clear that the attempt to fix the surface with a thin decorative topping failed miserably. That was likely due to insufficient surface preparation. Either that or the underlying concrete is soft or defective and is simply incapable of supporting the loads. In that case, one solution would be to isolate the original base material and place an unbonded topping, although that would need to be at least 4 inches thick, which might not work with existing doors and steps. Another solution would be to use an isolating membrane and install tiles.

To learn more about successfully installing toppings, get a copy of the recently published "Guide to the Design and Construction of Concrete Toppings for Buildings" from the American Society of Concrete Contractors (ASCC) (ascconline.org).



Here a thin, stamped concrete overlay has failed to bond properly to a defective concrete slab. To fix the problem, an isolation membrane should be applied to the prepped and cleaned slab, followed by tile or an unbonded topping slab.

Photo by John Carroll

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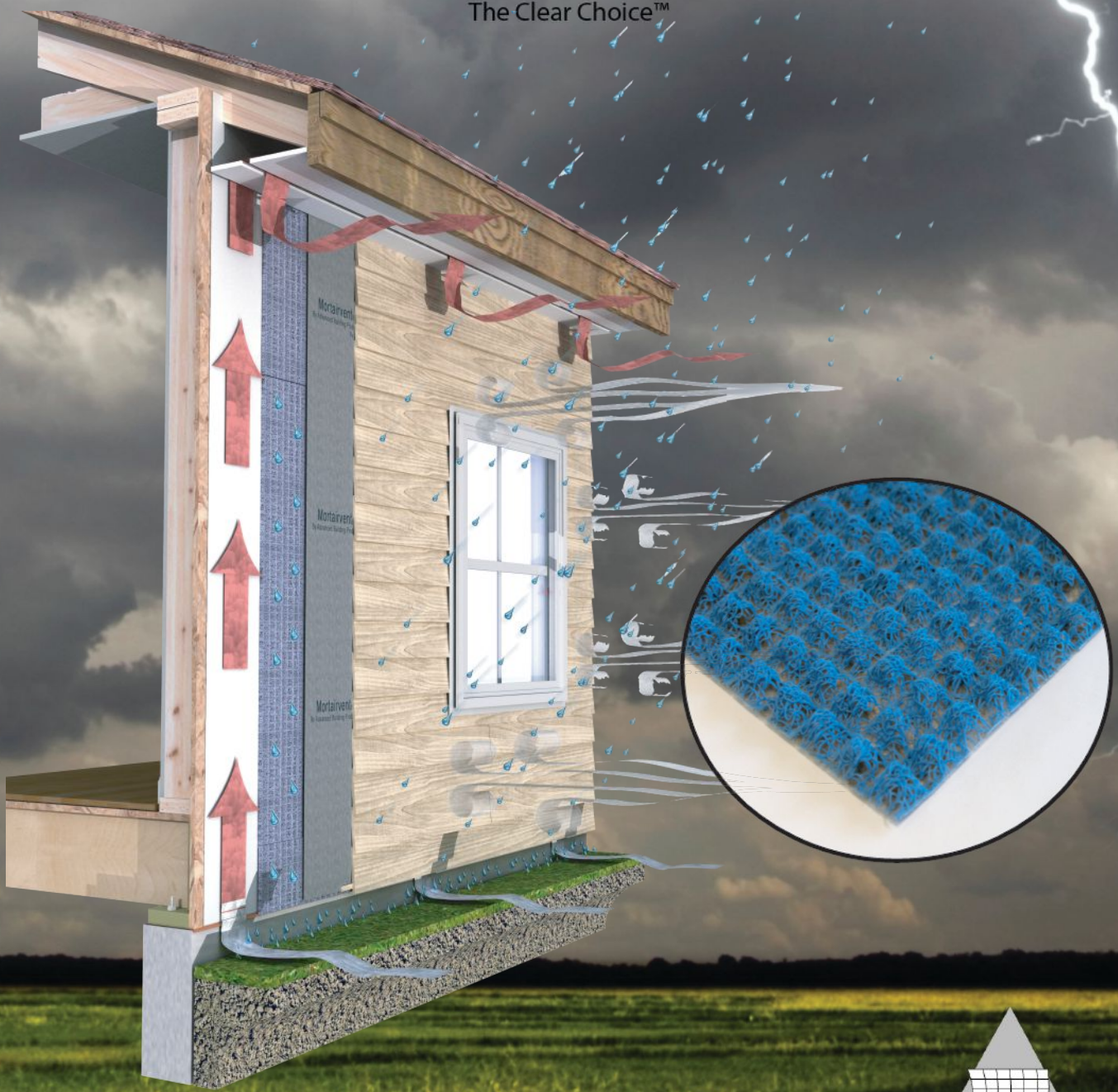

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Installing an All-Shingle Exterior With Fiber Cement Panels

BY CARL AND DARRYL DUDLEY

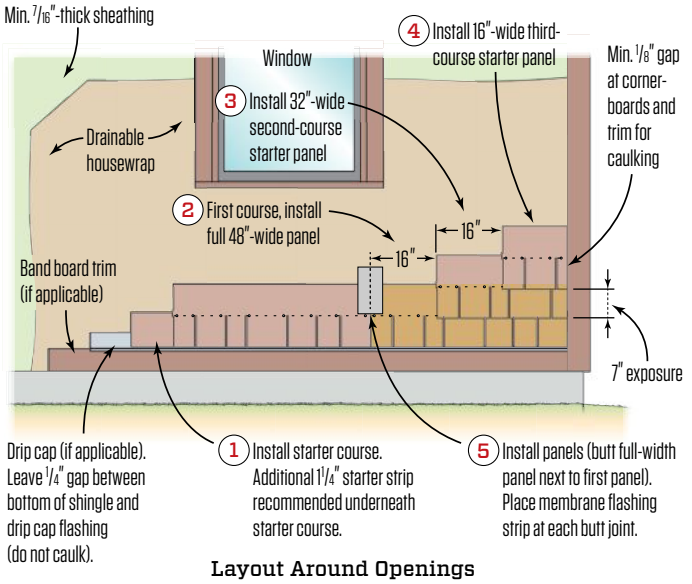
I own and operate a siding installation company in northern Vermont along with my son, Darryl. Recently, a high-end custom home builder we like working with asked us to clad a three-story house entirely with fiber-cement shingle panels. Although we knew we'd be in for a head-scratching challenge—the large home had a lot of complex geometry and numerous window and door openings to work around—we agreed to do the project.

I've been in the trades for 40 years, first framing homes, then specializing in siding starting in 1994. My son joined me in 2001. Over the years, we've installed fiber-cement shingle panels on a whole house only a handful of times. When we've applied the faux shingles, it's usually as accenting high up on gable-end walls or

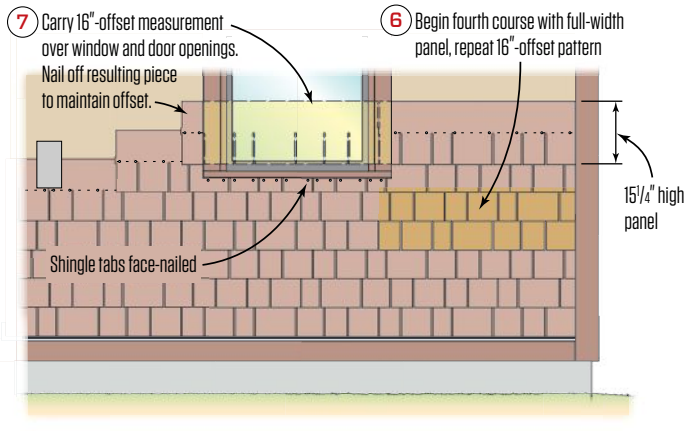
Photos and illustration by Tim Healey

Shingle Panel Layout

16-Inch Offset



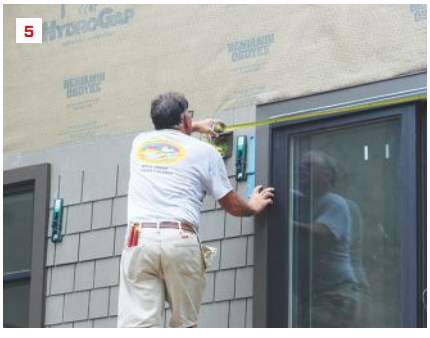
Layout Around Openings



Drawing based on technical guidelines from HardieShingle-HZ5-Installation Manual

HardieShingle straight edge HZ5 panels formulated for extreme weather were installed **(1)**. The shingles come bundled in mirror-image pairs, with the painted sides facing each other and separated by a plastic protection sheet **(2)**. Maintaining the manufacturer's recommended 16-inch offset pattern is critical (illustration, above).

After the general contractor installed the Boral trim, the shingle panels were applied starting on garage wall façade (shown above on the far right). The installers clad the house clockwise, lining up the coursing around corners and eventually finishing up back at the garage façade **(3)**.



Co-author Carl Dudley measures from the butt end of the shingle **(4)** and carries the 48-inch-based panel pattern over the slider door **(5)**; the remaining piece maintains the 16-inch offset **(6)**. Thinner pieces need to be predrilled and nailed off by hand. The next panel is installed around a build-out block needed for a light fixture **(7)**.

on dormers, with fiber-cement lap siding installed on the rest of the home.

Most builders we work with have an allotted price range for siding, and installing an all-shingle exterior with fiber-cement panels is too expensive. They are time consuming to install on a whole house, but they are long lasting and, aesthetically, they look a lot like wood shingles, more so than other faux-shingle products we've seen.

On this project, the homeowner chose HardieShingle straight edge panels (jameshardie.com) with a 7-inch exposure. The 48-inch-wide by 15 1/4-inch-high panel comes with a factory-painted "ColorPlus" finish on one side, which has a 15-year warranty. The shingles arrive on site bundled together in pairs (two mirror-image patterns are placed with the painted sides facing each other; a plastic protection sheet is inserted between the two to protect the factory paint). The individual shingle tab widths of the mirrored patterns vary slightly, which helps create a look of randomness of the shingles.

Layout. There are two basic rules of thumb for installing panelized shingles: Maintain your installation level line around the home and don't depart from the manufacturer's required 16-inch shingle offset pattern. Layout-wise, you install the panels on a façade as if the window and door openings are not there (see illustration, page 15).

Starting on the garage wall's façade, we worked clockwise around the house, using chalk lines, a 4-foot level, tape measures, and Gecko Siding Gauges (pactool.us) to install the fiber-cement panels. The general contractor had installed all the home's exterior Boral trim over a drainable WRB (benjaminobdyke.com), which in turn was installed over 7/16-inch Zip System wall sheathing (Hardie's minimum allowable nailing surface for shingle panel fastening).

A critical part of a good-looking installation is lining up the shingle coursing from one façade to the next, even when corner boards are installed. We snapped installation level lines, which we transferred over the Boral trimmed-out inside and outside corners, to maintain the alignment. You can tweak the shingle exposure somewhat—1/8 inch here, 1/8 inch there—or make up a 1/2-inch difference in height over three

or four courses between windows, but it's important to maintain your installation level line around the home in order to line up with the starting façade's coursing at the end (in this case, on the garage wall).

SHINGLE PANEL INSTALLATION

Starting out on a façade, we installed site-bent aluminum drip-cap flashing over the band-board trim at the base of the wall. We then nailed off the starter course, gapping it 1/4 inch off the drip cap for drainage. James Hardie notes in its installation manual to install a starter strip first, then install lap siding as a starter course over the starter strip. But on this job, we used cut-off stock for the starter course, which color-matched the overlying first course. Flashing and siding at window and door heads were installed similarly.

Cutting and fastening. Next, we began installing the shingles per the 16-inch offset pattern, fastening the shingles with approved stainless steel 1 1/2-inch-long ring-shank nails driven from Makita siding nailers; we installed eight nails into a full-width panel. While wearing OSHA-approved half-mask respirators, we cut the fiber-cement siding with sliding compound miter and circular saws fitted with fiber-cement saw blades. We painted all the field-cut edges using touch-up paint supplied by the manufacturer.

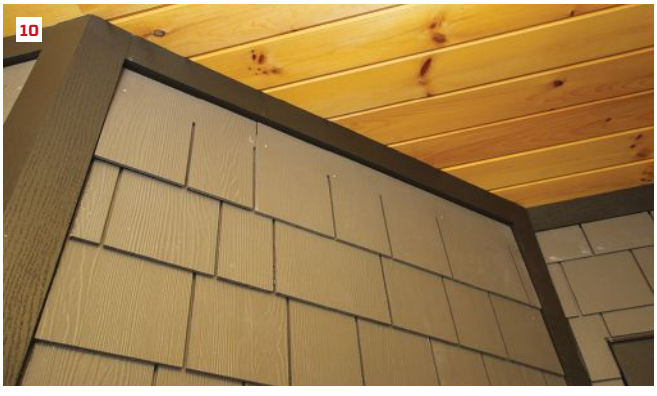
Joints and edges. We gapped the shingle panels off the corner boards and trim by a minimum of 1/8 inch to provide a sealing joint. Later, the joints will be sealed with a color-matched silicone applied by a painter sub hired by the GC. At butt joints between panels, we installed joint flashing strips to help prevent any bulk, wind-driven rain from getting behind the panels.

Tricky spots. Laying out the panels to the 16-inch offset around windows and doors would occasionally produce shingle widths too narrow to fasten off properly—pieces narrower than 2 inches also tend to break easily. In these instances, we used wider offcut pieces to remedy these issues, but quickly resorted back to a 16-inch offset. Also, in a few areas of the home, the fiber-cement panels planed into a porch-roof-to-wall juncture (sometimes at a shallow pitch), which resulted in our having to cut the shingle tabs to the roof slope while maintaining a 2-inch recommended clearance between the bottom of the shingles and the metal roofing.

Gable-end walls. On sloped sections of the gable-end walls, we started with a full-width panel installed toward the middle of the façade in line with the 16-inch offset, then worked our way back each way toward the sloped sides. Here, we used scrap leftovers for the small angled individual pieces, predrilling and hand-nailing them off as necessary. This was a good area to use up scrap; there was a 10% to 15% waste factor installing the siding.

Pros and cons. The finished siding looked nice and should last the homeowners a long time, provided they regularly maintain the sealant joints every four to five years. But it was expensive. We installed 50 squares at roughly $550 to $600 per square (pricing may have increased since job completion). And, it's a time-consuming product to apply; it took two installers two months to side the home.

Carl and Darryl Dudley own and operate C.D. Construction's Home Calls, in Fletcher, Vt.



A small sliver of a first course maintains the installation level line around the home **(8)**. Shingles are gapped 1/8 inch at a Boral build-out block; gaps are later sealed by another contractor with a color-matched sealant **(9)**. Shingles run up to the underside of the trim **(10)**. Later, individual shingle tabs will be cut from scrap, then predrilled and face-nailed.

The large home, with its complex geometry, took two experienced installers two months to complete **(11)**.

A Frameless Glass Guard Opens Up a Narrow Room

BY ROB CORBO

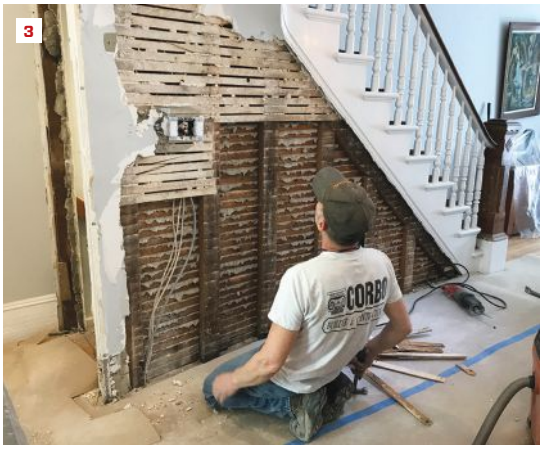
I always enjoy seeing Dave White's name pop onto the screen of my smartphone. Over the years, we have done a number of remodeling jobs for Dave and his wife, Donna, on their late-1800s row house in Hoboken, N.J. Unlike our other clients in Hoboken, who typically want to save as many of the original features of their homes as possible, Dave and Donna prefer a modern design aesthetic, which is a nice change of pace for us.

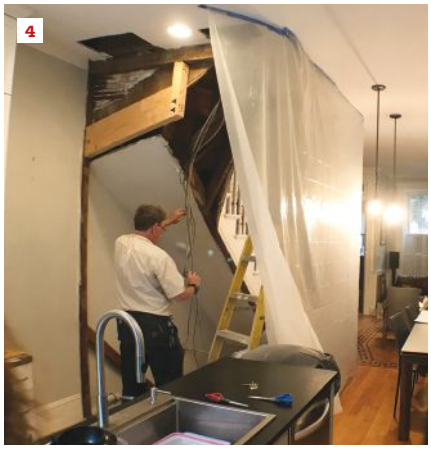
They are also inventive about maximizing every square inch in their narrow 15-foot by 40-foot-long four-story home (see "Updating a Row House Bathroom," Dec/19), while creating a sense of openness (see "Retrofitting an Oversize Door in Structural Brick," Oct/14, which describes our installation of a large, triple-glazed slider to transform an existing gloomy kitchen into a bright space).

On this occasion, they reached out to us to remove a wall separating their living room and kitchen from the basement stairwell to add to the area's open feeling. We have removed similar walls during numerous Hoboken renovations where we've matched the new open guard to the main stairway, but Dave and Donna wanted to replace the wall with a glass panel guard.

Demoing the wall. The stairwell's wall had a slight 4-inch curve along its length, while the adjacent wall mainly consisted of a narrow door to the basement **(1)**. We began by surgically taking down the lath-and-plaster wall **(2, 3)**, evaluating the structural integrity of the stair stringers and the landing above as we went along.

In row houses with open guards, it's typical for posts to be used to support the stair stringers and landing above. But here the homeowners wanted a clean, open look without posts, rails, and balusters hindering the view. We called in a stair specialist we often work with who is familiar with Hoboken row-house stairs to evaluate the stair framing. He devised a new header support made up of 4-by





The existing stairwell was curved along its length, while the adjacent return "wall" consisted of a 24-inch-wide door to the basement, which the homeowners had difficulty navigating while moving large items such as laundry baskets up and down the stairs **(1)**. The author (standing) and project manager Danny DoCouto surgically remove the curved lath and plaster wall **(2, 3)**. Fighting for every square inch of space, the original builders curved the wall to improve the flow of foot traffic between rooms. A stair specialist, Marty Anderson, was brought in to devise a new header support made up of 4-by stock and a custom steel connector to transfer the stair loads to the home's furred-out party masonry wall **(4)**.

Photos by David White and Rob Corbo

stock and a custom steel connector to transfer the stair loads to the home's furred-out brick party wall **(4)**.

Contrasting border trim. The demolition of the curved wall left us with a wide gap between the existing oak strip flooring and the edge of the stairwell. We came up with the idea to install a wide cherry border trim to make up the difference, matching the cherry wall-mounted handrail and stair treads beyond **(5)**. The contrasting colors looked sharp and gave a visual cue at the top of the stairs, adding a degree of safety.

FRAMELESS GLASS GUARD

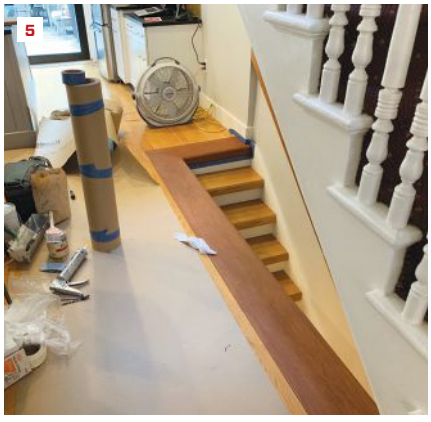
With the stairwell prepped and finished, the homeowners selected a glass guard system and arranged hiring a glass installation company on their own. There are many types of systems available offering different ways to support the glass, such as integral posts with clips clamped onto the glass and optional top rails. But the homeowners wanted a simple, clean-looking guard, so they chose a frameless glass guard system, similar to what you might see in a commercial setting like a mall.

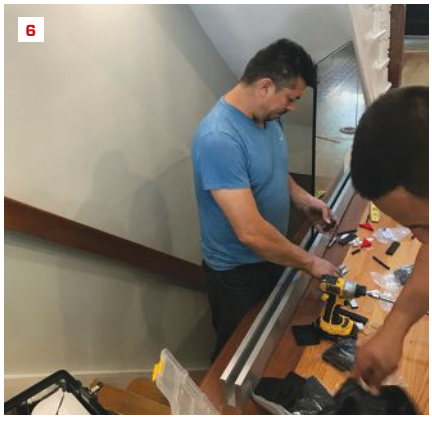
The system was manufactured by C.R. Laurence Co. (crlaurence.com) and it included a heavy-duty aluminum U-channel, or "base shoe" **(6)**, which was bolted to the floor with 9/16-inch-diameter by 5-inch-long lag bolts sunk into the floor framing. Driven through predrilled slotted holes in the aluminum, the bolts supplied enough grabbing power to counteract any forces applied laterally to the guard.

Two of the three pieces of 1/2-inch tempered glass had to be angle cut to fit under the stairs. The pieces were set using C.R. Laurence's Dry Glaze Taper-Lok system, in which rubber setting blocks and tapered wedges lock the glazing panels securely in place. Aluminum cladding with a factory finish was installed over the U-channel, then glazing gasketing was applied **(7)**.

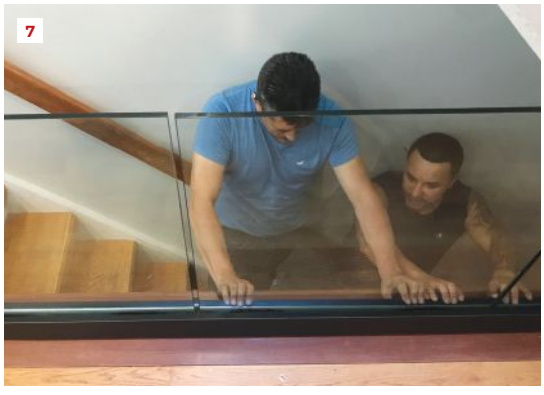
The frameless glass guard system was reasonably priced at roughly $3,000 and added light and easier stair navigability to this high-traffic area of the home **(8–10)**.

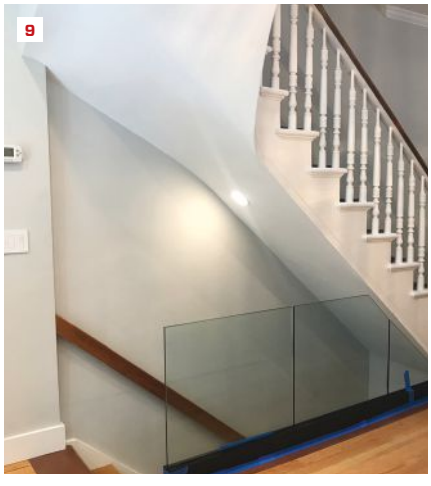
Rob Corbo is a building contractor based in Elizabeth, N.J.





Wide, contrasting border trim matches the cherry handrail and treads beyond **(5)**. After installing a heavy-duty solid aluminum U-channel, the glazing subs set the tempered glass panels with a Dry Glaze Taper-Lok system **(6)**.





Factory-finished aluminum cladding **(7)** and end panel **(8)** are installed over the solid aluminum U-channel. A contoured lath-and-plaster finish was applied to the underside of the landing **(9)**. The finished guard helped open up the room **(10)**.

The blue AnchorMate bolt holders **(1)** simplify the placement of anchor bolts and ensure consistency **(2)** that in turn simplifies the alignment of the mudsill later.

Anchoring Mudsill

BY TIM UHLER

Mudsill, or sill plates, makes the transition from concrete work to wood framing and anchors the house to the foundation. When I started coming to the jobsite as a teenager in the early 1990s, we anchored our mudsill with 1/2-inch cast-in-place anchor bolts placed 8 feet on-center. Only a standard washer and nut was required to attach it. That changed for us in the early 2000s, when building codes in our area were updated to meet seismic zone requirements and began to require anchor bolts spaced 60 inches on-center with 3x3x1/4-inch plate washers. Since then, several other options have been recognized in the code, and we've tried them all to figure out what is most efficient for us.

ALTERNATIVES TO ANCHOR BOLTS

The basic prescriptive requirements of R403.1.6 in the 2015 and 2018 International Residential Codes (IRC), call for minimum 1/2-inch-diameter anchor bolts. These bolts must extend 7 inches into the concrete and be spaced no more than 6 feet on-center. In seismic zones, these basic requirements apply with the addition of 3-inch-square plate washers. However, in all cases, the building code also allows for the use of "approved anchors or anchor straps spaced as required to provide equivalent anchorage to 1/2-inch-diameter anchor bolts."

For a number of years, we used Simpson Strong-Tie MASAP mudsill anchors, which qualify as an approved substitution for anchor bolts with 3-inch-square plate washers. These seemed like a good alternative to having to adjust the layout for joists that landed on bolts. They attached easily to panelized concrete forms, and we didn't have to worry about the joist layout. The MASAP is located at the edge of the foundation wall and wraps over the edge of the mudsill. This placement has the advantage that we could set the mudsill right on our snapped layout lines—a welcome change from aligning anchor bolts, which takes time to do accurately. Allowable holes for the anchor bolts in mudsill can't be oversized more than 1/16 inch, and so we often would end up having to move the mudsill slightly to accommodate the anchor bolts, and the mudsill would end up off the line.

With MASAP straps, we used a Hilti powder-actuated tool to secure the mudsill to the concrete on our chalk lines. This held it in place until we nailed off the straps.

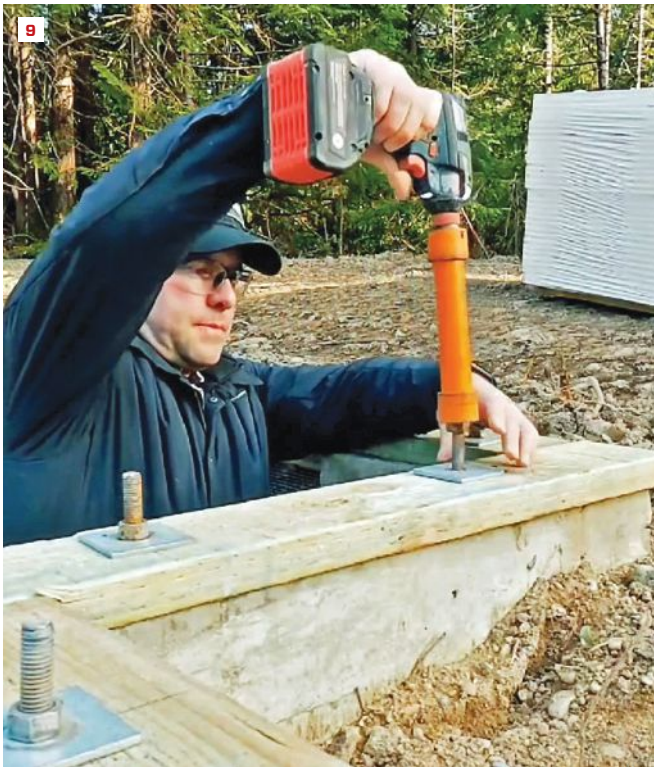
Photos by Tim Uhler

MASAP anchors are code-approved replacements for anchor bolts and 3-inch-square washers. They attach to the edge of the form **(3)** and wrap over the mudsill **(4, 6)**. Note that these strap anchors secure the mudsill, but they are not a substitute for shear wall hold-downs, such as the threaded bolts used for HDU anchors, that were required on this foundation **(5)**.

We used MASAP straps for nearly 10 years, nailing them off either with a positive placement gun or by hand-nailing. Frankly, this was tedious, and we needed to pin the plates in place with the Hilti to keep them from moving around when we nailed off the anchors. Another disadvantage is that the MASAPs created a gap between the mudsill and the rim joist that bears on top of it. All things considered, we ultimately went back to the anchor bolts, feeling they were cleaner and simpler to use.

MAKING ANCHOR BOLTS WORK

We sometimes sub out our foundation work, but typically we form and pour foundations ourselves. I lay out the location of the bolts prior to placing concrete, and my focus is to eliminate any framing landing on bolts or plate washers. Much of our framing is 24 inches on-center, so the bolt placement is 48 inches on-center and lands between joists or studs. I use Simpson Strong-Tie's AnchorMates to hold the bolts in place. These bolt holders are made



To align mudsill with anchor bolts, the author places the board against the bolts and marks each one **(7)**, then pulls the board back to his chalk line, measures the distance, and drills the holes **(8)**. Working in a D2 seismic zone, the author is required to use 3-inch-square plate washers on anchor bolts. To save time, he tightens the nuts with an impact ratchet **(9)**, being careful not to overdrive the nuts, as that can crack the concrete around the bolt. The rule is to seat the nut, then tighten it one half-turn.

of nylon plastic and hold up well over time so they more than pay for themselves. (We have been using the same set for the last two years.) Though not required, the bright blue holders also give the inspector something to see, and overall they make for one less thing for us to deal with during the pour.

Aligning the mudsill can be a challenge, but over the years we have worked out some good processes. The most important part is getting the foundation right to begin with. I have outlined our foundation process in a two-part series, "Building Stem Wall Foundations," Feb/13, and we cover it regularly on LinkedIn at @awesome framers.

To align the mudsill with our chalk lines, we place the sill board next to the anchor bolts, center a square with the bolt, and mark a line across the board. The bolts are not always perfectly vertical, so you have to eyeball the base of the bolt. When the locations are marked, we slide the board back to the chalk line and measure the distance from the base of the bolt to the edge of the board. We then mark this distance on the board and drill our holes. The largest hole we can drill for a 5/8-inch-diameter bolt is 11/16 inch.

THE CASE FOR DRILLING

A few of us framers on Instagram have been talking about ditching anchor bolts completely and drilling them in after the concrete is poured. There are a few options available that work for this in our seismic zone: Simpson's Strong-Bolt 2 wedge anchors (or similar from other manufacturers) and Titen HD screw anchors are two that we've used. Both are allowed as alternatives to cast-in-place anchor bolts, but there are some caveats.

The idea of drilling after the fact might seem on its face a slower method, but there some definite advantages:

- Drilling after the fact means we never have to move a framing member or notch it. Many foundation subs don't think about the framing; they just set bolts to the spacing called out on the plans. This means that when we sub out our foundation, we sometimes end up cutting anchor bolts off and drilling for Titens anyway.
- We don't have to even think about laying out bolt locations while forming the foundation.
- Mudsill can be set perfectly on the line and no holes will be oversized since the size of the hole for the anchor is exactly the same size as the anchor.

There are a few cons to drilling after the fact, though:

- The AHJ (authority having jurisdiction) might not allow it as the sole attachment method.
- Even if code allows the anchors on paper, inspection of the length can be an issue. The Strong-Bolt 2 has the length stamped on the end, but Titens don't. Additionally, the Strong-Bolt 2 has a torque requirement for the nut, which the inspector might want to verify.
- You can hit rebar when drilling. Rebar can be time consuming to drill, even if you use my favorite rebar-cutting bit (the Diablo Rebar Demon).
- Even if you don't hit rebar, it's slower to drill 8 inches into the concrete than it is to drill through the mudsill alone.

Of course, the big factor is cost:

- A non-galvanized 5/8-in. x 10-in. anchor bolt costs me about $1.50, or $15 for 10.
- Ten 5/8-in. x 10-in. Strong-Bolt 2 wedge anchors purchased online run about $30 (fastenersplus.com).
- Ten 5/8-in. x 10-in. Titens run $60 online (also from FastenersPlus).

Given this cost, what works best for us are 5/8-inch cast-in-place anchor bolts placed at 48 inches on-center for our crawlspace walls. For garage walls, we use Strong-Bolt 2 wedge anchors. The reason for the difference is that we frame our garage walls on the floor and then drop them into place with the forklift. Trying to get them onto a cast-in-place anchor bolt is a huge hassle when we can oversize our hole only 1/16 inch.

If I built only on slab, I would switch entirely to wedge anchors. Using them would allow us to sheathe all walls before standing them up, and still be able to perfectly land them on the foundation before installing the anchors. That would save us a huge amount of ladder work.

Contributing editor Tim Uhler is a lead carpenter for Pioneer Builders in Port Orchard, Wash. Follow him on Instagram at @awesomeframers or visit his website at awesomeframers.com

Drilling for wedge or screw anchors, such as the Titan HD **(12)**, simplifies both the concrete work and the installation of mudsill. But drill-in anchors depend on your being able to efficiently predrill through concrete and rebar. The author used to use a rebar bit—a small core drill **(10)**. That meant first using a standard concrete bit **(11, at left)**. As soon as he hit rebar, he'd switch to the core bit, and then switch back to the concrete bit as soon as he was clear of the rebar. The process is much faster with the Diablo Rebar Demon **(11, at right)**, which efficiently drills through both concrete and rebar, so there's no need to switch bits.

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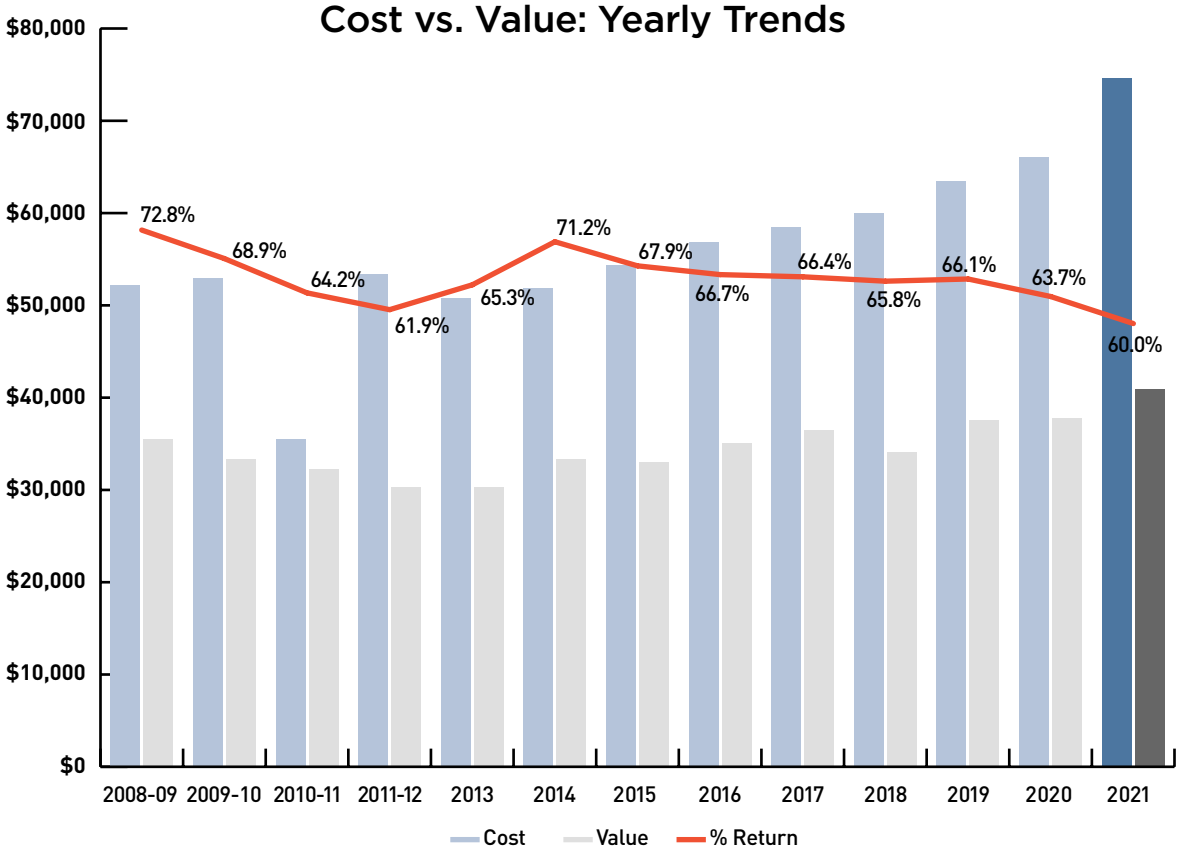
BY CLAYTON DEKORNE

Cost vs. Value

The release by Zonda (*JLC*'s parent company) of the 34th annual *Cost vs. Value* report finds exterior improvement projects continuing a multiyear trend of providing the greatest return on investment (ROI) for homeowners. Indeed, 11 out of the 12 projects with the highest ROI were exterior improvements. The leading returns included a replacement garage door at the No. 1 position, sidings (including manufactured stone veneer, which came in at No. 2), and windows. The exception to the trend, sitting at No. 3, is the minor kitchen remodel—a modest facelift of kitchen surfaces that offers a relatively high return when done prior to the sale of a house.

COST INFLUENCE

The trend of exterior replacements outperforming larger discretionary remodeling projects has been accelerated, no doubt, by a year in which COVID-19 has left many people reluctant to have contractors inside their homes but yearning to improve outdoor spaces. 2020 was a year we'd expect outdoor decks to reign supreme, but the data in the 2021 report doesn't track what's most popular. It tracks the ratio of value over cost for 22 common remodeling projects, and in that ratio lies the rub: Material costs, especially for decking and pressure-treated framing lumber, went through the roof in 2020, bringing down the return despite the



These trends are based on averages for 15 projects that have appeared in the *Cost vs. Value* report over the last 13 years.

project's value. The effect of rising material costs is shown across the board, with the ROI for all projects down an average of 3 percentage points. The wood deck project shows the greatest decrease in ROI (-10.3%) due to the highest increase in material costs (up 13.6%).

A look at yearly trends (see chart on previous page) shows that project costs have risen consistently since 2014, with a sharp increase in the last year brought on by supply chain disruptions largely created by the pandemic but complicated by global trading tariffs. Mirroring the increase in costs, the value-over-cost ratio as a percentage has steadily declined over the same period, with the sharpest decline in 13 years (-3.7%) occurring last year (compare to a decrease of -2.4% for the year before).

THE FOCUS ON HOME SALE PRICE

The *Cost vs. Value* report (costvsvalue.com) aims at a specific question: What value does a particular remodeling project add to the sale price of a home? This is only one kind of value that homes can provide, but it proves to be an important assessment. The value data in the report was derived in prior years from surveys of real estate professionals asked to rate the value of the 22 projects. For 2021, Zonda has revamped the report's methodology, employing an econometric model that overcomes a past problem with surveying enough real estate professionals. Built on the survey results, the new model sifts in a range of other variables, including local GDP, housing starts, existing home sales, existing home values, changes in existing home sales and existing home values, among others. What's important to grasp here is that all of these are variables that influence the sale price of homes in a specific location, and that is what defines the value side of the calculated ROI.

"Location, location, location" we know as the first principle of real estate, and the *Cost vs. Value* report addresses this by providing data for 150 metro areas (up from 100 last year). New for 2021, the report also allows users to drill down to data at the ZIP code level within each metro area covered to get a more fine-grained view of how prices differ on a local basis.

If we begin to think a bit more like a real estate professional, we begin to grasp how to fully understand *Cost vs. Value*.

Exterior projects. To begin with, a real-estate perspective helps explain why exterior projects retain their strong return on investment: "Curb appeal" and "first impressions" are strong concepts in real estate because they have a big impact on how much

Cost vs. Value: National Averages

Project	Job Cost	Value at Sale	% Cost Recovered
Garage Door Replacement	$3,907	$3,663	94%
Manufactured Stone Veneer	$10,386	$9,571	92%
Minor Kitchen Remodel	$26,214	$18,927	72%
Siding Replacement (Fiber Cement)	$19,626	$13,618	69%
Window Replacement (Vinyl)	$19,385	$13,297	69%
Siding Replacement (Vinyl)	$16,576	$11,315	68%
Window Replacement (Wood)	$23,219	$15,644	67%
Deck Addition (Wood)	$16,766	$11,038	66%
Entry Door Replacement (Steel)	$2,082	$1,353	65%
Deck Addition (Composite)	$22,426	$14,169	63%
Grand Entrance (Fiberglass)	$10,044	$6,116	61%
Roofing Replacement (Asphalt Shingles)	$28,256	$17,147	61%
Bathroom Remodel Mid-Range	$24,424	$14,671	60%
Universal Design Bathroom	$38,813	$22,475	58%
Major Kitchen Remodel Mid-Range	$75,571	$43,364	57%
Roofing Replacement (Metal)	$46,031	$25,816	56%
Bathroom Remodel Upscale	$75,692	$41,473	55%
Master Suite Addition Mid-Range	$156,741	$85,672	55%
Major Kitchen Remodel Upscale	$149,079	$80,284	54%
Bathroom Addition Mid-Range	$56,946	$30,237	53%
Bathroom Addition Upscale	$103,613	$54,701	53%
Master Suite Addition Upscale	$320,976	$152,996	48%

Sorted by the highest percentage of cost recovered (or return on investment), this chart ranks all 22 projects in the *Cost vs. Value* report.

A steep increase in costs during 2020 resulted in lower ROI figures compared to years past.

money prospective home buyers are willing to pay for a home. If they start out thinking the house looks good—is in good shape, has "good bones"—they begin to fit all the new information they learn once they walk through the front door around these positive impressions. The reverse—driving up and seeing a dilapidated garage door or a house in need of a paint job—has the reverse effect: Buyers start to downgrade what they are willing to pay for it. While these impressions are highly subjective, they tend to influence buyers in remarkably consistent ways.

Discretionary projects. While still returning a decent return, larger discretionary projects, such as kitchen, bath, and master-suite remodels, tend to have a lower impact on the price of a home. These projects involve a number of product options that have strong appeal to the client making the selection but tend to be too individualized to provide broad appeal. There is no one cabinet style or color, no perfect tile, or fixture design that everyone likes. Certainly, there are design trends that have wide appeal among a range of homeowners. But because of the vast differences in aesthetic tastes, one person's elegant new kitchen or bath may be viewed by prospective buyers as unappealing or in need of a reset.

START THE CONVERSATION

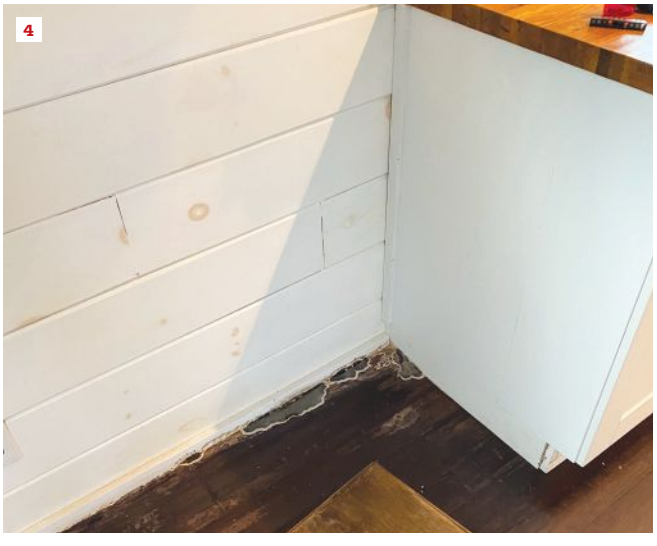
Building professionals are focused on a lot more than resale value when they begin discussing a project budget with prospective clients. Pride in design and craftsmanship, occupant health and safety, long-term durability of materials, reductions in liability, and potential for repeat business are all top of mind for the professional remodeler entering into a new project. But all these factors, and the different values attached to them, are not necessarily understood by clients.

Cost vs. Value serves to get the conversation started. By focusing first on the value of the client's investment, you can zero in on a client's biggest anxiety, cost. Instead of leading with your costs, you first deliver a generalized cost that demonstrates that the project they are considering will have a definite return. Once that's established, you can go on to raise their understanding and appreciation of the total value of your work and reveal what the project at hand will actually cost. The cost data does include a standard markup of 10% on materials and 10% on labor. This is considered low by many contractors who build high value into their work with things like a well-paid workforce that receives good benefits, ensuring a high level of skilled and trustworthy talent. But those are details to discuss as you distinguish your company and convince the client you are a good fit for their project.

BY JIM BRADLEY AND CHRIS WEST

A Troubled Tiny House

The cozy structure **(1)** was part of an HGTV program presenting an idyllic look at the tiny house movement—reality proved otherwise for the first-time homeowners. Here are two inside views: looking toward a raised dining room in the front of the home **(2)**, and in the kitchen looking toward the bathroom beyond **(3)**. Sleep quarters were in a loft above the kitchen.

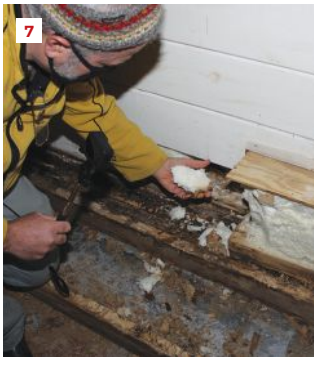


Mushroom blooms thrive at the base of an interior wall **(4)**. The manufacturer did not consider basic building science or changes in climate zone when building the home; it was built in Connecticut (zone 5) and trucked to Vermont (zone 6).

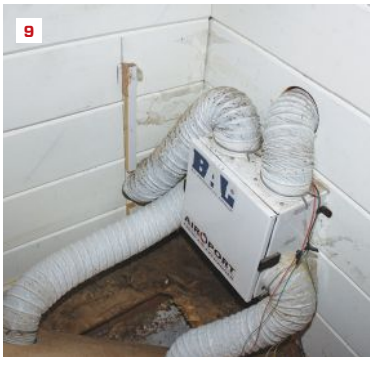
Last December, a young couple contacted us for assistance with their three-year-old tiny house in Burlington, Vt. Mushroom blooms had appeared at the base of the home's interior walls, which led to their discovering that the wood-framed deck built on the lower level of the home's metal trailer had rotted. When we arrived on site, we probed the single-part spray foam at the bottom of the wall near the kitchen cabinets and were able to dig out sopping wet Rockwool batt insulation (installed on the steel deck of the trailer between 2-by sleepers) and open-cell foam in the wall bays, as well as rotted exterior OSB sheathing.

Spartan living. The cozy structure was part of an HGTV program presenting an idyllic, storybook look at the tiny house movement, but the ending proved otherwise for the young homeowners. We felt bad for them. They were a cute couple, recently married, and their first investment in a new home turned out poorly (they purchased the structure from a Connecticut builder for $70,000, arranged by an HGTV freelance production company). While living "small" with an active outdoor-oriented lifestyle is admirable, the realities of marrying a small wooden structure to a steel trailer without considering basic physics is fraught with danger. Building science principles must be respected whether you're building a mobile home or a traditional structure—or a tiny house in which a young couple will be living with two cats and a dog.

Photos by Chris Murphy, Brianna Welch, and Tim Healey; illustration by Tim Healey



Seams in the sheet-metal bed had not been air-sealed, providing cold, moist air access into the framed floor **(5, inset)**. More critically, warm, moist air from the interior condensed on the metal bed, saturating vapor-open batts; water accumulated in the batts over time, resulting in rotted OSB subfloor and framing **(6)**. The problem was more acute along raised, uninsulated edges **(7)**.



Test holes at walls and ceilings proved dry; moisture hadn't penetrated the open-cell spray foam and condensed on the OSB sheathing as feared **(8)**. A questionable HRV **(9)** and inadequate heat pump were installed.

TINY HOUSE, BIG PROBLEMS

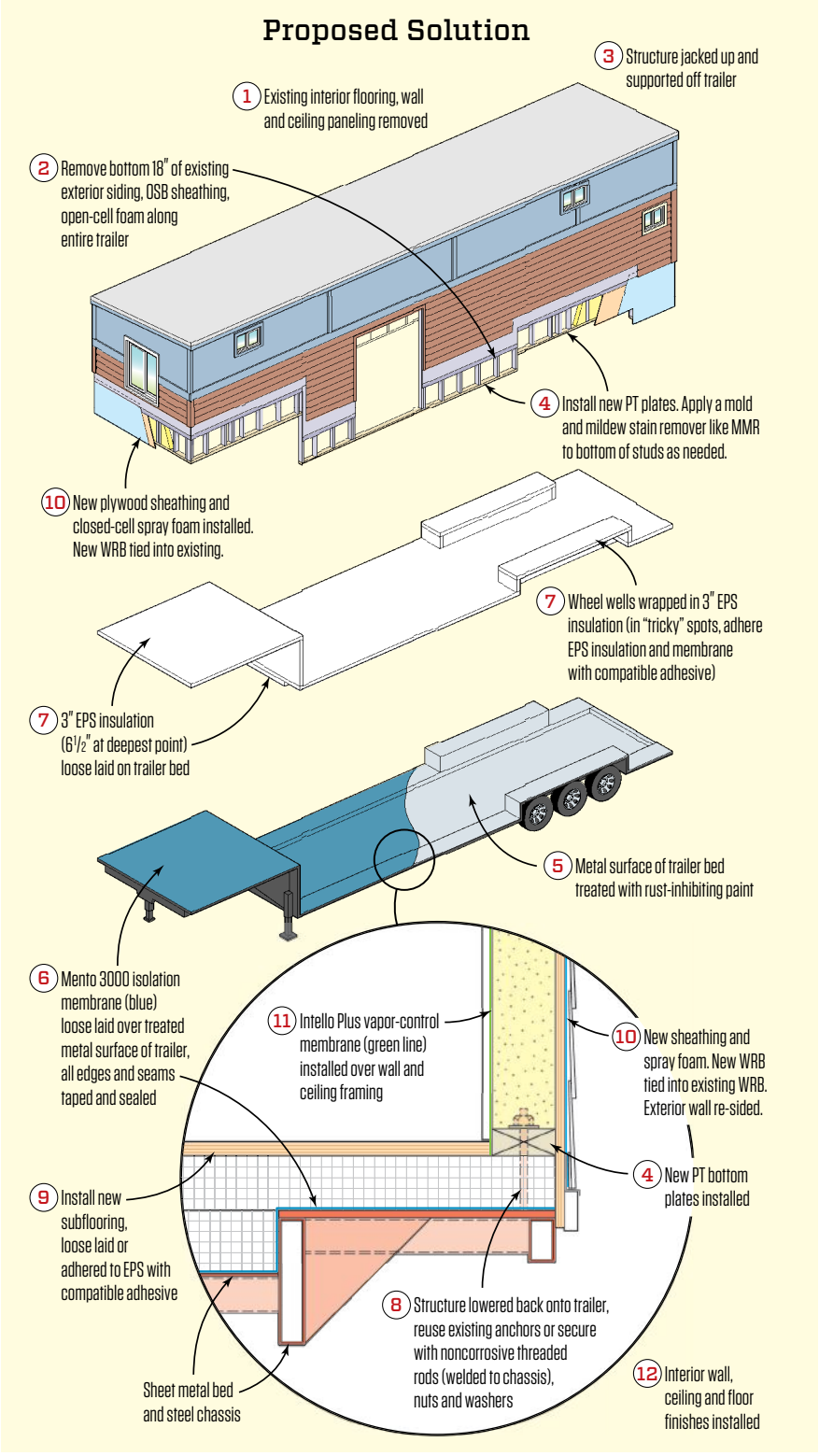
On our second visit, we determined that the rot found in the floor had migrated 8 to 12 inches up the sides of the walls. We cut test holes higher up in the walls and in ceilings and found them to be mostly dry. Moisture hadn't penetrated the open-cell spray foam and condensed on the interior side of the OSB wall and roof sheathing as feared, though it was probably just a matter of time before this happened due to the absence of an interior vapor-control membrane.

The main culprits leading to the floor damage were cold, moist air infiltrating the framed floor through seams in the sheet-metal bed that had not been air-sealed and, more critically, warm, moist air from the interior condensing on the inside surface of the trailer's sheet-metal bed and saturating the vapor-open Rockwool batt insulation on top of the metal between sleepers. With a lack of drying potential, water accumulated in the batts over three years of use, resulting in a rotted OSB deck, waterlogged 2-by sleepers, and a rusty sheet-metal bed. The problem was more acute around the plate-metal wheel wells and along the raised, uninsulated edges of the trailer where OSB subflooring was laid over the steel bed.

The first condensing layer. When designing a building's insulation envelope for a cold climate, you have to keep condensation in mind. During the freezing months, the inside moisture is higher than the outside moisture. Water vapor moves from high concentrations to low concentrations, similar to the way heat moves from hot to cold. Air with a high concentration of moisture will move through walls, ceilings, and floors to spaces with a lower concentration of moisture to try to reach equilibrium. In this case, the tiny home's builder did not take the high condensation potential of the metal trailer into account (with particularly bad consequences for the floor).

To prevent condensation on the first cold, solid surface of an assembly (walls, floors, and ceilings), one needs to use either all rigid insulation or a mixture of rigid and fluffy insulation that keeps the first solid surface in the assembly warm—above the dew point. The floor was insulated with Rockwool batts, which qualifies as a fluffy insulation. It is vapor open, meaning that water vapor can move through it. The first cold surface in the floor is the metal floor of the trailer and the sides of the studs. The water vapor in the air of the tiny house condensed on these surfaces and became liquid water. Then it couldn't evaporate; instead, it wicked up into the floor and walls, leading to the extreme level of rot evidenced by the mushroom blooms.

Build for the intended climate. It is worth noting



that the vapor-open insulation package installed here (without a proper vapor-control membrane) is also wrong for climate zone 5, which is where the builder who built the home lives and works. Regardless of whether the tiny house was shipped to Northern Vermont's climate zone 6 or a milder location in climate zones 3 or 4, the structure, as constructed, would have performed poorly over time. With all forms of transportable structures, you need to build to the climate in which they're going to be placed.

Possible solution. Included in our forensic report were plans to remediate the damage and shut down the conditions that allowed rot and mushroom blooms to occur (see illustration, left). We recommended first removing the interior finishes and the bottom 18 inches of the home, followed by decoupling the wood-framed structure from the metal trailer and isolating the metal from the living space with structurally rated low-permeable EPS rigid insulation. To repair the lower portion of the tiny house, we suggested removing the rotted bottom sills and any compromised wall studs and applying a mold and mildew stain remover to affected areas as needed. The final step would be to lower the structure back onto the trailer and reattach it, using the existing anchors if possible or, the more likely scenario, securing it with non-corrosive threaded rods (welded to the trailer's chassis), nuts, and washers.

For the HVAC system, a questionable air exchanger unit and inadequate heat pump had been installed by the builder. We recommended installing a more robust HVR unit and heat pump that would work efficiently in the cold Vermont winters.

In the end, we estimated that including interior finishes, it would cost roughly $45,000 to repair this troubled tiny house.

Jim Bradley *is a BPI-certified home-performance contractor, builder, and remodeler based in Vermont. He is currently a project developer and manager for Hayward Design Build, in Colchester, Vt.*

Chris West *is a PHIUS/PHI Certified Passive House consultant/trainer and owner of Eco Houses of Vermont, a building science consultancy specializing in Passive House design for single family, multifamily, and commercial projects.*

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Roof Collapse Averted

A simple framing error almost led to a total building failure

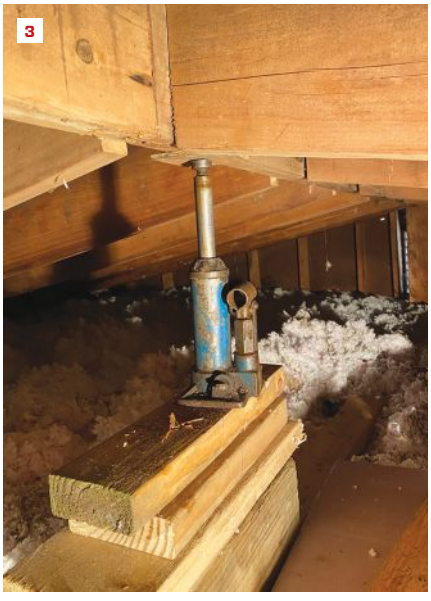
BY DARREN TRACY, P.E.

We recently replaced the EPDM (rubber) roof membrane on a single-family home with a shallow pitched roof. At 30 years old, it had lived a good life and served the house well. Our roofing subcontractor suggested we install asphalt shingles instead of rubber. I was not a fan of this idea because of the shallow roof pitch (2:12; this is the minimum required by many shingle manufacturers), until I saw the price differential.

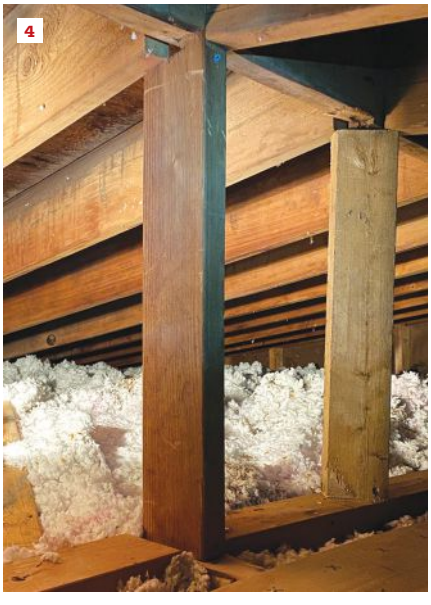
This is a rental property. My wife and I became landlords by default. We own a small construction company, and we needed a place for our employees to work so we did not have to lay them off between jobs. We saved and scraped together enough money to buy a cheap fixer upper. Because we are on a tight budget, we proceeded with the shingle installation, installing an ice and water barrier membrane on the entire roof for added protection.

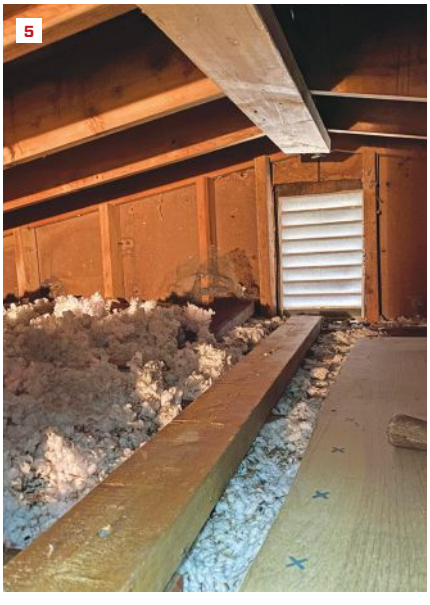
When the old rubber roof membrane and protection board were removed, I noticed undulations in the roof plane. These are visible in the inset photo above. Much of the plywood sheathing was loose and needed refastening as well. No sheathing clips were used when this home was constructed, probably in the 1960s or 70s. I also noticed a slight dip in one part of the ridge. It wasn't significant and a layperson may not have noticed it, but a carpenter tends to notice these things as a natural response to years on the job trying to make items plumb, level, and square.

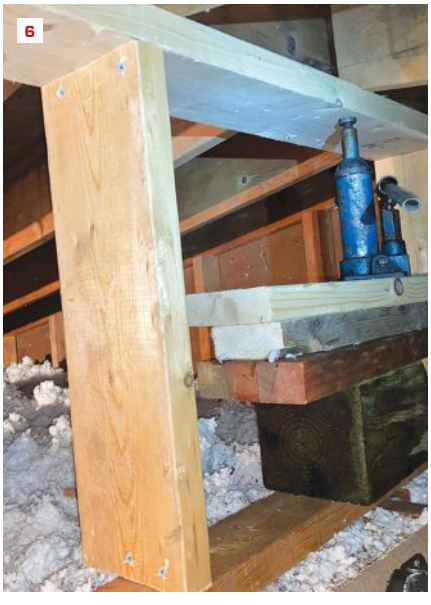
Photos by Darren Tracy



One sign that something was wrong was a slight dip in part of the ridge that was visible from the exterior when the roofing was stripped. Inside the attic, the problem was much more apparent: One ridge board had dropped approximately 1 3/4 inches **(1)**. Along the ridge board, some of the rafters had pulled away **(2)**. Remediation began with jacking the ridge board back in place **(3)**.

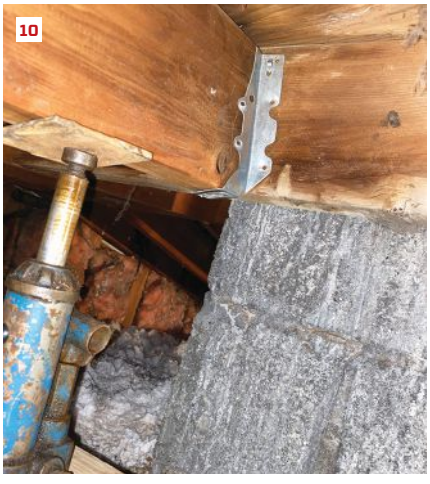






Initially, the author cut temporary support blocks from 2x4s and posted them down to a center bearing wall (in line with the center girder supporting the first floor) **(4)**. The final solution was to build a short wall, starting with top and bottom plates **(5)**, then jacking the top plate up as much as possible to push up any rafters that had dropped down **(6)**, before infilling with short studs.

The framed wall that supports the rafters **(7)** is put together with screws—installing those proved much easier than trying to swing a hammer or use nail guns in the tight attic space. For good measure, the author shimmed any remaining gaps between the rafters and the ridge board **(8)**.



Rafters abutting a header at the block chimney had dropped **(9)**. We jacked those individually **(10)** and attached the rafters to the header with joist hangers **(11)**.

INVESTIGATING THE PROBLEM

I decided to take a closer look in the attic, so I got as skinny as I could and shimmied my way into the shallow attic space. It was a good thing that I did! To my astonishment, the ridge board had dropped in some locations, and many of the rafters were pulling away from it.

If photos 1 and 2 (on the previous page) don't get your attention as a builder, engineer, or landlord, nothing will. The roof was in imminent danger of collapse had it been loaded with shingle bundles. Almost certainly, the roof would have collapsed during the upcoming winter season, especially considering that snow tends to stay on a shingle roof versus sliding off a rubber roof. In fact, snow sliding off the rubber roof may have saved this roof from previously collapsing. The ground snow load in this area is 50 pounds per square foot.

Some of my consulting work as a licensed professional engineer includes inspecting structural concerns flagged by a home inspector during the property sale process. Occasionally, I will see this type of problem. What is particularly interesting about this project is how close the roof was to collapse, not to mention that I (and my wife) own the building.

ANCILLARY WORK

Where sheathing was completely loose and needed to be replaced, we took the opportunity to add cellulose insulation (photo, top left). Note: This end of the house has a cathedral ceiling with insulation between the rafters. It was designed, in fact, with a ridge beam. The exterior walls in this area did not spread.

A good way to work with small quantities of bagged cellulose, in lieu of renting a blowing machine, is to place cellulose clumps in a plastic bin. Fluff the cellulose by mixing with a large drill and masonry mixing beater (photo, top right). Transport the fluffed cellulose to the roof in the plastic bin. Have a couple of bins handy so one person can be placing the insulation on the roof while another person mixes. It works great.

We also increased soffit ventilation where we had access (photo, above). The existing ventilation consisted of 1-inch-diameter holes drilled in the plywood soffit with perforated vinyl soffit below. This was inadequate. For this roof, code requires 1 square foot of ventilation for every 150 square feet of roof area, per IRC R806.2. We proceeded with some chain-saw carpentry and cut large openings in the plywood soffit. *—D.T.*

THE CAUSE

The ridge board dropped and the rafters pulled away because the exterior walls moved outward. The lateral forces induced by the roof load on the exterior walls were greater than the structure could withstand.

Even though the structure has rafter ties (ceiling joists) installed appropriately to resist lateral forces (see "Raising Ceiling Joists," Jan/19, for more detail about rafter ties), the lateral loads were too great for the structure to withstand. Because a roof with a pitch less than 3:12 provides too much lateral force on the exterior walls, the IRC stipulates that the structure shall be designed as a ridge beam versus a ridge board (R802.4.4).

The difference between a ridge beam and a ridge board is that a ridge beam is designed as a structural member to carry roof loads, whereas a ridge board is a spacer and facilitates rafter installation. It also functions as a nailer for the roof sheathing. Many old houses I have worked on have no ridge board at all. The apexes of the rafters simply abut one another.

THE SOLUTION

This is what we did to solve the problem: We jacked the ridge board back up in place with a 2-ton hydraulic jack. In this case, there was a first-floor partition directly below the ridge, so we blocked up from the partition wall and jacked the ridge board back in place.

A good boss shouldn't ask their employees to do anything they wouldn't do, so I was the good boss and crawled into the small attic space. Our employee, Brett, worked the ground, cutting lumber to length and feeding it up to me in the attic. To make the space as workable as practical, I placed 2-by-8-foot sheets of 1/4-inch lauan on top of the attic insulation and ceiling joists to provide "crawl space."

The first-floor partition that supported the new framing was directly above the center beam in the basement. I ran some quick calculations and found that the existing beam and footings were capable of handling the roof load from our newly created load path.

In summary, we converted a ridge-board design to a quasi-ridge-beam design with a framed wall functioning in place of the beam. Although the repairs are not perfect in terms of aesthetics, they are functional and work for me. Had this been a project for a paying customer, I may have made it prettier. With some measure of irony, one of the most dangerous structures this engineer has ever inspected has been his own property. Thankfully, disaster was averted.

Darren Tracy, P.E., owns West Branch Engineering, a consulting firm, and West Branch Inc., a construction firm, in Saratoga Springs, N.Y.

Euro Lumber Creates Grading Confusion

U.S. building codes do not formally recognize all the lumber currently circulating in the U.S. market

BY TED CUSHMAN

The COVID-19 pandemic has had a lot of ripple effects on the U.S. economy. Along with other factors, it has affected the supply of framing lumber in American lumberyards. Restricted supply of U.S. and Canadian lumber has led suppliers to look to Europe for wood to satisfy the high domestic demand. That means lumber produced in Europe has been showing up in U.S. lumberyards and home centers, and it may have different qualities than lumber from North America.

Background. Most lumber in the world market is visually graded. That is, a lumber grader at the sawmill looks at each piece and sorts the wood based on visual qualities—in particular, the size and number of knots in the wood. This characteristic is of aesthetic importance, but it also makes a difference in the structural performance of framing lumber in service.

The structural strength of lumber also varies widely by species, and by the place where the wood was grown and harvested. That's why a grade stamp on a piece of framing lumber will specify the wood species and region of origin, not just the visual grade. Sometimes, species are grouped together based on their similarity in structural performance. So, you may see a piece of wood marked SYP, for southern yellow pine; this designation could refer to several different species of pine that grow in the southern U.S. "Hem fir," by the same token, might be hemlock or fir; the two species have comparable performance.

Each of the common species and species groupings in the U.S. market is routinely tested for structural characteristics under a lumber grading program developed by the American Lumber Standard Committee (ALSC), a voluntary standards group based in Washington, D.C. The ALSC publishes design values for the various species and grades of lumber, and engineers use those values to design wood structures.

European wrinkle. Mills in the U.S. usually process wood of a single species or species group, from a single region. But imported European lumber that's appearing in the market these days is coming from mills that process multiple species, grown in multiple regions. So, for example, wood may bear a grade stamp indicating that the lumber could be Scots pine from Germany, Norway spruce from Germany, Northeastern France, or Switzerland, or Douglas fir or European larch from Austria, the Czech Republic, or Bavaria. The mill just happens to process all those different kinds of logs. The

These lumber grade stamps were recently photographed on 2-by framing stock for sale at a large retail lumber chain. Design values published in March (see Table 4G excerpt, facing page) to cover the species identified on these stamps are different from the design values for the four North American categories currently recognized by U.S. building codes. Please note that the Pacific Lumber Inspection Bureau (or PLIB, as identified in Table 4G) merged operations with the West Coast Lumber Inspection Bureau, or WCLB (as identified on the grade stamps above).

Table 4G **Reference Design Values for Multi-Species and Country Grademarked Visually Graded Dimension Lumber (2" - 4" thick)**

(Tabulated design values are for normal load duration and dry service conditions. See NDS 4.3 for a comprehensive description of design value adjustment factors.)

USE WITH TABLE 4F ADJUSTMENT FACTORS

Multi-Species and Country Label	Commercial Grade	Size Classification	Design values in pounds per square inch (psi)							Specific Gravity	Grade Stamping Agency
			Bending	Tension parallel to grain	Shear parallel to grain	Compression perpendicular to grain	Compression parallel to grain	Modulus of Elasticity			
			F_b	F_t	F_v	$F_{c\perp}$	F_c	E	E_{min}	G	
N Spr-Sc P(I) GER	NORWAY SPRUCE & SCOTS PINE from GERMANY										PLIB
Tabulated design values are the minumum values for the following species and commercial grades in Table 4F: NORWAY SPRUCE from GERMANY, NE FRANCE, & SWITZERLAND & SCOTS PINE from GERMANY	Select Structural	2" & wider	1200	550	160	355	1200	1.6	0.58	0.42	
	No. 1		800	375	160	355	1050	1.4	0.51		
	No. 2		700	325	160	355	950	1.1	0.40		
	No. 3		400	175	160	355	550	1	0.37		
	Stud	2" & wider	550	250	160	355	600	1	0.37		
	Construction	2" - 4" wide	800	375	160	355	1150	1.1	0.40		
	Standard		450	200	160	355	975	1	0.37		
	Utility		225	100	160	355	625	0.9	0.33		
N Spr-Sc P(I) ROM N SPr-Sc P(I) ROM-UKR	NORWAY SPRUCE & SCOTS PINE from ROMANIA NORWAY SPRUCE & SCOTS PINE from ROMANIA & UKRAINE										PLIB
Tabulated design values are the minumum values for the following species and commercial grades in Table 4F: NORWAY SPRUCE from ROMANIA & UKRAINE & SCOTS PINE from CZECH REPUBLIC, ROMANIA, & UKRAINE	Select Structural	2" & wider	1250	575	100	270	1200	1.5	0.55	0.38	
	No. 1		850	375	100	270	1050	1.4	0.51		
	No. 2		725	325	100	270	950	1.2	0.44		
	No. 3		425	200	100	270	550	1.1	0.40		
	Stud	2" & wider	575	250	100	270	600	1.1	0.40		
	Construction	2" - 4" wide	850	375	100	270	1200	1.1	0.40		
	Standard		475	200	100	270	1000	1	0.37		
	Utility		225	100	100	270	650	1	0.37		

Unless an engineer can determine that import lumber is adequate for a given design, there is a risk that the structure as built may not comply with code. Table 4G (excerpt shown above), an addendum to the 2018 Edition of the Design Values for Wood Construction, allows engineers to evaluate a project design built with European wood varieties. In many cases, the design values for the European lumber currently circulating in the U.S. are lower than for spruce-pine-fir, the weakest code-listed U.S. category.

wrinkle is this: The various kinds of wood that are coming out of European mills may have very different structural characteristics, even if their visual grading is very similar. While a piece of wood might bear a "Number 2" grade stamp based on its visual characteristics, engineering properties such as fiber stress in bending, modulus of elasticity, or density (specific gravity) could vary widely within lumber supplies that bear the same stamp. This complicates things for engineers and code officials who are trying to design or inspect structures built with this Euro lumber.

As of today, the ICC codes in the U.S. don't formally recognize all those European species and countries of origin. Tables in the IRC refer to four North American categories: southern yellow pine (SYP), Douglas fir, hem-fir, and spruce-pine-fir (SPF). Requirements in the code are based on those species and the properties that go with those species. SPF is the weakest species grouping among the eight design values that engineers use in wood design.

Design values have been published for the European species now appearing in the U.S. But the process of design is complicated by the mixing of species and countries of origin within one grade. To figure out the value for a given design problem, an engineer would have to look at each of the design values for each species of imported wood, and select the lowest value for any given property.

Table 4G. Some of this work has now been done for us. The American Wood Council has just released an addendum to the 2018 Edition of the Design Values for Wood Construction (a supplement to the National Design Specification for Wood Construction) that lists design values for European wood varieties (see excerpt, above). Engineers at the AWC have sifted through the design values for each of the wood species and countries of origin that have associated grade stamps, and have created combined tables that already select for the lowest value in each property.

Significance to design engineers. In many cases, the design values are lower for the Euro wood than for SPF, the weakest North American category listed in the IRC. In the case of shear wall and connector performance, the specific gravity ("G" in the table above) is a controlling factor because of its influence on fastener performance; the weaker Euro woods could result in a significant reduction in the capacity of a shear wall. Similarly, specific gravity influences the gripping strength of truss plates; weaker Euro wood could significantly compromise the strength of critical truss connections if the design software is not adjusted to take the wood variations into account. And in high-wind regions, bending strength of lumber is significant for the resistance of walls to the lateral pressure of wind.

Significance to builders. Up until now, this lumber strength issue may not have had a recognizable significance to builders. But the issue has been circulating in the code community and is starting to be on the radar screens of code officials. Going forward, inspectors in the field could be flagging critical structures, such as shear walls, constructed with lumber that bears an unfamiliar stamp.

Contributing editor Ted Cushman reports on the construction industry from Hartland, Vt.

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In construction, a good broker may be more valuable than a lawyer

BY PETE FOWLER

If you are a construction professional, you are at risk, and every step of every job presents risk that has the potential to bring harm—be it financial or bodily—to yourself, your loved ones, your staff, your clients, and the public. Insurance can cover this risk, but you must not do this alone. If you don't consider your insurance broker a key advisor, read this article and then go shopping for an insurance broker who can help you understand what you need to do to protect yourself and your business.

For the last 20 years, my company—a construction services firm conducting traditional building inspection and testing, estimating, quality assurance, and construction management services—has worked on hundreds of building claims and litigation matters, including expert witness testimony. We have been hired to analyze the liability of thousands of project players.

These are examples of some cases we have worked on:

■ A general contractor performed a whole-house interior and exterior remodel, using more than a dozen subcontractors. The owners were dissatisfied and refused to make the final payment, so the general contractor sued the owners. In response, the owners hired a lawyer and a team of experts to examine the project and find every conceivable variation from perfection, and sued the general contractor for construction defects, claiming a cost to repair of more than 100% of the original contract price. The general contractor, in turn, sued every subcontractor who worked on the elements of work in the defect claim. We have worked on so many of these cases, the sequence of events is like a proverb.

■ A condominium owner hired a general contractor for an interior remodel. The general contractor hired a plumbing subcontractor who was using a torch and lit the building on fire. The condominium association's insurance company paid to make repairs to the common area, and then pursued both the general contractor and the plumbing subcontractor for reimbursement of the claim paid.

■ An employee of a scaffolding sub-subcontractor, hired by the siding subcontractor, fell and was gravely injured. Since the employer

had the required workers' compensation insurance, the injured worker was unable to sue his employer, but he was not prohibited from suing the siding subcontractor who hired his company and the general contractor. The general contractor's insurance company hired a lawyer, who hired us to investigate and explain the roles and responsibilities of the various parties, in sworn testimony.

Count yourself lucky if you haven't been involved in a similar case. But even if you have escaped this misery, you need to ask yourself now, What would I do, if I were a player in one of these scenarios? More importantly, you need to be insured for any of these scenarios. It's not a matter of "if" anymore, it's "when."

In this article, I'll go over the basics so you have some background to ask the right questions when shopping for an insurance broker, as that's what you need to do if you don't already have one who is looking out for your interests.

TOWARD A RISK MANAGEMENT PLAN

As a construction professional, you're in the business of risk management. Now, let me be clear: Risk management is an enormous topic. It can be an entire profession, so a one-minute summary here won't begin to explain all that you need to know ... but it's important that you begin to think about being prepared to do exactly what the term says: manage, not just take, risks.

Risk management is the process for identifying, assessing, and prioritizing risks so they can be understood and addressed proactively. Risks in construction are immense; they range from something like fire, or a fall causing an injury, to a construction defect lawsuit.

Risk management allows businesses to understand and prepare for the unexpected by avoiding problem situations or minimizing risks and planning for extra costs before they happen. Every business faces the risk of unexpected, harmful events that can cost the company money, or even bankrupt the owners and business. There is no way to avoid risk entirely. But being aware and prepared with a thoughtful risk management plan can not only save businesses money, it can protect a company's public image, while potentially preventing injuries and accidents by keeping safety top of mind. Most risk management strategies include the use of insurance.

TYPES OF INSURANCE

All professional business owners and managers should know the options and requirements for different types of insurance. Sure, there are people like agents and brokers who will help businesses find and decide on policies, but having a big-picture understanding of these common types of insurance is helpful in making wise decisions. The business owner or manager has to make a judgment about how much insurance to carry based on their "risk tolerance." Here's a summary of the most common types of insurance in our industry.

Workers' compensation insurance, also known as workers' comp, is a type of business insurance that provides benefits to employees when they suffer from work-related injuries or illnesses. This insurance will help cover missed wages, medical expenses, vocational rehab, and death benefits from a compensable workplace injury to a covered employee. It not only helps employees but also protects businesses from lawsuits and keeps businesses compliant with state regulations. Generally, if an employee is entitled to workers' comp, they can *not* make a claim against their employer.

Nearly every type of employer in all states in this country is required to have workers' compensation insurance. Some states even have laws that require general contractors to actively make sure and document that every person on site, including the employees of subcontractors, are covered by a workers' comp policy.

The business owner or manager has to make a judgment about how much insurance to carry based on their "risk tolerance."

Commercial general liability (CGL) insurance provides coverage to a business for bodily injury, personal injury, and property damage caused by the business' operations, products, or injuries that occur on the business' premises or work sites. Commercial general liability can help protect a business from losses due to third-party bodily injuries, third-party property damage, reputational harm like libel and slander, and advertising injury (when another business claims your advertising looks too much like theirs). This type of insurance can help cover the cost of legal teams to represent your business, witness fees, evidence costs, judgments, or settlements. These policies are not for professional errors or omissions, only for "resulting or consequential damages" to the property or people, which includes claims like costs for lost profits and revenue. It is not required by law for all businesses to carry this type of insurance, but many administrative rules by state agencies overseeing the construction industry require construction contractors to have CGL insurance.

Builders risk is a special property insurance that covers damage to a construction project during the course of construction. Because every construction project is different, no two builders risk policies are alike. Generally, most builders risk policies cover property losses due to fire, lightning, hail, explosions, hurricanes, theft, vandalism, and many other risks. Exact coverages and limitations can vary greatly depending on the provider, and additional coverages can be added for extra expense, such as delay in opening, soft costs, extra expense, and loss of rents.

Umbrella coverage is a form of supplemental liability insurance. It protects the insured against claims that go beyond the existing limits of their other insurance policies, in particular CGL, auto liability, and employers' liability section of a workers' compensation policy. These policies usually do not pay until all

C. Insurance Requirements.

Without limiting Contractor's indemnification obligations, the Contractor shall not commence work until he procures and maintains, at his sole cost and for the duration of this Agreement, insurance coverage as provided below, against all claims for injuries against persons or damages to property which may arise from or in connection with the performance of the Work hereunder by Contractor, its agents, representatives, employees, and/or Subcontractors. In the event that Contractor subcontracts any portion of the Work, the Agreement between the Contractor and such Subcontractor shall require the Subcontractor to maintain the same policies of insurance that the Contractor is required to maintain pursuant to this section.

The policies and amounts of insurance required hereunder shall be as set forth below.

(a) General Liability (including premises, operations and mobile equipment, products and completed operations, broad form property damage including completed operations, explosion, collapse and underground hazards, contractual liability, personal injury, independent contractors' liability): with a minimum limit of Two Million Dollars ($2,000,000.00) for each occurrence (combined single limit for bodily injury and property damage). Minimum limit of Two Million ($2,000,000.00) aggregate for products–completed operations and with a minimum limit of Four Million ($4,000,000.00) general aggregate. This general aggregate limit shall apply separately to the Contractor's work under this Agreement.

(b) Automobile Liability (including owned, non-owned, leased, and hired autos): Insurance covering "Any Auto" with minimum limits of One Million Dollars ($1,000,000.00), single limit, per occurrence for bodily injury and property damage.

(c) Workers' Compensation and Employer's Liability: Workers' Compensation Insurance in an amount required by the laws of the [redacted] (Statutory Limits). Employer's Liability Insurance with a minimum limit of One Million Dollars ($1,000,000.00) per occurrence.

Sample of contractor insurance requirements as stipulated in a contract.

other policies have been exhausted. An umbrella policy is not the same as an excess policy, but the differences are far beyond the scope of this article.

Errors & omissions (**E&O**) insurance is professional liability insurance. This coverage is to protect companies and workers from lawsuits that claim mistakes were made in delivering professional services or inadequate work. It is designed to help protect businesses from negligence, errors, omissions, misrepresentation, violations of good faith, inaccurate advice, and injuries like libel and slander. It can help cover court costs, attorney fees, administrative costs to build a defense, and settlements. Architects, engineers, doctors, lawyers, and other licensed or registered professionals can buy these policies. In general, these policies are not available to construction contractors unless they are doing design work, in which case they can purchase contractor's professional liability insurance to cover professional services such as value engineering, schedule coordination, and design-build services.

Wrap up insurance is a method of insuring multiple parties (typically, owner, contractor, and all subcontractors) participating in multimillion dollar projects to ensure they all have the same broad coverage, limits, and claim response. There are two types of wrap up insurance: owner controlled and contractor controlled.

The owner-controlled variety is set up by the owner of a project to benefit the builder or contractor and covers all listed contractors. Contractor controlled is set up by a general contractor to extend coverage to all contractors and subcontractors. The structures of wrap up programs vary widely, but they almost always cover general liability and umbrella liability for all contractors participating at the project site. They can also include workers' compensation, builders risk, pollution liability, and professional liability. While wrap up insurance programs are most frequently used for large, single-site projects, a blanket or rolling wrap up can be used to insure multiple projects under one program. These policies have become popular in development projects, in part because common CGL policies typically exclude work on certain types of projects, including multifamily, that are common targets for construction defect litigation.

Conflict during construction defect claims is quite common, so successful wrap up policies are possible only when the insurers, sponsors, and participants recognize the value of a group approach and commitment from all concerned. This often requires a more cooperative approach to claims than the parties may be used to. Without such cooperation, the parties involved are back to only individual policies and adversarial claims.

Self insurance is a system in which a person or business sets aside an amount of money to cover any losses that may occur. When people or businesses consider losses they can afford to cover, self insurance may save money since they won't be paying a premium. This route requires retention at their own cost instead of having it insured.

No insurance is when a business refrains entirely from insuring against risks.

ROLES AND RESPONSIBILITIES

Making an informed decision with the help of a trusted and super-knowledgeable advisor is the right thing to do; making your own decision based on your own knowledge and experience is unwise. Everyone has a role to play when it comes to insurance. Here are the basics.

Insured. The insured is the person or company (contractor, designer, and such) covered by the insurance policy and is usually the one who paid "the premium" (the cost of the insurance). The

insured's responsibilities begin with choosing and securing the right advisors. There is plenty of variation in coverage and policies, each of which may have its own definition of the insured's duties. These should be thoughtfully reviewed, as a breach of these duties is a breach of contract. A thorough understanding of the policy and what is expected is a critical first step. Most of these duties will include notifying the insurer of a loss or claim, or even a situation that may result in a claim. Responsibilities can also include honesty and cooperation with the insurer throughout the investigation process and proof of loss. In the same way that construction professionals should read work contracts they sign, they should sit down and read the insurance contract. If the insured is also the policyholder, it is their duty to pay the policy premium.

Agent. Agents act as the go-between for the insured and insurance companies. Agents specifically act as representatives of insurance companies. They sell policies on behalf of insurers and may work for a single company, or they may be independent and represent multiple companies.

In the same way that construction professionals should read work contracts they sign, they should sit down and read the insurance contract.

Broker. Brokers represent the insured. They do not work for insurers directly; rather, they solicit quotes or policies from insurers on behalf of the insured. Construction is a risky business and a good argument could be made that a great insurance broker is more important than a great lawyer.

Underwriter. Underwriters approve or renew applications for insurance coverage for individuals and businesses. They evaluate and assume the risk of future events and charge premiums in return for a promise to reimburse the insured party in the event damage occurs. Underwriters typically work for the insurance company.

Insurance company. Insurance companies offer risk management in the form of insurance contracts. When they receive an application for a policy, they look at the perceived risk and decide whether the policy will be issued or denied. If the policy is issued, the insurance company or insurer guarantees payment for an uncertain future event.

Attorney. Finding a great attorney using basic due diligence is a must for business success. They are like a priest to whom you confess your sins, and they are like a wonderful mentor you can call when you're not sure of yourself. A lawyer experienced in your type of business should be on retainer, and you should call and ask them questions at least a couple of times a year.

COVERAGE BASICS

There are few hard and fast rules, so anyone who thinks they know what is covered and what is not without reading the text of the policy is foolish. Even when you have read the policy, you still don't know for sure. The arguments are so nuanced and the language so arcane that we sometimes don't know for sure until a judge or jury tells us what's covered.

Contractual risk transfer. Contractual risk transfer is a non-insurance contract or agreement between two parties where one agrees to hold another party harmless for specific actions, inactions, injuries, or damages. The ideal use of contractual risk transfer is to place the financial burden of a loss on the party best able to control or prevent the incident leading to injury or damage. These contracts should be as specific as possible, detailing scope of work and any financial burden should loss occur. They are accomplished using indemnity agreements, additional insured endorsements, and subrogation waivers (refer back to "Types of Coverage," above). The most common example of a contractual risk transfer in construction is an indemnity agreement as a clause in prime subcontracts.

Indemnity agreements. Indemnity is a contractual agreement between two parties where one party agrees to pay for potential losses or damages suffered by the other party that arise from the first party's performance of work as required by the contract. These can be seen in many insurance contracts where the insurer (or the indemnitor) agrees to pay the insured (or the indemnitee) for any damages or losses in return for premiums paid by the insured. When the term indemnity is used in the legal sense, it may also refer to an exemption from liability for damages. These agreements have what is called a period of indemnity, which is a specific length of time for which the payment is valid. Many contracts also include a letter of indemnity, which guarantees that both parties will meet the contract stipulations or an indemnity must be paid. All of the most sophisticated construction contracting businesses have well-defined standards around the issue of indemnity agreements. In general, lower-tier contractors, like subcontractors, indemnify the general contractor for any harm the subcontractor might cause.

Certificate of insurance (COI). A certificate of insurance is nothing more than a piece of paper showing proof of insurance, policy limits, and a coverage period at that point in time. Simply put, it is a contractor's way of showing an owner or another party they have insurance. The policyholder has their agent issue a certificate of insurance to prove they have an active policy at the time the certificate is created. For example, the general contractor on a project may ask for proof of insurance from the subcontractor. The subcontractor would obtain a certificate of insurance. This certificate might name the general contractor as the "Certificate Holder," but that does *not* mean they are included in the policy. All that means is they are the one receiving the document.

Additional insured (AI) endorsements. Many contracts require the policyholder to extend their coverage to other entities. Anyone who benefits from this extension of coverage is an "Additional Insured." If you are the general contractor, having your company become an additional insured means the subcontractor's policy also has your company covered. If they cause a loss, their insurance policy will be the first to pay for the claim.

Certificate and additional insured best practices include the following steps:

Step 1. Determine who manages certificates and how records are maintained.

Step 2. Develop an internal waiver process when accepting noncompliance for lower-risk trades.

Step 3. Develop clear insurance requirements in contract and subcontract agreements.

Step 4. Make compliance mandatory for high-risk sub-trades, like waterproofing or roofing, with a waiver process for lower-risk trades.

Step 5. Keep copies of all documents in a subcontract file. Make sure to get renewal certificates and additional insured (AI) endorsements.

Step 6. Consider specialized certificate or management software to make 100% sure that 100% of the certificates you care about are correct.

Waiver of subrogation. When an insurance company pays a claim, it often investigates the possibility of recouping what was paid if the loss was caused by someone else. The recouping of insurance claims paid is called "subrogation." If there is another party directly involved in the claim, or that the insurance company can prove shares responsibility for the loss, the insurance company will initiate subrogation against that other party to recover what was paid to the insured. The most common type of claim that can be subrogated is property damage.

A waiver of subrogation is when two parties contractually agree to waive rights of subrogation either against one of them or against each other (mutual waiver). Insurance companies do not automatically follow contractual subrogation waivers but will usually agree to follow the contractual waiver for an additional premium. For example, say the owner of a building has hired a contractor. Property damage to the building occurs during a storm and the owner's insurer pays the claim to make repairs. If no waiver of subrogation was included in the policy, the insurer is free to pursue the contractor. If the insurer can provide enough evidence, the contractor may become responsible for the financial burden of the property damage. The addition of these waivers generally results in a premium increase, but they can save the time and cost of lawsuits, cross-suits, or countersuits.

"Your Work" exclusion. Most CGL policies will include a "Your Work" exclusion. This type of exclusion, in its most basic form, means that the policy will not cover damages to a structure built by an insured contractor. Since a contractor controls the quality of their own work, it has been determined that it is fair to hold them accountable if the work is faulty. Faulty work can include parts, materials, equipment, or any type of operation performed that is done incorrectly as part of the work. This could be repairs or maintenance that doesn't meet the standards of quality, representations, or warranties. Faulty work can also include a lack of warnings or instructions. While the policy will cover most damages as a result of faulty work if they occur during the policy period, it will not cover the loss of correcting the work or repairs to fix the problem that caused the damage. For example, a roofing contractor does bad work. The contractor's insurance company will pay for resulting damages of a roof leak, like drywall or carpet, but won't pay for the cost to repair the roof. There can be many specific scenarios included in a "Your Work" exclusion, so paying careful attention to details is important.

Construction is a risky business and a good argument could be made that a great insurance broker is more important than a great lawyer.

Consequential damages are indirect damages associated with a breach of contract. Direct damages from a roof leak, for example, would be drywall and paint. Indirect damages can include lost profits, loss of the use of a building, loss of rent, increasing financing costs, damage to a business's reputation, or loss of opportunities.

DANGEROUS BUSINESS

Regardless of who you are in the construction industry, you are at risk of a claim. It's a dangerous business. That is part of what makes it interesting, but you need to be ready to survive whatever is likely to come your way.

In the three scenarios I presented in the introduction, none of the general contractors was forced out of business, because they were insured. In two out of three, the legal and expert fees alone were hundreds of thousands of dollars, and the settlements were many times that. In the third situation, legal and expert fees were more modest, but the cost to repair the physical damage was hundreds of thousands of dollars.

Hopefully, those are convincing outcomes to inspire you to go find a good insurance broker and use this article as a checklist to have them explain how all of this applies to you, your work, and your business specifically.

Pete Fowler is president of Pete Fowler Construction Services (www.petefowler.com), which provides building inspection and testing, estimating, quality assurance, and construction management, as well as claims and litigation support, throughout the U.S.

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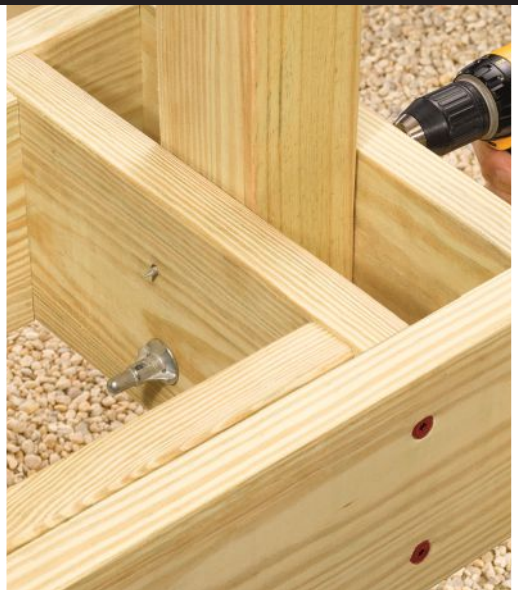

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A Traditional Porch Ceiling With a Modern Look

by Jason Stimis

Stretching 80 feet across the front of the Maryland home that my company was building, this front porch was one of the home's major design elements and would be highly visible from the road. As the general contractor, I knew the home inside and out. It was designed as an all-white, modern version of a farmhouse, with black doors and window frames. During construction, the owner and I agreed that a dark ceiling for the porch would help soften the contrast between the bright white exterior and the black accents.

The house stands on a fairly exposed site, a working farm on Maryland's eastern shore, between Chesapeake Bay and the Atlantic. So the ceiling would have to resist strong winds, humidity, and fading due to reflected UV radiation.

At my recommendation, natural wood was out. Not long before, I had completed a similar project using stained tongue-and-groove (T&G) pine, and I was disappointed by its premature need for refinishing. Black vinyl soffit was an option, but I wasn't sure it would be tough enough in these coastal conditions.

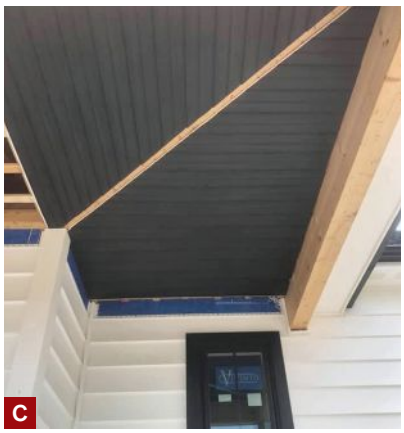
PVC trim is always a good choice in challenging environments, and we have installed a lot of it on all kinds of projects. But in this case, I was reluctant to recommend coating or staining standard white PVC to achieve the dark ceiling desired by the client. While good-quality PVC will stand up structurally to environmental hazards, applying color adds one more step to the process, and the surface can suffer noticeable dings and scratches during shipping and installation.

However, we had some familiarity with a comparatively new material that checked most of the boxes for this project. Versatex manufactures a T&G ceiling board it calls Canvas, which comes in a range of durable, wood-look laminates permanently bonded to a solid PVC substrate. I knew these field-tested

PHOTOS BY JASON STIMIS


A


B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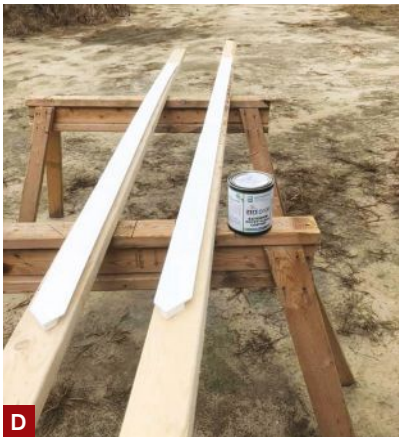
D


E


F

To prep the porch ceiling framing for the PVC T&G boards, workers installed strapping 10 inches on-center (A) and used construction adhesive to glue each blind-nailed board to the strapping (B). At the diagonals where the porch turned a corner, T-shaped molding was used to cover the intersection (C). Because this trim wasn't available with the Kitami finish on the rest of the ceiling, the author prepped and painted standard white PVC T-molding with AquaSurTech D200 paint, formulated specifically for use with PVC (D, E). The painted T-molding is a close color-match to the ceiling (F).

ceiling boards would be a perfect fit for this project, except for one problem: My client and I were looking for something darker and more neutral than the wood tones in the product lineup.

Here's where showing up at trade shows and product demos paid off. I met a member of the Versatex team who told me about a dark Canvas shade, called Kitami, that was in the new-product pipeline. According to the company, Kitami is a nod to the recent interest in shou sugi ban, a centuries-old Japanese technique for preserving cypress wall and ceiling cladding by heat-treating their outer layers. The resulting boards, or yakisugi, have a weatherproof, charcoal-toned, matte surface that was the inspiration behind the new Canvas color.

My Versatex friend supplied a sample, which my client agreed was just what the project called for, and I ordered enough boards with the Kitami finish to complete his 8-foot-by-80-foot ceiling. Following the company's installation guidance, we strapped the ceiling joists 10 inches on-center to make sure that the boards would remain flat and used construction adhesive to ensure that they wouldn't sag or start to come down. My two-person crew wrapped up the job in just one day, with ordinary carpenter's tools.

Kitami is currently available for T&G beadboard or 3/4-inch-thick WP4 stock, both with 4-inch crown and bed moldings to match. But it's not yet available as a T-strip, which we needed to finish the angles. For that, we acquired a quart of matching AquaSurTech D200 paint (aquasurtech-oem.com) and PVC cleaner, on the recommendation of the Versatex tech department, and used them to color-match standard white PVC molding. ❖

Jason Stimis owns Stimis Enterprises, a multigenerational home improvement and construction business based in Allen, Md.

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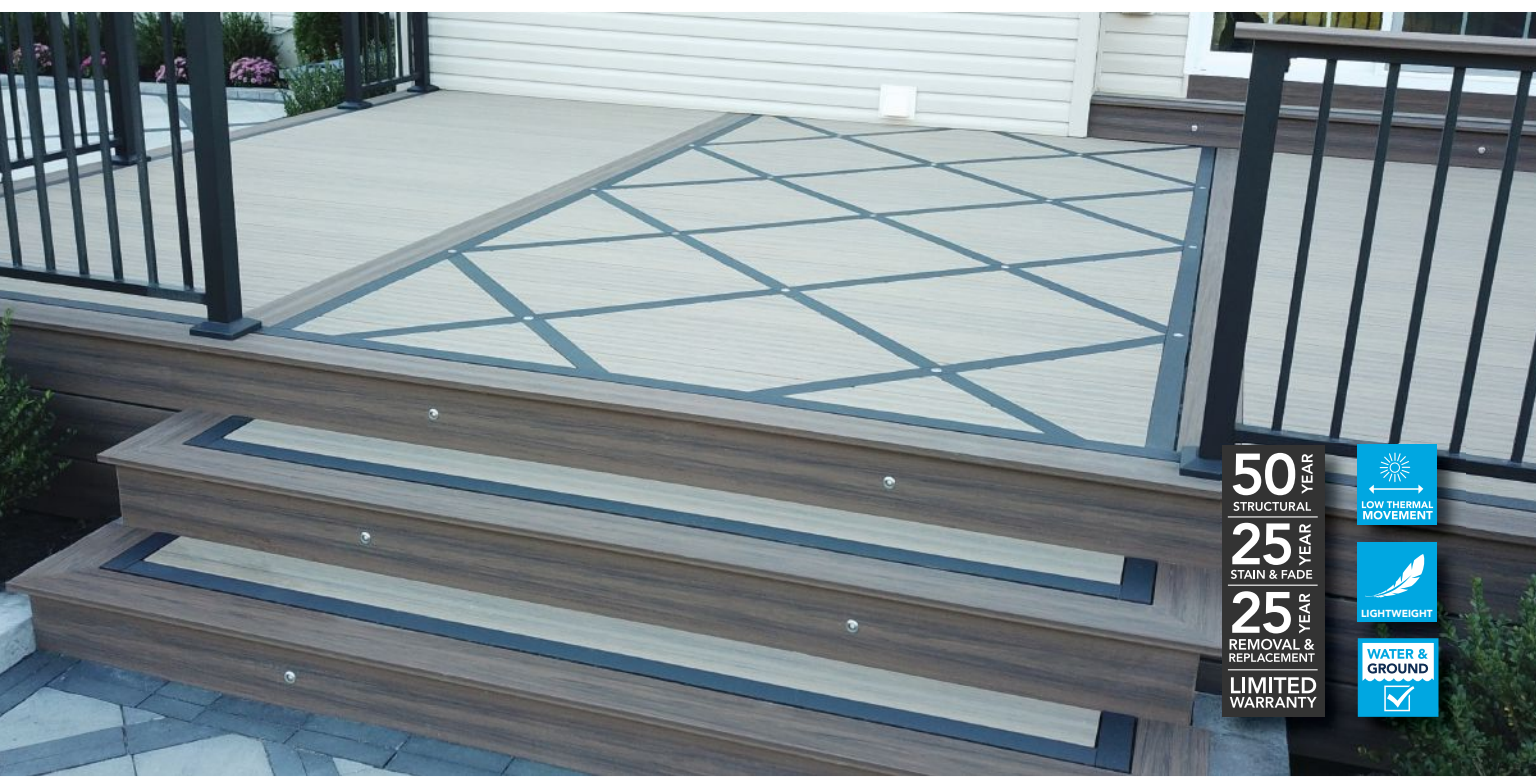

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PHOTOS BY EMANUEL SILVA

Classic Porch Revival

A mix of original and new materials refreshes an old porch

by Emanuel Silva

A few years ago, a client for whom I had previously done some basement repair work asked me to evaluate the porch on his mid-18th-century coastal New England carriage house. Built in the late 1990s, the porch wasn't nearly as old as the house, but the wood decking was starting to rot, and the treads on the two sets of stairs leading up to the porch were showing similar signs of decay and suggesting trouble underneath in the framing. The owner wanted to refresh the porch and had some specific—and often conflicting—ideas about what needed to be done to fix it, and the materials he wanted to use.

The original porch decking was square-edged 1x4 painted wood, probably fir, and the owner complained about the annual cleaning and refinishing ritual required to maintain it. Composite decking would have been a good solution, but the owner wanted wood, so I priced out several options including mahogany and ipe.

Meanwhile, the owner conducted his own research and discovered a product called Perennial Wood, an acetylated wood decking product first introduced to the market in 2012. I'd never even heard of it, much less had any experience with it, and suggested that the owner get some samples and stick them in a bucket of water. If he was satisfied with the decking after this water test, I agreed to install it, but only if he bought it and assumed responsibility if its performance didn't match his expectations.

Demo and Repair Strategy

Though the porch framing was 18 years old, it was in excellent condition thanks to the CCA-treated lumber that had been used to build it. Even the ledger was well-flashed and securely fastened to the house framing. I would have preferred to replace the railings, which had been assembled from a prefabricated composite kit, but they were still serviceable, and the owner wanted to retain them.

The porch had a pergola supported by PermaCast columns. Because the tops of the columns hadn't been capped when they were originally installed, water had gotten inside them, causing damage to the decking underneath. Otherwise, the composite columns were in good shape, although the pergola they supported was

Figure 1. While the original porch framing was sound, the worn and weathered decking needed replacement (A). Part of the repair strategy was to retain the stringers for one set of stairs but pour a new landing pad to support them (B).

Figure 2. The author reframed the front stairs, cutting new stringers and installing a new dropped header to help support them (A). New 5/4x6 deck boards were face-screwed to the framing after the PVC skirts and risers were installed (B).

not. Built with common framing-grade material, the beams and rafters were overdue for replacement.

Fixing a Pair of Stairs

Stairs are often a red flag on a porch renovation project. Sometimes, there's a code-related issue, such as when the risers vary too much or are too tall, or the treads aren't wide enough; other times, the problem is structural, such as when rot has developed or when the guard posts are too weak. In either case, it often comes down to the stringers—should they be kept or replaced? In this case, the answer was both; the owner agreed with me that the stringers for the shorter, front flight of stairs should be replaced, while the stringers for the longer, side flight could be retained (**Figure 1**).

After removing their treads and risers, I discovered that the key element missing from both sets of stairs was adequate support at ground level.

The stringers for the long flight of stairs off the side of the porch were simply bearing on a 2x12 that was on the edge of—but not fully bearing on—a small concrete slab landing topped with stone pavers. After temporarily supporting the stringers midspan, I formed and poured a new steel-reinforced concrete landing pad. With solid support, the old stringers simply needed new treads and risers.

The front stairs were another matter; not only was each stringer cut to a slightly

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THREE DECK UPGRADES THAT OPTIMIZE PROJECT POTENTIAL, PERFORMANCE AND PROFITS

By: TrexPro Mike Mitchell of Mitchell Construction

With homeowners more willing than ever to invest in their outdoor spaces, make the most of your projects by suggesting simple upgrades that will add function, value (and profit) without adding a lot of time or cost. Here are three easy add-ons that I suggest to all of my clients:

1. **Deck Flashing Tape for Wood Framing**
   Research* shows that most wood-framed decking substructures begin to show signs of decay within the first 8–10 years. This is because wood is highly susceptible to moisture damage. Deck flashing tape is a simple and inexpensive way to protect wood from deterioration due to weather and time. It also helps screws and fasteners hold longer for enhanced structural integrity.

   My go-to tape is Trex® Protect™. I use it on every deck I build—no matter the size or material—because I want my work to last. Engineered specifically for use on decks, the peel-and-stick tape is applied as a cap to allow the wood to breathe. It requires minimal cuts and little overlap making application a breeze.

   The butyl adhesive is super sticky creating a tight seal around fasteners. It doesn't dry out or curl up like other construction tapes and performs extremely well in a wide range of temperatures. Trex Protect also features a non-skid surface, making it easy and safe to walk across during construction.
2. **An Under-Deck Drainage System**
   Another way to optimize a deck project is by installing an under-deck drainage system. Using a network of troughs and downspouts, these systems divert water away from a deck, preserving the studwork and also keeping the area underneath dry and useable for storage or as additional living space—something all homeowners seem to be seeking these days.

   For optimal protection and aesthetics, I use Trex® RainEscape®. Installed above the joists, this system protects the entire foundation and also allows homeowners to run electrical wiring for lighting, ceiling fans and entertainment components, as well as gas lines for grills and outdoor kitchens—all concealed between the deck surface and a soffit ceiling to create a finished look.

   Trex RainEscape is easy and efficient to install. The entire system includes just five SKUs and only a utility knife, staple gun, hammer and caulk gun are needed for installation. The process takes no more than a few hours to complete, and the system is backed by a 20-year warranty from the world's #1 decking brand.
3. **Deck Lighting**
   Another "bright" idea for adding value to a deck project is lighting. Dimmable LED lights incorporated into railing post caps and stairs can increase safety while enhancing ambiance and extending the time that homeowners can spend outdoors. And don't forget to illuminate the space beneath the deck with soffit lights.

   While these add-ons may seem minor, they can have a major impact on customer satisfaction and your bottom line—especially during a season as busy as this one promises to be.

ABOUT THE AUTHOR

Mike Mitchell and his father, Scott, own Mitchell Construction in Monee, Illinois. Combined, they have 57 years of construction experience and build approximately 60 decks each year. They are certified TrexPro Platinum builders, the highest rank awarded by Trex®, the world's leading brand of high-performance, low maintenance composite decking. For more information about Mitchell Construction, visit **www.mitchellconstructioninc.com** or **@mitcondecks** on social media.

*Based on a survey of 100+ builders conducted by Dri-Deck Enterprises (now IBC, LLC).

Figure 3. Working from the old decking, the author installed the picture-frame border using 5/4x6 square-edged decking (A). The field decking was grooved for hidden fasteners (B). After face-screwing the border and treads to the framing (C), the author filled the countersunk holes with plugs cut from the same material (D). Then he flush-cut the plugs (E), sanded them smooth, and used a touch-up paint to color-match the plugs to the rest of the decking.

different length to account for the uneven stone paver landing, but there were only five stringers, while the span table for this particular type of 5/4 decking on this width of stairs called for six. I also wanted to improve the header detail so that the tops of the stringers would have a better connection to the deck framing.

Finally, when I removed the posts underneath the composite post sleeves that formed part of the railing system, I discovered substantial rot where the posts connected to the stringers. The owner agreed with my assessment that the stair framing should be replaced prior to installing new treads and risers (**Figure 2**).

Decking

It was clear that the Perennial Wood decking was a premium product—comparable in cost to the best ipe and composite products—when it was delivered to the jobsite. Each board was individually wrapped and blemish-free when removed from its wrapping.

For the treads and picture-frame border, I had specified square-edge 5/4x6 boards, while the field decking was grooved for hidden fasteners, which were supplied with the decking (**Figure 3**). Because the wood was prefinished, the manufacturer also supplied a quart of matching sealer/finish.

Perennial Wood was produced from southern yellow pine but not the same SYP that you find at the lumberyard. This material was cut from long, clear lengths of lumber that had been subjected to a combination of heat, pressure, and a dose of acetic anhydride. This process replaces the water-loving (hydrophilic) free hydroxyls within the wood with water-hating (hydrophobic) acetyl groups, basically transforming the wood's cellular structure. While Perennial Wood is no longer available, another company, called Accoya, produces modified radiata pine decking using a similar process.

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Figure 4. The author cut PVC plugs sized to fit inside the bases of the columns and screwed them to the decking (A). This ensured that the columns would be reinstalled in their original locations (B) and that the railings could be reused.

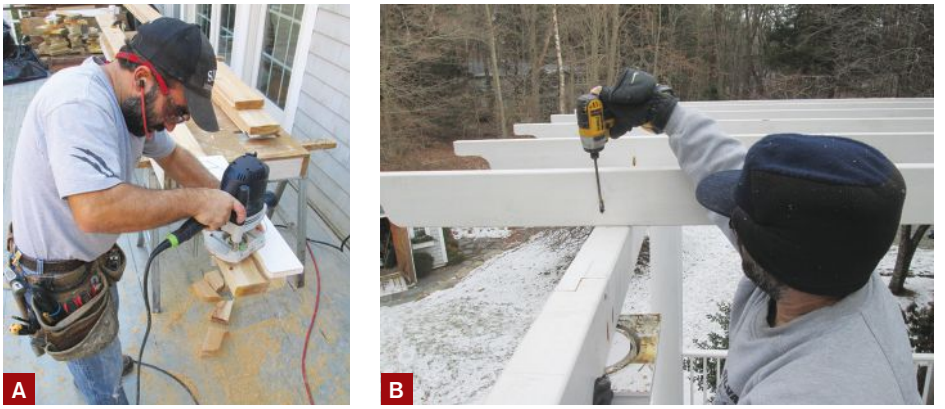

Figure 5. After pattern routing the rafter tail profiles (A), the author primed and painted the 2x6 red-cedar rafters and fastened them to the house ledger and 4x6 beam with structural pocket screws (B).

The decking was straight, flat, and free of defects, and installing it was a treat. In the field, I used hidden fasteners, while I face-fastened the picture-frame border and treads. I counter-bored the 3/8-inch-diameter holes for the stainless-steel screws I used to fasten the decking to the framing, and I filled the holes with custom-cut plugs.

The only hiccup that I encountered with the decking was trying to color-match the cut ends and plugs to the decking. The manufacturer-supplied touch-up coating was supposed to be opaque, but it applied like a translucent stain, even after vigorous mixing and multiple coats.

Columns, Railings, and Rafters

Because the owner wanted to reuse the railings, I carefully mapped out the locations of the columns as I removed them prior to replacing the decking. Then, to ensure that the railings would fit snugly when I reinstalled them, I had to make sure to place the columns back in exactly the right places.

My solution was to cut round plugs out of 2-by PVC stock that could be inserted into the base of each column. I screwed the plugs in place on top of the decking according to my map, and then slid each column into place over a plug for a perfect fit. A few screws driven through the sides of the columns into the plugs secured them to the decking as I reinstalled each rail section (**Figure 4**).

I wanted to keep water out of the columns, so I also cut round PVC plugs for their tops. I capped the columns with the plugs and a bead of sealant before installing the 4x6 red-cedar beam, which is spliced with a lap joint over one of the columns.

To duplicate the profile that had been cut on the tails of the original rafters, I made a pattern to clamp to the ends of the new 2x6 red-cedar rafters and use as a template. I cut the rafter tails with a bearing-guided flush bit, and then I primed and painted the rafters. Prior to installation, I used a Kreg jig to cut pocket holes at the house ends of the rafters and in the faces of the rafters where they bear on the beam. Installation was simply a matter of driving coated structural screws through the holes into the ledger at the house and into the beam (**Figure 5**). ❖

Emanuel Silva, a frequent contributor to JLC*, owns Silva Lightning Builders in North Andover, Mass.*

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PHOTOS BY DAVE SETTLEMYER

Flaming Boulders

A custom-built fire feature adds nighttime flair to a Colorado hardscape

by Dave Settlemyer

I've been working with natural stone for years, beginning by carving bowls into boulder tops, then coring through the boulders to run piping for water features. My familiarity with stonework eventually led to new ideas using natural gas and steel lines, and I also began carving shapes—from simple circles to boxed out rectangles and angles—into boulder tops for hardscape features such as Hibachi-style grill boxes that hold coals with grill grates on top, and inset natural gas grills built directly into the hollowed-out cavity of the stone.

These projects sparked the idea of creating a flaming boulder as part of a multiple-tier fire feature, something that could provide some depth of design and flame appeal. But when I included this concept in the design proposal for a recent project, the clients thought the feature was maybe a glitch in my design software, or an accident in my placement of flames. It took a little bit of convincing and explanation to help my clients understand the basis behind my ideas. Fire coming out of boulders?

After a short debate about cost effectiveness versus visual appeal, the argument for visual appeal prevailed. Of course, cost is always a factor with an original concept in a design, and clients have to be prepared to leave some wiggle room financially to account for unexpected issues arising during construction from unknown or previously untested features. This project started with a line item allowance of $10,967 for the fire feature, while complications stemming from delays, machinery overages, and extra labor added $1,142 to the cost.

Natural Gas and Permits

For a standard gas-fired outdoor appliance, such as a gas grill, we typically just make a connection to a ½-inch-diameter supply pipe stubbed out near a back door. For this design to work, we were going to require a bigger gas supply, which involved several exchanges with the local building department. To compensate for the maximum potential 220,000 Btu rating of the fire feature, we determined that the property fell under a renewable energy offset clause that required us to supply about 175 kilowatt-hours of renewable energy per month through

Figure 1. After laying a gas line in a 30-inch-deep trench and placing boulders in their proper locations (A), workers prepped the area for the concrete slab that would provide a base for the flagstone patio (B).

Figure 2. The author carved 8-inch-deep recesses into the tops of the boulders with a 10-inch-diameter core bit to house the burner assemblies (A). Then he drilled 2-inch-diameter holes down through the recess to connect to holes drilled horizontally through the backs of the boulders for the gas lines (B).

solar, wind, or geothermal heat recovery. In this case, the previous owners had retrofitted the house with solar panels and a Tesla battery bank that provided enough power reclamation and battery storage to allow us to move forward with the project.

Instead of being considered a single fire feature, the design was classified as three separate fire features, with three separate burners and ignition control sources, which made county approval difficult. Why did we need three burners? How were we going to control the gas supply? Was I doing this work myself or was I including additional contractors? Although my company carries several licenses from multiple jurisdictions for this kind of work, we weren't allowed to pull gas-line permits for this project, so we needed to hire a plumbing company to pull the permit and make the connections to the gas meter supplying the house.

Construction Delays

When we began the project in October 2020, our goal was to have the patio and fire feature ready by Thanksgiving so that our clients could enjoy it during Colorado's cool evenings over the holidays. Normally, this would be a reasonable time frame—six to eight weeks out from design to completion—and we began demo work on the existing lawn and patio, anticipating that the county would soon issue our building permit.

After demo was complete, we excavated a 30-inch-deep trench from the front yard at the gas meter all the way down the side of the house through the home's existing landscaping (which we had to maintain). From there, we continued our excavation under a fence, through the backyard, and around to the planned location for the new fire feature. Spanning nearly 150 feet, our trench managed to disturb the entire property, as we encountered sprinkler lines and drain piping and left mounds of dirt around the yard, all to bury a 1-inch-diameter yellow underground polyethylene gas pipe at the right depth.

Because of a hang-up in the building department due to COVID-related

Figure 3. Along with the burners installed in the two boulders, there are also two ground-level burners (A). The black steel gas supply lines run through 2-inch-diameter holes drilled through the boulders (B). Rated at 50,000 Btu each, the assembled brass burners will be covered by porous lava rock (C).

understaffing coinciding with Colorado's worst fire season ever, receipt of our permit for this next phase of the project was delayed. All building departments and available inspectors had been redirected to help move along the rebuilding process for displaced families who had lost their homes from the wildfires, and work on our project was put on hold until the county could issue our building permit. What we were told might be a one-week delay ended up being almost six weeks of open trenches and a muddy lawn. It wasn't until after the Christmas holiday that we were able to begin construction.

Cutting Stone

The flaming boulders were one part of a much larger project that included a flagstone patio with stone sourced from around the world, a deck, a porch cover, and an outdoor kitchen. We began by strategically placing 42 tons of local moss-covered boulders—selected to complement the size and style of the planned fire feature—at various points in and around the patio footprint. After all the boulders were arranged in the proper locations, we framed the patio area encapsulating the boulders into what would be a concrete base for the stone veneer. Then we locked the boulders into position with 24 cubic yards of reinforced concrete to ensure they'd never move and would forever be a part of the flagstone patio (**Figure 1**).

The two boulders we used for the fire feature weighed nearly 4 tons each, with the tallest one being nearly 7 feet high. Initially, we had planned to use a crane to set the boulders in place, but it turned out to be much more economical to rent a four-wheel-drive forklift with an extendable boom to manipulate the boulders into position and erect them.

To make a connection to the gas line that we had buried in the yard, we had to bore holes through the boulders. I first used a 10-inch-diameter diamond-tipped coring bit mounted in a Hilti core drill to remove 8 inches from the top of the boulders. Custom burners would later be housed in the holes, which we would then fill with lava rocks. Besides filling the holes to a level point on top of the boulders and hiding the burners, the lava rocks would help disperse gas to create more combustible area for the fire.

Figure 4. The fire feature is the cornerstone of a larger patio project (A), with multicolored flagstones set in mortar on top of a steel-reinforced concrete slab (B).

Figure 5. The flaming boulders are meant to be an artistic touch and visual pyrotechnic display but not necessarily a source of heat (A). The bottom chambers where the burners are located utilize the rocks as an infrared heat reflector, creating an elongated bed of flames from below (B).

I began with a handheld version of the drill, but quickly found the tool too powerful for this application. So I mounted the drill's stand directly to the boulder tops, anchoring the stand's feet to the stone with 10-inch-long wedge bolts (with 4 inches of each bolt embedded in the stone) to keep the high-torque machine stationary while drilling accurately (**Figure 2**).

After I removed the top 8 inches of stone for the burners, I switched to a 2-inch-diameter bit to drill an additional 24 inches down into the stone. Because the boulders were encapsulated in concrete, we couldn't drill their full depth, so I then mounted the drill to the back of each boulder to drill a 90-degree connecting hole where piping could be connected for gas service.

These 2-inch-diameter holes house ½-inch-diameter black steel piping, which we coated with Diamond Vogel two-part epoxy paint to create a permanent weather barrier so the steel pipe wouldn't rust in the future. The extra clearance around the pipe through the rocks allows for ample air draw so the flames can burn at maximum efficiency (**Figure 3**).

We used parts from Warming Trends (warming-trends.com) to construct the burners. To create nozzles and multiple burn points, we threaded ⅛-inch-diameter pipe nipples into larger, ½-inch-diameter threaded brass pipe in a tee shape. The upper burners are rated at 50,000 Btu each, while each of the two lower burners is rated at 60,000 Btu, for a 220,000 Btu maximum burn potential. Actual use is less than half of that.

We drilled holes for service keys through the faces of the boulders so each feature could be controlled individually; we mounted the service key for the main fire pit in the front of the feature, vertically through the patio. Similar to a gas cock control for an indoor fireplace, the keys control gas flow and have a removable safety key to prevent unauthorized use. Each of the three fire features is manually lit and individually controlled.

I took it as a personal challenge that the pipe work for these features would remain unseen. One of my goals was for anyone who witnessed this project to wonder how it worked. Thanks to the literal maze of piping through the boulders, the result achieved everything I hoped for and more (**Figures 4, 5**). ❖

Dave Settlemyer owns LS Underground in Longmont, Colo.

PHOTOS BY MARK CLEMENT

A More Efficient Jobsite

For a lone wolf contractor, doggedly seeking out wasted motion is a profit center

by Mark Clement

I might be a little off the deep end when it comes to an "efficient" jobsite, but over the course of a career spent refining tool and material layout, I've found that almost all of my attempts at avoiding wasted motion have paid off. There are many ways to define wasted motion, but one example that immediately comes to mind is driving to the big box store because I can't find X or Y. So is stumbling over materials or trash left on the cut bench or floor. So, from the truck I choose to drive to the carts I use to move material around, I try to keep the chaos to a minimum and the production as productive as I can make it.

Before I go any further, I think it's important to note that "efficiency" isn't a "thing" as much as it is a decision. It requires a little self-reflection and a step back to examine where there might be bottlenecks in your process, and then a dogged pursuit to ferret them out, oil them up, and make the entire machine that is you—the lone wolf—run a little smoother and make a little more money with a little less frustration.

What Is Efficiency?

Like a choice in toolbelts or the dump truck vs. dump trailer debate, it's not a one-size-fits-all answer. Rather, the pursuit of efficiency involves finding a balance that works for your situation.

For example, if you told me to reorganize my stuff in a click-together storage box system, I couldn't do it. My mind doesn't work that way. I might not lose stuff, but without seeing it all the time, I'd never be able to find it either. And if I have to open 25 lids to find a drill bit—well, forget about it. On the other hand, to see me lose my mind, show me a jobsite with half-open cabinet boxes strewn about, or a tipped-over pile of lumber, or a trillion cutoffs on the floor. And if you have to walk somewhere other than where you're standing to get your tape

measure or a pencil because you "don't like" toolbelts ... well ... somebody call the National Guard.

So, this article isn't necessarily 10 Tips to Get You Better Organized. It's about categories and clusters of jobsite realities we all face where it matters to be dedicated to taming chaos and wasted time at the source.

It Starts in the Truck

It only took me about 20 years to figure this out, but I had been using the wrong (for me) truck the entire time. Working on a TV show, where the production company gave us a 24-foot box truck to cart my shop around, made me realize that a pickup truck isn't necessarily the best option for a contractor. And while that box truck is obviously nowhere near as practical in real life, it saved so much time setting up and breaking down, I thought it would build the shows for us.

While my current dream mobile would be a stepvan I can outfit myself, I stumbled into a used service-body truck that instantly went to work paying for itself by saving me an hour a day toting tools, rummaging through truck boxes, or hauling my miter saw out of a truck bed or back seat. Or worrying about rain. It's a shed on wheels.

Also, because there is only one of me, my tools are now with me almost 90% of the time. If I were using an enclosed trailer and didn't tow it home all the time, doing a quick service call—even fixing something at my house—after working on a larger project would be out of the question. Or, I would have to go back for the trailer. There's only one of me, and I need what I need when I need it.

Materials Placement & Storage

I'm rabid about setting up my jobsites in a linear fashion so I can get to what I need as I need it. Where possible, I try to break the components out in related clusters of stuff rather than just going for the stuff I need first, then piling other stuff on top of other stuff. Kind of like a buffet, but heavier. Also, it's sometimes handy to have a few hunks of 2-by ahead of time for dunnage.

Figure 1. The ability to roll a stack of lumber around instead of moving it board by board contributes to efficiency (A). Placing a trash can to collect offcuts saves the time and energy needed to pick them up off the ground (B).

A recent shed build is a good example. My yard delivered the cube packed for shipping, not for how I'd use the building materials in it, so—like all deliveries—everything was tangled up. As I broke the cube down, I staged the customer's yard in clusters—joists, sheeting, studs, and so on—in a line. If instead I told a laborer to unpack the materials, the chances somebody would be moving that pile more than once would go up about 1,000%.

Carts. I don't make any money moving stuff around. I make it installing stuff. One question I often ask myself is, "Will I have to move this twice if I put it here versus over there?" On basement remodels, the answer is almost inevitable: Yes, because if you put the studs and plates in the middle of the room, and the tile in the corner for later, where will you cut? Or where will the plumber put his stuff? Can the electrician reach the panel?

To make moving materials around

easier, I make simple dollies using 2x4 lumber and 4-inch rolling/locking casters. Two will carry a mountain of studs, while one can carry a landslide of tile boxes. I've even put a site-built miter saw station on them and towed it around the room because cutting standing up is much easier than wrestling with a circular saw while hunched over and cutting on the floor, and faster than walking back and forth to sawhorses a million times. If something is in the way, the dollies allow me to roll it so that it is *not* in the way.

Mud. Deck builders often build in mud, which is slippery and sticky. Mud is a chafe that makes me inefficient, because simply trying not to fall down takes up bandwidth I need for solving other problems. To hedge my bets on this unavoidable jobsite condition, I tarp the site (lumberyard plastic is awesome—and awesomely free) before rain is expected. If the post holes are dug, I shovel any extra dirt my auger brings up away from the holes, then I bridge them with something (paver stones, plywood, or the like) so that the tarp won't fill too much in those areas. Attaching the plastic to the ledger creates a drain plane of sorts.

Delivery day. I tend to do a number of different types of jobs. For example, I recently cleared brush for a new fence install, so I needed my chain saws and related gear. The next day, I might need to load up my trailer with my subcompact loader and small cultivator, which I use for decks. Sometimes, material that I use for decks gets shipped to my house instead of the jobsite, and often I have leftover supplies from one job that I can use on the next. Before long, my truck looks like somebody tipped over a big box store inside of it. That is not efficient. That is a disaster.

When this happens, I try to go on a delivery binge and get everything that's snarled in the back of my truck where it needs to go. It is hard sometimes, because all my momentum is pushing toward finishing this or starting that, but this delivery time is time that is well spent.

Figure 2. Horizontal surfaces invite being loaded up with random stuff, but a site-built miter saw stand can also double as a valuable work table (A). Even if not needed for working at height, a rolling scaffold offers a convenient spot for storing fasteners and other small items, and it can be rolled to where those items are needed (B).

Tables & Trash Cans

Jobsite reality: Any and all horizontal surfaces will be immediately festooned with stuff there's no place for, such as keys, coffee cups, phones, chargers, paperwork, and breakfast sandwich boxes. So the first thing I set up on a jobsite is a portable table. I happen to like the OmniTable, but a small, portable, folding-leg table that's easy to move around is the basic idea. Onto this table goes all the stuff there's no place for, because now there's a place, which helps keep actual work surfaces clear.

The second thing I set up is a trash can, which gives me a place to dispose of the packaging after I take the last bite of the

Figure 3. For his most frequently used tools, the author prefers a large trilevel storage box with a bin for power tools, trays for hand tools, and wheels (A). Storing items by categories, such as cords, chargers, and batteries, and storing them in bins makes it easier to track an item down.

sandwich or unwrap some door hardware. The other thing I do with the trash can—which usually lives at the end of my cut bench; more on that in a second—is put a bunch of bags in the bottom of it, then wrestle a bag around the rim. After the first bag is full and I remove it, I have to spend zero seconds wondering where the spare bags are. Grab and go.

I know a lot of lone wolves like foldable, collapsible miter saw stands, but I'm not one of them. For all the efficiency they offer in the form of compact storage and roll-away transport, most offer stock support but no work surface. So I make my own miter saw tables, and while I've gone through a zillion designs (the current one is made from strapping and cost about 99 cents), what they all have in common is continuous infeed/outfeed. So when I'm installing crown, I can screw a cleat to the table top (because there is one) and cut material nested. I can hang my coping saw off a screw in the side along with the clamps I use to hold the piece in place while I cope. I also use the table's edge to measure to short points. I just align the edge of the table with the short point, then hook the table and measure. Everything I cut off immediately gets thrown in the trash can that is placed right there.

Tools and Boxes

I try to cluster my tools into categories: Trim stuff, paint stuff, deck stuff, fasteners, drill bits, and so on. I also try to cluster them in boxes that help me further separate the related parts. This isn't possible with open toolbox-type boxes without modifying them, and the last thing I want to spend my weekends doing is making boxes to fit in my boxes. So I try to buy boxes that do this for me.

A good example is my Craftsman trilevel toolbox. I can keep most of the everyday-carry deck stuff in one and roll it to where it needs to go in one move, not 35. I take the same approach with my service body truck. All the pneumatic stuff goes in one bin; all the clean-up stuff and the small vac goes in another; cordless tools, batteries, and chargers go in a third bin. The benchtop tools go in the main body of the van, and they're a mess, to be honest, but it works.

For hand tools, I've found hardly anything more to my liking than a simple riggers' bag. The one I got from Duluth Trading Company a lifetime ago carries what I need carried and stores it vertically in a slot so I can see it. On the other hand, a typical toolbox filled with wrenches, side cutters, and my wire stripper and other tools is really just a pile with sides. If I am sorting through many things to find one thing, that's a waste of time and motion. That's how you lose something. It's inefficient. ❖

Mark Clement is the author of The Carpenter's Notebook, *a member of the JLC Live demonstration team, and a deck builder/remodeler in Ambler, Pa. Follow him on YouTube and social media at @MyFixitUpLife.*

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A

New Railings for the Pinnacle

by Nate Plasha

Built in 1896 as a summer camp on a cliff overlooking Lake Champlain in Vermont, the Pinnacle features some stunning interior trim details, including a double-height great hall with an oversized fireplace, in the great lodge tradition of the Adirondacks. The exterior is less distinctive, except for a two-story belvedere on top and a deep porch that surrounds the house on the first floor **(A)**. From the porch, the Adirondack Mountains are clearly visible across the lake.

A few years ago, the camp was purchased by a buyer who wanted to convert the house to a year-round residence, and my job was to repair or replace the nearly 300 linear feet of railings that enclosed the porch. The homeowner's goal was to repair what could be salvaged and make any replacement parts virtually identical to the existing railing. In some jurisdictions, that would have been impossible; the rail height would have needed to have been raised to 42 inches. Here, historic preservation guidelines allowed us to "replace in kind" the railing **(B)**.

The basic railing design was sound, with details that had allowed the painted but untreated wood components to endure for years **(C)**. I've replaced a number of wood railings using these same details, such as a beefy top rail with a water-shedding profile and a beveled bottom rail, but the rustic stone piers that support the porch threw me a bit of a curve ball. Fitting a wood rail to an organic stone shape is tricky.

Not counting the stair rails, there were 25 sections ranging in length from 9 to as much as 14 feet; 10 needed total replacement, while the rest could be repaired, scraped and sanded, and repainted following RRP protocols for lead paint. I used the sections that needed replacement as full-scale templates as I rebuilt them in my shop out of sapele mahogany. Prior to assembly, I coated the parts with oil-based primer and two coats of paint.

Per the original design, I fitted the top rails into pockets in the stone columns and locked them into place with mortar **(D)**. At the base of the columns, I scribed the bottom rails to the stone and fixed them to the deck with blocks underneath. While the railings were just a small part of the overall project, they help preserve the historic character of the house without distracting from the views **(E)**. ❖


B


C

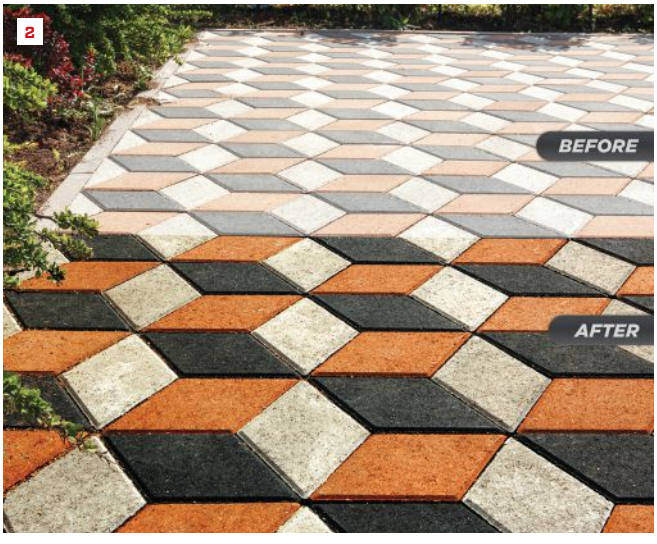

D

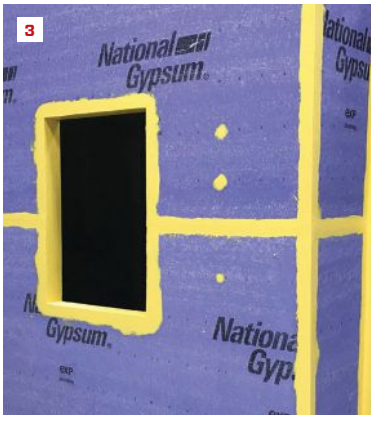

E

PHOTOS: A,D, & E, NATE PLASHA; B & C, TIM HEALEY

Nate Plasha owns and operates Black Locust Craftsmen in Burlington, Vt.

BY VINCENT SALANDRO





1. Decorative Vinyl Railing Infill

New Chippendale (shown) and Freeport decorative infill patterns for RDI's Finyl Line vinyl railings are preassembled and work with Finyl Line's T-Top top-rail profile. Both patterns are available in white, 36-inch-high panels and are offered in 6-, 8-, and 10-foot level lengths. Railings are reinforced with aluminum stiffeners that run the full length of both the top and bottom rails. Pricing varies. rdirail.com

2. Color-Enhancing Outdoor Sealer

ICP Building Solutions Group's Stain-Proof Paver Enhancer Sealer (previously known as Dry-Treat) offers color enrichment and water and liquid protection for a variety of exterior surfaces, such as brick and concrete pavers. According to ICP, the sealer's penetrating oil and water-repellent solution enhances the colors of treated materials without creating a sheen or shine or affecting the surface's slip rating. A 32-ounce container, which covers 80 square feet, costs about $60. The sealer also comes in 1-gallon ($220) and 2.5-gallon ($500) containers. drytreat.com

3. Single-Component Air Barrier

Sto RapidGuard is a single-component, multiuse air barrier and waterproofing material that seals rough openings, sheathing joints, penetrations, and transitions in above-grade wall construction. Applied with a caulking gun, the liquid-applied barrier adheres to damp substrates; installs between 33°F and 100°F; requires no tape, mesh, or fabric; and bridges cracks and seams in wall construction without tearing established barriers, according to Sto. RapidGuard is compatible with most building materials. stocorp.com

4. Prefabricated Wood Shearwall

The Strong-Wall high-strength wood shearwall (WSWH) is a prefabricated solution from Simpson Strong-Tie for lateral-force resistance in light-frame construction. Made of laminated strand lumber with pre-attached hold-downs, WSWH can be trimmed in the field and can be used in standard, garage-portal, and balloon-framing applications. Top-of-wall shear transfer is accomplished with a single plate that is fastened with both Strong-Wall screws and heavy-duty connector screws. Pricing varies by size and shear capacity. strongtie.com

5. All-in-One Outdoor Kitchen
The lightweight, all-aluminum Blaze Island from Blaze Grills houses five burners, a refrigerator, and storage space in a welded frame. Adjustable feet facilitate leveling, while powder-coated panels with a copper vein finish, textured black countertops, and screened rear venting complete the package. We found the Blaze Grill Island (including a four-burner stainless steel grill, power burner, and 24-inch refrigerator) online starting at about $8,400. blazegrills.com

5

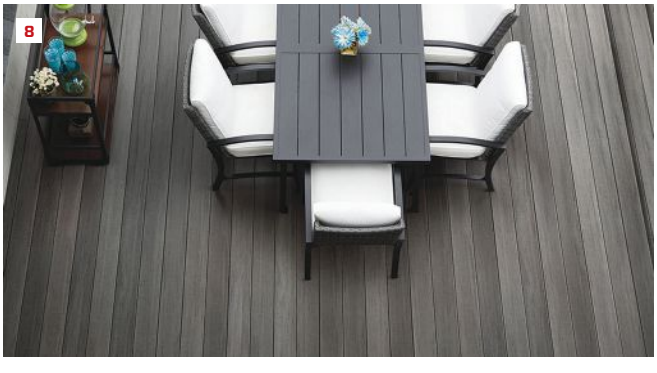

6. Engineered Wood Subflooring
AdvanTech X-Factor, Huber Engineered Woods' new premium subflooring, features a fade-resistant, water-shedding surface. According to Huber, the built-in protective top guards against flaking, delamination, or discoloration. This surface is also marker-friendly, which reportedly is great for jobsite communication. The long edges of the panel have tongue-and-groove joints, and the panel's bottom surface is fully sanded. Huber says that panels are made with SFI-certified woods and do not off-gas urea formaldehyde or VOC emissions. Pricing unavailable. huberwood.com

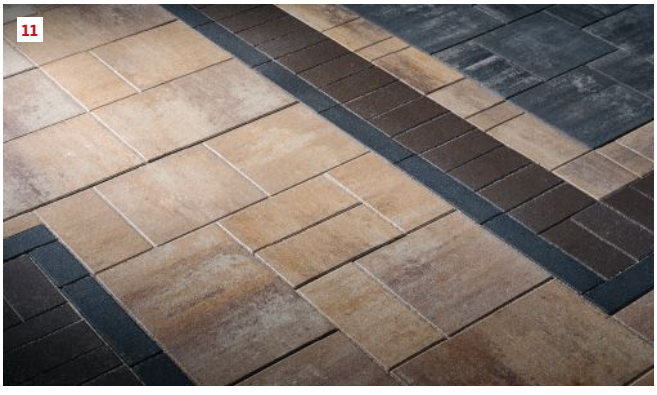
6

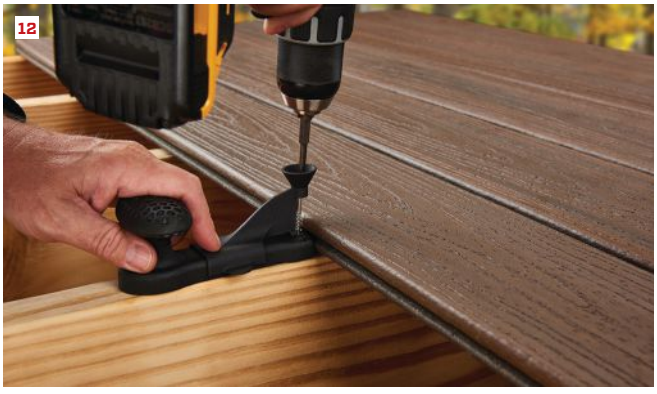

7. Smooth Panel Siding
LP Building Solutions has introduced LP SmartSide Smooth-Finish Panel Siding. The panel siding has a no-groove square edge for easier use in channel applications, according to the manufacturer, and is designed to hold up against extreme weather conditions, including moisture, freeze/thaw cycles, and wind gusts up to 200 mph. The panels are treated with the company's SmartGuard process for protection against fungal decay and termites and are preprimed for simple paint adhesion. Contact a local distributor for a quote. lpcorp.com

7


8. Low-Maintenance Capped Composite Decking
The TimberTech Azek Landmark Collection of capped polymer decking sports natural wood-grain patterns and a matte finish with unique crosscut markings. Available in two colors—walnut and castle gate (shown)—the decking is made from 100% synthetic material that was developed to resist moisture, fading, scratching, staining, and overheating, according to TimberTech. Pricing varies by region; on the company's website, this collection is rated with three "$" out of four. timbertech.com

8






9. Self-Adhering Roof Underlayment
Designed for use with asphalt shingles as a guard against wind-driven rain along eaves, roof penetrations, and valleys, DryRoof SA roof underlayment from CertainTeed helps prevent water intrusion by sealing around fasteners and other penetrations. UV-exposure resistant for six months, the lightweight self-adhering underlayment has a split-release backing and a slip-resistant sand surface to reduce the risk of falls. It's available in 45-pound rolls with a roll area of 195 square feet. The product is warranted against manufacturing defects and to remain watertight up to a maximum of 50 years. Contact distributor for pricing. certainteed.com

10. Hidden Flap-Door Hinges
Grass America's Kinvaro T-Slim is a new hidden lift hinge for flap doors that reportedly doesn't take up storage space inside a cabinet and offers a clean look when the doors are open. The soft-close, spring-tensioned mechanism is only 12 mm thick; it can be inset within wood or MDF cabinet sides as thin as 16 mm. Or, the thin mechanism can be screwed onto side walls and hidden with cover plates, which are available in different colors. Hinges can be adjusted in three dimensions. Pricing unavailable. grassusa.com

11. Smooth and Slate-Texture Pavers
Origins and Dimensions paver systems from Belgard Pavers are manufactured in multiple sizes in 3-inch increments (3x6, 6x6, and 6x9, along with 3x3 accent pieces) to reduce the number of cuts needed in the field. Origins has a slate-like texture, while Dimensions has a smooth surface. The modular sizing makes for a wide variation of layouts on patios, walkways, and pool decks. Available in multiple color blends, Origins and Dimensions can be used alone or in any combination with each other, according to Belgard. Contact distributor for pricing. belgard.com

12. One-Step Fastener Installation
The Trex Hideaway One-Step Installation Tool holds fasteners at a 40-degree angle to keep the leading fastener lip down, allowing users to install the fastener in one step, according to the company. The lightweight and durable tool features a rotating handle and a star-drive bit located on the underside. The tool is compatible for use with the Trex Hideaway Universal Fastener system. Pricing unavailable. trex.com

Classifieds

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Festool Kapex KS120 REB Miter Saw

BY TOMMIE MULLANEY

Festool first released the Kapex 10 1/4-inch sliding compound miter saw in 2008, and I've owned and used one on an almost daily basis since 2018. I'm admittedly a big fan, so last year, when the company rolled out the latest version of the saw, the KS 120 REB, I was eager to test it and find out how it compared with the older one. With an ergonomic vertical handle and lime-green accents, the new saw sure does capture your attention ... but so does the $1,500 price tag.

NEW FEATURES

I finally received a sample of the saw to try out a few weeks ago. Here are some of the improvements that Festool has made in the latest iteration of its flagship tool.

New bed extension tables. This feature gives the saw bed a larger footprint and significantly better stability, while preserving the "V-groove" interface of the original design, so the UG wings and original crown stops still attach the same way. These extensions are more than just bars; rather, they're an extension of the cast magnesium base itself, sliding out over 6 inches for additional material support on either side of the saw bed **(1, 2)**.

Cleantec locking dust port. A locking port has been added to the saw to remove any chance of the vacuum hose accidentally disconnecting from the saw. There is nothing fun about having a disconnect halfway through a cut, and while I like covering myself in man glitter as much as the next carpenter, I like to do it on my own terms.

Introduced late in 2020, the bayonet-style Cleantec port is widely used among other Festool tools, such as track saws and sanders, and accepts either Festool's 27-mm-diameter hose or its higher-capacity 36-mm-diameter hose (the smaller hose fits inside the port, while the larger size fits over the port). I've found that using the shortest length of the larger-diameter hose provides the best dust extraction **(3)**.

Along with the Cleantec dust port is a new rubber dust hood—or more accurately, a scoop—fitted to the bottom of the shroud covering the blade. This hood does a fantastic job of collecting cutting debris, and it's nice to have the option of folding it back or removing it altogether for more cutting clearance when needed **(4)**.

Magnetic brake. Also new is a magnetic brake that will bring the variable speed, 1,600-watt direct-drive motor to a complete stop within three seconds. Festool says that this brake has no contact points, so it will never wear out, unlike the older, electrical brake, whose failure causes the whole motor to fail. Along with other improvements to the motor structure—the saw is noticeably smoother and more powerful than my old one—the new brake should improve the saw's overall reliability.

The latest version of Festool's Kapex 10 1/4-inch sliding compound miter saw, the KS120 REB, has a magnetic rather than an electrical brake, which should result in longer motor life **(1)**. The base has slide-out extension wings for better stock support **(2)**.

Photos by Tommie Mullaney

The saw is now equipped with a bayonet-style dust port that is compatible with both 27 mm and 36 mm Cleantec dust extraction hoses **(3)**. A removable rubber dust hood improves the saw's already outstanding dust collection when the saw is connected to a vacuum system **(4)**.

The tool-free connection between the new UG stand and extension wings has been redesigned to be more robust **(5)**. The assembly can be folded up for transport **(6)**.

Relocated MiterFast storage. The Kapex includes an angle transfer device called MiterFast that makes the transfer of inside and outside angles from the workpiece to the saw quick and easy without complex angle calculations. Festool now stores this device on the back of the saw, where it is completely out of the way.

UG Stand and extension wings. Most of my testing was done with the saw clamped to my Festool MFT table, because the new and improved UG stand and extension wing system ($960) were out of stock. When I finally tracked down a set, I was happy to find that Festool has improved on the attachment of the UG wings to the UG stand, with a larger, more robust tab to connect to the base of the saw (the new saw will also work fine with the older stand and wings). A key part of what makes the system so great, the stand weighs only 47 pounds, and it has a very small footprint and wheels that allow you to roll the saw around any jobsite with ease **(5, 6)**.

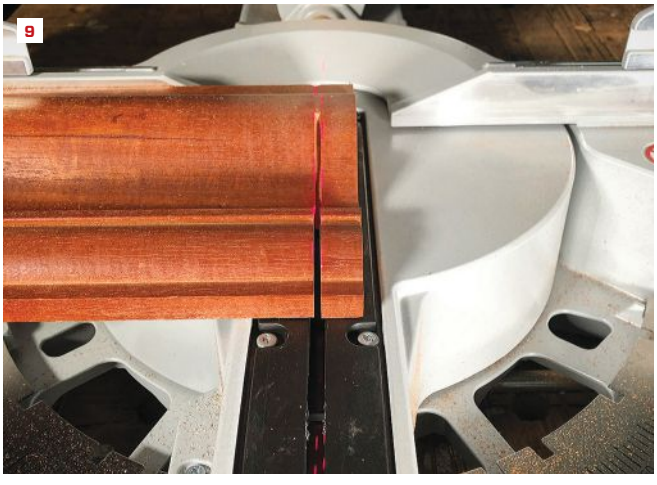
The wings are designed to fully support material up to 94.5 inches in length. For repetitive cuts, they have integral flip stops, as well as a metric or imperial tape measure (your choice) on both the left and right sides. According to Festool, the crown stops have been redesigned so that they now attach to the wings themselves, rather than to the saw.

FEATURES THAT AREN'T NEW BUT ARE STILL GREAT

One feature that makes the Kapex unique is the 30-mm rail-forward design, which not only makes the footprint smaller so you can cut with the back of the saw against a wall, but also reduces the blade deflection and head play that are all too common in sliding miter saws. I also like the counter spring balanced bevel adjustment, which allows you to position the bevel at any angle; even when it is not locked in place, the head will stay in position. This makes angle adjustment much less tedious and more accurate. Bevel gauges on both sides with easy-to-read lime-green arrow indicators make it possible to quickly dial the saw in to a fraction of a degree **(7, 8)**.

In addition, I really like the fully adjustable dual-line lasers, which accurately define the cut area for precise cut placement. This is another feature that helps me to be deadly accurate with my cuts, yet efficient **(9)**.

Cutting capabilities. Another unique aspect of the Kapex is that it has a 10-inch blade with a cutting capacity that rivals most saws with 12-inch blades. The saw can handle stock up to 4 3/4 inches thick in its special cutting position, and up to 6 5/8-inch crown in the nested position. It can cut miters from 50 degrees (left) to 60 degrees (right), and it offers a trenching capability with a simple flip of a knob, which allows you to cut trenches for lap joints or other jobsite challenges.



The saw's counter spring balanced bevel adjustment allows you to adjust the bevel at any angle without having to lock the head in place to keep it positioned **(7)**. Increments are clearly marked and easy to read **(8)**. Powered by the saw rather than by separate batteries, the dual laser lines define both the left and right sides of the cut **(9)**. A fast-action hold-down clamp can be used to secure the workpiece to the saw table, resulting in safer and more accurate cuts **(10)**.

One minor gripe I had with the old saw was the stock blade; I replaced it with a Tenryu IW-26080AB3 Miter-Pro Plus 80-tooth blade, which provided cleaner cuts and fewer flying offcuts. I tested the new saw using the stock Festool 495388 60-tooth blade that came with it. I'm told that Festool has made improvements to the stock blade, but I still plan to replace it with the Tenryu blade, which I feel is quieter.

Another minor complaint is that the blade guard sometimes gets in the way of cutting bigger stock, such as a 4x4, and tends to push small offcuts forward into the path of the blade.

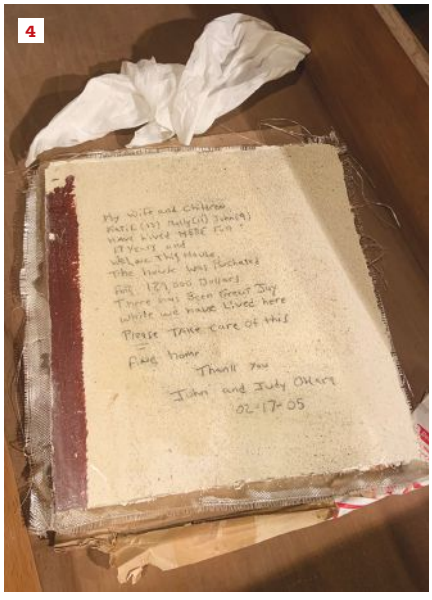
Safety. While many miter saws come with some sort of hold-down clamp, most of them are threaded and—let's face it—nobody has time to mess with adjusting them. But the Festool clamp features a slick fast-action cam design and an octagon-shaped foot that allows you to quickly and safely secure your workpiece on the left or right side of the blade. I don't typically use the clamp with basic moldings such as base or casing, but it's an excellent solution for wide material, or even for cutting extra-short pieces, as it allows you to clamp a sacrificial board to the saw bed **(10)**.

Like all Festool tools, the new Kapex is covered by the company's 3-2-1 warranty program, which offers three years of coverage, including wear & tear on things like the motor brushes, a two-day standard repair time, and a one-month money back, no questions asked, satisfaction guarantee. festoolusa.com

Tommie Mullaney owns Mullaney Woodworks in Naples, Fla. You can visit his web page at mullaneywoodworks.com or follow him on Instagram at @Mullaneywoodworks.

BY JENNA CROTEAU AND WARREN O'SHEA

Salvaging a Memento Written on Plaster



Starting with the earliest cave drawings, the urge to say "I was here" has often been expressed on the walls of our homes. As contractors who specialize in working on old homes, we commonly uncover these moments in time. So while removing wallpaper in an 1882 Queen Anne-style home, we were excited—though not surprised—to uncover a heartfelt note on the plaster wall beneath, written by a previous owner in 2005. The note expressed an immense love for the old home and pleaded with future owners to love and care for it as the writer had. Because he also listed the names and ages of his three children, I did a quick search of social media and discovered that I had several friends in common with the oldest daughter. I sent a picture of the note in a private message and let her know that we were updating the home with the care and love her father had hoped for.

She responded within minutes, expressing her gratitude and joy, and asked if there was any way that this artifact could be preserved. I felt in my bones that I needed to try to make this happen for her, and while I wasn't sure how, I was pretty sure I knew of an expert in old homes who could help me with this delicate undertaking: my boss, Warren O'Shea of O'Shea Builders.

To figure out the best way of extracting the piece, Warren and I did a few test runs on another part of the plaster-and-lath wall. We couldn't access the back of the wall to break away the plaster keying, so we would have to gingerly cut away the plaster and then the wood lath with a multi-tool. Lucky for us, the area fell between studs.

Once we had honed our technique, we sprayed the area with the note with three coats of artist fixative spray. This would prevent smudging of the pencil graphite when we brushed on the two-part epoxy coating after the fixative had dried. After the epoxy cured, we applied blue tape to the area where we planned to make our cuts, then gingerly made shallow, 1/16-inch-deep passes on either side of the note. We worked deliberately, alternating sides with each pass, until we reached the lath. Next, we used the same approach to make our horizontal cuts at the top and bottom in the gaps between the pieces of lath.

Before carefully cutting through the lath, we applied plenty of tape to the area to prevent the plaster from falling away and onto the floor. The vibrations from the multi-tool helped by knocking away the plaster keys, leaving the memento intact **(1)**.

Finally, using a piece of cardboard as a backing to carefully rotate the plaster section horizontally, we carried it to a table where we used the multi-tool to smooth out the back **(2)**. Then we cut out an oversized piece of fiberglass cloth, placed it on the back of the plaster, and painted on a thick coat of two-part epoxy to saturate the cloth **(3)**. After letting the epoxy dry overnight, we flipped the plaster memento over **(4)** and later cleaned up the edges, using a wood frame to make sure the sides were cropped evenly.

Jenna Croteau is a carpenter who works for Warren O'Shea, owner of O'Shea Builders in Windham, Maine.

Photos by Sarah Doughty

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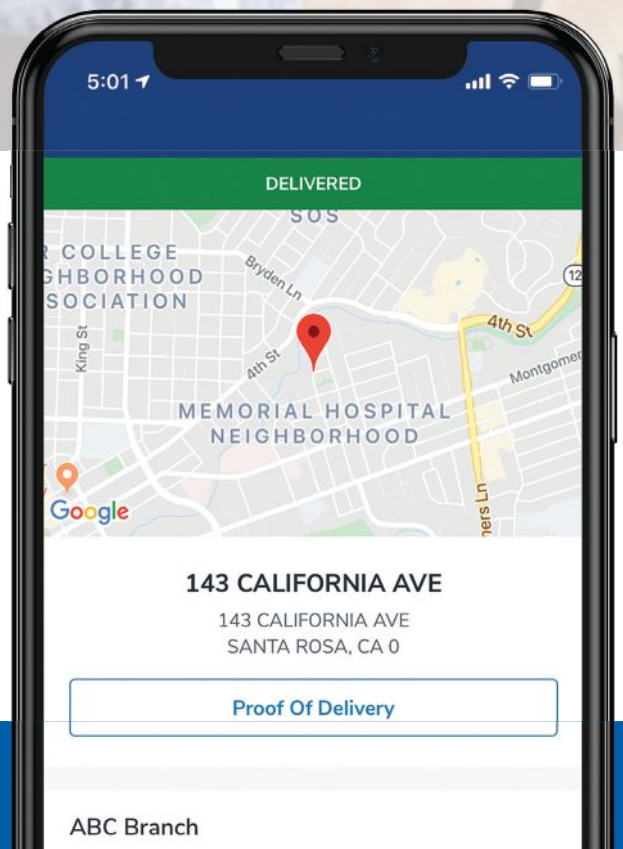

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