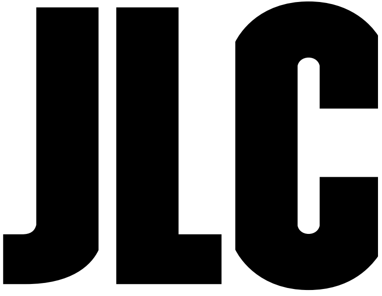

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Framing a Half-Round Porch

Air-Sealing Party Walls

Strengthening Load Paths

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On the cover: Justin Cline, of Eldon Builders in Cape May, N.J., tacks joists in place for a two-story porch supported by radiused steel I-beams and steel columns. Photo by Nate Eldon. See the story on page 36.

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THE JOURNAL OF LIGHT CONSTRUCTION (ISSN 1056-828X), Volume 37, Number 7, is published monthly by Hanley Wood, 1152 15th St. NW, Suite 750, Washington, DC 20005. Annual subscription rate for qualified readers in the construction trades: $39.95; nonqualified annual subscription rate: $59.95. Frequency of all magazines subject to change without notice. Double issues may be published, which count as 2 issues. Publisher reserves the right to determine recipient qualification. Copyright 2019 by Hanley Wood. All rights reserved. Canada Post Registration #40612608/G.S.T. number: R-120931738. Canadian return address: IMEX, PO Box 25542, London, ON N6C 6B2. Periodicals postage paid at Washington, DC, and at additional mailing offices. POSTMASTER: Send address changes to JLC, Box 3530 Northbrook IL 60065-3530.

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BY JLC STAFF

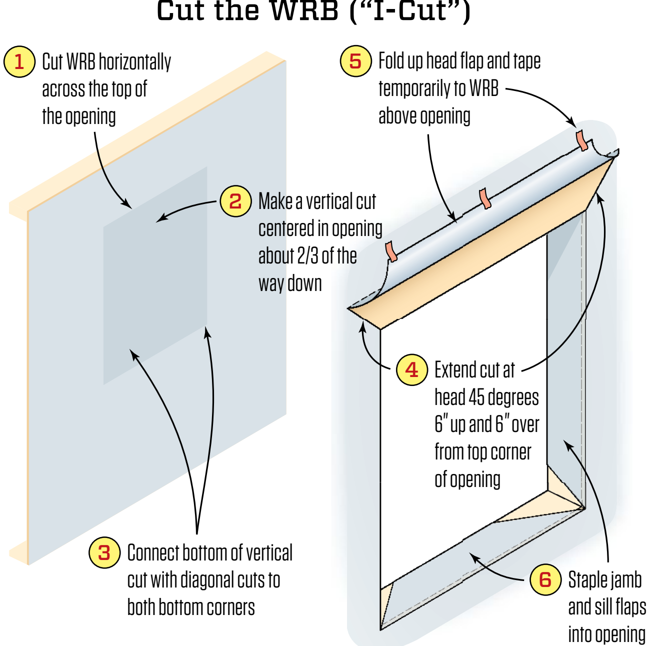
Installing Flanged Windows

After framing and roofing, there is no step more basic to building a house than installing windows. Most windows today have an integral attachment flange, so this article will focus on that type of window. In 2016, *JLC* published two articles by Gene Summy, a contractor and building inspector from Laguna Niguel, Calif., that addressed two different approaches to installing flanged windows (see "Installing Flanged Windows: Two Strategies Compared," Jan/16, and "Installing Flanged Windows Part 2," Apr/16). Those articles contain much greater detail about subsequent sealing and testing, and we encourage folks to read them for more information. Our goal here is to present streamlined versions of the two strategies side by side for readers to evaluate and choose between.

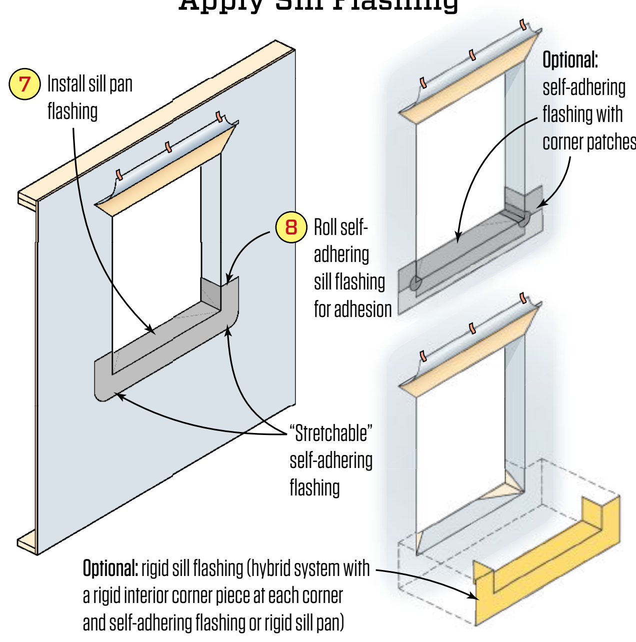
Both installation methods depend on a combination of self-adhered flashing tape (SAF) and sealant. SAF comes in many different configurations from many different manufacturers. Regardless of the type of SAF that is used, the installer should always go over the tape with a J-roller or similar tool to ensure full adhesion.

Properly applied sealant also plays an indispensable role in window installation, and selecting the right sealant is important. Window manufacturers use a variety of materials for the window cladding and flanges, and some sealants may not be compatible with certain windows. Always follow the manufacturer's specific sealant recommendations to avoid an adverse reaction between the sealant and the flange material.

Cut the WRB ("I-Cut")



Apply Sill Flashing



Both installation strategies covered here begin with proper preparation of the framed opening. Follow the steps to cut back the WRB and to flash the sill of the rough opening. Different materials and products are available to ensure a watertight sill.

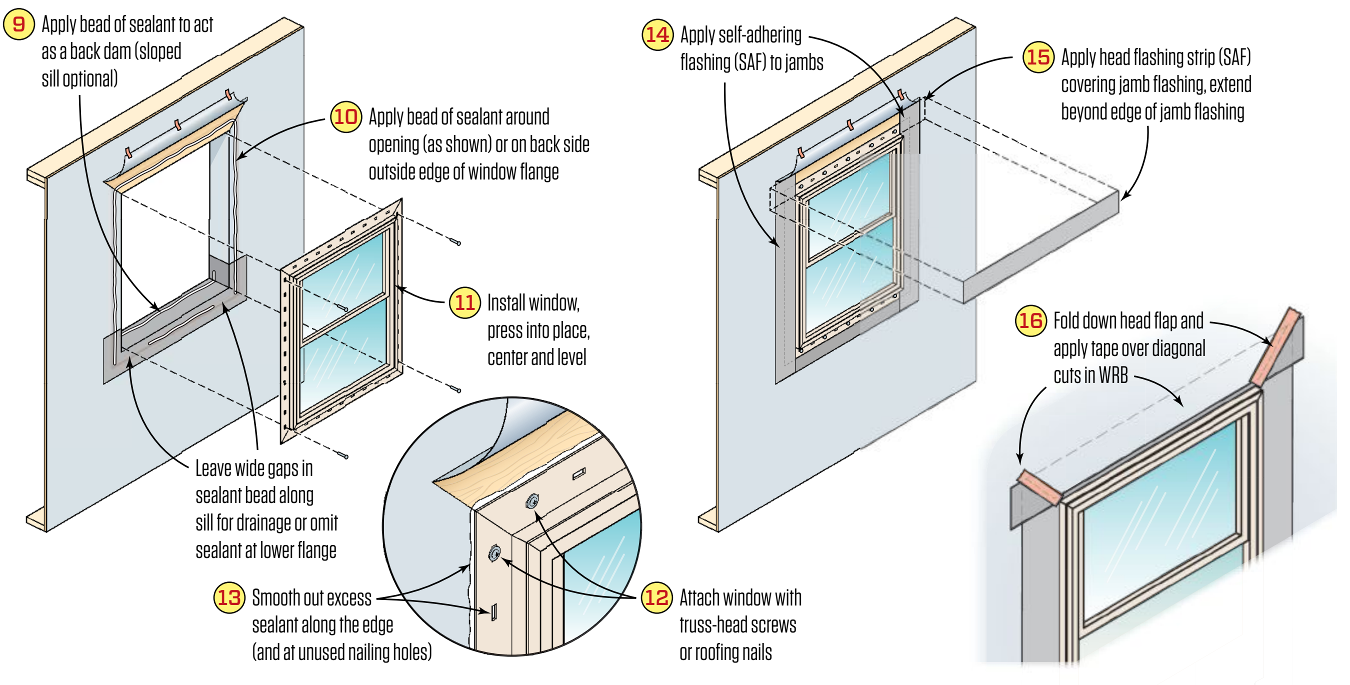
Illustrations by Tim Healey; photos by Gene Summy

For a more detailed discussion of installing flanged windows, go to **www.jlconline.com/training-the-trades/installing-flanged-windows**.

Method 1: Flashing Strips Installed Over Nailing Flanges

Install Window

Apply Jamb and Head Flashing

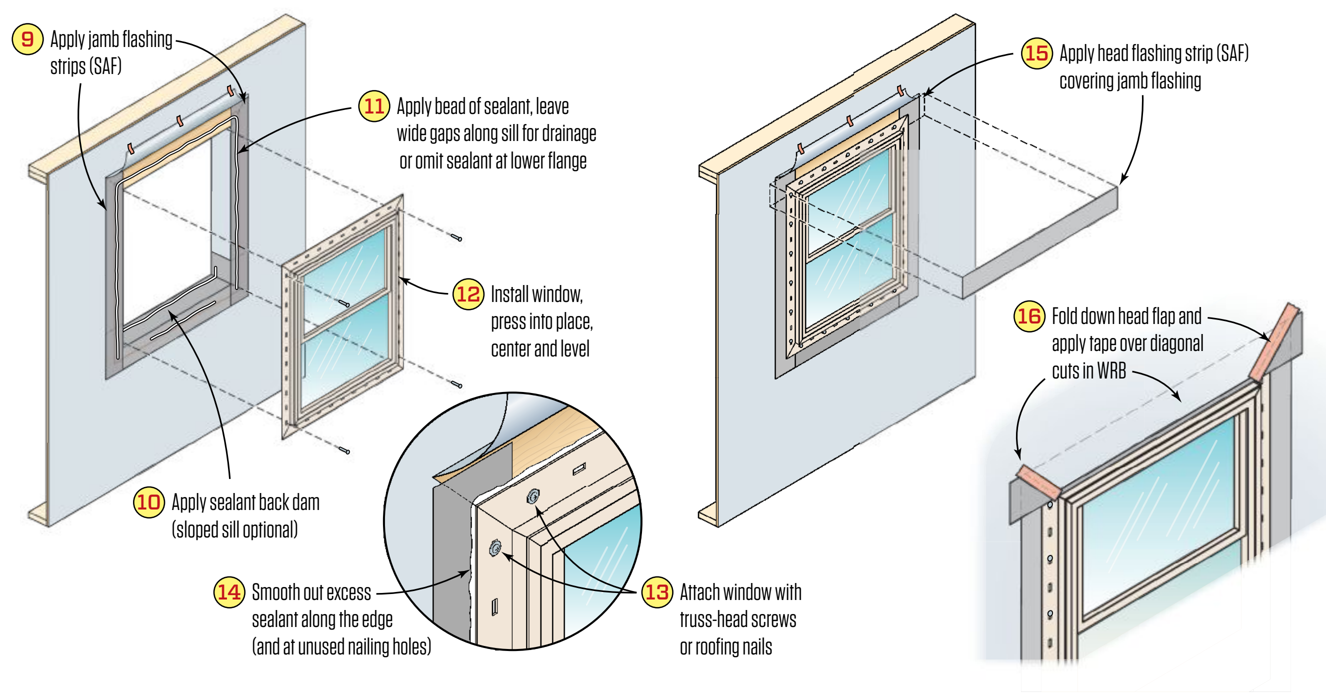


Illustrations based on AAMA 2400-10 (Method A-1)

Method 1 (above) is usually associated with East Coast installers. After prepping the opening, the installer applies a bead of sealant either to the back of the outside edge of the window flange or directly on top of the WRB, leaving wide drainage gaps along the bottom edge. If the latter strategy is chosen, it helps to first dry fit the window and draw a line around the perimeter of the window flange. The bead of sealant should go just inside that line. Press the window into place and make sure it is level and square, fasten the corners with truss-head screws or roofing nails, and confirm that the window operates properly. Drive fasteners in the remaining holes and smooth out excess sealant that has oozed from the flange. When sealant has cured, apply SAF to the sides of the window and then across the top of the window. Next, fold the WRB flap down and seal the corners. The advantage to this method is that the SAF seals directly to the window flange so you aren't depending on sealant alone to keep water out.

Rolling SAF is a must. To ensure proper adhesion and to eliminate wrinkles, use a J-roller to apply adequate pressure to the SAF (see photo, left).

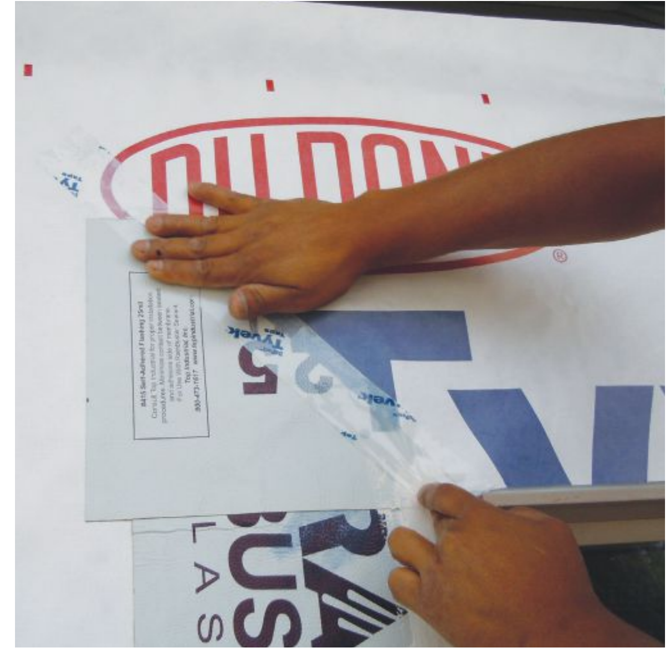
Method 2: Nailing Flange Installed Over Flashing



Illustrations based on AAMA 2400-10 (Method B-1)

Method 2 (above) is usually associated with West Coast installers. After prepping the opening, the installer applies SAF to both sides of the opening, and a bead of sealant either to the back of the outside edge of the window flange or directly on top of the SAF. If you're applying caulk to the SAF, it helps to first dry fit the window and draw a line around the perimeter of the window flange; the bead of sealant should go just inside that line. Remember to leave wide gaps along the bottom. Press the window into place and make sure it is level and square, fasten the corners with truss-head screws or roofing nails, and confirm that the window operates properly. Drive fasteners in the remaining holes and smooth out excess sealant that has oozed from the flange. When sealant has cured, apply SAF across the top of the window. Then fold the WRB flap down and seal the corners. The advantage to this method is that it allows for quick inspection of the sealant coverage without disturbing the SAF should a leak be discovered.

Sealing the WRB. With both strategies, the WRB head flap folds down over the SAF at the head of the window. Flashing tape seals the flap to the head flashing (see photo, right).



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Q With the recent upsurge of wildfires, should we be worried about putting asphalt shingles on homes in vulnerable areas?

A Steve Quarles, advisor emeritus at the University of California Cooperative Extension, responds: You should not be worried about putting asphalt shingles on a roof located in a wildfire-prone area if those shingles have a Class A fire rating. Asphalt shingles can have different compositions, and when installed properly, fiberglass composition shingle roof coverings comply with the provisions required for a Class A roof covering.

The Class A rating is specified in the ASTM Standard Test Method E-108, which evaluates the fire rating of a roof covering and has three parts. The first part evaluates flame spread over the roofing material **(1)**. The second part evaluates the ability of a roof covering to resist flames on top of the covering from burning through it and other components (such as sheathing and underlayment) in the roof assembly and entering into what would be your attic or ceiling space **(2)**. The final part of the test evaluates the roof covering's ability to resist generating embers, also known as firebrands, that can become airborne and spread a fire. With asphalt shingles, there are combustible components (namely the asphalt), but the noncombustible components (fiberglass and granules) provide the performance sufficient to comply with the provisions of the test **(3)**.

It is important to point out that this test specifically evaluates the roofing material and does not evaluate the vulnerability of the roof where it intersects with other surfaces or materials, such as where a roof plane meets a wall above, or at the eaves where the roof meets the gutter. In these cases, the adjoining surface could be the vulnerable component of the roof system.

Class A asphalt shingles are available in most parts of the country, and prices vary depending on the type you choose. Regardless of the type of roof you install, it must be kept in good condition and free of combustible debris **(4)**. For a closer look at the interaction between buildings and wildfires, see *Home Survival in Wildfire-Prone Areas: Building Materials and Design Considerations* (University of California Davis, Agriculture and Natural Resources), https://anrcatalog.ucanr.edu/pdf/8393.pdf.

The first two parts of the ASTM test of roofing evaluate flame spread **(1)** and penetration of the roofing assembly **(2)**. These roofing remains are from a home destroyed in the Camp Fire **(3)**. Debris piled up where combustible siding meets a roof can make a home vulnerable to wildfires **(4)**.

Photos by Steve Quarles

Q I've seen can lights installed in the ceilings of covered porches, but does the code let us install them in the 12-inch soffit in the eaves of a house?

A Glenn Mathewson, a code educator and consultant from Colorado (buildingcodecollege.com), responds: The International Code Council (ICC) publishes the IRC, but it doesn't manage the development of the electrical provisions. Those provisions are republished with permission of the National Fire Protection Association from its document, the National Electrical Code, or NFPA 70.

The eaves of a house would be considered a wet location, and sections 4003.9 and 4003.10 require luminaries (lighting fixtures) that are installed in wet locations to be listed and labeled for use in wet locations. Those fixtures must be installed in a manner so that water cannot enter the wiring compartment. (A can light in a shower is a good example of a wet-location luminary.) If the correctly rated can light is selected for a location beneath a soffit, these sections of the electrical code should be easily satisfied.

But let's consider what else might be going on at the soffits. In many cases, the soffits might have ventilation openings for ventilating the attic space, and there may be baffles or blocking hiding in the soffit spaces. Or there might not be either of those situations, and the soffit may simply be filled with stray attic insulation. Using an IC (insulation contact) rated can light will eliminate any issues with clearances to combustible materials and insulation. If the can light is not IC-rated, then a 1/2-inch clearance to combustibles and a 3-inch clearance to insulation must be maintained.

As a further note, if you are looking to replace a wall-mounted light next to an exterior door with a down-casting can light in the soffit above the door, be sure to consider any nearby stairs that lead from the entry landing or from the deck or patio at the entry. The wall-mounted light might have been providing the required illumination for the stairs as well as for the door.

An electrical code provision in Chapter 39 requires an exterior light with an interior wall-mounted switch at every exterior door with access to grade (such as the stairs from a deck to the yard). And in Chapter 3, there is a requirement that the top landing of all exterior stairways be provided with an artificial light source. Sometimes one light can serve both functions. There are no required illumination levels for either of these lights.

For doorways, the light provides security and sanity to the occupant opening the door to an unexpected visitor. This explains why a light is not required when there's no grade access. A light at the top of a stairway helps to alert occupants not seeking the stairs that there is a fall hazard.

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A bitumen foundation coating **(1)** will help to prevent water from being absorbed into concrete. But it needs a dimple mat **(2)** in front of it to relieve hydrostatic pressure. The dimples create a space between the soil and the concrete, allowing water to drain freely to footing drains.

Photos: Superpro Coatings (top); Aarow Building (bottom and next page)

Effective Foundation Waterproofing

BY JAKE BRUTON

Here in Columbia, Mo., we have a wet climate, averaging more than 40 inches of rainfall per year, which makes water management a critical concern on all our builds. On the new homes my company builds, we typically build slab-on-grade for simplicity with both water management and thermal efficiency. But for additions on existing homes, and particularly hillside homes, foundation waterproofing is unavoidable.

WATERPROOFING WALLS

The foundation waterproofing system we use is not fancy or expensive, but it works extremely well to fend off water problems. We begin by coating the foundation walls with a regular foundation dampproofing—what is called a "tar coating" around here. The guys put on the full suit, roll or spray the coating on, and use chip brushes to make sure it is worked into all the cracks and crevices on the surface of the concrete.

Bitumen-based dampproofing is a standard, traditional material for foundations, and 15 years ago, that's all you would have gotten. Dampproofing materials have changed over the years. Most are now water-based and not as hazardous for workers, but they still perform similarly. The important thing to understand is that, by itself, this material can't hold back pressure-driven water. Under hydrostatic pressure—the weight of water in the soil next to the foundation—water can be forced through the material. This is particularly true as the material ages, especially if cracks develop over time. The material is somewhat elastic but is limited in its crack-bridging capacity.

To prevent water from penetrating, we cover the foundation walls with a plastic dimple mat. This is typically a high-density polyethylene material that we attach to the wall with Tap-Cons and cap off along the top edge with a profiled plastic cap.

The 3/8- to 1/2-inch dimples keep the mat off the wall, creating a void behind it that allows any water that reaches the foundation to drain to the bottom. The water that finds its way past the mat is not under hydrostatic pressure that will drive it through the wall. The dampproofing is there to prevent the free-draining

When laying down perimeter drains, the author first lays down filter fabric, then embeds the pipe in gravel. Large (1-inch) gravel creates plenty of voids through which water can freely move, but the filter fabric needs to be there so soil won't fill up the voids over time. Note that the holes in the drainpipe face down to limit the volume of water that accumulates at the footing **(3, 4)**.

water from being absorbed into the concrete. Plain, old dampproofing works well in this capacity.

There's no secret here that makes one dimple mat that much better than another. It's simply the void—the air space behind the mat—that provides a clear path all the way down the wall for water to drain. There's no way for water to do anything but drain straight to the bottom.

PERIMETER DRAINAGE

At the bottom of the wall, the dimple mat turns and runs out over the footing where we have a perforated drainpipe. We lay the perimeter drainpipe, with the holes facing down and pitched at least 1/4 inch per foot, over filter fabric. The fabric sits on a layer of 1-inch clean gravel. We then bury the perimeter drainpipe with more clean gravel and wrap the filter fabric over the top. We throw a little more gravel on top of the filter fabric, but this is just to keep the fabric from moving around too much while we backfill.

We install the drainpipe with the holes facing down so the water can be carried away as quickly as possible. As water accumulates in the gravel around the pipe, we want it to spill into the holes in the pipe as soon as possible. If we oriented the pipe with the holes facing up, a lot more water would accumulate around the footing before entering the pipe, and we don't want it to accumulate to that volume.

Using this system, we have confidence that we can manage any water draining through the soil around the home. Of course, it works in conjunction with good grading as well as with gutters or wide overhangs to manage roof runoff. Like every detail on a home, it's all part of a system.

Jake Bruton is the owner of Aarow Building in Columbia, Mo. Follow Aarow Building on YouTube, and follow Jake @jakebrutonlive on Instagram.

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A Built-In Toy-Box Window Seat

BY BARRETT SITES

Recently, one of my customers hired me to add a doghouse dormer to the back of their house to create space in their children's bedroom. After framing and drywalling the new dormer, I suggested adding a window seat. With a piano-hinged lid, the window seat would be a great toy box. At my clients' suggestion, we sized the toy box to be 36 inches deep. Their plan was to add cushions on top so that it would double as a napping spot for the kids.

MDF parts. The simplest plan was to build the seat as a box that would fit inside the dormer walls. This strategy meant that I could fabricate and assemble the box in my shop. Because the project was paint grade and utilitarian, I made all the basic parts (top, bottom, front, back, sides, and divider) from MDF.

I don't own a track saw, so instead I used a length of 1/4-inch aluminum flat stock as a straightedge guide for cutting the pieces **(1)**. To position the straightedge correctly, I first measured the distance from the edge of my circular-saw base to the correct side of the saw blade. That number then became the offset for positioning the guide. I cut all of the larger pieces with my circular saw guided by the straightedge, and cut the smaller pieces on my table saw.

Routing rabbets and dadoes. For strong joints, I rabbeted the corners and dadoed the grooves where the bottom pieces fit between the sides and the divider. I used a router guided by the aluminum straightedge to cut the longer grooves along the front and the back **(2)**. As with the saw, I measured from the edge of the router base to the edge of the bit to determine the offset for positioning the strip.

For the shorter dadoes, I made a router guide out of pieces of MDF. The guide consists of a narrow fence strip that I glued and screwed onto a wider base strip. To position the fence on the base, I marked the offset from the edge of the base strip and then added about 1/8 inch. The extra width let me rout a fresh edge on the base. After routing the edge on the guide, I clamped it in place with the edge aligned with where I wanted the dado. Using a tip I got from Gary Striegler, I clamped the two sides of the box together and routed both at once **(3)**.

The author cut the toy-box parts from a sheet of 3/4-inch MDF, using an aluminum straightedge to guide the saw cuts **(1)**. He used the same straightedge as a router guide for the long dado cuts **(2)**. For shorter dadoes, he made an MDF guide, clamping the sides of the box together to make the dadoes identical **(3)**. The box was then glued and pocket-screwed together **(4)**.

Photos by Barrett Sites

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After installing the MDF box **(5)**, the author used pocket screws to assemble a simple face frame **(6)**; when applied to the front of the box, the frame provides a flat-panel look. The side pieces are reinforced with additional strips of MDF, which act as a stop for the lid **(7)**. The front edges of the side pieces and lid are finished with hardwood bullnose molding **(8, 9)**.

Shop assembly. When all the pieces were cut and grooved, I applied beads of glue to the corner rabbets and attached the sides to the back, clamping the pieces and then driving 1/4-inch crown staples to hold the joint until the glue set. I also attached the divider to the back in a similar fashion.

Then I carefully tipped the assembly on its back to attach the bottom pieces. After making pocket-screw holes along all four sides of the bottom pieces, I lightly sanded the edges so that the bottoms would slip into the dadoes easily. Working one side at a time, I applied glue to the dadoes, spreading it in a thin, even layer. Each bottom piece slid into place evenly, and I pulled the assembly together with a long clamp to make sure the bottom piece was fully engaged in the dadoes. To hold everything together while the glue set, I drove pocket screws into the holes along the sides and back **(4)**.

Installing the toy box. After attaching the front piece to finish the box, I brought everything to the site for installation. The box was slightly narrower than the opening, allowing it to easily slip into place **(5)**. I wanted the face frame to fit tightly to the walls, so I built it on site, joining the pieces of primed poplar together with pocket screws **(6)**. I used 1x4 for the top rail and the stiles and 1x6 for the bottom rail, to match the baseboard used to trim the room.

Adding the top. After gluing and nailing the face frame into place, I turned to the top. First, I installed 3-inch-wide MDF strips on top of the box on each side to space the lid away from the dormer walls. I finished the front edge of these pieces with 3-inch lengths of 5/4 bullnose hardwood strips glued and biscuited to the MDF. The box divider would support the center of the lid, but I wanted to add support along the sides as well in anticipation of kids standing on the lid. So I glued and screwed 3-inch-wide strips of MDF to the underside of the side strips to act as stops **(7)**.

A 6-inch-wide strip of MDF installed between the side strips provides an attachment point for the piano hinge at the back of the toy box. Before installing the MDF lid, I applied the same bullnose trim used on the side pieces to the front edge **(8)**. Once the toy box was assembled, the only things left to do were applying the paint and filling it with toys **(9)**.

Barrett Sites is a remodeling contractor in Chambersburg, Pa.

SUBFLOORS: ADVANTECH® SUBFLOORING VS. OSB VS. PLYWOOD

By: Matt Risinger, Risinger & Co.

When I started out in construction, I was working for a production builder. For many years, like most builders of that era, we used OSB (oriented strand board) subfloor — typically a 3/4-inch tongue and groove panel. There was no real choice in OSB then. It was whatever was available from the lumber supplier and we didn't think a whole lot about it. We used a conventional construction adhesive and nailed off the floor, as that was the fastest method. But we had all kinds of squeaks on the houses we built. I thought that making the transition to screwing down the subfloor would be the answer to my squeak problems, but this didn't help all that much. We still had frequent callbacks for squeaks. We also had a fair amount of edge swelling — an inevitable result of rain during the framing stage before we got the house dried in. That was a pain, too, because the swelling resulted in a wavy, bumpy floor that contributed to the squeak problems. Floor squeaks are the result of wood movement. Either a nail comes loose, or a screw shears off and you have up-and-down movement, or the edges swell and cause gaps beneath the underlayment that allow for creaks. Frequent callbacks did not do a lot for either the builder's reputation or for the bottom line.

Traditional OSB vs. AdvanTech® Panels

Commodity OSB (left stack) starts out at 3/4-inch thick, but after soaking in water, it swells. The AdvanTech® pieces (right stack) soaked in the same amount of water stay dimensionally stable. Typically, the swelling happens at the edges where the cut strands are exposed to rainwater or snow melt that drains down through the gaps at the panel edges of an installed subfloor. Once the edge swells, it does not return to the original panel thickness.

When I was working for a production builder, I didn't really have much say in the purchase of materials, so I wasn't able to change to a different subflooring product. Honestly, at that time, I did not really know there were other options. But when I started building custom homes about 12 years ago, one of the first changes I made was the switch to plywood. It was 1-1/8-inch plywood we should have glued to the framing, but we just nailed it. This provided a nice stiff floor and eliminated my squeak issues. However, on one of my very first houses using plywood, we had a giant downpour during construction when the frame was open. This resulted in a ton of edge swell. Being a custom-built house, I had to fix it by sanding the edges and flattening the floor. The whole time the job was on pause for this to happen all I could think was "OK, I love that I have eliminated squeaks. I love that I have a stronger, stiffer floor. But, man, this edge swell is a pain." (And I hadn't budgeted for the sanding either.)

Matt Risinger, owner of Risinger & Co. and experienced builder who specializes in fine craftsmanship and building science, shares his experiences with high-quality OSB and plywood.

I was looking for something better, but I thought "OSB? I've used that before and had problems. I'm not going back to that!" It was around that time, maybe 10 years ago, that someone suggested I try AdvanTech® subflooring.

I was soon to learn that there's a big difference between AdvanTech® panels and other sub-flooring options. Commodity OSB uses glues and a process that permits the panel to soak up moisture. Most subfloor-grade plywood uses similar glues between the laminations. While plywood gives you a more consistent panel, it is still prone to wicking moisture.

Plywood and OSB manufacturers try to improve this by sealing the panel edges, but the sealant, whether it is a wax or a paint, tends to get scuffed off. Think about how often panels get dragged on their edges across a truck bed or across the floor deck in the process of installing them.

Above, subfloor panels were allowed to stand in a pan of dye-colored water. The dye stained the three AdvanTech® panel samples (left) just to the level of the water in the pan, but the dye readily wicked through the grain of the plywood laminations (right), penetrating deep into the panel area.

Two things really distinguish how AdvanTech panels are made that contribute to their high performance over commodity OSB: resin technology and manufacturing precision. AdvanTech panels use an advanced liquid resin that coats flakes during the manufacturing process to make sure the panel is thoroughly protected. A lot of engineering and quality control goes into how the strands in AdvanTech panels are oriented and sized within the multiple layers to create a woven matrix of fibers that achieves the right balance of stiffness and dimensional stability. Commodity OSB is also set up in layers but can have larger variations in strand size and orientation within the layers and may use a different kind of resin that does not necessarily have the same moisture resistance. The AdvanTech subflooring manufacturing process also has a high level of precision to make sure the wood strands are the optimal thickness and dimension for a more stable panel. During manufacturing at AdvanTech panel mills, there are extensive quality control checks along the whole panel production process so that only the very best final boards earn the AdvanTech® brand mark.

Once I made the switch to AdvanTech subflooring, I had zero edge swell, even with heavy rains during construction. I've not had a single squeak and have never had to sand edges down. That has been a huge change for me. I opt for the 1-1/8-inch panel on most of my projects because I want zero bounce in the floor. Certainly, I spend a little more on this subfloor than I have in the past. However, the elimination of problems makes it totally worth it. As with most material choices, it's never just about initial cost. Think about it: Not having to pay the unexpected costs of sanding, which interrupts the flow of the project, is one thing. But if I had to fix a squeak after the owners have taken possession and are living in the home, that is a nightmare. My business is based on an expectation of quality. Having no callbacks — having a much stronger, squeak-free floor — has made all the difference in being able to build a solid reputation for high-performing homes.

To learn more about subfloor best practices, visit YouTube.com/MattRisinger.

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BY DAVID GERSTEL

The Why of Profit?

David Gerstel began his career in construction as a framing carpenter, has been a general contractor for four decades, and is the author of several books on construction company management.

Savvy builders understand profit viscerally. They want to be paid well for the skilled work they put in at their jobsites and for managing their companies. And they know that their companies must register additional earnings, a profit beyond what they pay out to cover production and overhead including owners' wages or salary.

"Jake," as I will call him here, is a skilled carpenter and project manager. His work is tight. He's reliable. He doesn't make excuses for mistakes. He just fixes them. As a result, since he got his general contractor's license and went on his own a couple of years ago, Jake has worked steadily on the basis of referrals from his customers.

When Jake finishes a job, he's likely to happily announce, "I made a good profit on that one." Usually, he's mistaken, for several reasons. He's misled by his healthy-looking bank balance. He fails to note that a good chunk of it is not from his supposedly profitable jobs but from a deposit for a new job—one barely underway and for which no balance-reducing bills have yet been paid. In other words, Jake falls prey to the hazards of cash accounting.

While he does track every dollar taken in, Jake is ignoring or understating his expenses. When calculating what he calls "profit," he adds up all payments received from his clients. But he subtracts only the cash he has laid out for materials and subs at his projects. He ignores all the costs of doing business beyond the direct costs of construction out in the field. Like a lot of startup builders, he thinks he doesn't have any such overhead costs—aka SGA (sales, general, and administrative) expenses—worth mentioning.

In fact, his SGA responsibilities burden him with significant out-of-pocket costs—for innumerable items from paper clips through his office computer—and for a huge amount of time. For every hour he spends on his jobsites, Jake spends roughly another half hour at SGA tasks like these: Phone conversations and visits with prospective clients. Completion of specifications for plans from designers. Estimating. Keeping the books. Building a network of trade partners and suppliers.

The value of those hours is not included in his calculations. If he did figure them in, he would arrive at a much less rosy conclusion about "profit" he is hauling in. To get to a truer figure yet, Jake would have to deduct for his out-of-pocket costs for SGA and even for less visible costs like the value of the space in his home that he uses for his business. If Jake were to truly account for all his off-site business costs and also factor in the value of the benefits beyond wages that he received from his former employer, he would see that so far the financial result of his going out on his own is close to a 50% pay cut and not an ascent to a glorious level of profit.

For all that, Jake is not as dumb about "profit" as I was when I was starting out as a general contractor. When Jake spends money on new tools, he does account for their cost as a cost of production, subtracting it along with other costs from the payments he receives from clients. When I was in my start-up phase, I was so enthralled with the wondrous new tools that I was buying that I figured their acquisition to be part of my income from my projects rather than as an expense.

Eventually, as tools began to wear out, it dawned on me that they were not like art works or gold doubloons I could enjoy or exult over for a lifetime. I realized that their costs were a business expense. I began to appreciate the reality of overhead. Jake is coming to the same understanding. If he follows the path taken by another start-up builder I know, he will soon learn to add a percentage of his labor and material charges into his price to his clients to defray his out-of-pocket overhead costs.

Eventually, fearful at each step that he is becoming outrageously expensive and that he will never get another job, he's going to increase that percentage substantially to compensate himself for all the time he spends running his business. Once he does get that far, Jake will be making a good living as a "belt-and-suspenders" builder. Yes, he's working hard—all day on the jobsite, for several hours every evening, and at least one day each weekend. But for a young guy who loves building, being his own boss, and working hard, it's a sweet spot—at least during a boom period like the one

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the construction industry is currently enjoying.

When Jake gets to that sweet spot, he will think of himself as running a very profitable business. But he still will not be. Though he is earning more or less market rate compensation (wages plus benefits) for his skilled labor, his business is not making any profit at all. It is only paying its expenses—for materials and subs at the jobsite, for overhead, and for Jake's labor on his jobsites and at running his company.

For a business to be profitable in the real sense of the concept, it must take in more money than it lays out. It must recapture in its charges more than it disburses for production of the goods it sells (construction in our case) and for SGA, including pay for the work SGA requires, whether it is done by owners or employees.

Experienced, savvy builders understand the need for profit viscerally. They want to be paid well for the skilled work they put in at their jobsites and for managing their companies. They also know that just as they must receive pay for their work, their companies must accrue earnings, a profit beyond what they pay out to cover production and SGA. In short, the savvy builders know they need to get paid and that their companies also need to get paid.

In all the various educational channels now available to builders, we hear a great deal about methods of making a profit. Relentlessly, we are advised to do such things as making sure that prospective clients have in mind a budget adequate to allow your company to make a profit before you spend too much time with them; applying markups that help you realize your intended profit; and building protections against profit erosion, such as a clear change order procedure, into your construction contracts and management systems.

But for all the information given us about the how-to of capturing profit, little is said about the *why* of profit, about *why* we must make a profit.

I have come to think that the prime reason that a construction company must earn a profit is to cover specific *profit costs* that are more than likely to hit you. Yes, just as you must recapture your direct costs of production out at the jobsite and the off-site SGA costs of running your company, you must capture profit to cover a whole other range of costs.

Unless you have read my new book, you probably have not heard the term "profit costs" before. I made it up. The reason I made it up is that I have long observed builders getting hit by a variety of costs—often severe or even brutal—beyond what they spend on production and normal SGA including their own pay.

Profit costs are those that go well beyond even the irritating burdens for items like callbacks for leaky faucets and other minor product failures. If you are nailing your numbers, you will have those costs anticipated in your estimates. Like other savvy builders, having concluded they are inevitable even with stringent quality control, you will add small percentages to cover them in your estimates at "project service" or "completion" or some similarly labeled lines.

Profit costs are a different kind of cat. They can be entirely unpredictable as to just what they might be, when they will come, and how much they will amount to. All we know about them is that they almost certainly will strike at some moments during our careers. I've been lucky. I have largely been spared profit costs like those that have badly damaged other builders I know. Even so, I recently was burdened with a long legal battle necessary to protect one of my projects. After two years, I prevailed and prevented neighboring construction that would have seriously impaired my project. But the profit cost was heavy, thousands of dollars and hundreds of hours of work.

It is to cover profit costs—from mis-priced jobs through litigation and recession—that you must make a profit. Stay in the construction business for long, and you are going to experience profit costs, even if you are unusually competent and unusually lucky. You want to be in a position to absorb the hit by some means other than bankruptcy.

A SAMPLER OF PROFIT COSTS

Before Construction Begins

- Pricing jobs too optimistically in order to stay busy
- Delay or serious inefficiency caused by designer or building department non-performance
- Cancellation of a project that leaves a hole in your schedule

During Construction

- Unanticipated and severe inflation of material cost
- Change order conflict, oversight, or neglect
- Prolonged disruption and reduction of productivity by severe weather

After Construction

- Client refusing to make final payment
- Leaks, decay, and other building failures
- Litigation

Anytime

- Injury to yourself or key employees
- Theft and vandalism
- Embezzlement
- General recession in the economy
- Bankruptcy

This sampler is drawn from a longer list of profit costs on page 259 of David Gerstel's new book, Nail Your Numbers, A Path to Skilled Construction Estimating and Bidding.

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You must not only make a profit, you must put it aside for your company. It is not your personal income. It is earnings your company needs to cover its living expenses.

You must not only make a profit, you must put it aside for your company. It is not your personal income. It is earnings your company needs to cover its living expenses. You must store it up in an Operating Capital Reserve Account (OCRA). Even a belt-and-suspenders operation like Jake's needs an OCRA. Profit costs are an equal opportunity bandit. They hit us all, regardless of the size of our companies. At his present level of what he thinks of as "profitability," when Jake gets hit with a profit cost, he is going to have to cover it out of the income he counts on to pay his family's bills.

Just how much should you store up in that OCRA? Years ago, I figured 10% of annual revenue—for example, $100,000 for a remodeling company with revenues of a million dollars a year would, I thought, suffice. Later, I revised my guideline upwards to 10% of revenue so long as that was enough to cover a builder's basic living expenses and the overhead expenditures essential to keeping their business in operation for a year. If not, then they needed to go higher than 10%. Why? Because during a prolonged recession, to keep key crew employed, they may have to take work at prices so low their charges to clients do not re-capture their overhead expenses (including their pay) for an extended period. To cover those expenses, they will need to draw on the OCRA.

Now I have come to think of 10% as an absolute minimum requirement. During the last recession, I encountered builders for whom an OCRA of 10% of annual revenue was woefully inadequate. One nearly exhausted an OCRA of a million dollars. Another had to mortgage his home to fund his company. A third reportedly went without pay for several years to keep his business alive. A fourth could not pay the rent for his showroom. None of the four are flakes or fly-by-night operators. All run well-established companies. They have been in business for decades.

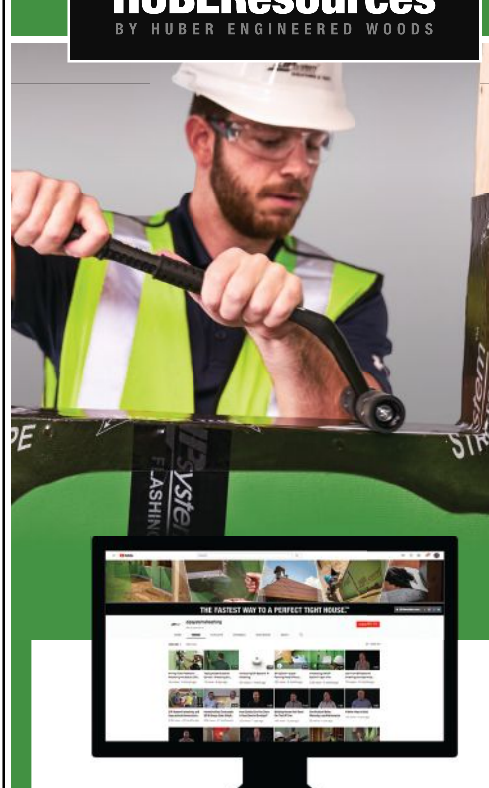
Not only do you need to charge profit and store it up against profit cost hits. You also need to charge for it at healthy levels when the economy allows. You need to resist growth in volume that is not profitable, no matter how tempting engrossed revenues may be.

Which business is more likely to sustain against recession or other heavy profit costs: the business with direct costs of $3 million and a realized 8% markup for profit? Or the business with direct costs of $12 million and a realized profit of 2%? I'll bet on the smaller volume operation. Because when a monster profit cost like a recession comes along and prices must be cut, the cuts will swamp the larger company in red ink. The smaller business, even though it will have to forgo profit, will likely be able to stay closer to break even, paying all its expenses including owner's pay with a bit of help from its OCRA.

That's the fundamental why of profit. You need it cover your profit costs just as your other charges recapture your outlay for on-site construction and for SGA.

At this point, you may be wondering, do I ever get to enjoy the profit I work so hard to achieve? Yes, if (and only if) you have created an efficient and effective operation that has been able to top up your OCRA. If you accomplish that, you can begin disbursing further profit as bonuses, and not only to yourself but to your team. After all, the top people in any highly successful enterprise earn and deserve bonuses. But those bonuses are still a profit cost. They are payouts required by the superior performance you and your team have turned in. They are just nicer profit costs than the disaster-driven kind. Here's hoping that you and your team will achieve and enjoy them.

David Gerstel's new book, Nail Your Numbers: A Path to Skilled Construction Estimating and Bidding, *can be ordered from online and brick and mortar bookstores.*



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BY TED CUSHMAN

A Vegetated PV Roof

Developer-builders Jessica Pitts and John Miller of Flywheel Development had a goal and a problem. Their goal was to build affordable net-zero townhomes in suburban Washington, D.C. Their problem was stormwater management: Rules in Prince George's County, Md., required them to detain the runoff from heavy rainstorms on site, rather than divert it into municipal storm drains.

The poorly draining site soils and the tight site precluded traditional ground-based stormwater-management best practices, so they looked to a vegetated rain-detaining roof for a solution. But Pitts and Miller also had other plans for the roof: They needed solar power to meet their ambitious energy goals.

In the end, Pitts and Miller reached both of their objectives with an innovative combination: a vegetated roof whose growing medium captures significant amounts of rainfall, with solar arrays mixed in with the plants and supported by modular frameworks that are anchored and ballasted by the green-roof growing medium. Manufactured by German firm Optigrun (optigreen.com), the PV array support system is imported from Germany, and the pair say this is the first time it has been deployed commercially in the United States. But Miller says the idea is a "no-brainer" financially: "Because the solar racking is ballasted by the green-roof media and the plants that keep it there, the percentage of the green roof that is ballasting the panels is eligible for the federal tax credit for PV."

The roof is also effective as a stormwater management system. Says Pitts, "The solar green roof is designed to detain between 1.8 and 2.4 inches of rainfall. There is little to no runoff from a small storm of about 1.2 inches or less."

The process started during the design phase. Says Pitts, "This can go on any sort of deck. Our structures are wood framed. But you have to account for the load that you're going to be carrying with the engineering, so it's important if you do this, to have a mind to do it at the beginning."

"Wind uplift is a critical calculation on the solar," Pitts notes, "and the depth of the green-roof media is determined by wind-uplift calculations. We had a 3-foot parapet wall on three sides of the roof, and the PV

Photos courtesy Flywheel Development

An electronic leak-detection sensor verifies the watertightness of the EPDM roofing material before the green-roof membranes and growing media are installed **(1)**. A plastic protection mat and a geotextile mesh are the next layers to be applied to the roof **(2)**.

Durable plastic rack bases are set in place on the roof **(3)**, then the geotextile mesh layer is rolled out, lapping over the plastic bases **(4)**. Metal racking for the PV panels is anchored to the plastic bases, which will be ballasted by the green-roof growing media.

system is down below that level and is protected from wind uplift on three sides, which reduced the depth of the green-roof media that we needed to install. So if you want to do this, at the beginning you need to think about the height of your parapet wall on your building and how you can protect solar panels from the wind."

The green-roof media would help to protect the building's EPDM roof from sunlight and weather. But the green roof and solar would also impede any needed repairs or maintenance down the road. So Pitts and Miller decided to install a leak-detection system before laying down the roofing. "We thought it was prudent to install a leak-detection layer," says Pitts. "It's a metal mesh that goes underneath the roof membrane. And what that allows you to do is that if you ever get a leak, you can identify the exact location of it."

The thin, stainless steel mesh comes in rolls and is installed directly to the roof deck before protection board and roofing are installed. "It looks like chicken wire," says Pitts. "There are two leads that you can run up the side of your parapet wall and hang out at the top. And you can test even before you put the green roof on. We had the people come out and test the membrane as soon as it was in place. They wet down the roof and apply an electrical charge and they look for places where you get a connection."

"They use a detector that looks like a push broom with metal bristles on it," says Miller. "They found five or six little pinprick holes that you never would have noticed, and we patched them. All you have to have is a roofer maybe bends over and maybe one of the metal brads on their jeans pokes a hole in the roof, or they drop their utility knife, and you would never know. The leak detection crew will circle this spot with a marker, and you're like, 'Wait a minute—that's a hole?' But this way you know on day one that your roof is leak-free. And if you have a future problem, then you can find it."

"So then you put in the layers of the green roof," says Pitts, integrated into the high-density plastic bases for the solar-array racks. "So you have your plastic protection layer, which keeps the roots from growing down into the actual roof itself. Then you have a protection mat, which is kind of like a felt material. And that's for protecting the roof membrane from the roughness of the growing medium. Then you have a geotextile mesh; the mesh that we were using has large holes in it—it's a loose weave—and that goes on top of the bases that the green roof ballasts down."

The mesh wraps under and around metal edging at the roof perimeter, and it runs over the PV rack bases. "And there's an L-shaped metal bar that is installed into each of those bases, and then the rack is accepted into those metal L bars," says Pitts. "And then each grouping of panels is also tied together. So you can do a long grouping of however many you would like, and we had four individual systems on top of each of the four individual homes. So each panel grouping becomes linked together, and then they all become linked together through the geotextile mesh."

Now it's time to place the growing medium. "We needed thick layers of media," says Pitts. "It's very common to have drainage trays and things of that nature to help reduce the depth of green roofs, but we wanted it to be thicker, because we are using the weight of it to hold down the solar. We had a green-roof-media company (Mulch Solutions of Falls Church, Va.) come and blow the media up onto the roof with its blower truck." There were two types of media: a larger, heavier drainage medium as a base layer, then a layer of growing

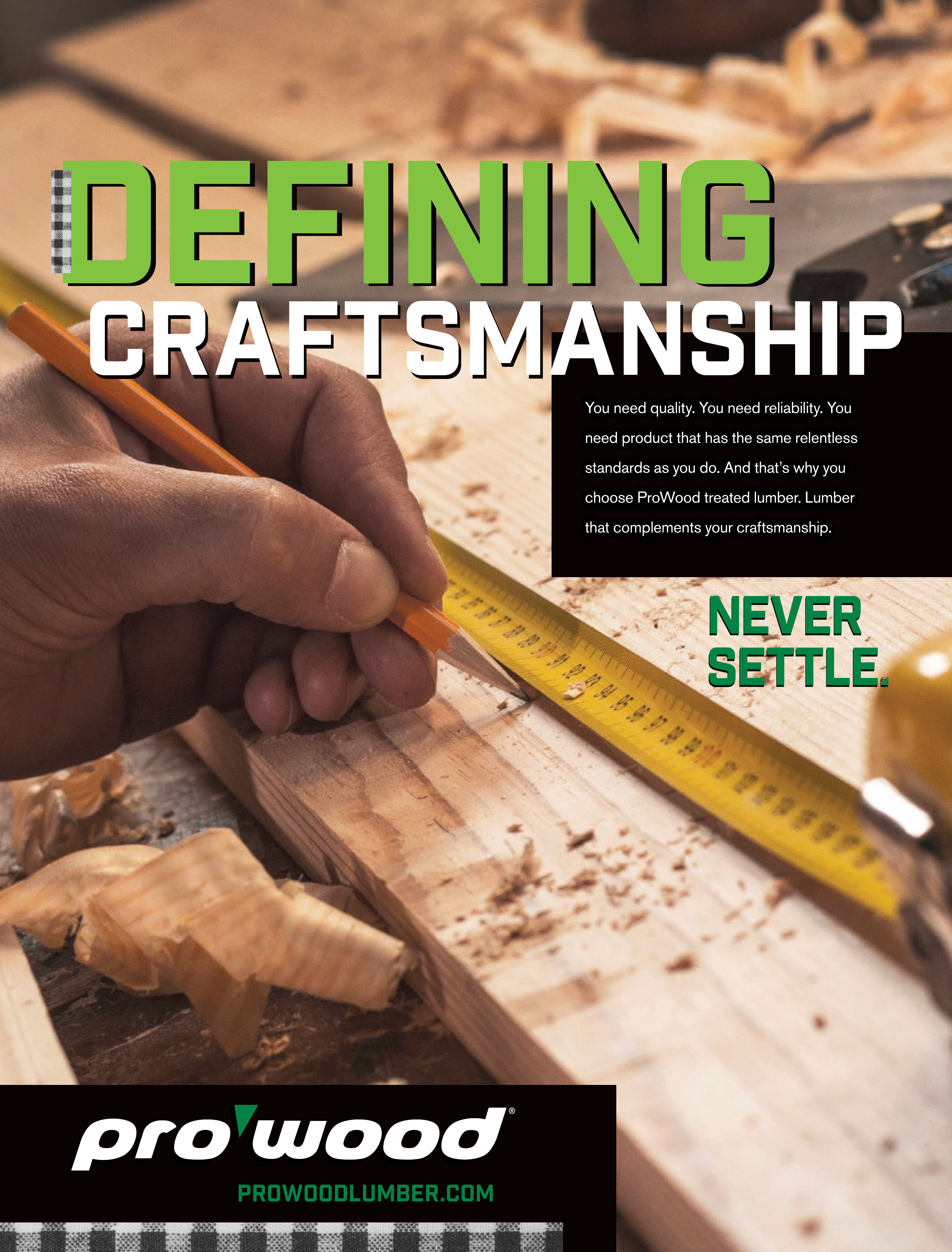
Green-roof mineral growing media is blown onto the roof, covering the geotextile mesh and plastic rack bases to a depth sufficient to ballast the racks against any wind pressure **(5)**. Small seedlings are then planted into the growing media **(6)**. After a single growing season, the plants have spread **(7, 8)** and will soon cover most of the rooftop area.

medium on top of that, separated by a layer of fabric. The entire placement with the blower truck took less than a day. Besides the efficiency, says Pitts, another advantage to the blower truck is that it avoids creating point loads on the roof during the application of the growing medium.

"And then the plants arrived," says Pitts. "There are two different types of green-roof plants: There are ones that grow in sun, and there are ones that grow in shade. So we had to demarcate the locations behind and beneath the panels and allocate the shade plants to those locations; and the sun plants went everywhere else. And then we got all the PV equipment, and the PV panels came up last."

The roof has been in place for more than a year now, says Pitts, and the plants are spreading nicely over the growing surface. "Green roofs require a lot of care and feeding in their first couple of years to get them to establishment," says Miller. "We're hoping that this year the growth is really explosive." Pitts adds, "We want it to get to the established point, and I think in this next year we should be reaching that, pretty close."

Ted Cushman is a senior editor at JLC.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BY DAVE COYNE

What a Long, Strange Drip It's Been

Drip edge installed tight to the fascia was directing water behind the gutters **(1, 2)**, causing saturation and major damage in the house walls **(3)**. To fix the problem, the author first had to strip away and replace the siding and sheathing.

Photos by Dave Coyne; illustration by Tim Healey

A few years ago, my company was called to look at a modest, pre-fab ranch-style house with a water-intrusion problem. The homeowner suspected a roof leak. Inside the house, water was staining ceilings and walls and running down windows, and there was a smell of mildew. A few years earlier, another contractor had reshingled the roof (over existing shingles), installed replacement windows, and re-sided the house exterior with vinyl siding.

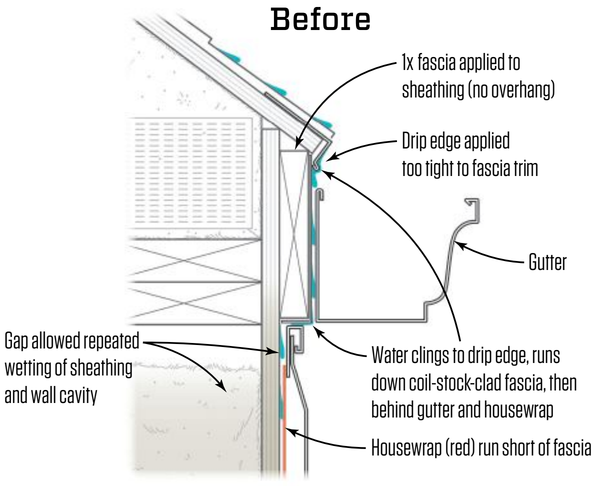
What we found when we inspected the roof was not a roof leak. Instead, the trouble had begun with the installation of the drip edge and gutters. One simple oversight started the entire problem: The drip edge was applied too tight to the fascia trim. I couldn't even fit a fingernail between the drip edge and the fascia board. That meant that the water would run straight down off the roof, wrap around the drip edge and onto the coil-wrapped fascia, and run down behind the gutter instead of falling into the gutter where it was supposed to go.

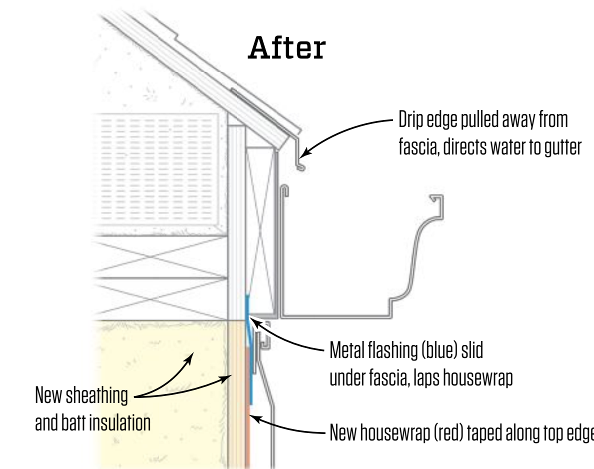
But that was just the beginning of the trouble. There was no roof overhang on this house. And when the water reached the bottom of the fascia, which was applied tight to the house walls, it would seep back to the sheathing.

There was no flashing installed that could direct the water back out away from the house or down onto the housewrap, which had been cut so it butted up against the bottom edge of the one-by fascia rather than running up behind it. Once the water reached the crucial seam where fascia met sheathing, it dripped down behind the housewrap.

Water soaked the sheathing. Over the years, the water rotted the sheathing in multiple places. When we removed the sheathing, we found rot around all the windows below the eaves, and some even on the gable-end windows. Housewrap on the walls stopped short of the windows, and wasn't integrated into any kind of tape or flashing. The window trim was installed in a way that let water penetrate to the sheathing and the window openings.

Water had soaked the insulation at the bottom of the wall, creating a habitat for ants and the insects that feed on them. In many places, even the framing





The author installed a working drainage plane using tape-sealed housewrap to keep the house walls dry, flashing below the fascia trim and pulling the roof drip edge away from the roof to direct rainwater into the gutters.

was saturated and rotted, blackened by rot to the point that it looked as if it had been burned.

In an ideal world, of course, this house would have had a roof overhang, and that would have helped. It would also have been a really good idea, when first trimming the fascia along the eaves, to have made an additional one-inch bend in the bottom edge of the wrap so that it returned to lie flat against the sheathing (a common trim treatment that we've all seen plenty of times). But even without those obvious touches, this house would have been OK if the roof-to-wall connection had been well flashed, the walls had been properly wrapped, and the windows had been properly flashed and sealed.

In this case, our scope of work didn't include reroofing or replacing the drip edge. We did go around the house and pull and bend the lower edge of the drip edge away from the fascia as much as the material would allow, to facilitate dripping into the gutter instead of behind it.

But our main project was to remove all the siding and sheathing, repair rot (including reframing windows), replace the bug- and mold-infested insulation, resheathe the building, construct a working drainage plane, and flash all the windows correctly into the housewrap.

To manage water that might still make its way from the roof edge back to the house wall, we added a piece of metal flashing extending behind the fascia to direct water out onto the housewrap if it managed to make its way back to the wall. We extended the housewrap up at the top of the wall, high enough that it fell behind this piece of flashing.

Now the house is tight and dry. But had the roofers initially left a half inch of space between the bottom flange of the drip edge and the fascia, the homeowner might have been spared this ordeal and a significant expense.

Of course, the drip-edge detail is not the only factor in the damage here. The previous contractor did many things wrong, and if you look at the number of circumstances that had to align in order to create this much damage, the lack of a roof overhang is certainly one of them. If the house had an overhang, things probably would not have gotten this bad. The fascia itself could have been damaged, if it were a wood fascia, but the water couldn't have traveled back to the house as easily, and the major damage to the wall below would most likely have been avoided.

Dave Coyne owns and manages Home & Hearth Remodeling and Restoration, based in West Springfield, Mass.

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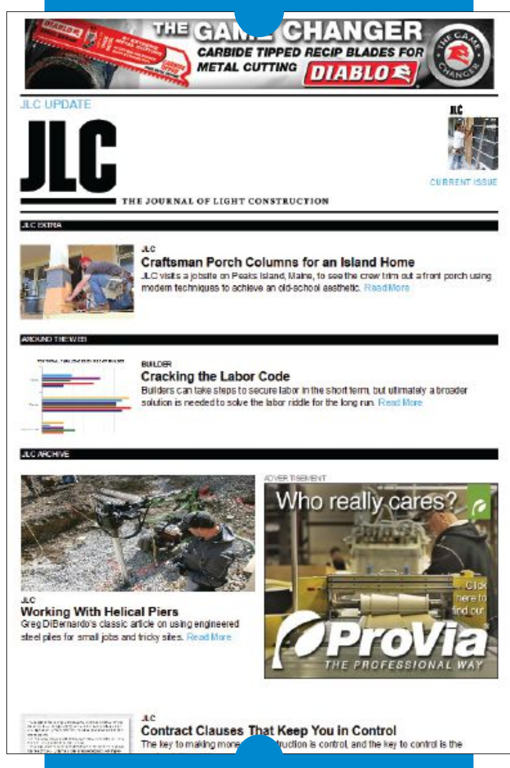

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Framing a Two-Story Half-Round Porch

Radiused steel I-beams and steel columns provide the core support for this outdoor space on the Jersey shore

BY NATHANIEL ELDON

Recently, my company built a new home with a two-story screened porch that had some interesting radius features. The main structure for the porch consisted of bent or rolled steel I-beams. Because we work on the coast, most new houses we build include some steel, whether for its superior strength for supporting a large floor or roof load, or for its ability to resist lateral wind forces. But this was my first go-around with steel beams formed into a circular shape.

The structural engineer and architect designed the rear porches with a half-round steel drop beam to support the second-floor porch, and an additional half-round beam at plate height to support the rafters of the conical roof over the porch. Three 5-inch square columns made from $1/2$-inch steel provide vertical support for the two half-round steel beams and the rest of the porch structure. These columns run full height to the underside of the upper beam, with the lower beam cut at the middle of the curve and attached to the columns via welded steel tabs called flag connections. The upper beam is bolted to steel plates welded to the tops of the columns.

CURVED LAYOUT

As with most construction projects, building the curved porch began with laying out its location at the early stages of framing

Photos by Nathaniel Eldon

After laying out the curved beam directly on the first-floor slab **(1)**, the author drew a full-size pattern on lauan plywood to help guide the metal fabrication **(2)**. The porch columns would attach to the metal plates embedded in the slab. The author also made a story pole to record the heights of the two radiused beams, as well as the differences in the column heights due to the drainage slope of the slab **(3)**.

the house. The columns would need to be welded to steel plates embedded in the concrete slab for the first-floor porch, so prior to pouring the slab, we laid out the locations for the steel plates and gave the mason their dimensions and references off the building. He then built piers from stacked masonry chimney block inside the curved foundation wall to support the point loads from the columns.

Once the porch slab was in place, I drew the radius and the width of the beams on the slab **(1)**. Knowing that the fabrication of the steel parts would take several weeks, I sprayed clear lacquer over the pencil and chalk lines to preserve them from the elements. Next, I made a template for the steel fabricator. A scaled drawing probably would have worked fine, but I prefer to make a full-scale pattern any time I need to involve a subcontractor to fabricate something as complex as this steel frame. For this project, I transferred the layout onto sheets of 1/4-inch lauan plywood **(2)**. My local steel fabricator then delivered the pattern to another fabrication shop in northeast Pennsylvania with specialized equipment capable of rolling the W10x26 I-beams into the circular shape.

At the layout stage, I also created a full-height story pole—20 feet tall—for the column and beam heights **(3)**. On the story pole, I indicated the locations and full height (10.33 inches) of the W10x26 beams. Because the first-floor porch slab was pitched for drainage, the three columns would be different heights, so I also indicated those differences. The north (center) column was to be full height, while the west column needed to be 7/16 inch shorter and the east column 1/4 inch shorter than the north. These adjustments allowed the beams to sit level once the posts were welded to the plates, and the differences in measurement were given to the fabricator to cut the columns accordingly.

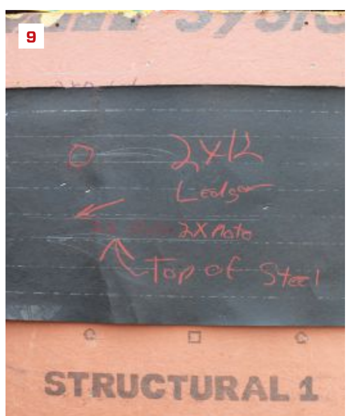
The steel fabricator sent out the beams to be rolled into the curve, then brought them to the site to check the layout and mark column positions on the top of the beam **(4)**. After finishing the remainder of the prep work, the fabricator brought the metal parts back to the site for assembly **(5)**. With the connections kept loose for adjustment, a crane raises the frame and sets it on the slab **(6)**. The fabricator tack-welds the bottoms of the columns to the steel plates to keep them in place during adjustment **(7)**.

THE STEEL FRAME

Four weeks later, the steel fabricator brought the radiused beams to the jobsite, but at that point, the beams had just been roughed out. To verify that the curve of the beams was very close to what I had laid out on the template, we set the beams on blocks over the layout lines that I had made on the slab earlier, then we transferred the column locations onto one of the beams for completing the beam and column fabrication **(4)**. We were also careful to label the direction and orientation of the beams so that nothing could be flipped around during handling.

The fabricator then returned to his shop to fabricate the columns, to cut beams as needed, and to add welding flanges and flags to the columns. Also, I opted to have the fabricator galvanize the columns and beams. Even though exterior trim material would encapsulate the structural steel frame, I worried that the marine environment would rust the components and eventually stain the ipe decking and silver travertine patio material. Galvanizing added a bit of time to the fabrication, but it was needed to ensure the longevity of the structure. Three weeks later, the steel fabricator delivered the components for the frame, in pieces. His crew then assembled the structure without fully tightening the bolts, to allow for minute adjustments once the steel frame was standing **(5)**.

After the frame was assembled, a crane lifted it to a vertical position on the slab **(6)**. After placing the columns on my soapstone layout marks on the welding plates, the ironworkers tacked down the columns **(7)**. We also braced the frame back to the building. Plumbing each of the three columns in two directions was a bit of an ordeal, and when the frame was finally plumbed and braced, the crew permanently welded the columns to the plates and tightened all of the bolts joining the columns to the curved beams.



After bracing the frame and tightening the connections, the author sets a laser on the beam to lay out the ledger on the house **(8)**. After marking and labeling all of the lines **(9)**, the crew snaps a chalk line for installing the ledger **(10)**.

Using a series of cuts made with a circular saw, a crew member cuts the plates to go on top of the curved steel beams **(11)**. The curved plates were tacked in place with powder-actuated fasteners **(12)**, then through-bolted to the top flange of the steel beam.

SECOND-FLOOR DECK LAYOUT

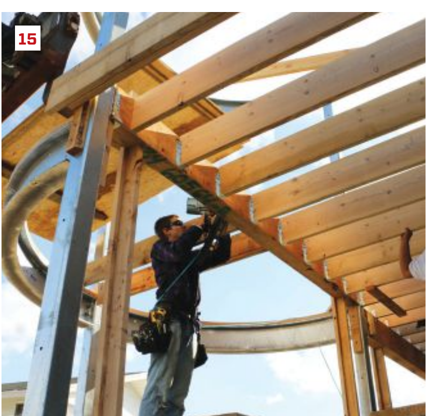
With the steel frame welded in place, we were ready to frame the second-floor deck. The curved part of the deck joined a rectangular deck that continued over to an intersecting volume of the house. As I typically do, I began by stapling an 18-inch-wide rip of felt paper onto the wall sheathing of the house at approximately the same height as the deck ledger. The building paper gives me a good surface for laying out the ledger, and later in the process, I'm able to integrate the paper with the WRB below the deck as I side the house.

After placing my rotary laser on top of the lower curved beam **(8)**, I made some level reference marks on the felt paper for the deck-ledger locations. From there I accounted for the offset for the height of my laser and made marks in red keel to indicate the top of the steel, the top of the 2-by plate, and the top of the 2x12 ledger **(9)**. With the help of a crew member, I snapped blue chalk lines on the felt to set the bottom of the deck ledger **(10)**.

FRAMING THE CURVE

While the crew installed the ledger for the deck, we plated the top of the curved beam with short lengths of 2x12s. We held the pieces in place on top of the beam and scribed the curve for both sides of the beam. We cut the radius with a circular saw, making a series of passes along the curved line **(11)**. As each plate section was finished, we fastened it temporarily in place with powder-actuated pins. Later, we through-bolted the plate to the steel beam **(12)**.

An LVL drop beam that extends from the house to the west column of the curved porch supports the joists for the rectangular part of the deck. The joists for the curved porch hang from an LVL flush beam that spans between the east and west columns. That flush



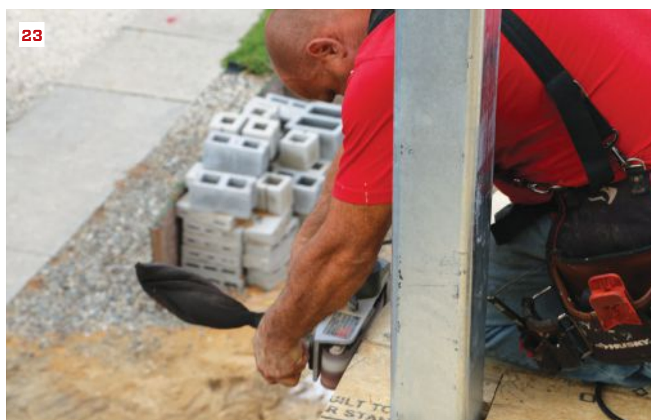
A crew member nails concealed-flange hangers to the flush beam **(13)**, which was braced between the columns for framing the deck **(14)**. Later, the hangers were welded to the columns. A 2-by block tacked between the middle two joists **(15)** catches the laser light from the pivot point on the slab below **(16)**. Drilling through the block transfers the point to the top of the block **(17)**, for marking the radius on the joist ends **(18)**. Perpendicular blocking supports the outer edges of the plywood rim joist **(19)**.

beam breaks up the joist framing, with regular joists running from the flush beam to the ledger on the house, and joists for the curved section extending from the flush beam out over the curved plates that we'd just finished installing.

Before the flush beam was installed, a crew member attached concealed-flange joist hangers on the ends of the beam **(13)**. (The drop beam for the rectangular section had received the same treatment on the end that attached to the steel porch column.) Instead of the nailing flanges extending out to the sides, they wrapped around the end of the beam. After lifting the beam into place with the telehandler, we supported it with temporary props that we kept in place while we framed the floor **(14)**. Later, the ironworkers came back and welded the concealed flange hangers to the steel columns, and we removed the temporary bracing.

After dropping in the common-length deck joists between the ledger on the house and the flush beam, we were ready to cut the joists for the radius section. We set two joists at the center of the curve, letting them run long over the curved plate **(15)**, and then installed a 2-by block between the joists at the flush beam. Using a laser, we plumbed up from our original pivot point on the first-floor slab and made a mark on the underside of the 2-by block **(16)**. We drilled through the block **(17)** and pushed a nail through the hole to transfer the pivot point to the top side of the 2-by. That nail gave us a radius point for cutting our joists to length.

We installed the rest of the joists for the curved section, letting them extend out past the curved plate. Then one crew member held the end of the measuring tape at the pivot point while a second crew member scribed the length and the angle of each joist **(18)**. Then it was just a matter of setting the saw to the proper angle and cutting the joists to length. To support the outermost joist bays,



The rim joist consists of three layers of 1/2-inch CDX plywood, followed by an upper and lower band of 1x5 PVC to even out the curve **(20)**. To provide the base for the waterproof fiberglass layer that will protect the areas below the porch, the crew nails down OSB subfloor, routing the curve around the perimeter with a bearing-guided bit **(21)**. After fitting the final piece of subfloor around the outer column **(22)**, a crew member smooths the edge of the cut sheathing with a belt sander **(23)**.

we attached perpendicular blocking to the adjacent joists **(19)**. The blocking kept the amount of unsupported rim to a minimum.

SHEATHING THE CURVED FLOOR

When the joists were all cut to length, we installed three plies of 1/2-inch CDX plywood that bent easily around the curve of the joist ends. We staggered the seams between each layer, nailing the plywood to the ends of the joists and the blocks. To fair out the curve for the finish fascia, we nailed two bands of PVC over the plywood.

To provide optimal protection for the screened-in porch areas on the first floor, plans called for the second-story porch floor to be waterproofed with fiberglass using the methods described in my article "Fiberglassing an Exterior Deck" (Feb/16). The finished porch floor would consist of ipe decking installed on treated wood sleepers on top of the fiberglass. Because the fiberglass waterproofing layer requires a solid subfloor, the crew installed AdvanTech's moisture-resistant 3/4-inch OSB panels over the deck joists, extending the subfloor panels out over the rim joist **(20)**. As we worked, we trimmed off the radius using a router with a bottom-bearing bit **(21)**. The final piece of subfloor wrapped around the north post **(22)**. After completing the subfloor, we belt-sanded the edge to smooth out the curve in preparation for the fiberglass waterproofing layer **(23)**.

With the subfloor installed, we set up scaffolding to build the conical roof over the second-floor deck. The fiberglassing and finish details for the round porch were done after the house was weathered in.

Nathaniel Eldon owns Eldon Builders (eldonbuilders.com), a custom home building and remodeling company in Cape May, N.J.

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Air-Sealing a Masonry Party Wall

A masonry parge and fluid-applied membrane are the keys to performance

BY ED MAY

I'm a Passive House consultant working in New York City. These days, my partner, John Mitchell, and I spend a lot of our time focusing on Passive House renovations of existing brownstone townhouses. We currently have seven or eight similar townhouse projects underway in various stages of completion, consulting with various general contractors, where a brownstone is being gut-renovated and extended and the project goals include Passive House certification. Our role includes detailed energy and building performance modeling, as well as a lot of on-site design, advising, inspection, crew education, and quality assurance.

Like all extensive renovations, a Passive House brownstone renovation is complicated work with many intricate and interesting problems to solve. One of those problems is how to deal with the party wall between the dwelling that's being renovated and its adjacent neighbors. We're typically shooting to comply with the EnerPHit Passive House standard, which calls for a total building airtightness of 1.0 ACH50; to hit that mark, that party wall needs to be made as airtight as possible.

In a city like New York with an older building stock, townhouses with true shared party walls are an enormous market, and a real challenge for builders seeking to improve the airtightness on their projects. These shared party walls are typically built of brick masonry, and have pockets for timber joists from both sides. This unsealed wall can lead to a variety of troubles for homeowners,

Before the masonry parge and air-sealing fluid membrane can be applied, masonry needs to be repaired as necessary. Above, a chimney flue **(1)** and other irregular surfaces **(2)** will have to be filled before the wall can be coated. Penetrations from new and existing structural carrying members **(3)** also need to be filled and smoothed prior to air-sealing.

allowing air and cooking odors, pests such as mice and insects, as well as noise and other unwanted contaminants to pass between neighboring homes.

Most projects start with demolition: The party walls are stripped back to bare masonry. There are exceptions; sometimes we are asked to preserve existing plaster, which can be quite airtight and may have aesthetic value or historical significance. In those cases, we may have to work around the old material, and bridge or connect to it somehow. But in general, we pull everything off the walls until we can see existing old bricks and mortar.

At this point, we need to repair any missing or damaged masonry as directed by an experienced structural engineer. These are pretty old walls that we're working on, and most of them have seen better days. At the very least, you're going to need to repoint certain portions of the wall. Some of the masonry may have water or fire damage. Earlier renovations may have been done in a way that requires repair now.

Then, once the masonry itself is in good shape, we recommend a full parge coat using a lime mortar, to create a flat and level surface for later air-sealing work. This allows the masons to even out any irregular surfaces from the masonry and fill small voids or gaps where necessary.

Once the wall field is prepared and any joist replacement has been completed, a liquid-applied airtightness material is installed over the parge. This material can be any of a number of products, but we typically recommend Sto Gold Coat or Sto EmeraldCoat. These water-based acrylic coatings, typically used for exterior waterproofing under EIFS applications, are vapor permeable but airtight, and can be rolled on or spray applied. This material is installed over the field of the wall and is applied roughly around the timber joists.

We apply a minimum of two coats at 12-mil wet thickness, and sometimes as many as three coats if the substrate is very irregular. Some installers have taken to adding a small amount of different colored pigments to the material before application in order to clearly show where the various coats have been, and have not been, applied, as an aid in inspection.

Sometimes we have clients who push back on the masonry parge step, and want to apply the fluid-applied membrane to the bare brick and mortar without parging first. Occasionally, we've let that happen, but recently, I've become more of a stickler for the parge coat. It's vitally important in order to get that nice, flat masonry surface. Without the parge coat, there are significant voids and gaps, and the Sto fluid is hard to apply on a rough, variable surface like that. It's just like painting: Surface preparation is key. It's boring, nobody

A lime mortar parge **(4)** is the first layer to be applied to the brick masonry after rough repair is completed. Next, the parge is coated with up to three coats of fluid-applied, vapor-open airtight sealing membrane **(5)**. The final result is a fully membrane-coated wall **(6)**, ready for blower-door testing to verify airtightness levels.

likes to do it, and it's invisible in the end, so nobody likes to spend money on it. But it's important to prepare the surface properly to receive these additional coats.

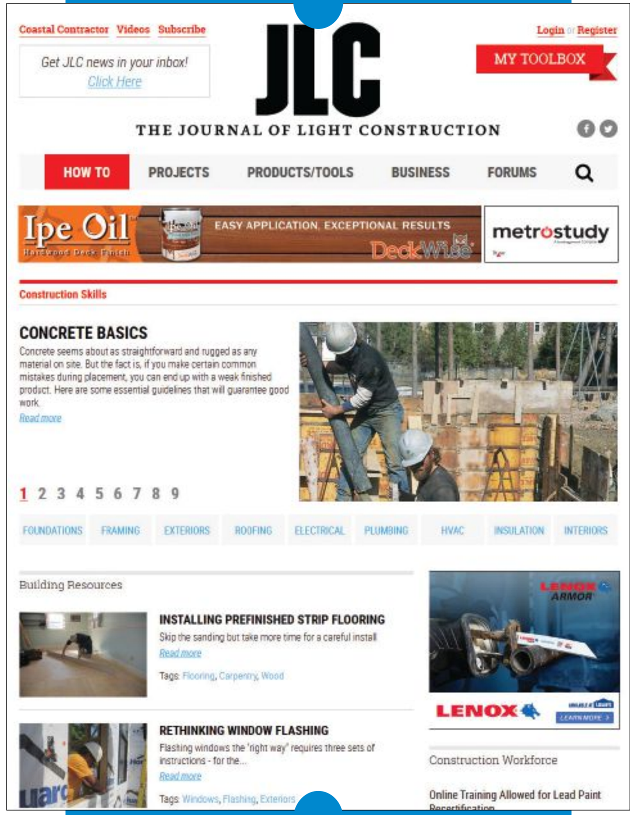
While it is possible to air-seal around the joist-to-masonry-wall connection with tapes, sealants, or other products, the new generation of spray-applied flexible airtightness materials seem to provide a more cost-effective and thorough seal at this joint. Products such as Partel's Blowerproof or Pro-Clima's Visconn (see photo, page 43) are an ideal solution to this joint, because they can span over small gaps and maintain elasticity and integrity at this connection over the long term. The spray application also helps to speed up the installation of the product on these irregular and oddly shaped connections.

Once the field and the joints have been sealed, the last step is to connect this party wall airtight layer to the front and back walls of the row house. These front and rear walls are typically exposed to the outdoors, and as a result will feature insulation and other layers distinct from those of the party walls. Most common in high-performance retrofits are interior side air/vapor control membranes, and in particular, one of the new generation of "smart" vapor control membranes which has a variable permeability depending on the ambient relative humidity. In that case, we like to seal the air/vapor control membrane robustly to the party wall by extending the membrane onto the party wall 8 to 12 inches and using a permanently elastic sealant such as Pro-Clima's Contega-HF to bond the plastic sheet to the masonry layer. A termination bar or tape layer is also used to keep the plastic membrane in place and avoid any curling or damage during construction.

At this point, any insulation can be installed on the party wall as desired. Many clients will elect to add some insulation to this wall to reduce unwanted sound from the neighbors. Additionally, to reduce the thermal bridging from the masonry party wall at the front and rear, it is recommended to install insulation 3 feet along the wall at the front and back. Beyond that zone, insulation is not required for energy or thermal comfort.

Finally, we try to test our airtightness application with an interim blower-door test while we can still get to and fix the airtightness layers. Even the most careful air-sealing can still miss gaps in unexpected locations, and the blower-door test is the only good way to verify that everything has been installed correctly and is working as expected, and to point to any areas that need further attention.

Architect Ed May is a member in bldgtyp llc, a consulting firm based in New York City.



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Upgrading the Load Path

Lateral wind loads force you to think about connections

BY TED CUSHMAN

When Hurricane Michael slammed into the Florida Panhandle last year, it damaged or destroyed thousands of structures. But as always in a major hurricane, a few well-built homes stood out as examples of how rugged construction can stand up to a storm. In one example, six small Habitat for Humanity houses in Panama City came through Hurricane Michael essentially unscathed, even as the homes around them lost their roofs and suffered significant structural damage.

The six houses were part of the "Habitat Strong" program, an above-code construction program modeled on the recommendations of the "Fortified Home" program developed by the Institute for Business and Home Safety (IBHS), an insurance industry nonprofit that advocates for more-resilient building practices. Framed by local builder Eric Anderson (Compass Homes of Northwest Florida), the houses boasted beefed-up roof details and an engineered design featuring a continuous foundation-to-ridge load path. But according to IBHS, the added features that contributed to the buildings' exemplary performance added only a modest amount to the affordable structures' cost.

From one house to the next, components and details may vary, said IBHS Market Development Manager Alex Cary, herself a licensed builder in Alabama. But the concept of a continuous load path is consistent, she explained in a *JLC* interview. "It [the Fortified standard] just says that it has to be an engineered design," said Cary, "because there's a million ways to skin that cat."

© Insurance Institute for Business & Home Safety

Framed by Florida builder Eric Anderson, the Habitat for Humanity house above stood up to Hurricane Michael's wind force with no significant damage, while downed trees and ripped-off roofs around the area attest to the power of the winds at that location. Credit goes to Anderson's preferred above-code connection details and a continuous load path.

In this case, builder Eric Anderson applied the same construction details that he typically includes on his market-rate houses. ("I build above code," said Anderson.) To resist uplift, Anderson installed the "Go-Bolt" system (go-bolt.com), developed by a Florida builder after Hurricane Andrew. Go-Bolt adapts the reinforcing concept often used in concrete masonry block construction and applies it to stick framing. The method relies on threaded rod connectors that run all the way from the foundation to above the top plate, tied to anchors embedded in the concrete at the foundation, and fastened down over the top plate with 3-inch washers and nuts. "I've got them within 8 inches of the corners, within 8 inches of every opening, and then spaced every 6 feet within the rest of the wall," said Anderson.

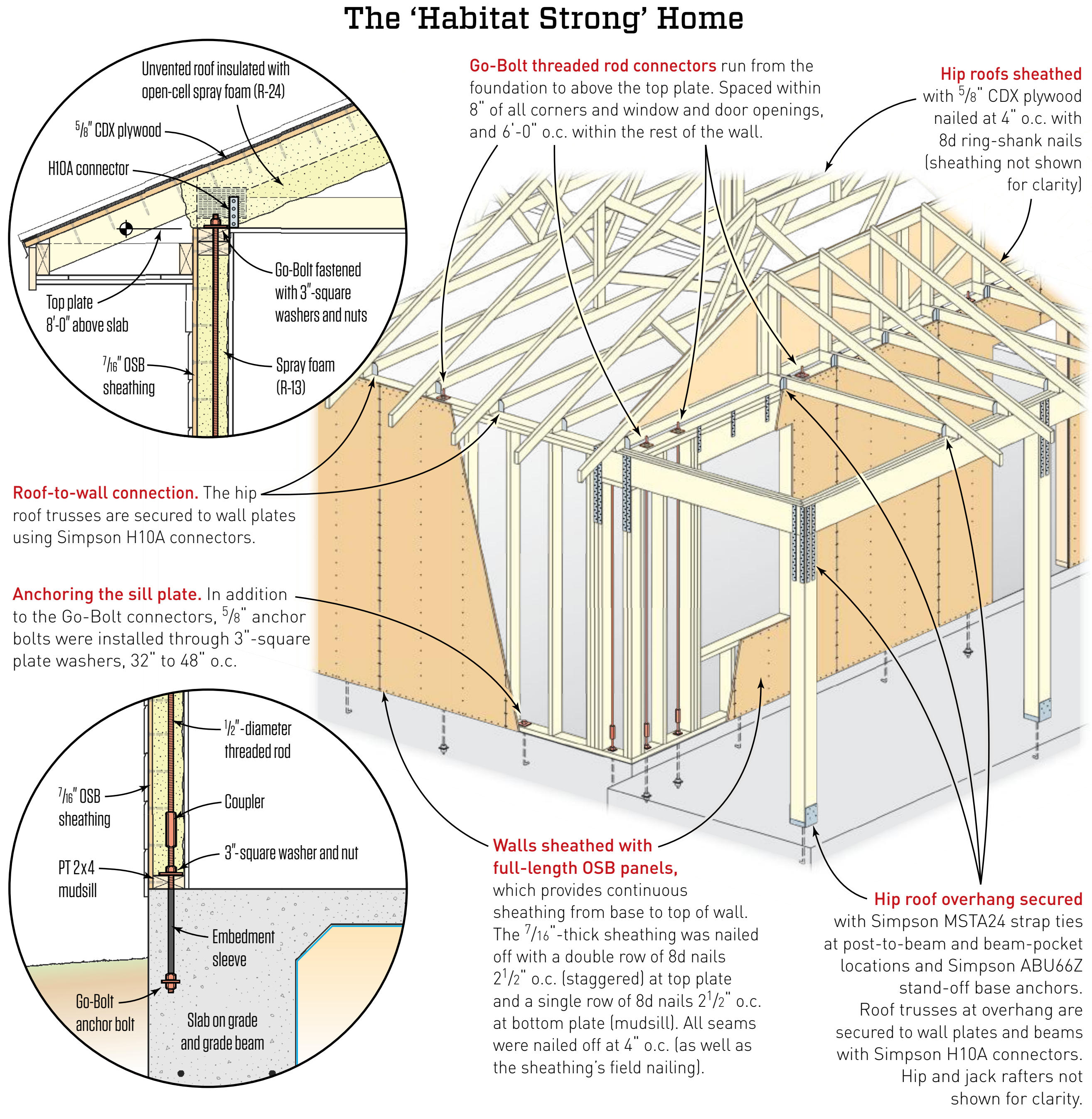
Anderson fully sheathes his stud walls using long-length Windstorm OSB panels from Norbord (norbord.com), which allows continuous sheathing from the base to the top of the wall with a single long sheet of OSB. At the top of the wall, he specs staggered nailing at 2 1/2 inches on-center into each of the double wall plates. The plate at the base of the wall also gets nails at 2 1/2 inches on-center. Sheathing is nailed to studs at 4 inches on-center, in the field as well as at the joints. On the Habitat projects, Anderson uses galvanized 8d nails, hand-driven by volunteers. On his regular jobs, his crew uses gun nails, but they follow the same tight nailing pattern.

Roof trusses are secured to the wall plates using Simpson Strong-Tie H10A connectors. The Habitat houses have hip roofs, sheathed with 5/8-inch CDX plywood nailed at 4 inches on-center with ring-shank nails. The entire roof is covered with peel-and-stick bituminous membrane and roofed with 24-gauge steel roofing. The roofs are unvented, said Anderson, and insulated with spray foam (as are the walls).

UNDERSTANDING THE LOAD PATH

Anderson's above-code details are a package deal: Omit any particular item, and the house could fail at that location. That's the whole idea behind the load path: A house is only as strong as its weakest point. To learn more, *JLC* talked with engineer Mary Uher, a region manager with the Field Services Division at APA - The Engineered Wood Association. Said Uher: "We all know that a chain is only as strong as its weakest link. We have to think of a house as a chain. So we have to be able to tie the roof to the walls, the upper-floor walls to the lower-floor walls, and the

Insurance Institute for Business & Home Safety



Key to the survival of these small cottages was the construction detailing that achieved a continuous load path from the foundation to the ridge of the buildings. Other, larger homes by the same builder, using the same basic details, also came through the storm unscathed. The foundation was tied to the walls using a continuous steel reinforcing rod from foundation to top wall plate, and the wall plates were tied to the trusses with Simpson Strong-Tie steel connectors. To resist racking forces in the walls, nails were spaced 4 inches on-center or closer. Roof sheathing was nailed to the trusses using 8d ring-shank nails at 4 inches on-center.

Illustration: Tim Healey

Wind Effects

Uplift

Shear

Sliding

Overturning

Lateral pressure of wind introduces a variety of stresses to any structure experiencing a severe wind event. The continuous load path from the roof to the foundation has to resist uplift pressure that can rip roofs away from walls, shear forces in the walls that brace the building, sliding forces that tend to push the house off the foundation, and overturning forces that tend to tip the house.

Illustration: Tim Healey

walls to the foundation; and then the foundation has to be big enough to get the load into the ground."

The requirement for a complete load path is written into the building code. The 2015 International Residential Code (IRC), Chapter 3, states: "The construction of buildings and structures in accordance with the provisions of this code shall result in a system that results in a complete load path that meets the requirements for the transfer of loads from their point of origin through the load-resisting elements to the foundation. Buildings and structures constructed as prescribed by this code are deemed to comply with the requirements of this section."

If you want to exceed bare minimum code, it's important to do so throughout the load path. Most framers intuitively understand gravity load paths. You're working against gravity the whole time you're framing, and you typically have a gut feeling about whether a structure you frame is going to stand up. But wind loads aren't so easy to grasp by instinct, and it's quite common for framers to leave one weak connection in an otherwise strong building.

APA ABOVE-CODE RECOMMENDATIONS

APA's publication "Building for High Wind Resistance in Light-Frame Wood Construction" offers a detailed set of prescriptions that exceed the code minimum. In describing the recommendations, Uher thinks like an engineer: She starts at the top of the building with the roof sheathing attachment. "Code minimum is 6d common nails 6 inches on-center on the end of the panels, and 12 inches in the field," said Uher. "If you use an 8d deformed shank fastener—that is, a ring-shank or screw-shank fastener—and tighten that nailing pattern to 4 inches at the ends and 6 inches in the field, it creates a much better performance, and your roof is more likely to stay attached to your trusses."

Next in line is the roof-to-wall connection, where the rafters or trusses connect to the walls. Here, there are multiple options for an upgraded connection. The basic recommendation is for a steel connector between each truss or rafter and the top plate. The ideal connector should resist forces in three dimensions: up and down, side to side, and in and out. A good example of a connector that works this way is the SST H10A clip.

Another advantage of the H10A connector is that it reaches down far enough below the truss to tie into the bottom member of a double plate. In buildings damaged by high winds such as tornadoes, Uher noted, it's typical to see top plates separated by the wind forces. "Everyone knows that nails are the worst in withdrawal," said Uher. "The top plates are held together by a couple of nails, and they can separate. So we recommend a connector that ties both those top plates together."

Rather than a steel plate connector, you can use structural screws up through the wall plate to connect a rafter or truss to the plate. The screws typically cost more than steel connectors, but may be faster to install, noted Uher.

In some situations, sheathing and nails can be used to create the appropriate connection. "If you have a raised heel truss, you

The photos above show failures in the upper portions of houses. Roof sheathing has been ripped away from trusses **(1)**, an entire roof has been pulled off of its supporting walls **(2)**, a gable end has been torn away from the roof and wall in one piece **(3)**, and an entire second story has been lifted off the lower story **(4)**. Each failure shows a different weak point in the load path.

can use your wood structural panels to transfer that load down into your wall," said Uher. An APA publication, "APA System Report 103: Use of Wood Structural Panels for Energy-Heel Trusses," provides guidance for engineers on how to specify that assembly for various wind load situations so that the wall sheathing can serve as part of the load path.

In any case, Uher said, it's critical to make sure that the wall sheathing is attached to the wall top plate. In field investigations, teams have seen cases where the trusses stayed attached to the wall plate, but the wall plate simply separated from the wall. Four-inch-on-center nailing into the top plates makes this failure less likely.

Another problem area is the gable end. This is typically framed using a gable-end truss, but that creates a potential "hinge joint" that is weak against the lateral pressure or suction of wind. In a storm, the joint between the gable truss and the wall it rests on can buckle either inward or outward. To resist that force, APA recommends a bracing detail for gable trusses consisting of a brace back into the roof assembly that ties into the next two trusses back from the wall. A metal strap on the face of the wall helps to tie the members together.

There's another good way to improve the strength of the gable end: Don't use a gable end. Instead, design the house with a hip roof. Field investigations and laboratory studies have shown that hip roofs perform significantly better than gable-end roofs in high-wind events.

Now we're at the walls, the next link in the load-path chain. Here, APA recommends continuously sheathing with wood structural panels. Said Uher: "A whole box is stronger than parts of a box." As for thickness, APA recommends using 7/16-inch-category structural panels (code only requires 3/8-inch-category panels for braced walls, Uher said, but most builders nationwide are already using 7/16 inch). For nailing, APA recommends a similar pattern to the roof sheathing: 4 inches on-center on panel edges and 6 inches on-center in the field. Common nails are fine, said Uher; ring-shank or spiral-shank screws

In the photos here, walls have parted company with the foundation at the sill plate. An intact wall lies on the ground after separating from the sill **(5)**. A sill plate sits attached to the foundation where a wall separated from it **(6)**; sheathing was not nailed to the sill. And a wall has slid off the sill **(7, 8)** where non-structural sheathing pulled away from the sill.

don't make much difference in a shear wall, where if fasteners were to fail, it would be in bending, not in withdrawal. But it's important to remember that 4-inch nail spacing is recommended not just at the edges of panels where the panels break on a stud, but also at the top and bottom plates. "We need them around all four sides," said Uher.

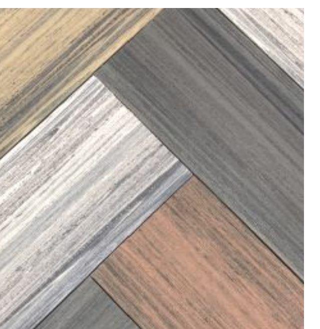
In two-story homes, it's important to consider how upper-story and lower-story walls are tied together. Metal straps are one option. You can also simply span between upper and lower walls using structural sheathing. Or, you could use a threaded-rod system such as the Go-Bolt to connect multiple stories all the way from the upper-story top plate down to the foundation.

Although Go-Bolt was an early originator of the threaded-rod concept as codes toughened in Florida after Hurricane Andrew, there's a lot of competition in the industry by now. Simpson Strong-Tie offers a system called Strong-Rod, and MiTek supplies a system called the Z4 Tie-Down System.

When you reach the bottom of the lowest-story wall, it's time to tie the base of that wall to the foundation. Here, APA recommends tightening up anchor-bolt spacing from the code-required 6 feet on-center to a closer 36- to 48-inch spacing. Anchor bolts should be installed with 3-inch-square washers to prevent failure of the bottom plate in cross-grain bending.

And, Uher emphasized, there's no point in making a strong connection between the sill plate and the foundation if the wall isn't firmly connected to the sill plate. "We've seen that a couple of times, where they'll have anchor bolts, and they'll have their sheathing tied to a sill plate, but then the sill plate the sheathing is tied to will just be nailed into the sill plate that's anchored to the foundation," said Uher. "It's really important to finish that chain and nail your sheathing to the sill plate that has the anchor bolts in it."

Ted Cushman is a senior editor at JLC*.*



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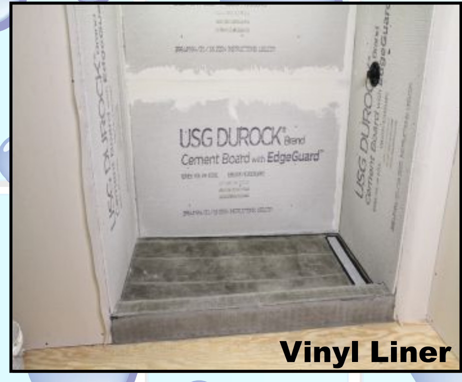

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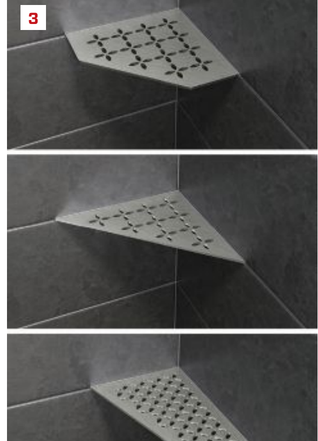
BY SYMONE GARVETT



1. Modern Window Collection
Marvin Windows and Doors has introduced Marvin Modern, a new line that incorporates a modern-style frame with a high-density fiberglass exterior and aluminum interior. All frames maintain a sight line of less than 3 inches, even when multiple panes are mulled together. Frames are available in ebony, bronze, anodized/silver, gunmetal, or stone white, with an option to split interior and exterior finishes. The line currently includes a Multi-Slide Door and Direct Glaze Window and will expand to include casement and awning windows this year. Contact a local distributor for pricing. marvin.com

2. Crystal Door Knob
Nostalgic Warehouse's Round Clear Crystal Knob features a minimalist circular shape that magnifies the facets beneath. The manufacturer says the door knobs are made with lead-free crystal and are suitable for both interior and exterior doors. The knobs can be paired with a variety of backplates and finishes to create customized looks. Pricing for the knob with plates ranges from $125 to $175. nostalgicwarehouse.com

3. Stainless Shower Shelves
The 5/32-inch-thick brushed stainless steel Schluter shower shelves are made to fit between rows of shower tile, and do not require additional materials or tools for installation. The rectangular Shelf-N fits inside Schluter's Kerdi-Board-SN shower niche; the Shelf-E's three configurations (shown) are made for corners; and the Shelf-W stands alone between tile rows. The shelves complement Schluter's Style shower grates, and curve and floral patterns match the point and linear drains with the same designs. Pricing ranges from $85 to $130. schluter.com

4. Pop-Up Outlets
Doug Mockett & Company aims to add electrical function and convenience to countertops with the PCS34 Kitchen Power Grommet. To access the three electrical outlets, users simply pull up on two metal handles. When finished, users press the release button to drop the unit back down. While closed, the lid sits only 5/8 inch above the surface, and a clear rubber ring around the top creates a watertight seal, according to the manufacturer. It is available with clear, black (shown), or satin aluminum trim rings. Prices start at $135. mockett.com

5. Matte Black Faucets

Lenova's newest kitchen faucets, the SK222 and K410, are also the first to offer its new matte black finish. The manufacturer says that its proprietary PVD processing makes the finish durable and easy to maintain. Both faucets are made from 304 stainless steel and feature an arched profile, a two-function sprayer, 360-degree swivel spout, and side control lever. The K410 has a rounded cross section, while the SK222's (shown) is angular. Pricing ranges from $325 to $425. lenovasinks.com

5

6. Smart Ceiling Fan

The new Nirvana Smart Fan is the latest in Modern Forms' collection of Wi-Fi-enabled smart fans. With the Modern Forms app or integrated third-party platform, users can control the fan's speed and luminaire, set schedules, and create multiple user accounts. Voice assistants may be used to turn the fan on and off, set its speed, reverse the blades' rotation, or dim the luminaire. Local control options include a scalable RF wall panel control, with additional wall controls available. It comes in four finishes: glossy white, koa, matte black (pictured), and titanium silver and is suited for both indoor and outdoor use. Pricing starts at $334. modernforms.com

6

7. Flashing Tape

Tamko Building Products' latest flashing membrane, TW Flash-N-Wrap Pro, is designed to protect exposed entryways and windows from moisture and air penetration. According to the manufacturer, the new tape ensures a tight seal around windows and doors, and it can be left exposed for up to 180 days. The adhesive side has a treated release film. The tape comes in 4-, 6-, and 9-inch rolls. Pricing varies by region. tamko.com

7

8. Smooth Siding

Based on customer demand, LP Building Solutions has launched a smooth finish in its SmartSide siding collection, appropriately called Smooth Trim & Siding. The latest addition has a light, uniform appearance, along with the durability of treated engineered wood. SmartSide Smooth is manufactured with the company's four-component SmartGuard process, which the manufacturer says helps materials resist termites and fungal decay and provides long-term strength in a variety of weather conditions, including moisture, hail, freeze-thaw cycles, and up to 200-mph wind gusts. Contact a local distributor for pricing. lpcorp.com

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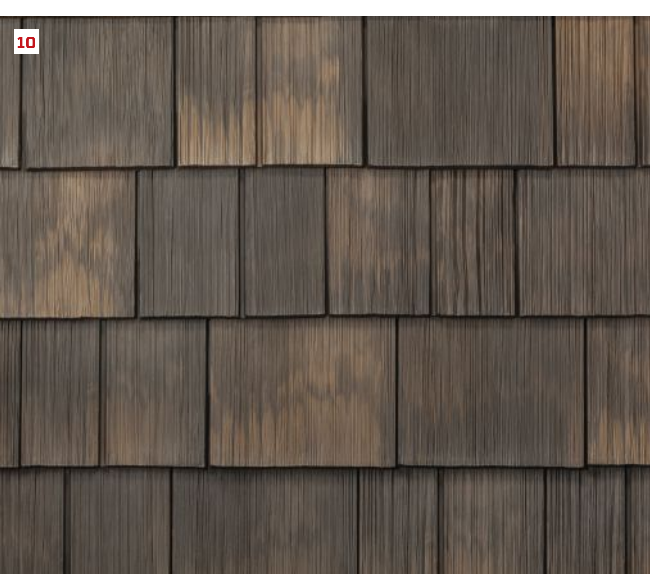
PermaBase CI
Cement Board



9. Insulated Cement Board

PermaBase CI Insulated Cement Board was created to provide durability and insulation in one lighter-weight package, says National Gypsum Co. PermaBase CI combines structure, insulation, and waterproofing, reducing the number of times a crew has to circle a house to prepare the exterior for cladding. It does not purport to provide an air barrier. It's approved for adhered veneer finishes such as manufactured and natural stone, thin brick, and tile, as well as direct-applied coatings of synthetic stucco. Prices set by distributor; expect to pay about $2.50 to $3 a square foot. nationalgypsum.com

10. Composite Siding

DaVinci Roofscapes seeks to replicate the look of cedar shakes in its new line of composite siding, Hand-Split Shake Siding. Each "shake" is 18 inches tall and 5/8 inch thick in either 8- or 10-inch widths, with the 10-inch option simulating 4- and 6-inch shakes placed side by side. The siding is made with virgin resins, UV and thermal stabilizers, and a fire retardant and is available in eight colors. Contact a local distributor for pricing. davinciroofscapes.com

11. Well-Lit Garbage Disposal

Moen's EXL100C garbage disposal is equipped with six motion-activated LED lights to illuminate the space under a kitchen sink when the cabinet door is opened. The lights provide up to 75 lumens of output, and a positionable motion sensor has a front-facing battery compartment for easy replacement. The disposal runs on Moen's 1-hp permanent magnet Vortex motor and has SoundShield insulation. The EXL100C attaches with Moen's Universal Xpress Mount, which fits all Moen assemblies and most existing three-bolt garbage-disposal mounts, along with an open dishwasher inlet that installs without tools. Prices start at $660. moen.com

12. HD Video Doorbell

The Nest Hello video doorbell's HD video camera allows homeowners to see a live stream of their front door at any time, plus snapshots from up to the last three hours of recording. The 4:3 aspect ratio camera shows people at the door from head to toe, as well as packages on the ground. Even if the doorbell is not rung, homeowners can receive alerts when a person or package is at the front door, through a smart device, Google Home console, or Google Chromecast Ultra, and can hear and speak to visitors through the unit's speaker and microphone. Pricing starts at $200. nest.com

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Deep Bench

BY MARK CLEMENT

The first thing I set up on any job is a work table. It's nothing fancy—usually just two or three 2-bys and sheet of plywood—but it is the nexus of all the work I do moving forward. I also use foldable tables from time to time and deploy them as needed. Sometimes, I mount the miter saw to the big table, with in-feed outfeed support (2x4 blocks on edge work pretty well) for long boards screwed to the plywood.

Other times, I use it as an actual bench on which I would put, pile, or mount, or use in conjunction with, any number of tools from jointers to routers and as a place for coffee, keys, chargers, multiplug, file folders with jobsite docs, my phone, and the like. Otherwise, that stuff ends up where I can't stand it—everywhere. To that end, here are some tools that might make a bench-top, whatever it may actually be, better.

Worx Bench

The Worx Pegasus Folding Work Table and Sawhorse could not possibly come from a more DIY, infomercial manufacturer. Manufacturers send me things, and this appeared on the doorstep one day and I was pleasantly surprised.

I forget the original job I used it for, but the table itself is solidly built. Though I eventually threw the table's DIY clamps out, this table's design and features are extremely well built. It folds and unfolds solidly. It collapses into a compact-enough shape to not take up too much space when not in use, and it's just the right height to be outfeed for my table saw. I also found it ideal for cutting Rockwool insulation. The Pegasus is just the right size (31 by 25 inches) and working height (32 inches) to support the shorter stone-wool batts that are cut with a bread knife. Any time I can stand up to work or support hard cuts with a tool that stores easily, I'm a fan.

worx.com // $120

Four Flavors of Impact

Makita's new XDT16 18-volt impact driver doesn't just look fully-featured; it's overflowing with features. I'm pretty happy with the forward/reverse switches on my impact drivers, but Makita has so many features in what it's calling the most compact and lightest weight impact driver in its category, that I'm not sure it's in the category. The driver has an Assist Mode for minimizing cam-outs and cross threading longer fasteners; Tightening Mode 1 for self-tappers; and Tightening Mode 2 for self-tappers in heavier gauge metal. It has four speeds. And a work light. It all runs on Makita's 18-volt battery system. It even has "Extreme Protection Technology," which is reportedly a series of integrated seals engineered to channel away dust and water for increased durability. My only question is what else can the company add to the driver a year or two from now when it wants to upgrade the tool? Maybe combine it with its coffee maker.

makitatools.com // around $180

Slide to the Left, Slide to the Right

While my main chisel-use is to blast into a PT joist to pry the wane out of a deck board, I appreciate a sublimely sharp tool—which mine is not. Lacking in the skill, patience, or coordination to resharpen my edge tools, I basically just don't. However, the M-Powertools Fastrack jig might get me there. Screwed down to a bench-top, this jig positions the iron against the stone. Sliding back and forth (in a dovetail aluminum channel the precision of which should make any craftsman happy) leads to a sharp edge. Used with the company's Diamond Cross stones, you can make even the most beat-down chisel shine with sharpness.

m-powertools.com // $80

Water Table

In my informal survey of tool-store shelves, tile saws seem to be either fully-featured, water-cooled piles of awesome or rattle-trap store brands. There is very little occupying the middle of the road. Porter-Cable's new PCC780LA 20-volt Max 7-inch Table Top Wet Tile Saw seems to fill that void. (Craftsman, too, which is owned by the same parent company, seems to have inherited some DNA from the Stanley brands. I've made a few cuts with the Craftsman version, and for occasional tile jobs, it seemed to cover most of the bases.)

Many years ago, Porter-Cable had a corded tile saw with a curvy armature and what amounted to a vertically mounted angle grinder, and I cut a decent amount of tile with it. This one is considerably better; it is lighter (27 pounds) and smaller, has no cord to bend a drip loop into, and has a carry handle (aka "roll cage," according to Porter-Cable). The sliding table delivers 17 inches of on-table cutting capacity, which means you can cut a 12-inch-by-12-inch tile corner to corner. It includes on-board miter square and splash guards.

portercable.com // around $200

Mega Miter

A miter saw and bench are usually the nexus of my jobsite setups. And while we could fill up a mile of pixels @the_tools_show (our presence on Instagram) lamenting features that have come and gone from miter saws over the years, I'll be all set if I never lug a 12-inch slider up a winding staircase again. I like using them, sure, but finding a way to carry them without gouging the walls and my knuckles isn't easy. I'm not sure I've picked up the current miter saw I have the same way twice. The cord never seems to want to re-wrap the same, and I can't get my fingers under the deck to lift it.

Jet, in what looks to be a sensibly feature-rich 12-inch slider, seems to have heard my complaints. The first in its list of features on the website is "multiple carry handles allow for convenient portability." And, on closer look, it appears there's more to like. For instance, the rails are covered. This will keep sawdust out, of course, but it'll also hold off rain or snow should that be something you contend with. It's got a cord wrap. (Yes!) The knobs look easy to manipulate, and I'm partial to the horizontal D-handle configuration.

The unit also features Jet's Xacta green laser guide, which the company says is easy to see even in outdoor applications. While I'm partial to louvered guards, this one is clear, which I think is the next best thing.

jettools.com // $800

Mobile Workshop

Even if you are not bleeding black and green, I think this mobile workshop is Indy Car–level cool. It has a workbench and tool storage. On wheels! What a great concept. While this isn't yet for sale as I write this, you will be able to buy it someday for $650; some retailers are currently accepting pre-orders.

The MW 1000 is compatible with all accessories for Festool's MFT multifunction table including guide-rail supports, parallel guides, quick clamps, and more. The unit measures 25 1/4 by 23 5/8 inches and is 46 inches wide. It has a none-too-shabby load capacity of 220 pounds. Set up, the table is 17 1/2 by 14 1/4 inches with a work height of 35 1/2 inches. It weighs in at 68 pounds.

festoolusa.com // $650

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BY JOSH EDMONDS

Let There Be Light

Here's an easy solution to jobsite lighting. Like many builders, we have used light strings during framing and mechanical rough-in, when it's simple to hang the lights on framing. We use 100-foot strands with 10 lights spaced 10 feet apart, and use LED lamps because they're more durable. But during drywall, taping, and painting, it's not so easy to hang them. We (and many others) have tried laying light strings on the floor, but that doesn't work so well—they get stepped on and provide poor light. Enter spring-loaded dust-wall poles. These keep string lights off the ground without putting holes in the ceiling. Quick and easy, but a great solution.

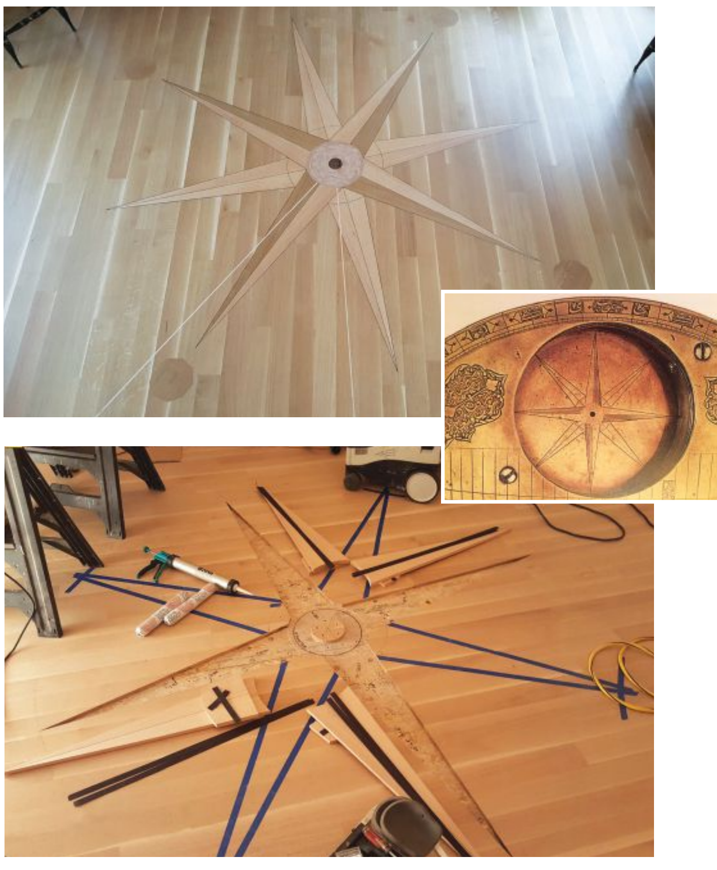
Josh Edmonds runs Simple Integrity, a design-build firm specializing in high-performance homes and historic renovation, based in Cooperstown, N.Y.

Send us your tips: *JLC*, in partnership with our sister publication *Tools of the Trade* and Milwaukee Tools, is giving away a power tool each issue to the reader who sends us the most ingenious or most useful trade tip. Next month, we'll give away a Milwaukee USB RedLithium battery-powered Redstick Digital Level (see photo, right).

Send tips to JLC-Editorial@hanleywood.com with "Trade Tip" in the subject line. Any building trade qualifies. Don't sweat the grammar or writing. But please send us high-quality photos to explain your tip.

Photos: Josh Edmonds

BY HOWARD BRICKMAN



Inspired by a 17th century brass map (inset), this compass rose is the focal point of an eight-sided room. The author inlaid the compass points in contrasting woods and veneer. The center is a spiral of end-grain maple with a walnut burl center.

Dead Reckoning Craftsmanship

This project started as a consulting assignment. The architect, Donald Grose, called me in to evaluate the wood flooring that was being supplied for a client's new home.

While walking through the house, we entered a well-lit octagonal room located at the far end of the house. Donald explained that the room would remain essentially unfurnished and be used for meditation. He also mentioned that the clients were going to buy a factory-made medallion as a focal point for the center of the room. As a former Air Force navigator, I have a special affinity for compass roses, and I thought that this would be a perfect spot for one.

At Donald's urging, I mentioned my idea to the client, and after much discussion and research by the client, we were given a picture of a compass rose on a brass map from the 1600s. Working off the photo, Donald created a scaled drawing of the compass rose. The client asked me to make the compass rose look as close to the drawing as possible. Donald also generated a 6-foot-diameter paper template that we set on the subfloor in the proper orientation so that the flooring installers could make sure there were no nails where we needed to cut out flooring for the compass.

The flooring in the room was to be rift- and quarter-sawn white oak. I selected several boards of rift-sawn red oak and darker quarter-sawn white oak for fabricating the points of the compass and purchased some veneer sheets dyed black for the lines. I made the center circle with end-grain maple that spiraled inward to a dark center. That piece I cut out of a burly spot in a board that I had noticed near my work area in the client's basement. The client told me that the board was milled from the crotch of an old walnut tree on the property that had been struck by lightning. For the directional letters, I got help from Jim Garth, of Decorative Flooring. He laser-cut the letters, inlaid them in polygons, and provided a template for me to rout out and drop in the letters at the four points.

The compass rose took a couple of months to complete, and it was the finishing touch in the home. The drawing and the actual compass rose turned out to be a close match. It was a real pleasure to work with a client and architect who came up with such a well-defined design and who had the patience to let me work through the details.

Howard Brickman is a flooring contractor and consultant based in Norwell, Mass.

Photos by Howard Brickman

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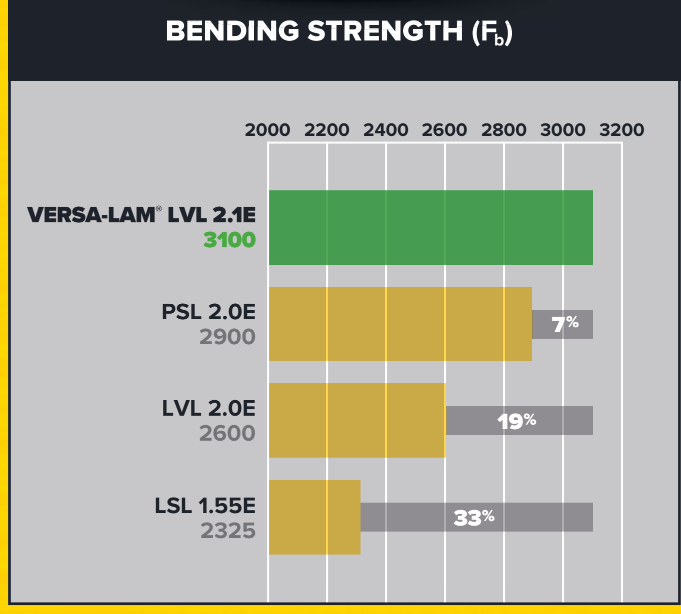

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