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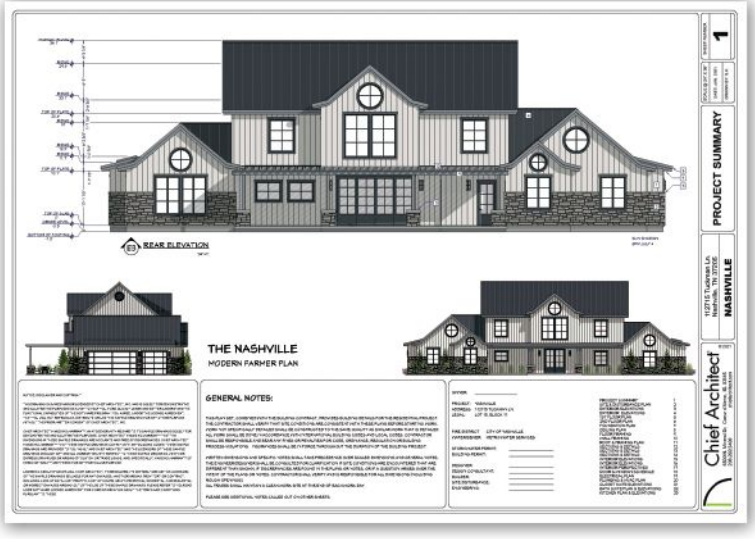

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On the cover: Kyle Ouellette and Kory Demello of Liberty Building Envelope in Middletown, R.I., form a pan for a concave standing-seam roof. See the story on page 11. Photo by Wade Paquin.

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BY CLAYTON DEKORNE

A Trip to the Lumberyard

As a carpenter-in-training, I was allowed to accompany my father to the lumberyard, and little by little, I learned my way around the stacks, so that eventually, long before I could be called a carpenter of any sort, I could make the trip to the lumberyard myself and come back to the jobsite with a decent load of lumber.

But this experience isn't always part of the training for new hires these days. As one contractor recently explained to me, insurance requirements for adding employees as additionally insured onto a company's insurance policy are steep for young 20-somethings, so he limits who drives on company time. This contractor depends either on his more experienced carpenters picking up materials on their way to the jobsite, or on deliveries. Understandably, to control costs and keep jobs on budget, savvy contractors try to shut down the cost of running to the lumberyard frequently. But the result is that new carpenters don't have the luxury of accompanying an experienced carpenter to the lumberyard where they can learn experientially how to select lumber. New crew members need to learn this another way.

This article is intended as a primer on selecting softwood dimensional wood materials for framing and finish that you typically find at a lumberyard. A follow-up article will cover hardwoods used primarily for finish work—materials you typically need to get from a specialty lumber dealer or millwork supplier.


1

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FINISH VS. FRAMING MATERIAL

Lumber found at most lumberyards is differentiated as "yard lumber" (appearance-graded softwood for finish work) and "structural lumber" (stress-graded softwood for framing).

1-by and 5/4. On site, we commonly refer to finish material as "1-by" material—dimensional lumber used for trimwork that is rough cut to 1 inch thick, hence the name, but dressed out at 3/4 inch thick—or "five-quarter"—dimensional finish lumber that is rough cut to 1 3/4 inches thick and dressed out to 1 1/8 inches thick. (Actual dressed dimensions can vary 1/16 to 1/8 inch depending on the moisture content.)

2-by and up. Framing lumber is often called 2-by material (rough cut to 2 inches thick but dressed out to about 1 1/2 inches thick), 4-by (roughed to 4 inches thick but dressed to 3 1/2 inches), 6-by (dressed to 5 1/2 inches), and so on. Unless you are on a timber-framing crew, you don't use many 6-bys or larger dimensional stock. At these sizes, we now rely much more on engineered wood materials—a topic for another day.

FINISH LUMBER

Here, I focus on making sense of "flat stock," used for casing, jambs, baseboards, ceiling and wall paneling, and other finish boards. From a lumber producer's standpoint, "select" also applies to the materials used for millwork and moldings. But selecting these is often simpler; they're almost always milled from clear, select wood. There are no knotty grades of this material, so you just need to look for straight pieces that aren't cracked or scuffed.

If the yard carries a really big inventory of softwood finish lumber, you may see lumber designated S4S (surfaced four sides), though this designation is more common to hardwoods, which we will cover in a later article.

Select 1-by and 5/4. Among the finish-grade "white

"Legal" lumber grades must have a grade stamp listed by the American Lumber Standard Committee (ALSC); these stamps **(2, 3)** are among them. The "J-Grade" stamp **(4)** signifies a premium grade for the Japanese market that has been intermittently available recently owing to transportation disruptions. But while considered "better," it's not technically listed for use in the U.S. The IPPC tag **(5)** certifies "heat treated" (good for killing insects) wood for pallets that is not allowed for structural uses.

woods" typically found in lumberyards (mostly pines of which there are several used for finish lumber, but occasionally may include aspen and balsam fir), most select lumber grades are generally described by letters.

A Select (or Clear) is not common. True "clear" material has no visible defects on either side of the board. It's preferred for naturally finished or high-end painted trim and cabinet stock.

B Select (sometimes called Prime) may have small defects such as pin knots or a few pitch pockets. It is also used for trimwork and cabinets, but if a natural finish is called for, carpenters will need to select the best side and strive to cut out the infrequent defects.

B&B (or B&BTR). Frequently, you may find yards carrying "B and Better," which is a mix of A and B Select materials.

C Select may have tight pin knots that are more frequent on one side than in B Select, but it should have one side that is nearly clear. Here, too, carpenters will need to select the best face, but they will likely to have to live with some pin knots.

C&BTR (or "C and Better") is a mix of C and B Select.

D and D Select contains pin knots and numerous small blemishes. When available, it is the best choice for a purposefully rustic, clear-finished look.

Note that select grades may also be called by names such as "Superior," "Prime," or "Supreme" for the better grades, and "Choice" for D and D Select. If a yard has a big enough inventory, you may see premium-graded materials sorted by grain specification: FG (flat grain), VG (vertical grain), and MG (mixed grain). But this is not common unless you are ordering from a large regional lumber distributor or specialty hardwood and millwork supply. We'll get into that in another article.

Common 1-by and 5/4, sometimes referred to as the "knotty grades," is normally a non-stress-graded product used for construction and utility purposes. Common finish lumber is generally separated into three different grades, No. 1, No. 2, and No. 3.

No. 1 Common (or Construction grade) is high-quality pine with a knotty look. Knots are tight and small. It is used mostly for shelving in closets and inside cabinets. It paints out OK if you seal the knots before priming.

No. 2 Common (or Standard) has slightly larger, but still tight, knots. It doesn't paint as well as No. 1 Common. It's one of the most available woods and is better for sheathing or fencing than for any finish application. You have to sand around knots, fill checks in the larger knots, and seal before painting. It's very hard to pull off for interior uses unless you're purposefully going for a "rustic" look.

No. 3 Common (or Utility) is low quality; loose knots (that fall out to become knotholes), splits, and other defects relegate these boards to formwork, barriers, and other temporary construction uses.

Redwood and cedar. While classified as softwood like the other woods dealt with here, redwood and cedar are in a class of their own. In both species, there is a pronounced difference in color between heartwood and sapwood. Heartwood also has high natural resistance to decay, so some grades are denoted as "heart." Because Select lumber grades emphasize the quality of one face, the reverse side may be lower in quality. Select lumber grades are not uniform across species and products, so certified grade rules for the species must be

Redwood grades account for defects such as knots, but also for the pronounced difference between heartwood and sapwood **(6)**. Code inspectors may look for an end tag specifying the "use category" for treated wood **(7)**. Both of these are ALSC accredited; the "checkmark" on the green tags indicates the added conformance with AWPA standards.

used for detailed reference. Cedar architectural grades include Clear Heart, A, and B. Redwood architectural grades include Heart Clear (or Clear All Heart), Clear, Heart B, and B Grade.

Cedar and redwood are normally kiln-dried. It's critical that you unwrap these if they are wrapped in plastic and let them acclimate to jobsite conditions before installing them.

FRAMING LUMBER

Almost all softwood lumber sold in 2-by and 4-by dimensions for structural applications is "stress graded," but this grading is a visual inspection. It is different from "machine stress rated" (MSR) lumber, used by truss and other component manufacturers, that is run through nondestructive grading equipment to verify its structural capacity. For most stick framing, lumber is visually inspected and assigned allowable properties under the National Grading Rule, a part of the American Softwood Lumber Standard set by the American Lumber Standard Committee (ALSC).

For dimensional framing lumber, a single set of grade names and descriptions is used throughout the United States, although the allowable properties vary with species. The most common grades are divided by the way they are used:

Select Structural is usually specified for girder beams and columns, or for joists and rafters, and includes No. 1 & BTR (for Douglfir & hem-fir); No. 1 (primarily for spruce-pine-fir, or S-P-F, which means any stick of S-P-F lumber can be any of these three species); No. 2, and No. 3. The lower the number, the fewer defects.

Stud grade lumber is mostly for 2x4 and 2x6s, but you may find 2x2s and occasionally larger members marked with a Stud-grade stamp. These are rated for vertical use in load-bearing walls. Beware: An inspector can red tag a Stud-graded piece of lumber used for a ledger, short span rafter, or other horizontal framing member.

Light framing grades—designated "Construction," "Standard," and "Utility," in order from better to worse—include less expensive 2x3, 2x4, and 4x4 lumber. These grades can be used for wall framing (studs, sills, plates, posts, and cripples), but they are typically not as straight and true, and may be better suited to temporary uses, such as formwork, handrails, barriers, and platforms used during construction.

Grade stamps. One of the most important sets of ALSC rules is for the grade stamps that identify—for each stick of structural lumber—the wood species, the mill where it was produced, the dryness at the time the board was surfaced, and the inspection agency supervising the grading. Every piece of framing lumber is stamped, and the stamp is something a building inspector might look for. Recently, there has been a spate of appearances of lumber in the supply chain that is not approved (often from overseas sources or wood certified for pallets) sold for framing, and the International Code Council has begun a campaign to alert inspectors to this "illegal wood." To verify if the grade stamp on the lumber you are buying is "legal," check the most current "Lumber facsimile list" by going to alsc.org and clicking on "Lumber Program."

PRESERVATIVE-TREATED LUMBER

Preservative-treated wood is treated with chemicals to create a bug- and rot-resistant wood for outdoor uses. There's a lot to learn about the different treatments used (start with "Decay Resistance and the Code," Jul/2019), but most important thing to understand is that code inspectors will look for an end tag on treated-wood structures. Any structural member used within 18 inches of the ground must be preservative treated. If it's not touching the ground, the inspector will look for an American Wood Protection Association (AWPA) "U1" tag, or ALSC-certified category tag, that specifies "Above Grade." If it's touching or buried in the ground, the wood needs a "Ground Contact" tag.

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Q When I'm installing crown molding in a large room, the walls are often longer than the material used to trim it out, and the scarf-joint technique I use when installing baseboard doesn't work quite so well with crown. What is the fastest and most efficient way to make nearly invisible splice joints in the molding?

A *Gary Katz, a frequent contributor to JLC and a presenter at JLC Live, responds:* Splicing crown molding on the wall is a waste of energy and effort, so while there are several approaches that you could take, there are really only two ways I can recommend for handling walls that are longer than your crown molding. These days, younger production carpenters are butt-jointing those splices, using biscuits or Festool dominoes in the joint, and even assembling the pieces on the wall. They seem very happy with the process and the results.

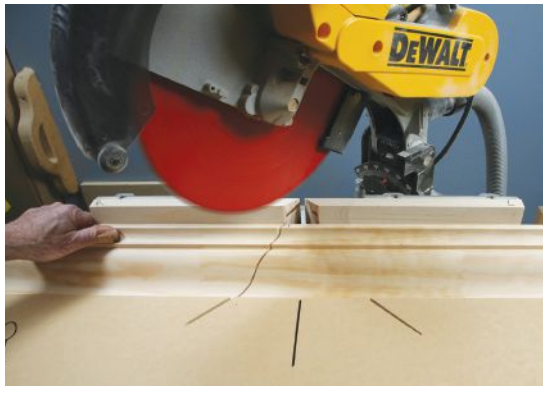
But as a nearly 70-year-old carpenter, I'm not too thrilled about butt joints, as you can probably imagine. Instead, I prefer to preassemble the joint on my miter saw, with a piece of 1/4-inch plywood glued to the back to reinforce the joint.

I start by cutting an inside corner miter on the end of the first piece and an outside corner miter on the end of the second piece, usually with the crown nested "in-position" at my saw. The trick to making these cuts accurately is to fit your miter saw with a simple crown stop jig (see photos, below), or fasten a pair of crown stop brackets (an accessory offered by many miter saw manufacturers) to the miter-saw extension wings; when you preassemble long lengths of crown molding, you really need proper support.

I start the assembly by gluing a 1/4-inch plywood gusset to the back of the piece that has the inside corner cut. I use FastCap's quick-curing 2P-10 adhesive for that, with activator.

Once the glue sets, I roll the piece on its back, spread regular wood glue on the miter (both pieces), put 2P-10 on the face of the plywood, and spray activator on the back of the second piece of crown (with the outside corner miter). Then I place the second piece, holding pressure on the miter and where the crown contacts the plywood. This is where it helps to use your crown stop and assemble the pieces in a nested position—which makes it easier to align the miter—and apply pressure for about 30 seconds, until the 2P-10 sets.

Then I carefully move the preassembled pieces to the floor and against a wall, out of the way. Since I'll need to wait a few hours for the wood glue to dry, I glue up all of the long pieces that I'll need for the room at the same time. Then, it's simply a matter of measuring and cutting the piece as if it's one single length.



Photos by Gary Katz

With the crown upside-down, measure its horizontal projection, then rip a gauge block to that width to use in setting the crown stop (left). The jig holds the crown molding in position when you're cutting the inside and outside corner miters needed to make a splice (right), and when gluing the joint together.

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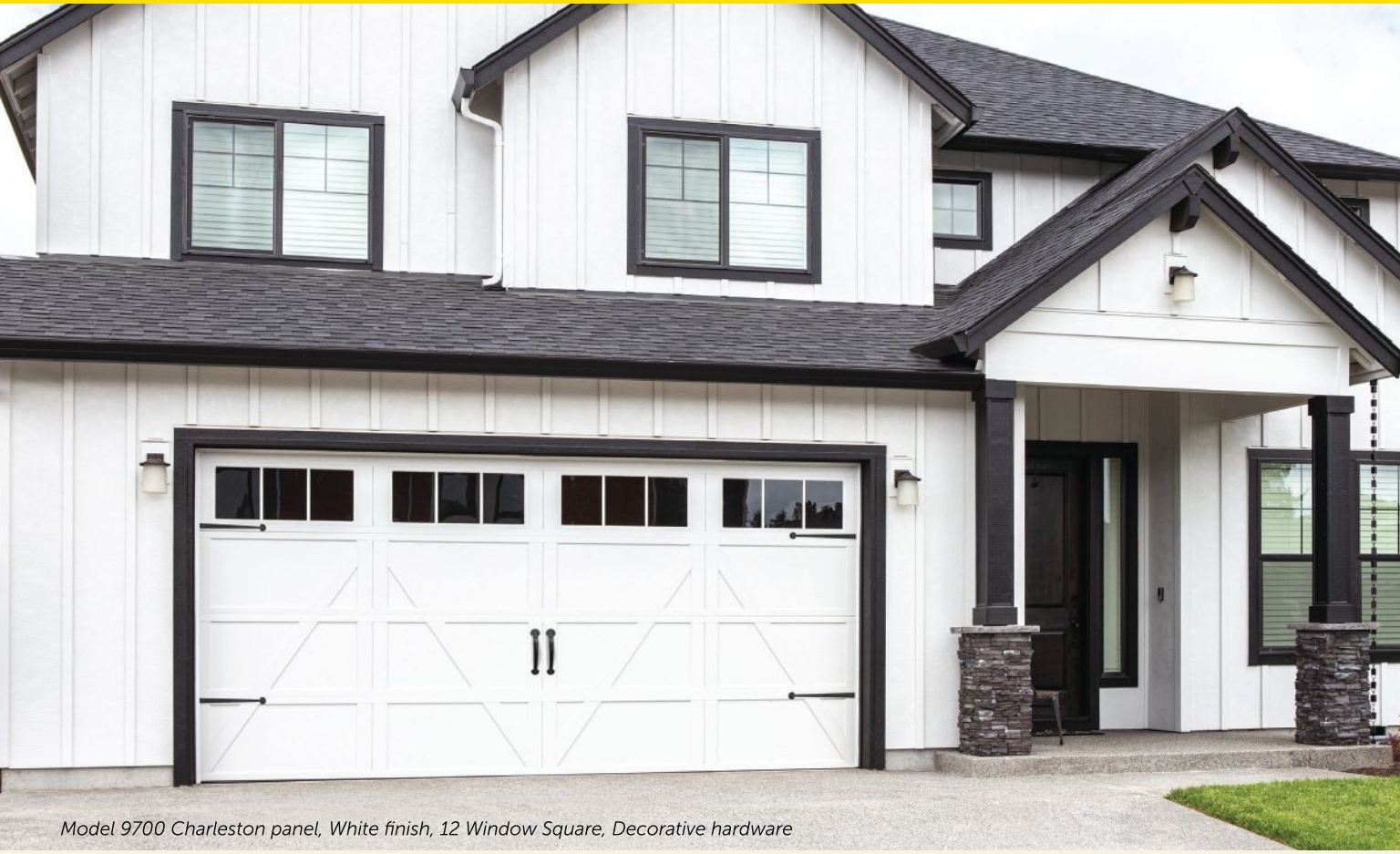

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Photos by Wade Paquin

A Concave Metal Roof

BY WADE PAQUIN

On a recent house build, we were confronted with a detail typical to the coastal, Shingle-style homes we are known for—a small, pop-out roof to protect the garage door opening from weather. The architect had originally drawn this as a straight-hip roof that would be shingled with wood. On this particular home, however, we were using an Eastern-white-cedar sidewall shingle that couldn't be carried over the roof. (In the past, we'd done this with Port Orford cedar shingles that performed well on a roof exposure.) To overcome the problem, I gently suggested to the architect that we install a flared, standing-seam-metal roof instead. He embraced the idea, pitched it to the client, and we set to work.

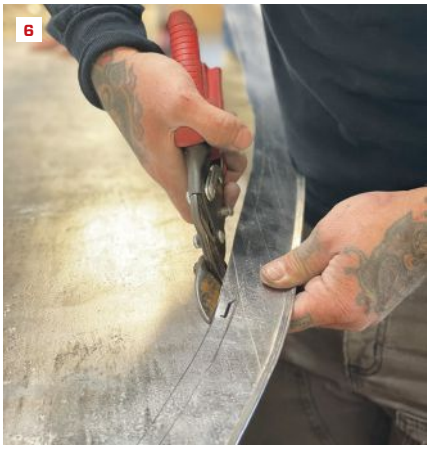
FRAMING AND TRIM

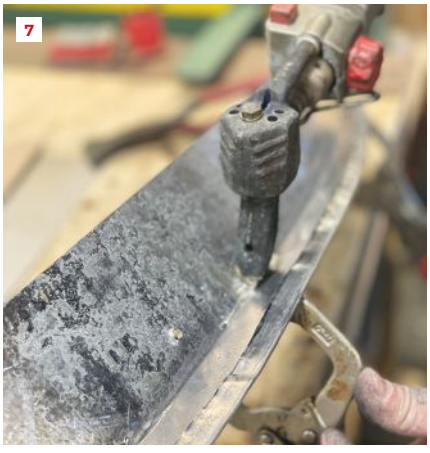
We began by building a 2x8 substructure (ledger, blocking, and subfascia) that we affixed to the wall with SDS screws. To define the stepped soffits, we capped this framing with Versatex cellular PVC on the bottom and top. The top provided a base for attaching curved ribs built from two layers of 3/4-inch CDX plywood. The concave roof surface was made with 2x4 furring strips running horizontally over the ribs. Making this segmented surface proved much faster than bending multiple layers of 1/4-inch plywood (which we have done in the past) and resulted in a sturdier structure. We finished out the rake ends and fascias with Versatex, as well, bringing it right up to the top edge of the furring strips so the metal roofing would cap the top edge of this trim.

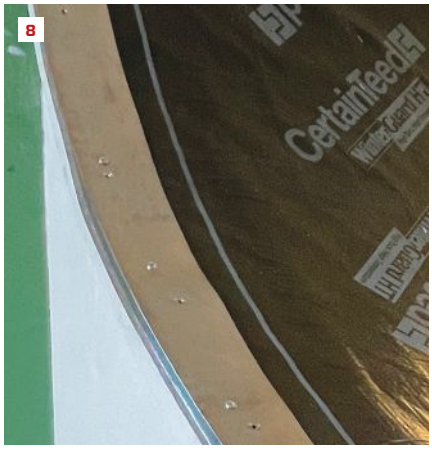
UNDERLAYMENT

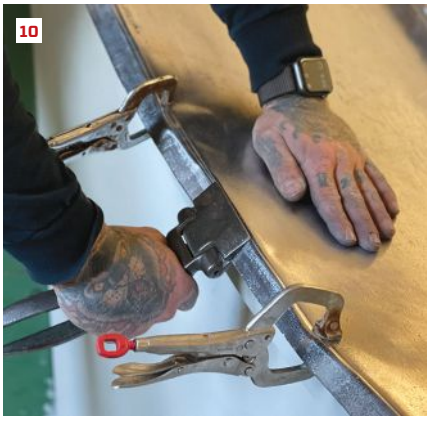
On the coastal homes we build, peel-and-stick ice membrane is our go-to underlayment for most roofs. However, because metal roofing conducts heat so efficiently,

The curve of the roof is seen here in profile, trimmed with cellular PVC **(1)**. Kyle Ouellette begins the metal work by tracing the curve for the rake edge on a sheet of lead-coated copper **(2)**. After cutting the curve with snips, he scores the metal to define the hem **(3)** and folds it over with tongs **(4)**. With a roller bender, he begins to roll the edge over at an angle to form a drip edge **(5)**.



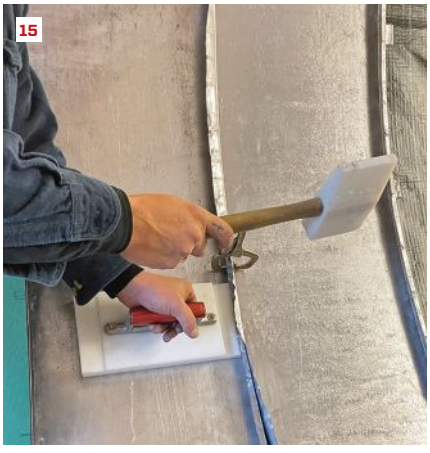






Ouellette cuts the hemmed and rolled drip edge off the sheet **(6)** and uses a lock seam to join it at a right angle to a second strip of metal. He reinforces the lock seam with solder from the back **(7)**; this second piece attaches to the roof surface **(8)**. The pans that form the field of the roof start with straight folds in a metal brake. These folds, which will become the "standing seam," are carefully crimped, little by little, to bend the panel to the roof curve **(9)**. One edge of the pan is joined with a lock seam to the drip edge **(10)**. On the other edge, he begins to form a standing seam with a PVC roofer's anvil and wedged mallet **(11)**. Each pan is secured to the roof with stainless steel screws through metal tabs folded into the standing seam every 12 to 16 inches **(12, 13, 14)**.


First we went above.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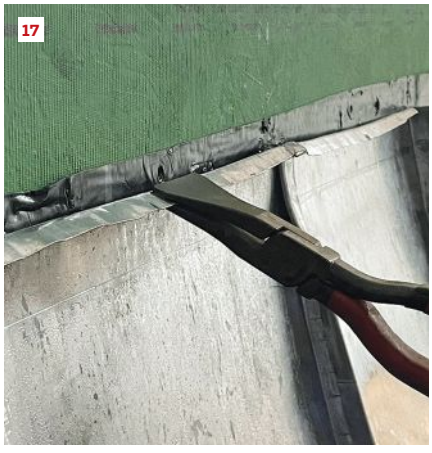
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The standing seam is completed with a roofer's anvil and mallet, with the long leg on the second panel folded over the bent rib on the first **(15)**. Once the seams are folded together, they are pressed tight with tongs **(16)**. At the transition between the metal roofing and the wall, the top of the pans are folded over **(17)** to prepare for seaming them to a horizontal strip of transition metal **(18)**. The top edge of this transition flashing is taped to the sheathing with Zip System tape **(18, 19)**.

ordinary ice membrane is at risk of melting in direct sun. This can create a dripping mess—a callback we can't afford to have. Instead, we installed a high-temperature underlayment rated to withstand roof temperatures up to 260°F.

CURVED STANDING-SEAM METAL

At this point, we turned the task of forming the concave standing-seam-metal roofing over to Kyle Ouellette of Liberty Building Envelope. Using lead-coated copper, he and Kory Demello began with the rake drip edges—the hardest and most time-consuming part of the job. Making these two rake pieces for each side of the roof easily consumed about 70% of their time. To illustrate the process, we did a full mock-up in Kyle's shop to photograph for this article. For the actual job, the rake pieces and curved pans were cut and formed in his shop, but all the seaming work was done in the field. Ordinarily, the pans would be installed in the field beginning at the center and working out in both directions to each rake end.

Wade Paquin runs WKP Construction, a custom home building and renovation firm based in Newport, R.I.

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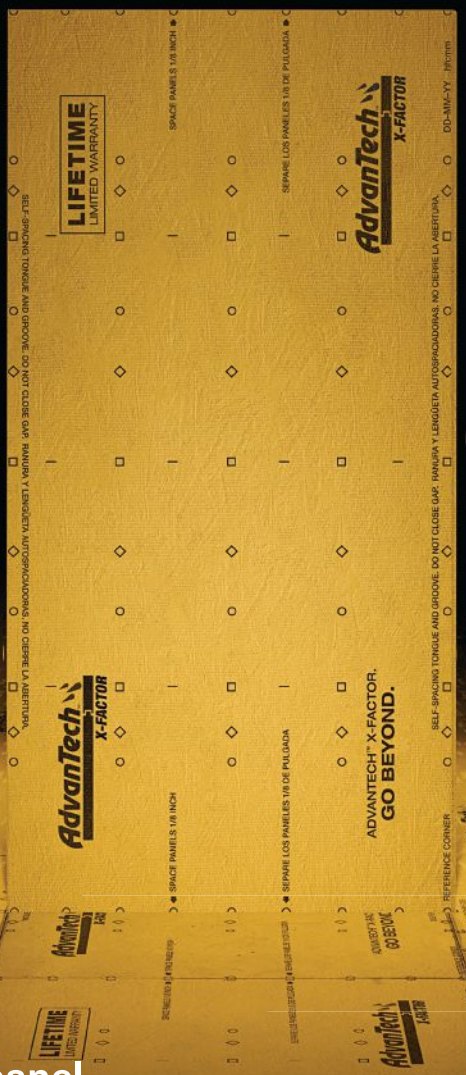

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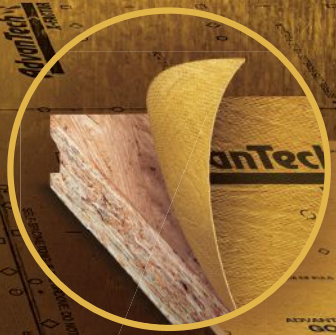

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Rebuilding a Basement Bulkhead Entry

BY EMANUEL SILVA

In the area where I do a lot of my work, there are a lot of older homes with stone foundations, and often the entry into the basement is in bad shape. In this particular case, the home's basement originally had a porch-style entry with stone foundation walls and a roof, which had been replaced with a simple metal bulkhead door some years back. The homeowners wanted to replace the badly corroded metal door, but the bulkhead foundation walls and concrete steps leading down into the basement were also deteriorating and unsafe. In my repair proposal, I recommended not only installing a new bulkhead door unit but also removing the concrete steps and replacing them with pressure-treated stringers fitted with composite treads. I also recommended raising the height of the curb above the level of the driveway.

Demo and prep. The riser heights on the old concrete stairs varied by more than an inch, making them unacceptable to my building inspector. But removing them was easier said than done, despite their cracked and crumbling appearance. Using a combination of a sledgehammer, a pick ax, pry bars, and a rotary hammer, I began chipping away at the stairs from the bottom up **(1)**. As I worked, I shoveled the debris into 5-gallon buckets and piled it up in the driveway for later removal.

Because I was concerned about water getting into the basement, I left the existing bulkhead door in place during this phase of the project. That way, I had easy access to the stairs, but could close up the door at the end of the day and not worry about rain or snow falling overnight.

Once I finished removing the stairs and loose sections of concrete from the bulkhead entry's stone foundation **(2)**, I removed the old metal bulkhead door and replaced it with a temporary shelter **(3)**. This involved removal of some vinyl siding, as well as some underlying courses of cedar shingles, the home's original siding. This preparation would later enable me to properly flash the

The author started by demolishing the bulkhead entry's existing stone steps **(1)** and clearing out the rubble **(2)**. Next, he removed the vinyl siding and some underlying cedar shingles around the metal bulkhead door and framed a temporary shelter **(3)**, then drilled holes in the old concrete and stonework for epoxied rebar dowels **(4)**.

Photos by Emanuel Silva

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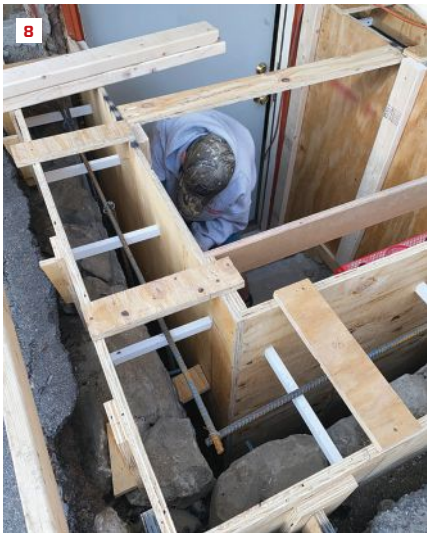
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To form a higher curb and smooth out the bulkhead walls, the author cut sheets of 3/4-inch plywood into forms that would be filled with concrete **(5)**. He used a combination of cleats **(6)**, wedges **(7)**, and internal PVC spacers **(8)** to brace the forms so that they were as plumb, level, and square as possible. In addition to the rebar dowels drilled into the existing bulkhead stonework, #4 rebar will reinforce the new concrete **(9)**.

new bulkhead door to the existing wall.

Framed with 2x4s and covered with a plastic tarp, the temporary shelter was light enough to be picked up and moved out of the way while I was working. At the end of the day, I could slide it back in place over the bulkhead entry to keep the work area dry and relatively warm overnight, even during a cold and wet New England January.

Formwork. I didn't want to totally replace the existing stone bulkhead foundation, but I wanted to reinforce and smooth out the walls without losing too much stair clearance. To do this, I planned to cap the walls with a thin concrete overlay while forming and pouring a new, higher curb. The trick would be securing the new curb and thin walls to the existing stone foundation.

I started by drilling evenly spaced 5/8-inch-diameter holes in the existing concrete and stone, using a carbide-tipped masonry bit to drill the holes as deep—up to 4 inches—as possible. After blowing dust out of the holes, I injected Simpson Strong-Tie's SET-XP epoxy anchoring adhesive into them and then inserted short lengths of #4 (1/2-inch diameter) rebar into the holes, with 2 inches of the rebar exposed **(4)**.

Next, I measured and cut the form walls from 3/4-inch CDX plywood, using a track saw to make sure the panels were square and the edges were straight, and scribing them as needed to fit over the concrete curb and some extra-wide foundation stones. Following the very first rule I ever learned about construction from my very first boss—start every project level, plumb, and square—I took care that my form walls were parallel to each other and level across the top.

I used a portable Kreg jig to cut holes for pocket screws in the forms and fastened the side forms to the door jambs. I also used

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The author and his son, Carter, mixed up more than 50 bags of concrete on site **(10)**, using shovels and a long pole to push the concrete to the bottom of the forms and eliminate voids **(11, 12)**. Raised several inches above the level of the driveway, the new curb will block rain and snow from entering the bulkhead entry **(13)**.

pocket screws to fasten plywood spreaders to the forms to brace them **(5)**.

After cutting the end panel to width, I attached plywood cleats to its edges, then slid the panel into position and screwed the cleats to the side panels **(6)**.

Next, I ripped the plywood to width to form the outside edge of the curb, which is raised about 12 inches above the level of the driveway. Plywood cleats held the inner and outer forms together at the top, while I used spacers cut from PVC stock to help hold the forms together and hold up the rebar that I dropped in to reinforce the concrete. I also braced the outer forms with wedges tapped into place between the plywood and the cut edge of the asphalt driveway **(7)**.

As I assembled the forms, I added lengths of #4 rebar oriented horizontally to help reinforce the concrete walls **(8, 9)**.

Pouring concrete. Mixing up more than a yard of concrete on site is hard work, but in this case, ordering a short load of ready-mix wasn't an option. The house is located on a narrow lot on a tight street, so we still would have had to deliver the concrete from the chute into wheelbarrows, then roll it up the driveway to dump it into the forms. Instead, I ordered a couple of pallets (42 80-pound bags of concrete mix per pallet) and hauled my two-bag mixer along with my son Carter to the jobsite to help me with the pour.

Prior to the pour, I used a 3-inch roller mounted on a painter's pole to apply Quikrete bonding agent to the existing foundation. I've made a habit of using bonding agent whenever working with old concrete, masonry, and stone to improve adhesion between the old materials and new concrete. Sometimes the bonding agent can be added to the mix, but it can also be brushed or rolled onto the surface just before the concrete is poured, so that the surface is tacky.

Mixing up the 50 bags or so needed to fill the forms ended up taking about four or five hours **(10)**. Fortunately, the day was sunny and mild with temperatures in the mid-40s, warm for a January day in New England, so I wasn't worried about freezing temperatures. I also knew that, before leaving the jobsite, I would be able to cap the space again with my portable shelter and crack the door to the basement open, which would keep things warm overnight.

During the pour, Carter and I used shovels and a long pole to consolidate the mix, eliminate voids, and help push the concrete into all the cracks and crannies in the existing stone foundation **(11, 12)**. After screeding the top level and floating the surface, I allowed the concrete to set up, troweled it smooth, then applied a brush finish so there would be good adhesion with the PVC cap that would separate the new metal door from the concrete surface **(13)**.

Finishing up. Metal bulkhead doors can be—and often are—installed directly over a concrete curb, but this is where I typically see the worst corrosion get its start. So I like to install a wood or PVC sill to keep the

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The author fabricated a PVC apron to frame the entry for the bulkhead door **(14)**. With PVC rippings scribed to the irregular stone foundation and added to the assembly, the one-piece design made flashing it and fitting the metal door to the wall easier **(15)**. After parge-coating the bulkhead foundation walls with mortar, the author cut pressure-treated stringers **(16)**. Fitted with low-maintenance PVC stair treads and a new metal bulkhead door isolated from the concrete curb by the PVC apron, the new entry will provide years of dry, trouble-free access to the basement **(17)**.

metal bulkhead door frame separated from the concrete. On this project, I opted for a PVC cap because it would also help me to solve the transition at the wall between the home's irregular fieldstone foundation and the wall sheathing.

I cut the cap from 3/4-inch-thick PVC sheet goods, sizing it to be slightly wider than the curb to help shed water, and joined the pieces together with pocket screws and PVC adhesive **(14)**. Installing the cap as a unit rather than in separate pieces made it easier to fit it to the wall and then to fit the metal door to the cap. Scribed PVC rippings added to the vertical part of the cap fill in the gaps between the cap and the house **(15)**. I fastened the cap to the concrete with pairs of 2 1/4-inch-long flat-head Tapcons about 10 inches on-center, bedding the cap in beads of OSI Quad Max sealant and filling the fastener holes with 3/8-inch-diameter plugs that I cut from PVC.

Since the PVC cap was level and square and formed a perfect 90-degree angle where the horizontal leg met the vertical leg at the wall, it only took a few minutes to install the Gordon metal bulkhead door. First, I applied a continuous bead of sealant to the base of the frame, then set it into place and fastened it to the cap with short #8 stainless steel pan-head screws.

Before cutting the stair stringers, I parged the interior walls of the bulkhead with type S mortar, adding a bonding adhesive to the mortar to help with adhesion. As I applied the mortar, I used a mason's brush to smooth it out and add a stuccolike texture to the finish. This filled in voids and should help prevent water from penetrating into the bulkhead area.

Finally, I cut five matching stringers for the new stairs. It's always nice to have wide treads, but in this case, I didn't have a lot of room to work with and ended up with 9 1/4-inch treads and 8 1/4-inch risers. Fortunately, these numbers were acceptable to my building inspector, because the basement already had another means of egress, and these were considered to be secondary stairs. For him, the most important issue was that the riser heights were consistent from the top to the bottom of the stairs **(16)**.

To minimize maintenance, I made the treads from PVC decking with a textured finish, which will provide better traction when wet than pressure-treated lumber would **(17)**. For each 9 1/4-inch tread, I used two 5 1/2-inch-wide deck boards, ripping one to 4 inches to provide a small nosing and allow a small gap between the boards for drainage.

Emanuel Silva, a frequent contributor to JLC, *owns Silva Lightning Builders in North Andover, Mass. You can follow him on Instagram at @emanuel.a.silva1996.*

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Replacing a Failed Ridge Beam

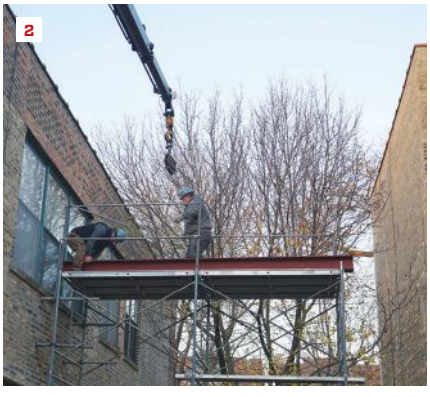
BY JAKE LEWANDOWSKI

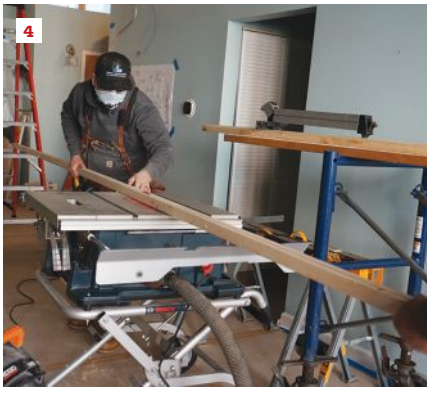
Like most structural repair projects, this one involved more preconstruction work and site prep work than actual repair work on site. We started several months before any site work was performed with an inspection of a heavy timber roof beam that supported a section of roof in an old warehouse, which had been converted years before into a condominium apartment complex. This beam was taking a significant amount of the roof's load, and it appeared from the ground that the timber was rotating. A closer inspection revealed a total beam failure. A core sample was ordered, which confirmed that the interior of the heavy timber had rotted away.

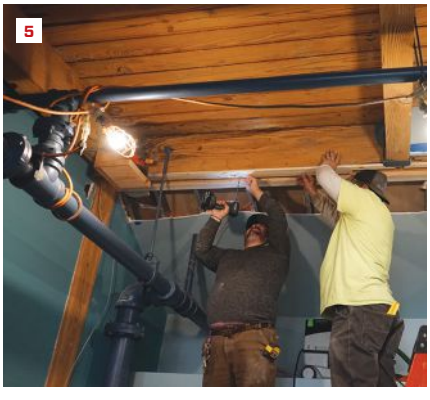
The leaks that initially caused this rot had been taken care of long ago, and by this time, the interior rot was dormant. The beam wouldn't deteriorate further if it stayed dry, but it was structurally unsound. In an effort to save the homeowners association money, the engineering team weighed leaving the timber in place against the much more involved job of removing and replacing it. For the final design, the engineering team and homeowners association opted to install a new steel beam directly under the existing timber to carry the roof load. This replacement beam would also be designed to pick up the loads on all the purlins that tied into the beam. The purlins themselves were perfectly sound, but we could no longer rely on their connection to the timber beam.

FIELD MEASUREMENTS

Once we had a design that was feasible and within the client's budget, we needed to take field measurements so we could order







The author's crew set up scaffolding and craned the replacement beam onto the top lift **(1)**, positioning it in front of a window **(2)**. Note the gusseted flanges on the left side of the beam; these were added to support the purlins **(3)**. Once the demo crew had cleared the site, the author set up shop and began ripping leveling strips **(4)**, which his crew screwed to the bottom of the failed beam **(5, 6)**. These strips would provide a level surface against which they could place the new steel beam.

Photos by Jake Lewandowski

the steel beam. The failed heavy timber was anything other than straight, and the purlins were all at different elevations. One of the columns was also out of plumb by a few degrees.

Using a laser to set a benchmark height, we were able to identify the failed beam's low point and high point and all the purlin elevations. Once we had these measurements, we could start working on the shop drawings and order the steel.

MANEUVERING THE STEEL AND PREPPING THE SITE

There was no easy way to bring the modified W-beam into the condo unit. We ultimately decided the best course of action would be to bring it in through a window. To accomplish this, we first set up scaffolding outside the unit. This allowed us to set the beam with a crane on the scaffolding so we would be able to roll it in when we were ready for it.

Before we could move the beam into position, some of interior walls around the failed beam had to be demolished. We were responsible for laying out what needed to be demolished for the demo contractor. We also met with the electrician to discuss removing some electric work that was mounted on the failed beam. Once everything was demoed, and the electric was out of the way, we were ready to go.

We laid down floor protection and started setting up our shop. The first task was to shim the bottom of the failed beam so when we raised the new steel beam into position, it would sit level. To do this, we set up a laser line tangent to the beam's low point. Then we measured from the beam to the laser to find the shim heights. Following these measurements, we ripped tapered strips and screwed them to the bottom of the beam.

We now had a flat surface to which we could lift the beam. We rolled the beam off the scaffolding onto the material lifts. We used two Sumner 2118 Series telescoping lifts, which are sized to move through standard door openings and have 5-inch polyurethane casters that roll smoothly. However, the lifts have a fairly wide footprint that can sometimes get in the way of our ladders. After positioning the beam where we wanted it, we set up post shoring, which we clamped to the bottom of the W-beam flange.

SECURING THE BEAM

Two post shores were enough to support the beam, but we also secured the beam with lag screws through the beam flange and the leveling strips. This was for positioning only as we completed the next step: shimming between the purlins and the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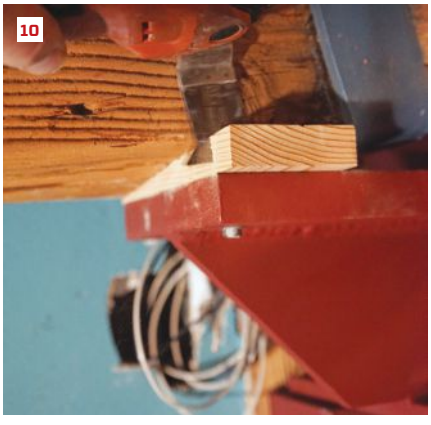
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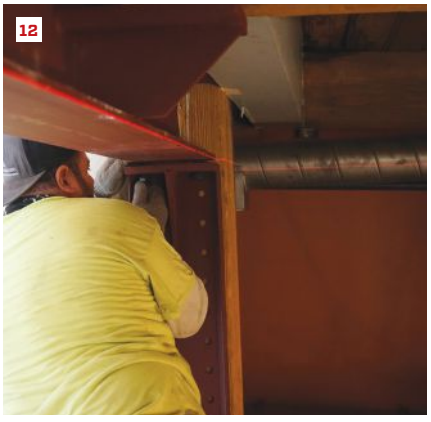
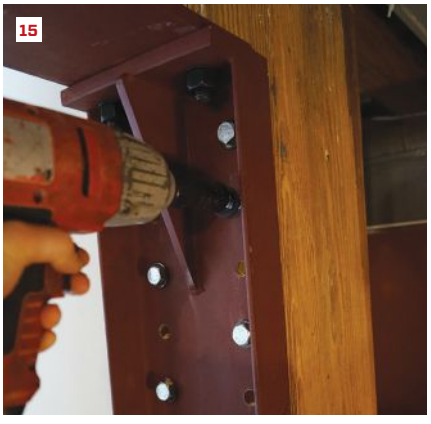
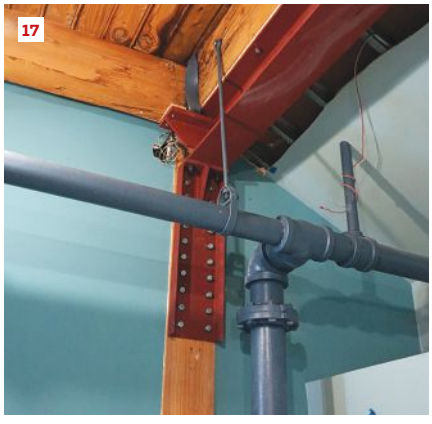
Once the beam was positioned and checked for level with a line laser, the crew set up post shoring for temporary support **(7)**. The crew installed lags through the top beam flange **(8, 9)** to secure the beam's position. The primary load would come from end brackets (see photos on next page). Before the end brackets could be installed, the gusseted brackets on the steel beam had to be shimmed **(10, 11)**. Since the purlins were at varying elevations and angles relative to the steel beam, these shims were cut at compound angles.







With the beam secured, a crew member lifted one end bracket into position **(12)**. Note how the bracket was purposefully fabricated out-of-square to accommodate the out-of-plumb column **(13)**. Each bracket required 20 lag screws, and each hole for the lag screws was predrilled using two different drill bits—one sized for the threaded shank and one for the shoulder of the lag **(14)**. The crew alternated holes when driving the lags **(15)**. As a final step, the beam was wiped clean **(16, 17)**.

gusseted plates that we had fabricated on the beam.

For this work, we used an angle finder, aligning it to the bottom of the failed beam and in line with the gusseted plates, so we could dial-in to level on the bubble vial. We had to do this in two directions (in line with the new beam and in line with the gusseted plates at a right angle to the beam) to find the compound angle we used to cut the shims. Once the shims were cut, we tapped them into position and trimmed them flush with a multitool.

END BRACKETS

The primary load on the beam is carried by two end brackets, which we call "haunches," that transfer the load to the existing wood columns. The load on these columns carries all the way down through the structure to complete the load path.

Each bracket was fabricated slightly differently to align with the existing columns, one of which was slightly out of plumb. As shown in photo 13 above, the top bearing flange on this bracket was purposefully fabricated out-of-square to accommodate the out-of-plumb column. (This underscores how critical it is to get proper field measurements of existing structures. Good measurements make for accurate shop drawings, which make tricky jobs go much smoother, in my experience.)

We installed the brackets with lag screws, using a two-step predrill—one bit for the diameter of the shank in the threaded section, and another for the diameter of the shoulder section. When installing these lags, we alternated holes to draw the bracket in uniformly.

As a final step, we wiped down the beam. Once we were finished, the electrician reinstalled the electrical and a drywall crew patched the wall surfaces to complete the job.

Jake Lewandowski is a construction manager with his family's business, Great Lakes Builders (greatlakesbuildersinc.com), specializing in structural repairs in the Greater Chicago region.

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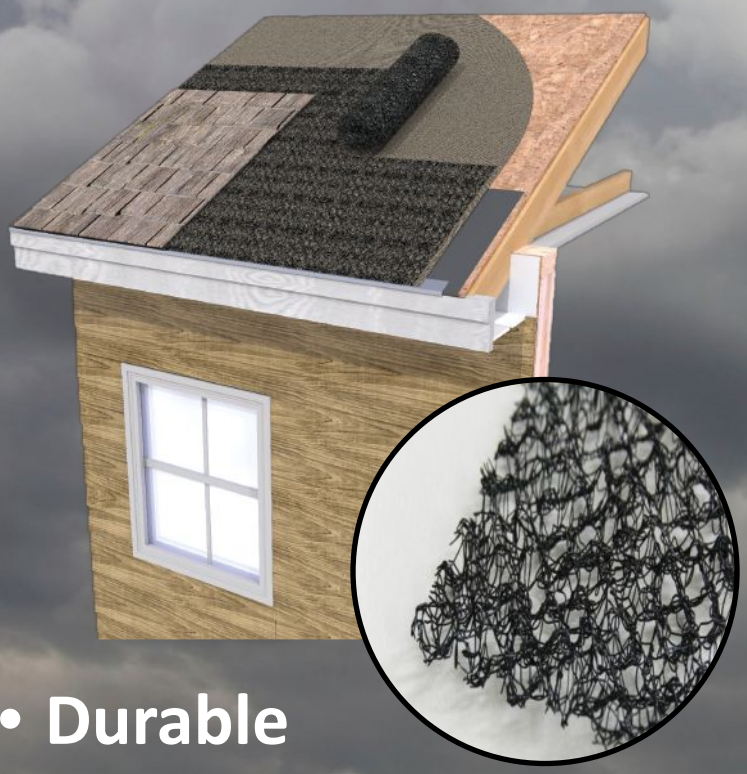

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BY ROB CORBO

Keep It Simple: Making Retirement Savings Work

Last month, in part one of this series on retirement, we concluded that saving for retirement can be difficult for small construction and remodeling companies, but it's necessary for everyone's future well-being. We established that traditional and Roth IRAs are viable and powerful options for retirement saving, and we focused on the importance of starting an account now, contributing regularly, taking advantage of tax-free growth, and letting the wonder of compounding (time) work for you. When it comes to saving for retirement, you can't start early enough, and it's never too late to start.

In this article, we will dive deeper into two forms of IRAs, examine the significance of fees, and weigh in on finding IRA investment opportunities that maximize gains.

Two forms. Both traditional and Roth IRAs come in two forms, regular and self-directed. A regular IRA is simple to open and allows you to invest in stocks, bonds, certificates of deposit (CDs), exchange traded funds (ETFs), and mutual funds. A self-directed IRA is complicated and more difficult to open, and it has significantly more IRS rules, but it allows you to pursue alternative investments including rental property, precious metals, commodities, limited partnerships, and more.

Being that we in the industry are regular folks, a regular IRA is the perfect investment vehicle. It has more than enough investment options, and, most importantly, a number of financial institutions charge no IRA account management fees (be sure to ask), leaving your retirement account with the maximum amount of money to compound. Come retirement, any reduction in your savings base, no matter how small, will be magnified in the final dollar total. When it comes to saving and compounding, fees are your enemy.

Where to open an account. You can open an IRA account at any number of brokerage firms and banks. The application process shouldn't take more than 20 minutes. When selecting a financial institution, look for one that does not charge you a fee for opening your account, managing your account, sending regular contributions, and buying or selling funds in your account (transaction fees). Also look for a firm that offers commission-free ETF purchases and no-transaction-fee (NTF) mutual funds.

If your bank only offers CDs and savings accounts, as many do, open your IRA at a brokerage firm so you have access to stocks. Stocks have returned 10% a year on average over the last 100 years. In comparison, Treasury bonds have averaged 5% since 1926 but are at 2.2% today, and a 5-year CD is paying 0.8%. The "rule of 72" helps clarify what these percentages mean in real terms: Divide 72 by the interest rate (expressed as a whole number) on a particular investment to find the number of years it takes to double your money. At a 10% rate, it will take 7.2 years to double; at 0.8%, 90 years.

Investing. Once you open your regular IRA, you must decide how to invest your contributions. Because contributions represent a lot of sweat equity, your goal is to balance reward and risk. To maximize reward, it's best to invest in the stock market. To minimize risk, it's best to diversify, so no single company's failure dooms your future. The best way to diversify is to invest in a variety of companies, and one way to do that is to invest in an ETF or a mutual fund index fund; each share of an ETF or a mutual fund represents a basket, or variety, of companies.

When you're investing, your goal is to balance reward and risk. To maximize reward, invest in the stock market. To minimize risk, diversify.

ETFs duplicate an index, say the S&P 500; stocks in the index are in the fund. There is no turnover—no buying and selling—the fund is passive (not actively managed), and the expense ratios (fees) are low.

Mutual funds. Some mutual funds are passive index funds with low expense ratios. Others, which have higher expense ratios, are actively managed by a fund manager who continuously changes the mix of companies in an effort to achieve higher returns. Over the long term, due to higher expense ratios, many actively managed mutual funds realize lower returns than passive index funds.

Remember the Einstein quote last month? "Compounding interest is the 8th wonder of the universe. He who understands it, earns it; he who doesn't, pays it." Paying a higher expense ratio than necessary is an example of "he who doesn't, pays it." A $10,000 investment with a 10% annual return over 20 years with an expense ratio of 0.50% accrues to $61,159; with an expense ratio of 2.0%, it accrues to $49,157. Expense ratios for mutual funds range from 0.50% to 2.0%, while those for ETFs range from 0.05% to 1.00%. The Vanguard S&P 500 ETF has one of the lowest expense ratios, at 0.04% or 40 cents per $1,000 invested.

Dollar cost averaging. Warren Buffett, one of the most

successful investors in the world, has said that an index fund, because of its low expense and simplicity, is the most sensible investment for most folks. "By periodically investing in an index fund, the know-nothing investor can actually outperform most investment professionals," Buffet says. He recommends investing what you can afford, in a timely manner, over a long time horizon—a method know as "dollar cost averaging."

With dollar cost averaging, there will be periods when your index fund is buying stocks at their highs, and other times at their lows. You must be disciplined enough to make your IRA contribution on a regular basis, through thick and thin. The stock market is a roller coaster ride. Rather than becoming anxious when the market drops 20% to 30%, delight in the fact that you are able to buy stocks at a discount. Who doesn't enjoy buying a new tool at a 20% discount? Buffett has said that investors should be fearful when others are greedy, and greedy when others are fearful. So, when the market is down big, in correcting mode, and investors are fearful, you might want to consider increasing your contribution, buying more for less.

Don't wait. Open your IRA now. Is the stock market high as I write this? Yes, it's high on low interest rates, government stimulus, vaccinations, and hopes for a back-to-normal economy. Will it correct sometime in the future, maybe this year? Absolutely. Is that a reason to delay? No. Make your contribution on a regular basis, as if it is a household expense. Write a check for retirement when you pay the utility bill. Better yet, have your checking account debited automatically. You are dollar cost averaging, flattening the roller coaster, making any correction a bit less painful and a bit more rewarding. Time is on your side.

Our goal as regular folks navigating the financial landscape is to keep it simple. Open a regular IRA, traditional or Roth. Open it at a reputable financial institution with numerous offices, an online presence, and no IRA account management fees. Purchase an exchange traded S&P 500 index fund, and sit back and enjoy the ride. (Cue up Pink Floyd: "Money. It's a gas. Grab that cash with both hands and make a stash. ...")

Rob Corbo, a frequent contributor to JLC*, is a building contractor based in Elizabeth, N.J.*

JLC INTEL

AZEK Exteriors

THE SURPRISING SECRET OF A HIGH-END CUSTOM HOME BUILDER

This builder always chooses material with his reputation in mind, even rot-resistant skirt board.

David Barnes considers every last detail.

Maybe that explains why the home builder's project pipeline is filled for the next three years. Barnes owns and operates Barnes Construction, a custom home builder in the Hampton Roads area. All homes are built to the owner's and architect's specifications, with prices starting at $2 million on up to $10 million or more.

It's easy to spot examples of Barnes' take-no-chances approach. Take sheathing. He only specs insulated panels that resist air and water. Nails? You guessed it: strictly stainless steel.

PORTHOLE LESSON

A Barnes' homeowner walk-through is a teaching moment. For Barnes, it's an opportunity to reinforce the exceptional care, value, and quality his team has delivered to the homeowner. For the owner, it's clear proof of his or her wise investment in superior materials and workmanship.

Take something as simple as a porthole window for the shower area. Barnes says, "We take and bend a circle of cellular PVC for the window jam and then CNC the window circle, using 1x4 PVC. We use rubber trim for the back band most of the time. It works great. Never a worry about warping or rot."

Curves, circles, and arches figure prominently in his home construction. "The architect I usually work with loves to draw them," he says. "We do a lot of curved roofs. That means we cut cellular PVC sheets on the jobsite or CNC them offsite. We also have our own heat blankets for heat forming PVC, like we do for porthole windows." The ability to heat-bend cellular PVC is a value-added characteristic that helps enhance design without sacrificing durability.

SECRET SAUCE

For Barnes, cellular PVC trim and sheet is a key ingredient to his oceanfront homes. You might call it his secret sauce for the way it indemnifies himself from rot, warping, splitting, delaminating, or swelling. To illustrate, he tells a story, "I'm currently building a $2.5 to 3 million home on the ocean. The home next door is an ICF house, very durable for the coast. That house has fiber cement cladding and wood trim. I can't believe they used wood. Beach sand has already blasted the finish off. It's only a couple years old and already the wood is laid bare and starting to rot."

TOP CHOICE

Of course, not just any cellular PVC product will do. Take one-piece skirt boards. He's shopped around and selected AZEK Skirt Board. He cites several reasons why:

1. **Installation.** The AZEK skirt board is a three-in-one product. There's no need to install a separate starter strip, skirt board, and flashing.
2. **Size.** "It comes in 5/4 x 6, 5/4 x 8, and 5/4 x 10. That's a real benefit for us," he says. "AZEK skirt boards also come in 18-foot lengths, so there are fewer joints."
3. **Constructability.** "The boards aren't brittle. They don't break like some. Plus, they cut easy and are very millable. We like to route shiplaps joints," he says.
4. **Density.** "We've tried a lot of PVC products," he explains. "There's a lot less shrinkage with AZEK. The density is different."

Barnes knows everything depends on his reputation. "Consider the overall project. If you can add more value by selecting a premium product over a secondary one for a minimal difference, why wouldn't you?" Barnes has the project pipeline to prove it.

To learn more about one-piece skirting boards for your next project, visit **AZEKexteriors.com**.

Produced by Hanley Wood Strategic Marketing Services Group

BY ALLISON BAILES

Retrofitting Forced-Air HVAC With High-MERV Filtration

Load calculations, equipment selection, and duct design, done according to Manuals J, S, and D, respectively, are often required by code and sometimes even enforced. But one thing that's not required anywhere is retrofitting the air filtration so that it not only protects the equipment from dirt but also does a good job improving the indoor air quality.

The coronavirus spreading COVID-19 is an airborne contaminant, so all the hullabaloo around ventilation and filtration is warranted. But what can you do about filtration in an existing home, especially if you're not doing anything else to the HVAC system?

You can't just swap out a cheap fiberglass filter for a pleated, high-quality filter. You have probably heard this warning before—and it is justified, because most HVAC systems are not designed to handle the extra resistance to airflow that a high-quality filter will introduce.

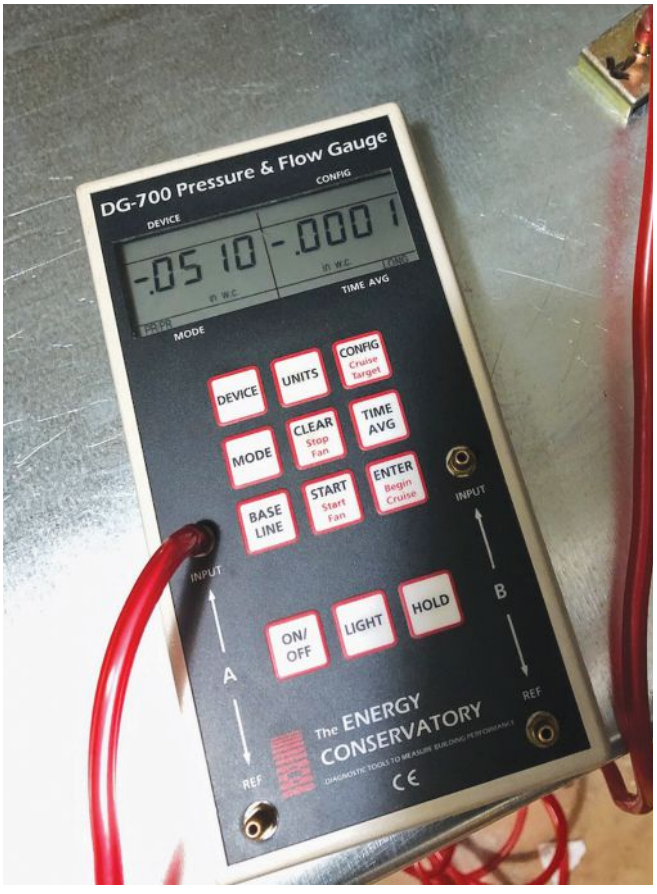
WHAT YOU NEED TO KNOW ABOUT MERV

Before I jump into the details of how to retrofit a forced-air HVAC system for better filtration, let's talk about filtration quality. ASHRAE (the professional society for heating, air conditioning, ventilation, and refrigeration) developed a standard for rating the ability of filters to capture particles of different sizes: the Minimum Efficiency Reporting Value (MERV). This number goes up to 16, with higher numbers meaning better filtration quality.

A MERV rating gives you reliable information about how good a filter is at capturing one of the worst indoor air pollutants: particulate matter that's 2.5 microns or smaller (particulate matter known as PM2.5). A MERV-13 filter is supposed to catch 85% of PM2.5, so that's a good minimum MERV rating to shoot for. Going to the high end of the range, MERV-16, brings you to 95% capture efficiency of PM2.5.

Photos by Allison Bailes

This 16x25 MERV-13 filter in a ceiling filter grille keeps the resistance low and the indoor air quality high.



The pressure drop (0.0510 i.w.c.) across the filter shown on the previous page is about half the maximum pressure drop recommended by the ACCA (0.1 i.w.c.).

Unfortunately, not all filters have MERV ratings. Some use other rating systems, like Home Depot's Filter Performance Rating (FPR) or 3M's Microparticle Performance Rating (MPR). If you want the best filtration, I recommend buying MERV-13 or better and avoiding the others.

ASSESSING FILTER IMPROVEMENT POTENTIAL

The first step in a filter retrofit is finding the status of airflow in the current system and looking for ways to modify the distribution system to accommodate high-MERV filtration. The reason you shouldn't just pop in a MERV-13 filter is that the current duct system probably already has a lot of resistance. But you don't know how bad it is until you measure, so that's step one.

There are two measurements—total external static pressure and filter pressure drop—you need to take to determine what the resistance is in the current duct system.

Total external static pressure. First, get a reading with a manometer of the total external static pressure (TESP), which is the pressure difference across the furnace or air handler. This number is fairly simple to get and is a measure of how resistive the whole duct system is. Once you know this number, you can compare it with the maximum static pressure recommended by the manufacturer. Most furnaces recommend a maximum of 0.5 inch of water column (i.w.c.), for example, so if the system you're retrofitting comes in at 0.7 i.w.c., you shouldn't add resistance.

Filter pressure drop. This measurement is also done with a manometer, but you measure the pressure difference across the filter only. The Air Conditioning Contractors of America (ACCA) recommends 0.1 i.w.c. or less, but many high-MERV filters have much higher pressure drops. A study in California found that systems where a 1-inch fiberglass filter was replaced with a 1-inch pleated filter averaged 0.28 i.w.c. of pressure drop. For a system that needs to stay below 0.5 i.w.c., that can be a problem because the filter by itself is using up half of the pressure to move the air through the duct system.

The static pressure and filter pressure drop together tell you how well the duct system is performing overall and how much resistance the filter is adding. Most existing duct systems are pretty bad, so your goal should be to improve both of these numbers with a filter retrofit, if you can.

WHERE TO PUT THE FILTER?

You have two choices for where to put the filter. You can put it in a cabinet near the air handler, or you can put it in a filter grille. You may also want to increase the number of filters because filter area is the key to low filter pressure drop. Whether you increase the number of filters, put in a bigger one, or both, putting the filter at the air handler is hard to do in many cases because of limited space. Sometimes you can bring return air into both sides of the air handler, and that allows you to add a filter. Often there's just not enough space available for that to work.

The best place to put a filter is in a return filter grille. Even in new construction, you can't always do that, but if you can, you definitely should. It's usually easier to get more area in filter grilles than at the air handler because you can make filter grilles pretty big and you can have more than one. Having filters at the grilles usually makes them easier to change, too. Yet another benefit is that filters at the grilles keep the return ducts clean (assuming the ducts are sealed properly).

In our HVAC design work, we always try to use filter grilles. We make them all the same size for the convenience of the homeowner, who then can buy a box of filters all the same size. Unfortunately, this method doesn't work well with a house that already has dedicated returns in each bedroom.

HOW BIG A FILTER?

The filter face area is the biggest factor in achieving low pressure drop. Many filters are sized for a face velocity of about 500 feet per minute. We size ours for 200 feet per minute or less, which works

A shallow return (above) filter grille box results in a higher pressure drop across the filter. Replacing it with a deeper box (right) behind the filter succeeded in reducing the filter pressure drop by 30%.

out to 2 square feet of face area per 400 cfm of air flow. (Since a ton of air conditioning corresponds to a nominal airflow of 400 cfm, this formula can be shortened to 2 square feet per ton.) This is the face area, length times width, not the actual filter surface area. Because of the pleats in the filter media, the filter surface area will be higher.

I like to size each of the filter grilles for 400 to 500 cfm of airflow. That makes the required filter size, using the rule of thumb above, 2 to 2.5 square feet. Common filter sizes with that face area are 12x24 and 14x25. I like to go even bigger when possible and use 16x25 or 20x20 filters.

Remember, 2 square feet per ton is the *smallest* filter you want to use if you're going for really good filtration with low pressure drop. Using a larger filter reduces the face velocity and pressure drop even more. I put three 16x25 filters in my house, each filtering about 300 cfm. That works out to about 3.7 square feet per ton and a face velocity of about 100 feet per minute.

And what about filter thickness? We generally specify 2-inch-thick filters because they work well and, compared with thicker filters, they are less expensive and require less space.

DON'T IGNORE THE SPACE AROUND THE FILTER

One mistake I made with my house was not detailing what happens on the reverse side of the filter. The installers put the filter grilles in the ceiling and then screwed a piece of sheet metal directly to the back. The 14-inch round return duct then was attached at the center of that sheet metal backing. The problem with this configuration is that there's almost no space between the 2-inch-thick filter and the sheet metal backing. The result is unnecessary turbulence and a higher pressure drop.

When I added a bigger box behind the filter grilles, I was able to reduce the pressure drop by about 30% (see photos, above). With this arrangement, my filter pressure drops are all less than 0.06 i.w.c. And remember, this is with MERV-13 filters!

When you're done with the filter retrofit, measure the total external static pressure and filter pressure drop again. By following the guidance here and upsizing the filter, you should find that both are lower. Retrofitting an existing HVAC system for good filtration is more involved than simply replacing the existing filter with a higher quality filter, but it's certainly possible, and your clients will benefit with better indoor air quality.

Allison A. Bailes III, Ph.D., author of the Energy Vanguard blog *(energyvanguard.com/blog—a must-read for the energy-minded) owns Energy Vanguard, a residential building science firm in Decatur, Ga., that does HVAC design across North America.*

BY DOUG HORGAN

Lessons Learned Installing Synthetic Slate Roofing

There are many ways to mess up a synthetic slate install. Most of them are similar to how to mess up any kind of roof: Leave out the kickout flashings, botch the head or side lapping, put in the ice membrane incorrectly, that sort of thing. But a few are unique to synthetic slate.

Synthetic slates have had a mixed record in the U.S. Several brands have had failures leading to class-action lawsuits and premature need for replacement. Other brands, however, have been around for quite a while with few or no problems, like Majestic EcoStar, the brand we have been using since 1999 without product failures. Still, there are tricks to installing them successfully.

If there are potential issues, why risk using synthetic slates at all? Probably the number one reason we use synthetic slates is clients want the look of slate but don't want to reframe their entire roof to support the weight of genuine slate. Synthetic slates are also a bit less expensive than real slate—not a whole lot less, but a bit.

Read the manual. Each type of synthetic slate is different from the next. The materials may be recycled or new, and may include plastics, polymers, rubber, minerals, UV inhibitors to reduce sun damage, and a number of other ingredients, depending on the manufacturer. The installation method even varies depending on the molded shape. It's critical to read and follow the directions carefully to avoid installing a product incorrectly. For example, one manufacturer's (davinciroofscapes.com) slate product has interlocking channels, which, the manufacturer points out, require the starter row to be very straight; otherwise, the variation telegraphs all the way up the whole roof.

Communication. Good support and training for the installation of the material is necessary too. Not every roofing crew can easily digest written instructions in English; videos, complete

Here, a 5:12-slope synthetic slate roof that had been inappropriately installed over regular roof underlayment **(1)** needed to be torn off (the manufacturer's instructions called for full-coverage ice barrier membrane underlayment for slopes under 6:12). Compounding problems, water had collected in depressions molded in the shingles to designate the nailing areas **(2)** and had leaked down through the nail holes, causing the roof deck to swell in numerous locations **(3)**. The author's company installed new synthetic slates with proper shingle exposure over an ice barrier membrane underlayment **(4)**.

Photos by Doug Horgan

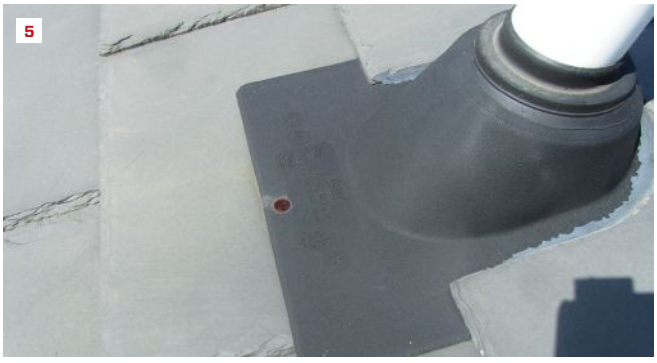
and clear illustrations, or instructions in workers' native languages are helpful. Many manufacturers, for instance, publish French and Spanish versions of their manuals; the Hungarian crews we have worked with for years have had a Spanish-speaking crew member or two use Spanish instructions to communicate to the rest of the crew. Of course, it always helps to draw out details on scraps of plywood, no matter what the crew's native language may be.

Faux slate quirks. These slates often have some surprising requirements. We once had to tear off an entire 30-square roof because the material was not approved for slopes under 6:12 without an ice-dam membrane underlayment, and it was leaking in hundreds of spots **(1)**. Contributing to the problem, water had collected in large depressions molded in the shingles to designate the nailing areas **(2)** and had leaked through the nail holes, causing the roof deck to swell in numerous locations **(3)**. We tried to salvage the synthetic slates, but they were too brittle. (The roof had been installed by another contractor, but it was heartbreaking to see the waste involved. That product has since been discontinued.) We installed new EcoStar synthetic slates (ecostarllc.com) over a Carlisle ice barrier membrane underlayment (carlislewipproducts.com) rated for high temperatures **(4)**.

Another surprise trick several manufacturers require is bending every shingle before applying it. They want the shingles all slightly curled downward so the corners don't lift (I have seen a roof with a lot of lifted shingles). We work with crews to be sure this step is taken.

Accessories with matching life spans. The good news with the better synthetics is the materials seem to be holding up quite well. A few roofs we've built are about 20 years old and they look great. I wouldn't bet my life they last to 50 or 100 years (unlike high-quality genuine slates, which can last more than a century), but it's not out of the question. To me, that means that we should normally be using fasteners and accessories likely to last that long as well: stainless steel ring-shank nails, which are available for roofing guns (some synthetic slate manufacturers actually carry them and sell them as part of an extended warranty program), copper or stainless steel flashings and vent covers, and brand-name underlayments designed to last.

I too often encounter 10- to 15-year products, such as plastic vent boots **(5)** and electro-galvanized nails, on these "50-year" roofs. Not every client wants to pay for high-quality accessories, but we price them as the default so the whole roof lasts as long as the shingles. We have struggled to find long-lasting accessories for some applications, though. In some cases, our roofers have fabricated copper covers; in others, we do the best we can. After all, a dryer vent cover can easily be replaced after 20 years if it rusts out; I feel more strongly about providing long-lasting nails and flashings.



A 15-year plastic boot with a neoprene collar is installed on a "50-year" synthetic slate roof **(5)**. A heavy-gauge metal flashing sleeve and cap is more appropriate for the life span of the roof.

Installing slate without the correct overlap can allow water to wick under the shingles and corrode fasteners, particularly on low-pitched roofs **(6)**. Also, long-lasting fasteners should be used; electro-galvanized nails corrode quickly if they stay wet.

Snow guards with slim, sheet-metal legs are easier to install than traditional guards with heavy bars. Here, the individual stainless steel snow guards do not lift the shingles high **(7)**.

On a 10-year-old EcoStar slate installation, slates were mixed from different bundles per the manufacturer's instructions. Although the slates all looked the same upon installation, the color varied over time, appearing more natural **(8)**.

On another project, the author's roofer was not careful with mixing the bundles, and the roof looked odd after 10 years **(9)**. Per the client's request, the shingles were carefully removed, mixed, and reinstalled over new underlayment **(10)**.

Headlap and shingle exposure. Headlap is the amount the second row above a shingle overlaps the top of that shingle (in other words, the area of double coverage between slates). For true slate shingles, code (R905.6.5) requires a 2- to 4-inch headlap depending on roof slope (4 inches for 4:12 to 8:12 slopes, 3 inches for 8:12 to 20:12 roofs, and 2 inches for steeper ones), but for synthetic slate, code gives precedence to the manufacturer's instructions. Most of the instructions I've seen don't call out a headlap; rather, they specify the exposure, or how much of the shingle is showing below the row above. But since the shingles are all the same length, it adds up to the same result: There's a minimum required overlap, which sometimes varies with the slope of the roof. Installing slate without the correct overlap can allow water to wick under the shingles and corrode fasteners, particularly on lower-pitched roofs **(6)**.

Snow guards. Slate roofs shed snow readily and snow guards are needed to protect the roof, gutters, and things below from avalanches. Synthetic slates seem to be even slipperier than some genuine slates, so guards are important. Designing guards is an entire practice unto itself, so I appreciate when manufacturers call out in their manuals how many are required, based on the pitch of the roof and how long each slope is from eaves to ridge. These directions seem to have disappeared from the instructions I recently checked, but we've also found that manufacturers and distributors of snow guards will usually help with the design.

Most clients love the look of the snow guards. With synthetic shingles, we've found that individually mounted snow guards manufactured by Berger Snow Guard Systems (bergerbp.com) have worked the best. They have slim, sheet-metal legs that don't lift the shingles up very high and that install more easily than the heavy bars on some traditional guards. They're available in galvanized, stainless steel, or copper **(7)**.

Mixing the slates. Some brands of synthetic shingles will change color after installation, and different batches will change differently. We found this out on our first synthetic install. We followed the directions to "thoroughly mix" the bundles of plastic shingles, even though they all looked to be the same color. Within a few years, the roof had a noticeable variation between slates. In a way, it looked more natural after the color change, like a genuine slate roof with different shades **(8)**.

On another project, our roofer was not careful with the mixing, and the roof looked pretty odd after 10 years **(9)**. The shingles were still in great shape, but the colors looked bad enough that our clients made a reasonable request that we fix them. We had a crew carefully remove, mix, and reinstall the shingles over new underlayment—lesson learned **(10)**. Now when I drive around town, I notice this issue everywhere, regardless of the synthetic slate brand, color selection, or roof pitch **(11, 12, 13)**.

In the author's region, inadequately mixed or blended shingles are common regardless of synthetic slate brand, color selection, or roof pitch **(11, 12, 13)**. Some manufacturers have recently started premixing bundles of slate to help with this problem. The top surface of some brands tends to oxidize. Here, workers had rubbed off the top oxidized layer with their shoes when maintaining a skylight on an upper roof **(14)**. These wear marks can be quite noticeable from the ground.

Oxidation. The top surface of some brands tends to oxidize, and I've seen this oxidized layer rubbed off by maintenance workers' boots numerous times over the years **(14)**. It's best to avoid repeated travel on most types of roofing, so provide direct access to HVAC equipment or skylights that are located on upper roofs and may need regular maintenance (although keeping equipment off upper roofs is the optimal solution). Some flat roofing materials have walking pads you can add, but I don't know of any for steep roofing.

Leave some spares. It's always good to have a couple of extra bundles in case something goes wrong—for example, you have to pull a few shingles to replace a rusty dryer vent, or a tree branch crashes through a few shingles. The question is where to hide them so the homeowners don't end up throwing them away. Attics and other rarely accessed parts of the house seem to have a better track record than garages and basement storage areas. I've even seen spare materials stuffed up in joist spaces in the furnace room. Homeowners won't often bother to remove these, but I've seen people throw away tile, paint, shingles, spare custom-milled trim—all kinds of stuff they may regret parting with—when they perceive it to be in their way.

Be careful with new products. While we stick with the brand we have had the best luck with, other tradespeople have told me about other brands that have been around as long and are holding up well. It's wise to be cautious with any new product. Ask around, particularly through the material distributors. They tend to be named in litigation and they want to limit their exposure, too, so they are not likely to continue carrying products that have failed. But you do have to ask—the information is not likely to be publicly available. Last, I recommend that before installing a new product, you visit 10- to 15-year-old installations nearby to see how it will look long term.

Doug Horgan is vice president of best practices at BOWA, a design/build remodeling company in McLean and Middleburg, Va.

Making a Versatile Mantel

Use simple joinery and stock moldings to build this flexible design

BY GARY STRIEGLER

One of my favorite quotes from a famous football coach—"Sometimes you gotta play with what the defense gives you"—applies when it comes to building mantels. More often than not, the fireplace has to fit in a tight space, such as between a couple of doors or cabinets, or in a room with a low ceiling.

On this job, the wall where the mantel would be located simply bumped out into the room the depth of the firebox, with limited wall space on either side of the firebox opening for the mantel. It was going to be a tight fit, so I went with a design that featured a pair of paneled pilasters with a simple, fairly narrow entablature above that would leave enough wall space to accommodate a large flat-screen TV mounted above the firebox.

While this mantel was designed for a tight spot, the beauty of the design is that the size and proportions can be adjusted to fit almost any space. I used only three different moldings (except for a simple one that I fabricated myself) to build this mantel, but by changing their style and size, it is possible to use this approach to build a custom mantel to fit almost any client's taste.

DESIGN AND LAYOUT

To meet fire codes, combustible materials must be held back from the sides and top of the firebox opening according to the

Photos by Gary Striegler

manufacturer's specifications. Typically, inspectors in my area require an 8-inch clearance between the firebox and any combustible materials on the sides, and 10 inches of clearance above the firebox. A noncombustible hearth is a requirement for a true wood-burning fireplace, but for the vented gas fireplace on this project, I referred to the setback measurements in the fireplace manufacturer's installation guide.

When designing the mantel, I used a story pole based on actual measurements taken on site. Since space between the corners of the bump-out and the firebox was limited, I downsized my typical frame-and-panel details. Instead of 2 1/2-inch-wide stiles and rails, I sized them to be 2 inches wide, and instead of a traditional wider panel molding, I chose WindsorOne's WOBB002 band mold, which is only 3/4 inch wide but creates a dramatic shadow line **(1)**.

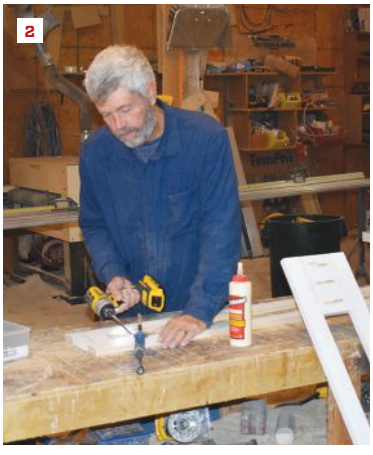
For the horizontal layout, I started in the middle and marked the rough opening for the firebox, then added 8 inches to account for the noncombustible material on each side. That was more than the installation manual called for, but I wanted the metal fireplace to look as authentic as possible, and any real wood-burning fireplace would have at least that much clearance. Next, I marked the width of the frame-and-panel pilasters, which I sized to be a total of 10 inches wide.

To finish the horizontal layout, I did a quick design for the entablature, which projects outside each pilaster. I decided to fabricate the mantel shelf from 1x7 poplar, rounding over the edges to give the shelf edge a bullnose profile. Below the mantel shelf, I built up a detail consisting of WindsorOne's WOCM005 3/4-by-4 9/16-inch crown and WOBM001 1 3/16-by-7 1/4-inch colonial-style base molding. While the total shelf depth measured 7 inches, only 5 inches would project in front of the pilasters, so I added another 5 inches on each side outside the pilasters to finish the horizontal layout.

The vertical story pole layout was a lot simpler. Starting from the floor, I marked the firebox height and added the required clearance to wood based on the manufacturer's chart contained in the installation manual. This useful chart indicated how far out from the wall the mantel shelf could project at different heights above the opening. For example, at 10 inches above the opening, a 2-inch-deep projection was allowed; a full 8-inch-deep mantel shelf had to be at least 16 inches above the opening.

To leave room to mount a large TV to the wall over the fireplace, the top of the mantel shelf could be no more than 62 inches above the floor. After marking its 62-inch height on the story pole and the three molding profiles supporting it, I was left with about 3 inches of height for the frieze crossing over the two pilasters.

The author marks the height, width, and noncombustible clearance dimensions of the fireplace on a story pole, then lays out the mantel design in full scale **(1)**. Only three different stock molding profiles were used to build the mantel in this story.



The author used pocket screws to fabricate the frames for the pilasters **(2)**, then built them out to a 2-inch depth with 1 1/4-inch-wide rippings inset slightly from the frame edge, which he later flush-trimmed **(3)**. After fastening the panels to the frame and adding the panel mold, he installed base mold, which he ripped to a 5-inch width **(4)**.

The author joined the pilasters together with a 2 1/2-inch-wide ripping with a bullnose profile **(5)**, then fastened a vertical 1x8 to the assembly along with blocking to support the mantel shelf **(6)**. After wrapping the 1x8 with base trim ripped to a 5-inch width and turned upside down, he preassembled the crown detail **(7)**, then used its dimensions to size the mantel shelf **(8)**.

To check my proportions, I did a second vertical layout of the pilasters. This layout included the base detail and horizontal frame members, or rails, plus the size and location of the necking trim close to the top of each pilaster.

PILASTER ASSEMBLY

I started by pocket-screwing together the two poplar frames that make up the front of each pilaster, using the vertical and horizontal layouts from my story pole as a guide **(2)**. To build out the pilasters to a 2-inch depth, I added 1 1/4-inch-wide returns cut from 1-by stock behind each stile. I wanted to make the joint between the stiles and returns virtually seamless, so I first glued the returns to the back of each stile, holding them in place with a few 23-gauge headless pins. Then I drove pocket screws spaced 5 or 6 inches apart to tighten up the joints. During assembly, I let the edges of the stiles overhang each return piece by about 1/16 inch, so after the glue dried, I flush-trimmed and sanded the joints **(3)**. It takes a little more work, but the result is an almost invisible joint.

Next, I stapled 1/4-inch-thick plywood panels to the back of the frame (paint-grade 1/4-inch plywood scrap is almost always available in my shop, but any flat material that takes paint well will work here).

When cutting the WOBB002 band mold to finish the panel detail, getting the mitered corners just right can be tricky. I have found that it works best to put the short pieces at the rails in first, then fit the longer ones at the stiles. For perfect miters, the secret is to take your time and not cut each piece for a fit that ends up being too tight, even if it means several trips to the saw. I fastened the molding in place with the headless pinner.

The final assembly detail in the workshop was fitting the pilasters with 1 1/2-inch-wide necking trim **(9)**. At the jobsite, the author fastened mounting cleats to the wall with nails and construction adhesive, then nailed through the pilasters into the cleats after making sure the mantel shelf was level **(10)**.

Finally, I ripped the WOBM001 7 1/4-inch-wide base profile down to 5 inches and wrapped the molding around each pilaster for the base detail **(4)**.

ENTABLATURE AND MANTEL SHELF

To assemble the unit, I started by clamping both pilasters to my worktable, with the spacing between them based on the measurements recorded on my story pole. Then I joined the pilasters together with a 2 1/2-inch-wide ripping on the flat, sized so that it would be long enough to project 1/4 inch wider than each pilaster **(5)**. Before pinning the ripping to the pilasters, I eased its front edges and ends with a 1/4-inch-diameter round-over bit.

For the frieze below the mantel-shelf assembly, I used a length of WindsorOne 1x8 trim **(6)**, orienting it vertically and cutting mitered returns at each end so that it would line up with the front and outside edges of the pilasters—basically set back 1/4 inch from the ripping. I like to use the WindsorOne products for this purpose because they are always straight and flat. To join the 1x8 vertical frieze to the 2 1/2-inch-wide horizontal ripping, I used scrap 1 1/4-by-1 1/4-inch rippings for blocking, then added some vertical blocking to support the top mantel shelf.

I continued to build up the frieze, wrapping the 1x8 with a layer of WOBM001 base molding ripped to a 5-inch width. I aligned the ripped edge with the top edge of the 1x8, so that the molding profile is upside down.

When assembling the mantel shelf and crown molding trim detail, I started by joining the mitered corners of the crown together on a worktable with wood glue and headless pins **(7)**. Then I took the final measurements for the mantel shelf from the crown detail, sizing the shelf so that it would be 2 inches longer and 1 inch wider, which would create a consistent 1-inch reveal above the crown **(8)**. I cut the shelf from 5/4x8 stock, then rounded over the edges and ends with a 3/8-inch radius bit before nailing the shelf in place. Then I pinned the crown assembly in place, a sequence that seems to provide a better fit than installing the shelf last.

To finish up, I ripped 1 1/2-inch-wide necking trim from 1-by stock, first rounding over both the top and bottom edges. By lowering the 3/8-inch-diameter round-over bit slightly, I was able to make a subtle shoulder cut on the top and bottom edge of the necking as I rounded it over **(9)**.

INSTALLATION

Installing this prefabricated mantel on the jobsite was super easy. First, I made a pair of cleats out of 5/4-inch stock sized to fit inside each pilaster while offering a little room both side-to-side and up-and-down for adjustment. After determining exactly where the mantel needed to be located on the wall, I attached the cleats to the wall framing with construction adhesive and finish nails.

Next, I checked to see if the floor was level. When it isn't, I start by setting the pilaster on the high side first, holding it up off the floor with an appropriate spacer if the finish material in front of the fireplace has yet to be installed. Then I set a long level on top of the mantel shelf and shim up the low side (if there is one).

Finally, I simply nailed through each side of the pilasters into each cleat with a 15-gauge finish nailer **(10)**, before turning the mantel over to the painters for final finishing.

Gary Striegler, a JLC contributing editor, owns Craftsman Builders (craftsmanbuildersnwa.com), in Fayetteville, Ark., and teaches workshops at the Marc Adams School of Woodworking. Follow him on Instagram: @craftsmanbuilders.

Working Efficiently in the Time of COVID

A remodeler looks back on a year working around housebound clients

BY MIKE WHALEN

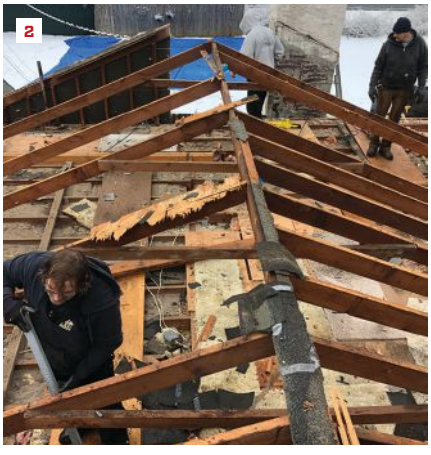
I'm a project manager and lead carpenter for DBS Remodel, a residential remodeling company based in Poughkeepsie, N.Y. We're a midsized design-build firm with 17 full-time employees, most of whom have been with the company for 10 to 25 years (I have been with DBS for 18 years). We're a close-knit group with a reputation in our community as quality remodelers who meet challenges head on. But nothing in our past work experience could have helped us prepare for the nerve-wracking events of last March when the state of New York shut down all "non-essential" construction due to the coronavirus.

Like many in our profession, our company had to furlough all its employees at the beginning of the pandemic. Undaunted, we stayed connected via group chats and Zoom while under stay-at-home orders and began to plan how to weather the crisis. Our company president assembled a "COVID Care Team" tasked with researching and developing COVID safety protocols in preparation for re-opening (see "Developing COVID-19 Safety Protocols," pages 44 and 45).

By mid-May 2020, the state of New York reclassified residential remodelers as "essential" workers, albeit allowing only one worker per jobsite, and we began to make our way back to our jobsites. Crew size without limitations was soon allowed, provided we follow on-site COVID safety protocols. Our office managed to incrementally attain half-staff levels by following its own set of COVID rules, while office personnel who can work from home still do so.

Managing projects during a pandemic. We've been fortunate to maintain a consistent volume of kitchen and bath remodels over

Photos by Mike Whalen; graphics by DBS Remodel



The house before a pop-up addition was built **(1)**. Working outside over existing living space in winter and maintaining 6-foot social distancing, carpenters removed existing roof framing **(2)**, while electrical subs working closer together wore masks rewiring ceiling lights **(3)**. The home was tented off as necessary **(4)**. Demo began on a Monday and the new pop-up addition **(5)** was shingled by Saturday afternoon. Access to the second-level work area was by ladder only at this stage.

the years, along with a few basement conversion projects and home additions. When "non-essential" construction initially shut down due to the virus, we worried about the possibility that clients may not want us back in their homes for weeks, months, or even years.

Quite the opposite occurred, and the pandemic ended up creating a residential building and real estate boom in our area; we've had a higher volume of work than in previous years, with sales remaining strong. But, along with the record-breaking demand, some scheduling "head winds" unique to the pandemic and our remodeling niche have occurred.

Early into the pandemic, a new duty for our project managers was to explain to our trade partners and visitors the company's COVID safety protocols and enforce them (which included taking temperatures and making sure everyone was wearing masks and washing their hands regularly). We also had to be diligent about separating our work areas from the clients who were isolating in place, using plastic, Zip poles, and tape. Access to work areas was kept to a minimum with signage noting that they were "COVID Clean Zones." This additional COVID gatekeeping added time to our schedules, but more impactful was having to plan around trade partners who had to self-quarantine (typically for 10 days) either because they came in contact with people with the virus or they had traveled.

Also, in an effort to anticipate possible scheduling backups, we scheduled our project preconstruction meetings at least a month ahead of mobilizing on site (pre-pandemic, we typically scheduled them two weeks in advance). Lead times on materials such as windows, doors, and cabinets were long as well as replacement times for any damaged or mis-shipped items (though lead times are starting to show signs of getting better). Material shortages driven by demand and supply-chain issues became enough of a problem that we had to improvise our material selection to meet schedules. On more than one occasion, we had to purchase longer 2-by stock and cut it down to length because shorter length material wasn't available, and we had to run to Home Depot to pick up slightly lesser-grade interior doors—with client approval—because of delays from our usual vendors. We did not like the inefficiency and the potential waste this presented,

Developing COVID-19 Safety Protocols

At the end of March 2020, our company president called a team meeting via Zoom to begin to researching and developing COVID safety protocols. We formed a "COVID Care Team" with a goal of becoming "COVID Clean" on site and in the office. Each member of the team was assigned different research areas, such as tracking quickly changing state requirements, developing lists of safety precautions we would need to take to resume working in clients' homes again, and brainstorming ideas on where to allocate cleaning and isolating-barrier supplies needed to re-open.

A human resources firm we had fortuitously hired a couple of months before the pandemic provided us a wealth of literature on COVID-19 regarding prevention, safety, and legal aspects of opening up our business (a serious concern at the time was that businesses could be fined up to $10,000 per safety protocol violation).

Within weeks, we had assembled our "DBS COVID Care Manual," a 42-page document comprising New York State health and safety guidelines and office and field procedures, which we fine-tuned to our remodeling business (see "Field Procedures for Interior Renovating" excerpt on facing page). The manual served as a training resource for our workers and trade partners, and though it wasn't required in the field by law, we could easily access the document on our phones via our Buildertrend app if we needed to refer to it.

Looking to the future, jobsite procedures learned from this crisis, such as hand-washing stations and portable toilets, both with hand sanitizer, will be adopted post-pandemic. Using the homeowner's facilities will no longer be an option—*M.W.*

Wearing masks emblazoned with the company logo, members of the COVID Care Team (top left) helped develop the "DBS COVID Care Manual" (partial cover, bottom left). The manual served as a training resource for DBS workers and trade partners. Flyers with condensed information from the manual (above right) were handed out to the homeowners.

Developing COVID-19 Safety Protocols

The following is an excerpt of the author's company "DBS COVID Care Manual."

Field Procedures for Interior Renovating:

1. Create a barrier of the immediate work area using plastic, Zip poles, tape, etc. It will be the judgment of the individual working in this area to determine whether the use of an air scrubber will be safe and efficient.
2. No one will enter this barriered area without a face covering. If more than one person is in this area, it will be the responsibility of the individuals working to wear face coverings. Additionally, communicate with the homeowner whether a face covering is necessary when in the barriered workspace.
3. It will be the responsibility of that individual in that work area to determine if the use of gloves is necessary based on safety issues.
4. When exiting the work area, either to gather materials or tools, or for bathroom use, a face covering shall be worn until the individual has safely exited the home. The same applies for entry or re-entry to the work zone.
5. At the beginning and end of each day, any doorknobs, railings, hard surfaces, etc. that are touched to gain entry to the work area will be disinfected by the individual working in that space.
6. At the end of each day, the immediate work area shall be disinfected including hard surfaces, tools/equipment left in the area, and the air within the workspace.
7. Once this area is disinfected, a "No entry COVID Clean Zone" sign will be posted outside the space. If a homeowner is allowed to enter this area (after work hours), it will be the responsibility of the homeowner to follow the same protocol that has been put in place by DBS Remodel. The sign can be posted during the course of the workday to remind the homeowner of the DBS protocol listed above.

All trade affiliates will have the responsibility to:

1. Come to DBS jobsites in good health and deem themselves safe to work.
2. Abide by the DBS protocol on the jobsite for any interior/exterior operations, and for the privilege to use and clean the DBS supplied portable toilet.
3. Respect any DBS employee as we would respect you. If you are asked to leave a jobsite due to suspicion of your current health condition, you do so in a respectful, businesslike manner.
4. Respectfully abide by a heeded warning if it is deemed that you have violated the DBS protocol. If any violation were to continue, you may be asked to leave the jobsite.
5. Wear a face covering for any interior meetings that take place between yourself and the homeowner or any DBS employee. It will be your responsibility to provide your own face covering.

A hand-washing station complete with hand soap, rinse water in a sprayer, paper towels, and hand sanitizer is currently mandatory on all jobsites (and will be after the pandemic, per company policy).

An example of the laminated COVID safety signage prominently placed around the jobsite.

An air scrubber helped keep workspace air separate from a client's living area **(6)**. Inside, electrical subs working in close proximity wore masks **(7)**, while a plumbing sub working alone wore a mask though it wasn't required **(8)**. A "COVID Clean Zone" sign **(9)** was placed at the only interior access **(10)** to a new-master-suite work area. The completed pop-up addition **(11)**.

but competition with larger builders for materials at the time left us with little choice.

Housebound clients. Since returning to work last May, I've run seven remodeling projects: a few bathrooms, a kitchen, a basement conversion project, and a pop-up addition. Our crew and trade partners were easily able to isolate from the homeowners on the basement and addition projects, but the interior kitchen and bath remodels were a little more intimate. On the kitchen project, the homeowners were an older couple, so we were careful to follow our COVID-19 safety protocols to a T. We were diligent about wearing masks all the time, maintaining the ZipWall barrier, keeping the number of workers and visits to a minimum, and using an air scrubber for both dust control and to create negative pressure in an effort to keep air in the workspace separate from the clients' living area.

With the pop-up addition (shown in the photos on page 43 and above), we were able to slightly ease up on the safety protocols because the work area was separated from where the homeowners were. We had to build over existing living space, taking the roof off the lower single-story part of the house and adding a new second floor for a master bedroom suite. The job scope also included upgrading the existing electrical service, so we needed to schedule disconnecting power with the homeowners, who, along with their school-age children, were working remotely online.

Learning from the crisis. With vaccinations rolling out, the pandemic appears to be showing signs of waning. In our region, there has been a huge cultural shift with regard to people working from home and moving out of the New York City metropolitan area. This hit home for me when a client we just completed a remodeling project for was told that their offices would be permanently closing and that "this is your life, you're working remotely from home from now on." This may be the new normal—or a hybrid of this and the pre-pandemic "normal." Regardless, we intend to adopt new procedures learned from this crisis to keep our company vital and thriving.

Mike Whalen is a project manager at DBS Remodel, a design-build residential remodeling company based in Poughkeepsie, N.Y.

BY VINCENT SALANDRO

1. Design-Forward Wall Panels

As its name suggests, Wilsonart's Wetwall Water-Proof Wall Panel System is suited for wet-area applications, such as shower walls and bath surrounds. The lightweight tongue-and-groove panels can be installed over gypsum board, green board, and fiber board, with an average installation time of 2 1/2 hours. The resulting grout-free surface is easy to clean, according to Wilsonart. Panels are available in 15 designs. wetwall.com

2. Steel-Alternative Rebar

GatorBar Glass is a glass-fiber-reinforced composite rebar manufactured by Neuvokas Corp. Compared with steel, says the manufacturer, GatorBar Glass is two to four times stronger in tensile strength and seven times lighter in weight and won't rust, even in high-chloride concrete and highly corrosive applications. The manufacturer also claims GatorBar offers contractors better price stability than steel alternatives do. Contact Neuvokas Corp. for a quote. neuvokascorp.com

3. Flexible Engineered-Wood Forms

Designed for use in flatwork concrete forming applications, LP ArchForm Concrete Edge Forms from LP Building Solutions are made of engineered wood strands and faced with a resin-saturated overlay to resist moisture. According to LP, the lightweight 5/16-inch-by-12-inch-by-16-foot forms are well-suited to radius-forming and are flexible enough to curve around the contours of formed concrete projects such as patios, walkways, and pool decks. Contact a local distributor for pricing. lpcorp.com

4. Smart Air Cleaner

General Tools' Floor Air Filtration System automatically turns on when its infrared sensor identifies particles in the air as small as 1 micron, and then adjusts fan speed depending on the number of particles sensed. The unit has a replaceable interior filter—an LCD screen indicates when to change it—and a washable outer filter. A remote control (included) can be used to manually control the three-speed fan, and casters make the unit easy to move between and around jobsites. It's listed on the company's website for $600. Optional activated carbon and HEPA filters are available. generaltoolsusa.com

5. Heavy-Duty Job Storage
Crescent Tools' Jobox Site-Vault piano boxes and chests feature an upgraded three-point locking system. Boxes offer a chamfered lid, shelves rated for 1,000 pounds, and a built-in sidewall storage bin for frequently used items. A gas spring makes the lid easier to open and prevents it from slamming shut. The seven piano-box options range from 48 to 74 inches long and from 39 to 64 inches tall. MSRP for the 42-inch Heavy-Duty Chest (pictured) is $635. crescenttool.com

6. Self-Cleaning Coating
Sto Corp.'s iQ Technology Coatings, including StoColor Lotusan (pictured), StoColor Climasan, and StoColor Dryonic, reportedly help protect against environmental degradation. According to the manufacturer, StoColor Lotusan creates a microtextured and hydrophobic surface that has only a small contact area for dirt and water—allowing dirt to be easily carried away by rain—and that protects facades from algae and fungi. According to the manufacturer, Sto iQ Technology coatings also protect against air pollution, temperature damage, and UV-light damage. Pricing varies. stocorp.com

7. Self-Adhered Drainable WRB
Benjamin Obdyke's HydroGap SA self-adhered drainable weather-resistive barrier has a continuous acrylic adhesive that seals around fasteners and penetrations, while 1mm spacers create a drainage path for bulk water. Benjamin Obdyke says the adhesive also contributes to tear resistance and diminishes the chance for ballooning and blow-off. The new WRB has a perm rating of 12, is UV-resistant for 120 days, and comes in 80-foot rolls. Contact local distributor for pricing. benjaminobdyke.com

8. Antibacterial, Air-Purifying Paint
Living Well paint from Sherwin-Williams features two new interior options: SuperPaint with Sanitizing Technology and SuperPaint with Air Purifying Technology. Both varieties provide long-lasting color and don't require special tools to apply, according to the manufacturer. SuperPaint with Sanitizing Technology contains antibacterial properties active for up to four years, while SuperPaint with Air Purifying Technology is designed to reduce ambient odors and VOCs. Pricing for both SuperPaint varieties starts at approximately $65 per gallon. sherwin-williams.com

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9. Airtight Vent Hood

Deflecto's 4-inch Galvanized Steel Vent Hood, Pipe, and Collar is suitable for venting a dryer or a bathroom fan. Made from steel to protect against corrosion, the fireproof ventilation accessory has a positive-action damper to improve efficiency and help keep cold air and rain from entering a home, according to Deflecto. We found it online for between $6 and $10. deflecto.com

10. Concrete Screw Anchors

Redesigned Tapcon concrete screw anchors are available with a star flat head and a hex head. The star-head recess eliminates bit slip during installation by providing six points of contact between the bit and the anchor. The hex-head screw anchors feature new ribs under the head that resist anchor spinouts and head snaps during installation, according to Tapcon. Both screws have a corrosion-resistant coating. The screws are available in 3/16- and 1/4-inch diameters and in lengths from 1 1/4 to 4 inches. Online, a 75-pack of 1/4-in. x 2 1/4-in. star flat-head anchors with bit runs about $22. tapcon.com

11. Shake and Slate Metal Roofing

ProVia's metal shake and slate roofing panels are 10% thicker than the industry average while weighing up to three times less than asphalt shingles. According to the manufacturer, the panels, which have a durable and fade- and chalk-resistant finish, are designed to withstand extreme weather conditions, meeting or exceeding ASTM and UL industry standards for resistance to corrosion, wind-driven rain, impact, and wind uplift up to 180 mph. Pricing varies based on project and region. provia.com

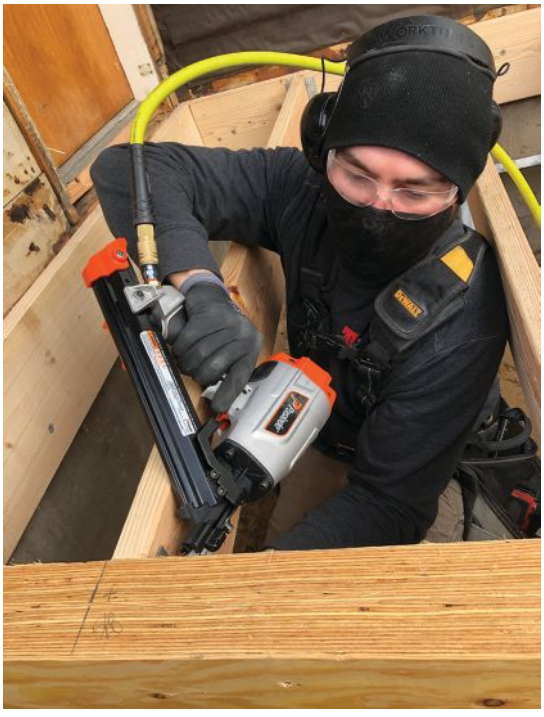
12. Hands-Free Faucet

Toto's Touchless Smart-Sensor Faucets are available in many of the manufacturer's spout styles, including the GE, GC (pictured), GM, Libella, Gooseneck, Axiom, Helix, and Standard. The touchless faucets feature Toto's Ecopower platform, which harnesses the energy of running water to power the faucets. The hands-free faucets replenish their charge with every use, and no minimum daily usage is required, translating to reduced electricity use, lower maintenance costs, and better ecology, according to the manufacturer. The faucets are also available with an electrical platform. Pricing varies based on faucet collection. toto.com

JLC

JLC Update: the source for information to help pros improve job performance—including hands-on job tips about the best materials and techniques, industry news and product trends. Sign up now at **jlconline.com**.

hanleywood



With its compact one-strip magazine, the Paslode P150S-PP nailer fits easily between joists. The gun is designed to be used with 1 1/2-inch metal-connector nails, guided by a probe tip.

Photos: top, Ian Schwandt; bottom, courtesy ITW

Compact Metal Connector Nailer

BY IAN SCHWANDT

I am sure that I am not the only carpenter with "fond" memories of being an apprentice and beating my fingers up while hand nailing joist hangers and hurricane clips. That said, positive placement metal connector (PP-MC) nail guns are still an unsung hero of the framing nail-gun category. With the bulk of my career being spent on interior finish and commercial jobsites, a PP-MC was never a tool that found its way to my kit, until I decided to build my own house.

Enter the new Paslode F150S-PP pneumatic nail gun. The metal-connector takeoff on my house numbers in excess of 200; at an average of eight nails per connector, that's a lot of nails and a lot of work. The Paslode F150S-PP shoots only 1 1/2-in. x .131-in. and 1 1/2-in. x .148-in. brite or mechanically galvanized nails, but this spec satisfied 90% of my connector fastening scope. For the remaining metal connectors, joist hangers on my deck, I used both screws and Paslode's F250S-PP nail gun, which shoots 2 1/2-in. x .162-in. nails as well as the 1 1/2-inch nails shot by the F150S-PP.

In addition to shooting into traditional framing lumber, we used the F150S-PP on LSL framing lumber, LVLs, and the new PT-LVL from PWT. From a power standpoint, the F150S-PP performed solidly, only occasionally requiring us to pull out a hammer to set a proud nail. Over a few weeks of testing, the gun never jammed and the new nose design gave all of the users, including my wife and father, confidence that the gun was placed correctly before pulling the trigger. My wife, who is no stranger to the jobsite, commented that the F150S-PP was the nail gun that she felt most comfortable using thanks to its balanced feel, which is the result of its light weight (6 lb. 4 oz.) and small size (11 5/8 inches across the head). Paslode does offer a magazine extension that increases the capacity from one clip of nails to two. While my gun wasn't equipped with this option, there were times I wished it had been, especially when I was nailing off hangers from scaffolding.

At about $340, the F150S-PP and F250S-PP have similar price tags, and for some, that would make the bigger F250S-PP the obvious choice. However, if you are not a production framer or deck builder, the availability of other fastening options for the 2 1/2-inch metal-connector requirements of joist hangers, coupled with the light weight and well-balanced (yet powerful) specs of the 150S-PP, makes it a good option for remodelers, DIYers, and general contractors. paslode.com

Ian Schwandt is the project developer for TDS Custom Construction in Madison, Wis., and is building his own high-performance house in Dodge County, Wis.

Battery-Powered Jobsite Power Supply

BY TIM UHLER

Our jobsite has changed so much in the past few years. In addition to completely switching from corded to cordless power tools, we recently started using a jobsite tablet for blueprints, email, safety documentation, and manufacturer spec sheets. All of us on the crew use smartphones and I record a lot of content for YouTube and Instagram, so we need to be able to easily and quickly charge and recharge our portable electronic devices on the jobsite.

Milwaukee recently released its M18 Top-Off 175-Watt Power Supply, which we've been using for two months. Is it worth spending $100 on? Spoiler alert: I just bought one and will probably buy another one soon.

What makes this little glorified battery charger so great? Well, in addition to being superportable (it's powered by an M18 battery), it features a USB-C port, a USB-A port, and an AC 120-volt outlet. I can use all three simultaneously if I need to. The 45-watt USB-C PD port is also superfast (my phone says "supercharging" when plugged into it). The charger works with all my M18 batteries and has a hook, so I can hang it off framing.

I have taken this little unit on camping trips to recharge portable lights, phones, Kindles, tablets, a GoPro, and a Sony A7III camera. I have even used it to power the Sony to shoot a class for the International Builders' Show on a jobsite. In addition, I can power my laptop with it. This is one of those products that makes sense for work and carries over to vacation and even power outages. milwaukeetool.com

Tim Uhler is a lead carpenter for Pioneer Builders in Port Orchard, Wash., and a contributing editor to JLC. Follow him on Instagram at @awesome framers, subscribe to his YouTube channel, or visit his website, awesomeframers.com.

You can plug an M18 battery into Milwaukee's Top-Off power supply to recharge cellphones and other devices.

The Dalluge Da Bar is a tough nail puller with flat claws that can slip easily under trim without damaging it.

A Better Nail Puller

There is an art to pulling nails. You know how I got so good at it? Yep, lots of practice. My first nail puller was the same one everyone else on my crew was using at the time, and it was so awful, it made me hate pulling nails with a passion. It was a major upgrade when we started using Shark's Japanese-style nail pullers, which worked well for us for many years. But about four years ago, I started breaking them. I think I went through three of them that year; previous to that, I had used the same one for a decade. Meanwhile, one of the guys on the crew tried the Dalluge Da Bar 12-inch nail puller and kept telling me to try it. Still, I was stubborn, and only bought my own to try out after I broke two more Shark bars.

It turned out to be simply the best nail puller I've ever used, and not only because it hasn't broken after more than two years of use. What makes it great is that this Japanese-made bar has thinner, flatter claws that get under the nail head with less gouging. I'm told that they're great for removing trim, but even pulling nails out of a joist hanger—while not fun—is much easier with this bar. We bought a few extra ones from the lumberyard for $15 each, which feels like a pretty good deal. I realized recently that I think I use my hammer to strike this bar more often than I use it to drive nails. I'm not sure what that says about me as a framer ... actually, I do know: It means I make too many mistakes. vaughanmfg.com —*T.U.*

Photos: Tim Uhler

Advertising Index

Classifieds

BY CLAYTON DEKORNE

From Poland With Love

Over the past year, the pandemic had been for me a tragedy played out only at a distance. But this changed dramatically in January when my father-in-law, who lives in Wrocław, Poland, was admitted to the ICU in critical condition with COVID-19. Shortly after, in early February, we pressed pause on life in the U.S. and boarded a plane; my wife, Ola, had to be home.

Her father, Andrzej Zybura, is a former ship captain with a burly stature and powerful presence. I have to look up to address him, but he is not intimidating; he is one of those humans of radiant warmth who instantly draw you in close to explain, teach, reassure, and inspire. It is this nature, I imagine, that makes him so successful on the building projects he is constantly at work on in his "retirement."

He is something of a master of building logistics—an expediter on projects that have to be done "without compromise." He strategically inserts himself into a project to train the installers, talk with suppliers, and smooth over changes with the architect, the city inspectors, the utility companies—whoever needs to be involved to make sure the changes he sees that need to be done, do get done, all while keeping the job on time and on budget. He does this for hire for friends, for referrals from friends and relatives, and for contractors who fall behind and eventually get referred to Andrzej, who, if he takes the job, becomes their friend.

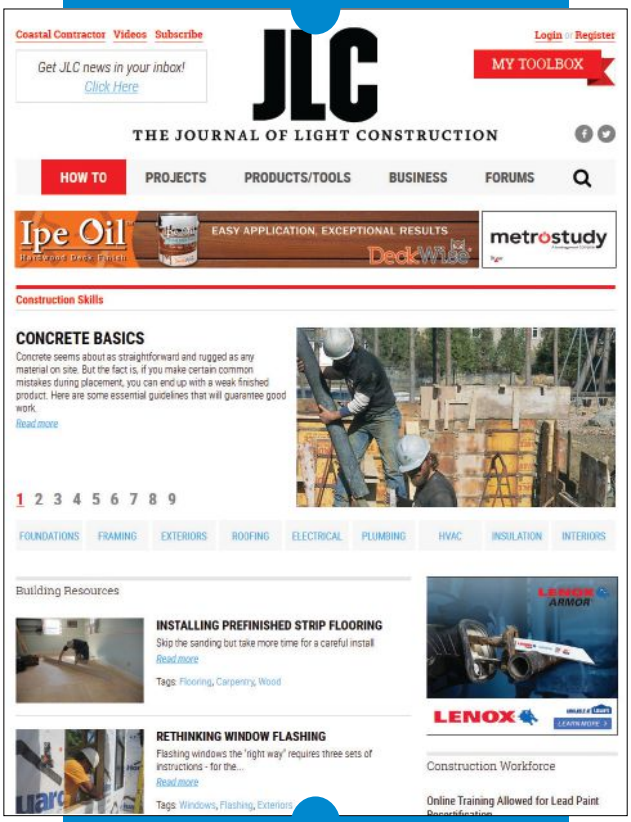
As I walk the neighborhoods near Ola's family home, I think a lot about Andrzej. You don't see cheap houses here. They are standard middle-class homes—a few from the 1500s and following centuries, but the majority from the 1920s and 1930s. Unlike most other neighborhoods of the city, this area survived the 1945 siege by Soviet artillery forces trying to rout the Nazis who had occupied the city since 1939 and were making Breslau, as they called it, their last stand in Europe. Even the newest homes built after the war weren't thrown up quickly. They were built to the same pattern that homes had been built in Poland since the Middle Ages—with thick masonry walls, deep inset windows, steep tile roofs, and wide overhangs. Every roof has wide steel or copper gutters and downspouts that connect to storm drains.

Modern changes have been made, though: High-efficiency gas boilers for hydronic heat are ubiquitous. Nearly every window I see is triple-glazed. The exteriors now have 4 to 6 inches of continuous insulation covered with traditional stucco. There is a quiet resilience to these homes, and as I walk, admiring them, I think about Andrzej, praying that he too endures to see them again.

Photos by Clayton DeKorne

Some common building details on homes in Wrocław ensure durability and energy performance: wide, powder-coated steel gutters **(1)** that connect to storm drains; R-20 to R-30 continuous exterior insulation clad with traditional stucco; the generous overhang and let-in drip edge of a stone windowsill **(2)**; triple-pane, tilt-and-turn windows situated mid-wall **(3)**.

JLC



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