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PAGE 68

• Systematic
approach to
window trim

PAGE 60

• Roofing
to resist
the wind

PAGE 46

• Build a
backyard
cottage

PAGE 54



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Rendered in Chief Architect.
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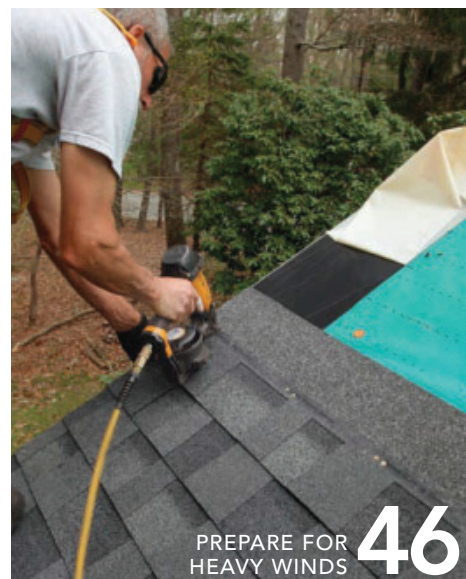
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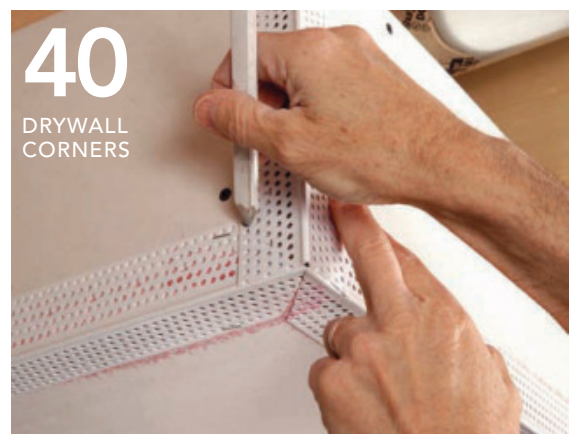


60
BENCH-BUILT
WINDOW TRIM



PREPARE FOR
HEAVY WINDS

46



40
DRYWALL
CORNERS

40 Crisp Corners for Drywall

The right way to install metal, vinyl, and paper-faced corner beads

BY MYRON R. FERGUSON

46 Nine Upgrades to Windproof Your Roof

Nail down the details to keep asphalt shingles where they belong

BY MIKE GUERTIN

54 Small-Home Harmony

Tight space restrictions, unique cultural requirements, and the desire to age in place informed this compact, efficient design

BY MATT COFFEY

60 Precision Window Trim

A systematic approach ensures better joints and a faster installation

BY ANTHONY VITALE

COVER STORY

68 Frame Walls Plumb and Straight

Following these steps will make the rest of the build easier

BY BRIAN MCCARTHY

SPECIAL SECTION

72 **FineHomebuilding** HOUSE

This high-performance house embraces local materials, modern lines, and the craftsman's hand

BY MELA BREEN



54 AGE IN PLACE
IN STYLE



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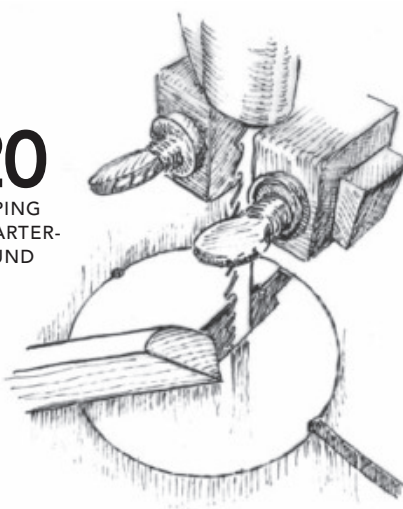
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IN EVERY ISSUE

- 8 **FINEHOMEBUILDING.COM**
- 10 **CONTRIBUTORS**
- 12 **LETTERS**
- 18 **TIPS & TECHNIQUES**
 - Appliance sled
 - No-fall drywall
 - More-accurate molding
 - Great grout spacers
 - Prevent clogs in spray-paint cans
 - Easy-read wire strippers
- 22 **KNOW THE CODE**
 - Electrical outlets by the numbers
- 28 **TOOLS & MATERIALS**
 - Cordless sliding miter saw
 - Cold-weather bibs
 - Air-sealing system
 - Beam saw
- 36 **DESIGN/BUILD**
 - Gable-end eave design
- 80 **HOUSES BY DESIGN**
- 84 **ASK THE EXPERTS**
 - Dry joints in brick walls
 - Re-side over lead-tainted siding
 - Sweaty register grilles
- 88 **BUILDING MATTERS**
 - Climate change for builders
- 94 **AS-BUILT**
 - Starting steps
- 98 **KEEP CRAFT ALIVE**
 - Alex McKenzie, carpenter and furniture maker

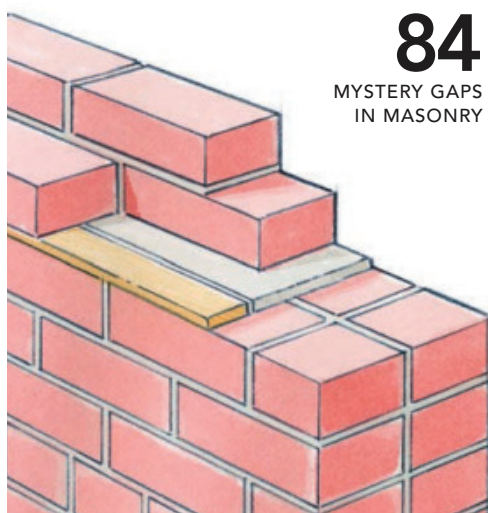
20

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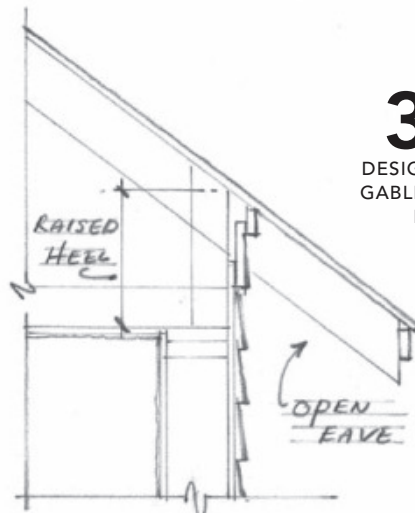
84

MYSTERY GAPS
IN MASONRY



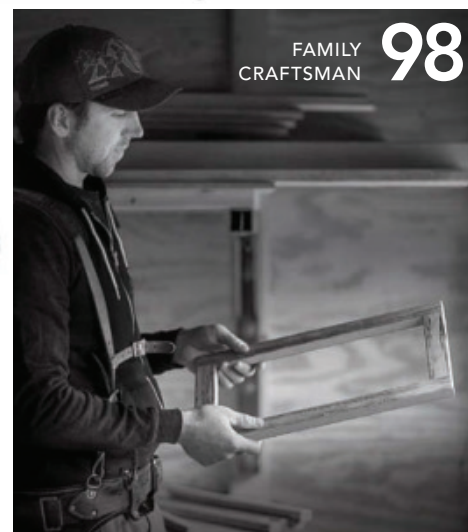
36

DESIGNING
GABLE-END
EAVES



98

FAMILY
CRAFTSMAN



BIG-TIMBER
SAW **34**



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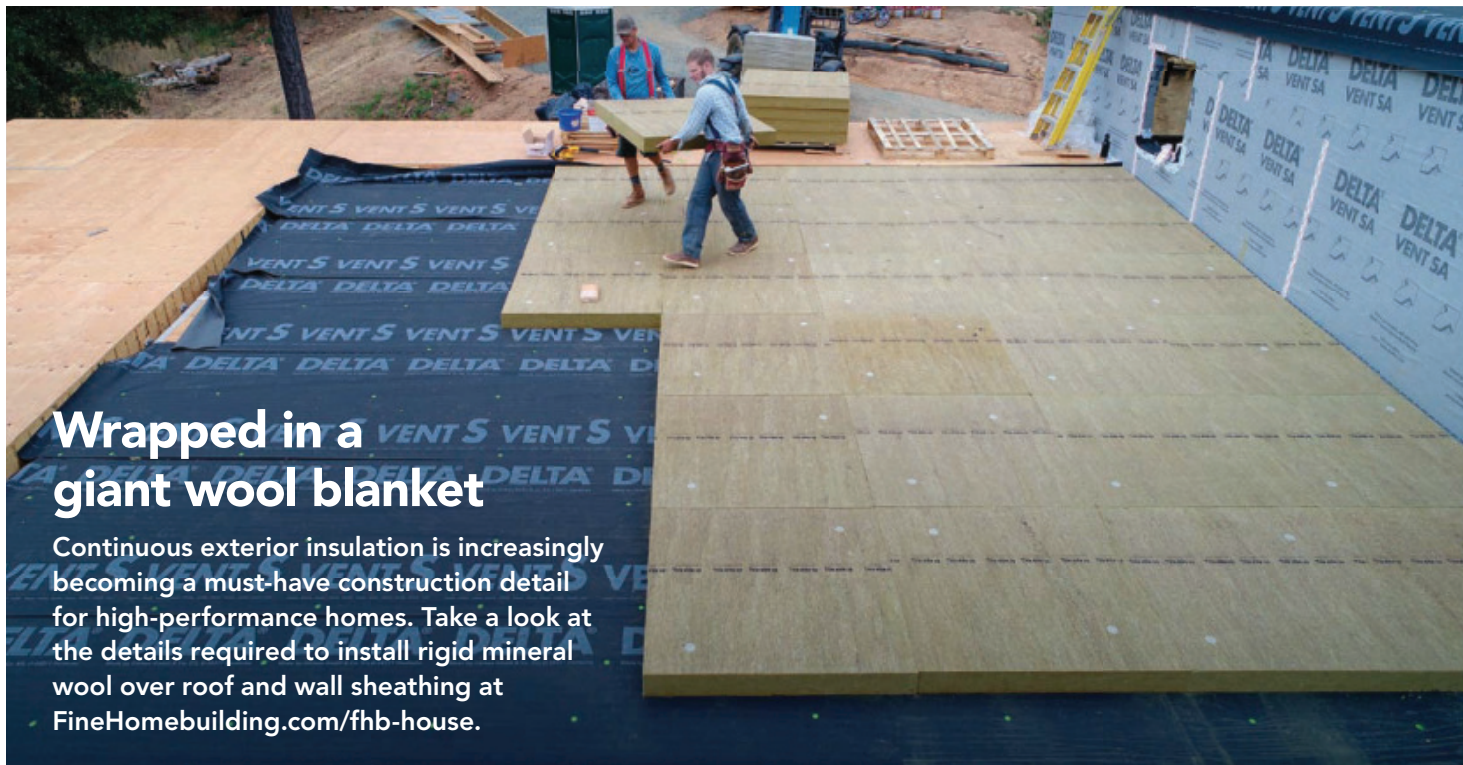
ON THE COVER Carpenter Chris Brown frames walls with care to make the next steps in the build easier. See the article on pp. 68-71. Photo by Patrick McCombe.

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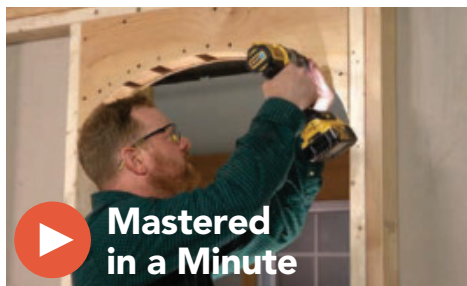


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Wrapped in a giant wool blanket

Continuous exterior insulation is increasingly becoming a must-have construction detail for high-performance homes. Take a look at the details required to install rigid mineral wool over roof and wall sheathing at FineHomebuilding.com/fhb-house.



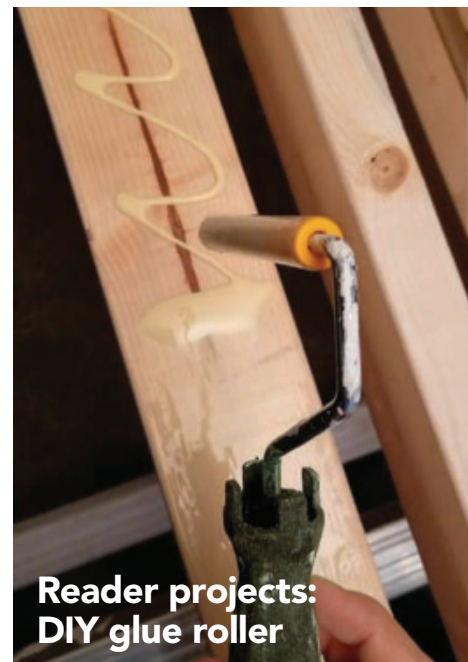
Mastered in a Minute

Adding an arch to a doorway is a great way to bring architectural interest to a room. Give us a minute, and we'll show you how to frame it.



Episode 147: Building a garage workshop

The editors debate the pros and cons of stemwalls, monolithic slabs, and pole barns to help a listener design a new outbuilding.



Reader projects: DIY glue roller

We wouldn't have many home-building lessons to teach if it weren't for all of the crafty contractors and savvy homeowners out there getting things done. If you've got a great tip you'd like to share, post it at FineHomebuilding.com/quicktips.

Modern Craftsman in the mountains

With its clean and rugged stonework and massive cedar posts, this house in Asheville, N.C., is the epitome of the "mountain modern" style that is gaining popularity across the country. Find more photos of it and other inspiring homes at FineHomebuilding.com/design.



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contributors

THE VOICES OF EXPERIENCE



MATT COFFEY ("Small-Home Harmony," pp. 54-59) grew up as his father's carpentry apprentice. After completing Wentworth Institute of Technology's architecture program, he became a LEED-AP and pursued further education at Ecosa Institute, the Glenn Murcutt Master Class, and with the Biomimicry Guild. Buying a zero-net-energy home deepened his appreciation for high-performance design and led him to South Mountain Company, where he is a co-owner.

NATHAN RINNE ("Tools & Materials," p. 28) is the owner of Rinne Trimcraft in central Missouri. A sixth-generation carpenter, he learned the trade at a young age from his father and grandfather. Nathan went on to focus on custom carpentry and design, crafting elaborate pieces on-site that would normally be relegated to the shop. He has been featured in a host of local and regional magazines. You can view his work on Instagram @rinne_trimcraft.



Trim carpenter **ANTHONY VITALE** ("Precision Window Trim," pp. 60-67) is owner of Probuilt Woodworking in Clinton Township, Mich. He grew up in his family's stairbuilding and custom-millwork business, where he worked summers starting in his early teens, and he has been a full-time carpenter since finishing school in 2004. He works mostly in southeast Michigan and has won a handful of Detroit Home Design Awards for interior trimwork.

BRENT HULL ("Ask the Experts," p. 84), owner and president of Hull Historical, is a nationally recognized authority on historic design, architecturally correct moldings, and millwork. He remodels historic homes, crafts custom millwork, and builds new homes based on historic traditions. The recipient of five John Staub Awards for classical architecture in craftsmanship and historic restoration, he is president of the Texas chapter of the Institute of Classical Architecture & Art.



write an article

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Opinions and approaches may vary

I just finished the *Kitchens & Baths* issue (*FHB* #279), which was great. However, I did notice that "Houses by Design" (p. 84) shows a kitchen where the designers filled the space above the wall cabinets—a good 6 in. or so—with a large cornice to match the height of the adjoining ceiling beam. Then in "Design/Build" (p. 89), author Marianne Cusato says that cornices on kitchen cabinets should be no larger than 2½ in. This struck me as a little odd, and it seemed like a slight dig to the designers featured in "Houses by Design."

—RAYMOND MACKENZIE
via email

Editorial director Justin Fink replies: We get this type of comment periodically from readers wondering why a piece of advice, an opinion, or a technique in one issue of *Fine Homebuilding* contradicts the advice, opinion, or technique presented in a different issue. In this case, the conflicting information had only a few pages in between. That's a bit closer than I would like, and I can understand why it caught your attention—it should have caught mine. That said, I'd file this example under my favorite mantra: "First, learn the rules. Only then should you consider breaking them." Marianne Cusato shared the "rule," and the kitchen designers shared an instance of breaking it.

This example offers a good opportunity for a more general reminder. *FHB* is in the business of inspiring and aiding designers and builders in the pursuit of exceptional craftsmanship. It's not too often that you will see us point to a single example as the only way to do something, and when that does happen, it's usually more a case of overwhelming expert consensus than editorial agenda. If one carpenter copes shoe molding and another miters it, we want you to hear from both, and it's our job to make sure you understand why each thinks their method is the right way. That constant challenge to our ways of thinking is how we grow as designers and craftsmen, and I'd wager that it's what keeps most of you interested in picking up each issue in the first place.

I embrace the discussion and even the arguments (and I expect a lot of both on the heels of our latest "Building Matters" on pp. 88-92). In writing this letter, I'm reminded of the aftermath surrounding a piece I wrote for *FHB* in 2005, my first year with the magazine. The article, which compared vent-free and vented gas fireplaces, generated some strong opinions. The very first letter we got was from an advocate of vent-free appliances, who was annoyed that I had been so critical of what he considered to be a perfectly safe technology, citing its use in millions of homes. The letter that immediately followed was from a different reader, this one furious that we would waste even a single word discussing vent-free appliances, which he claimed were an unparalleled hazard to indoor-air quality.

I was sure I would be fired. I remember my editor standing in my office with printouts of each letter in his hands. I sat there squirming as he read the first letter, and then the next. Finally, he looked up at me and said, "Looks like we did our job."



Where theory meets practice.
Rules of space, proportion, and style are critical to good design work, but we must also know when it's OK to break them.

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To wrap or not to wrap

In *FHB* #280, the author of “Wallpaper the Right Way” recommends wrapping outside corners during installation. After hanging wallpaper for more than 40 years (admittedly, not professionally), I can’t

My concern is the mixed messages I’m getting related to low impact and “being green.” On one hand, you have excellent in-depth articles that talk about low impact, zero net energy, minimalist design, etc. Then you have an article about an

to this is the building code itself. With very specific methods and materials described in the code, it’s difficult for creative alternatives to get out of the inventor’s garage. Miles of red tape and tens or hundreds of thousands of dollars keep all but the largest players from testing and gaining code approval for anything new.

I know what you are thinking: “This process keeps us safe from untested designs and materials.” Yes, it does. It also virtually eliminates serious innovation. I’m not suggesting we abolish the code, just that we simplify it and reduce the barriers to entry for new participants. Why does the code specify that rooms must be a certain minimum size? Let the free market decide the answer to that question, and only put what is absolutely necessary to keep construction safe in the building code.

—STAN SPENCER
via email

“Miles of red tape and tens or hundreds of thousands of dollars prevent all but the largest players from testing and gaining code approval for anything new.”

imagine a more wrong way. The article says that the technique is appropriate “as long as the paper remains plumb after wrapping the corner.” For the paper to remain plumb, the corner would need to be plumb—a rarity. In my view, it is almost essential to follow the time-honored technique of cutting every corner, inside and out, then beginning anew with a plumb strip of paper after each turn. It gives the hanger a perfectly plumbed starting point on every wall. The author’s suggested technique will almost always result in the paper’s pattern creeping up or down the wall with successive strips.

I also question the recommendation that installers cut all the strips of paper before they start. While that “efficiency” is great for a pro, I don’t recommend it. It’s better to cut one piece at a time and avoid costly mistakes.

—CHRIS MOLANDER
via email

Asian-Craftsman kitchen that uses large quantities of Macassar ebony and wenge (“Out of Sight,” *FHB* #279). Macassar ebony and wenge are *both* on the International Union for Conservation of Nature Red List. This basically means that they are threatened, that they have experienced high levels of reduction over a few generations, and that continued harvesting is not sustainable due to slow growth, habitat loss, etc.

I need to call you out on this. You have good writers, good editors, and good illustrators, all reflecting excellent people in the residential building trades. But this is a bit of a discrepancy.

—PAUL NOVELLI
via email

Building codes block innovation

I am writing to give an alternative perspective on the building code, as referenced in the “Know the Code” column about the recent changes to accommodate tiny houses (*FHB* #278). It is generally felt that the rate of technological innovation in the building industry is moving at a snail’s pace when compared with innovation in most other industries. I suggest that one of the largest contributors

Painting is inevitable

I discovered your magazine at the public library in Pensacola, Fla., and have perused it over the last couple of years. Reading Scott McBride’s evolution of roofing (“As-Built,” *FHB* #278) was the first time that I ever laughed out loud. It sounds as if Scott is about my age (62) and has traveled some of the same paths. I always warned my helpers that “paint attacks,” which is why I have worn what I consider to be disposable clothing (Walmart jeans and nice thrift-store shirts) for many years despite my income level. No matter what job I was called to do, the “While you’re here . . .” profit center always seemed to light up, and I would end up doing some painting.

—KYLE THORSON
via email

your safety

Home building is inherently dangerous. From accidents with power tools to falls from ladders, scaffolds, and roofs, builders risk serious injury and even death. We try to promote safe work habits through our articles. But what is safe for one person under certain circumstances may not be safe for you under different circumstances. So don’t try anything you learn about here (or elsewhere) unless you’re certain that it is safe for you. Please be careful.

—JUSTIN FINK
editorial director

Mixed messaging

I recently began subscribing again to *FHB* after perhaps three decades of absence (I was an original subscriber). It is still an excellent magazine, though it obviously caters to the highest of the high end of things.



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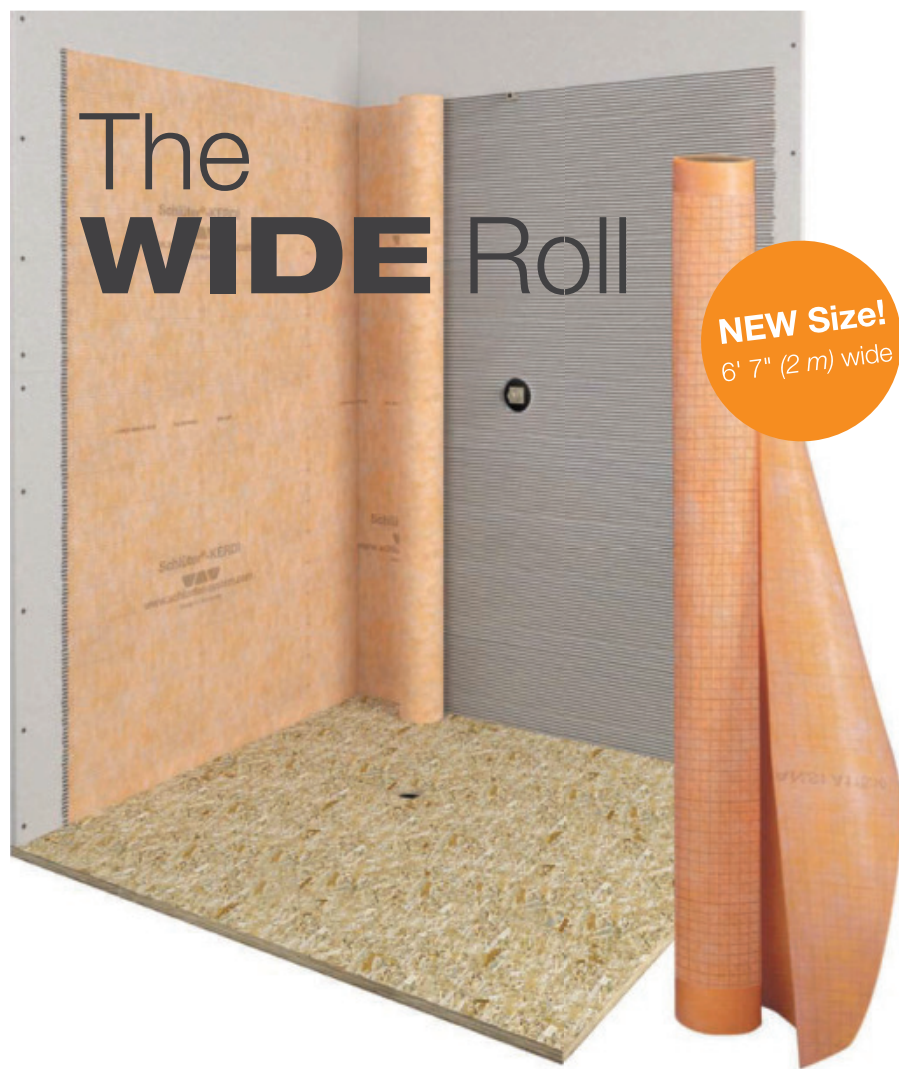
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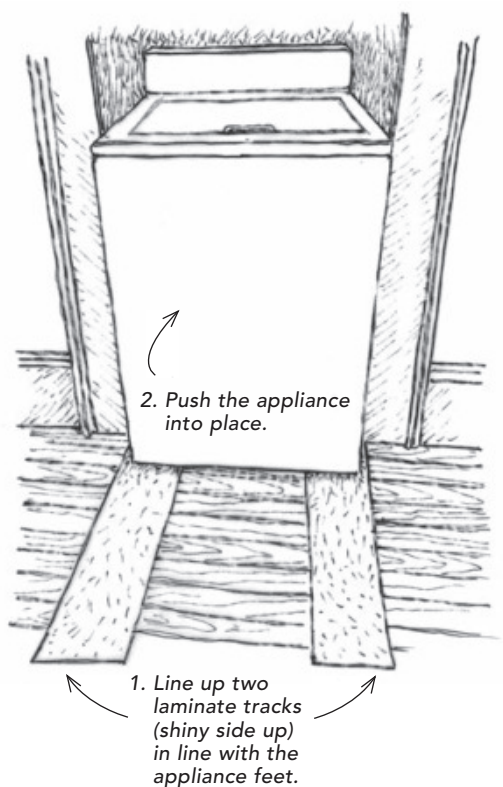
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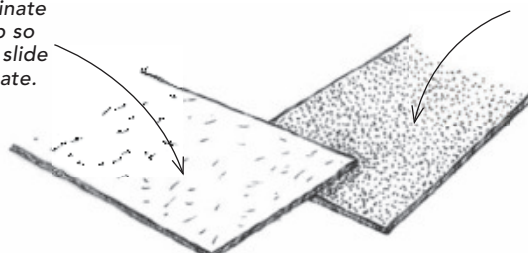
Appliance sled

When I need to slide an appliance into a tight space, I take two pieces of plastic laminate—the kind used for kitchen counters—about 4 in. wide and 6 ft. long. Usually I turn the shiny, slippery side up. I place the strips so that they line up with the appliance's feet, creating two tracks into the appliance space. Then I put the feet on the strips and slide the appliance into place. I tilt the appliance slightly to the right or left to free one of the laminate pieces, and then I do the same on the other side. Recently I had to slide a 24-in.-wide stacked washer/dryer into a 24½-in. space. This unit had rubber pads on the steel feet that would not slide on the finished oak floor, so I put the shiny side down and positioned the two strips directly under the appliance feet. The laminate slid easily on the clean floor, and I removed the strips as usual.

—STEPHEN BEESE
Winston-Salem, N.C.

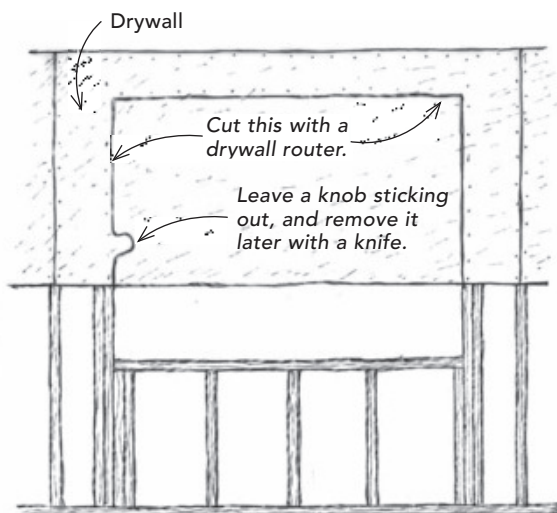
With steel appliance feet, turn the laminate shiny side up so the feet can slide on the laminate.

With rubber pads on the feet, turn the shiny side down so the laminate can slide on the floor.



submit a tip

Tips & Techniques is a forum for readers to exchange information about methods, tools, and jigs they've devised. We'll pay for any we publish. Email photos and a description to us at fh@taunton.com, or upload them to FineHomebuilding.com/reader-tips.



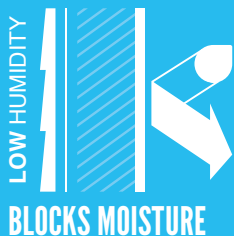
No-fall drywall

Whenever I used to rout drywall for a door or window opening, the piece I was cutting always fell before I could get to the end of the cut, tearing the drywall and sometimes hurting my toes. To prevent this, I now leave a little knob sticking out in the piece I am cutting. The piece won't fall because the knob holds it there. Once the waste piece and my router are safely on the floor, I cut off the knob with a utility knife.

—RICARDO MARTINO
Ghent, N.Y.

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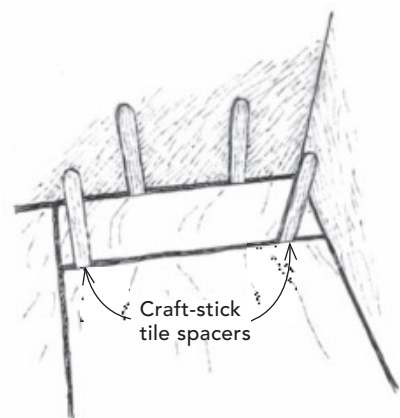
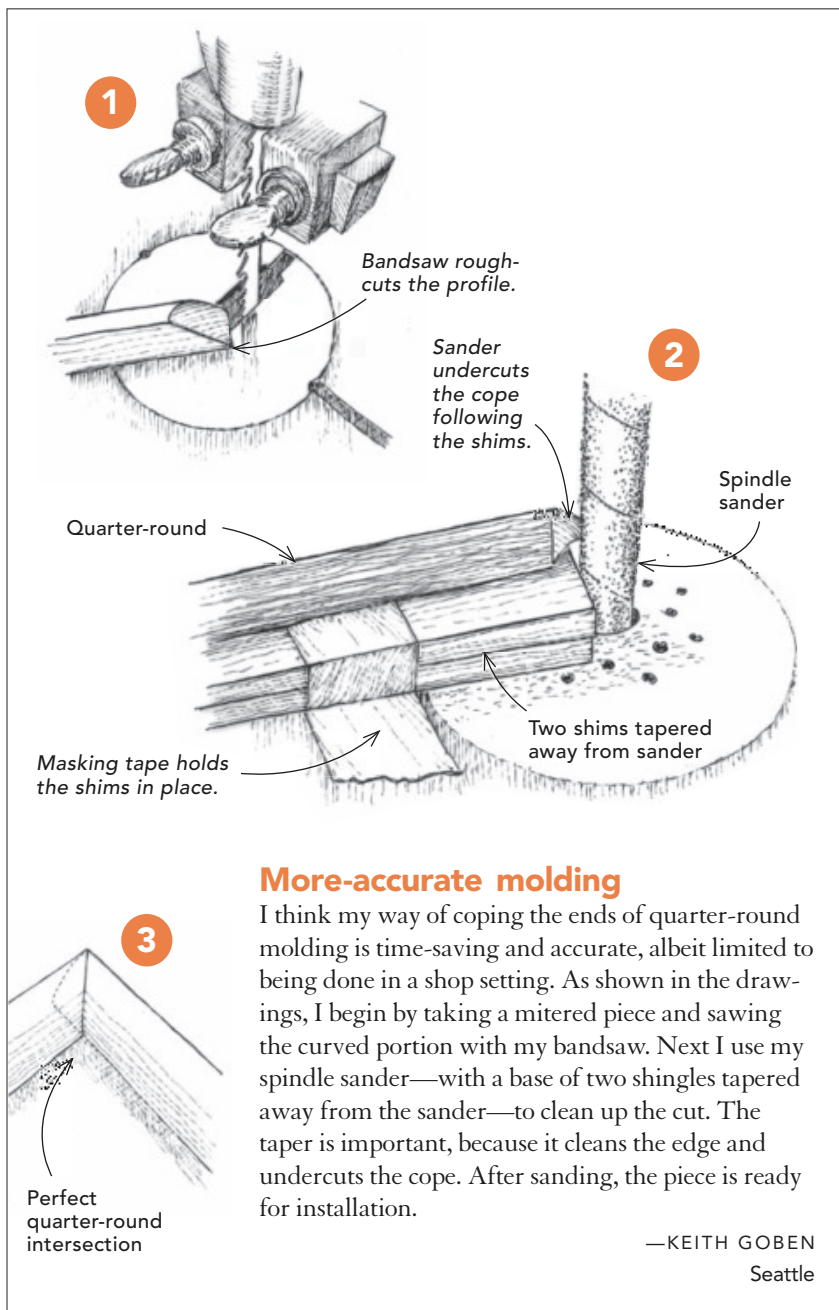
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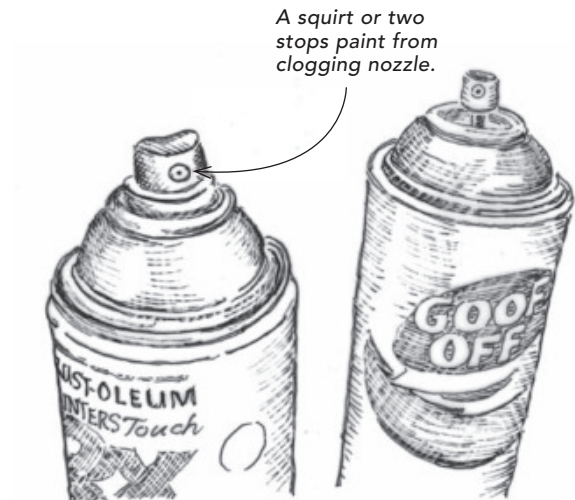
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Great grout spacers

When installing ceramic floor tile, a lot of people use 1/8-in. tile spacers to maintain grouting space. These spacers are small, hard to handle, and must be sliced to fit against a wall. I like to use Popsicle sticks instead, which are sold as “craft sticks” at arts and crafts stores. They are inexpensive and easy to remove when you’re done.

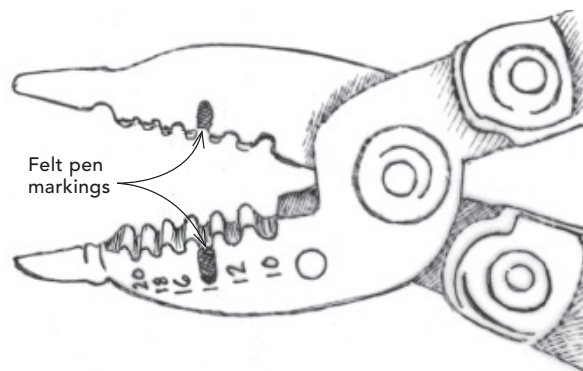
—MARCH COOVER
Dallas



Keep the paint spraying

It’s always frustrating when I try to use a partially empty can of spray paint and find that the nozzle is clogged. Conventional wisdom is to hold the can upside down and spray to clear the nozzle after each use. I have found this method to be unreliable and wasteful of the needed propellant. My solution is to spray the nozzle with Goof Off after each use. I have been doing this for two years and have never had a clogged tip.

—BRIAN FLYNN
Overland Park, Kan.



Easy-read wire strippers

When I’m wiring a house, I find it difficult to see the correct stripping gauge on the stripping tool because of my aging eyes. The problem is worse when there’s not enough light. I solved the problem by marking the 14-ga. stripping notch (the most common size) with a black felt-tip pen (on the front and the back side of the tool). With this modification, I now can easily strip a wire’s insulation without worrying about nicking the conductor by using a notch that’s too small.

—RON WLOCK
North Vancouver, B.C.



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Electrical outlets by the numbers

BY GLENN MATHEWSON

Building codes are full of maximum and minimum dimensions, and in most cases they aren't just random numbers. Learning the reasoning behind the dimensions is a great way to remember them. Understanding the "why" also helps you take ownership of the rules and believe in their value to society.

Building codes devote a lot of attention to electrical-outlet

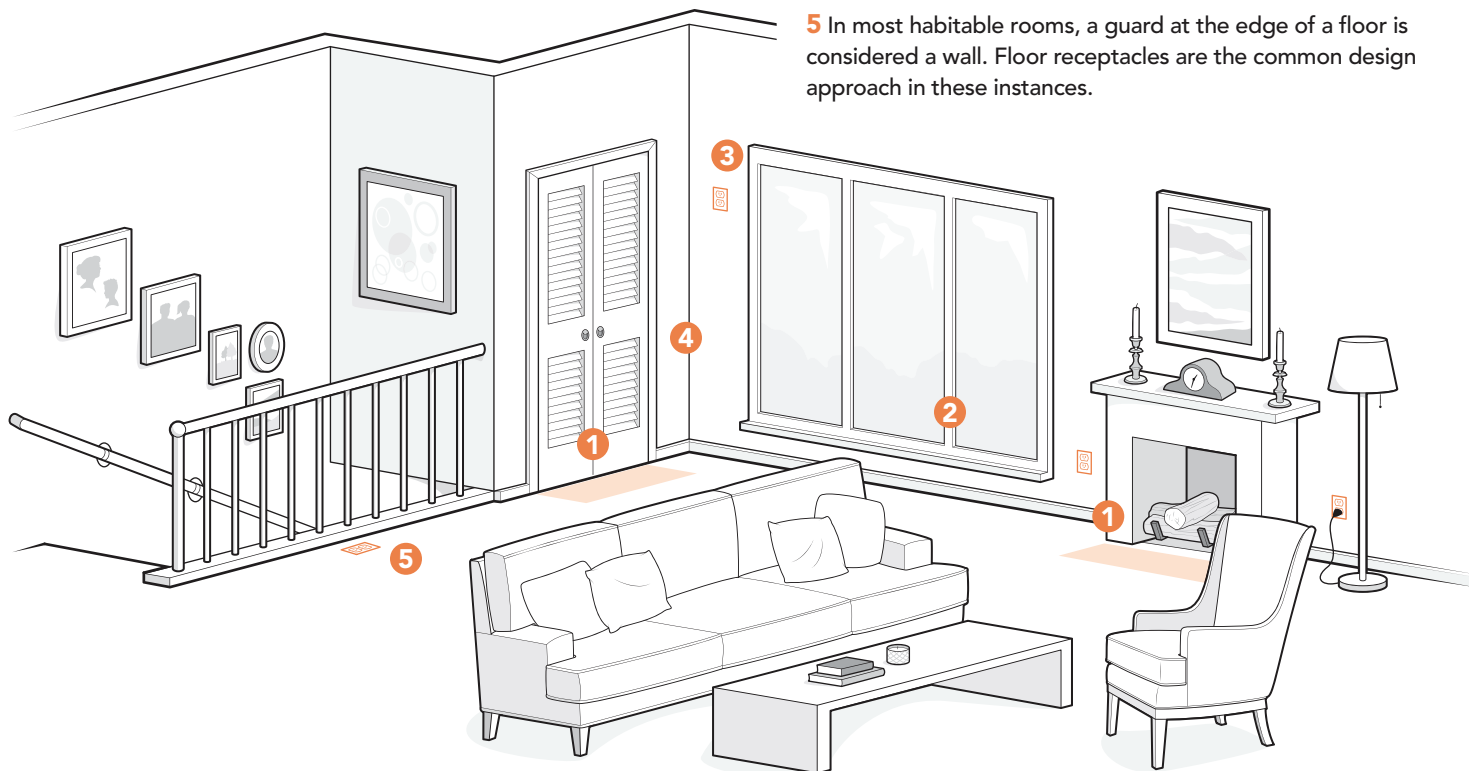
receptacle spacing in an effort to limit the use of extension cords. Why? Because extension cords increase risk. They aren't protected like the cables in your walls. Extension cords are meant for temporary use only, when an occupant is fully aware of their temporary hazard.

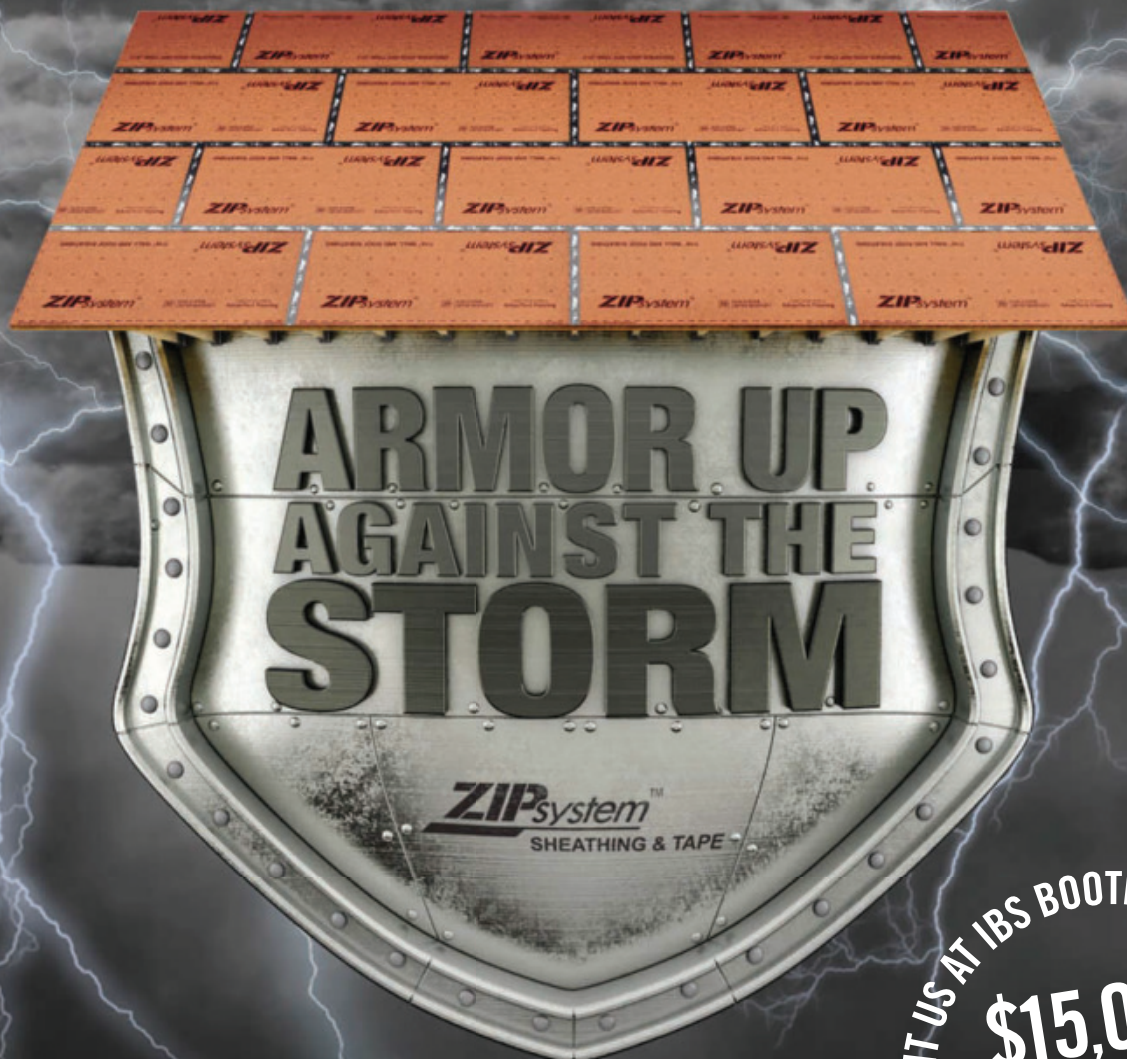
If you have receptacle outlets available at locations where there is a high probability an occupant will want one, then

WALL RECEPTACLES

Most walls 2 ft. or longer require a receptacle, with spacing a maximum of 12 ft. apart, allowing a standard 6 ft. fixture/appliance plug to reach from anyplace along the wall. There are also some details and exceptions to know.

- 1** Doors and fireplaces are two examples of breaks in wall space measurements, and receptacles must be within 6 ft. of each side.
- 2** Windows do not break a wall-space measurement, even if they extend all the way down to the floor. If no room for outlets is available on the wall, a floor outlet is an option.
- 3** Receptacles can be as high as 5½ ft. from the floor and still satisfy the requirement for spacing along walls.
- 4** Wall-space measurements must include distances around both inside and outside corners.
- 5** In most habitable rooms, a guard at the edge of a floor is considered a wall. Floor receptacles are the common design approach in these instances.





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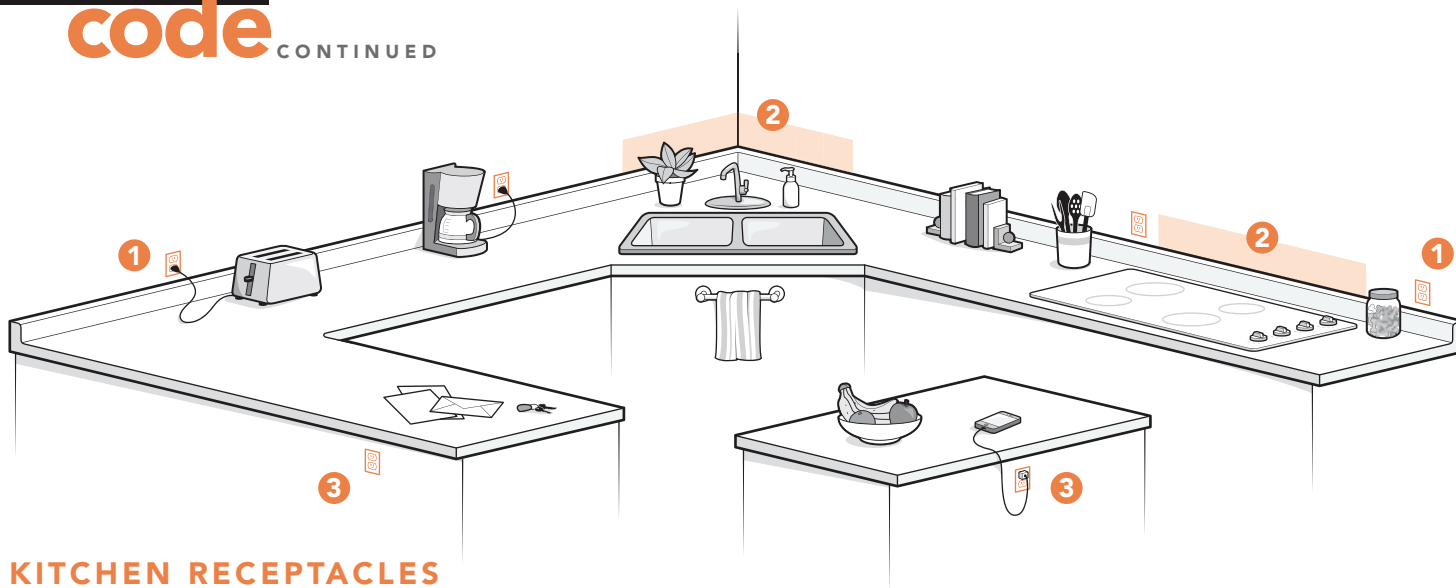
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KITCHEN RECEPTACLES

Any countertop space 12 in. or longer must have a receptacle, with spacing of subsequent receptacles a maximum of 48 in. apart. There are also some details and exceptions to know.

1 There must be a receptacle within 24 in. of the end of all countertops in front of walls.

2 Sinks and ranges are two examples of a break in the countertop space. Receptacles must be within 24 in. of each side. If there are 18 or more inches behind the sink, a receptacle must be placed there as well.

3 Islands and peninsular countertops that are 12 in. or wider and 24 in. or longer must have a receptacle, typically installed in the side of the cabinet no more than 12 in. below the countertop, which can have a maximum overhang of 6 in.

that person has no need to use an extension cord. Hazard reduction achieved!

Electrical codes assume likely locations where electrical devices may be used in homes. There are two broad categories that get a lot of attention and specifics in the code: wall receptacles and kitchen countertop receptacles. For wall requirements, you've got to know the intended function for each room. The code is specific about which rooms this applies to: kitchen, family room, dining room, living room, parlor, library, den, sunroom, bedroom, and recreation room. It's also nonspecific in ending that list with "or similar room or area of the dwelling unit." This keeps any wordplay

out of the issue ("But the list doesn't say anything about a sewing room"). It's anticipated that if offered sufficient wall space in these rooms, occupants may wish to power a lamp, clock, or other appliance, and an extension cord will be their solution if the code doesn't provide a receptacle. Two feet is considered sufficient, and thus an electrical device must be able to be placed against a wall 2 ft. or longer and reach a receptacle. A typical floor lamp, alarm clock, television, tabletop lamp, and so forth has about a 6-ft.-long fixture cord. If there is a receptacle within 6 ft. of the end of a wall length, and 12 ft. between receptacles, then that typical fixture can be placed anywhere along the wall and an

extension cord is not necessary. This average cord length is the basis for the maximum dimensions of when you need to reach something (a receptacle), but it also has implications for when you don't want to reach something (such as a bathtub).

The kitchen might have the greatest concentration of electrical usage of any place in a house. It's all about the probability of use. If it's a convenient place to put the blender, then there needs to be a receptacle. Countertop appliances have an average cord length of 2 ft. Therefore, a maximum spacing of 4 ft. between receptacles and 2 ft. to the countertop's end(s), the edge of the sink, or the edge of the range is required. Counters that are interrupted by stoves, sinks, or refrigerators are considered separate countertops in applying the rules for receptacle locations. There are more specific code provisions for peninsulas, islands, the area behind sinks, and receptacles below countertops. They are all based on the same concept of probability of countertop

use and common appliance cord length.

There are a few other places where receptacles are required, and it's for our own good. All hallways 10 ft. or longer must have at least one receptacle, and there are special accommodations made for foyers, where receptacles would be handy but maybe not as necessary. In foyers, the minimum wall length expands from 2 ft. to 3 ft. before a receptacle is required.

Though all these different numbers can make code compliance more difficult, the variety addresses each unique hazard in the most minimum accepted manner. Understanding the logic behind these dimensions can make them sensible personal choices, regardless of whether they are administered and enforced by the local government. Rules that we embrace as our own put us back in charge of our work and our homes.

Glenn Mathewson is a consultant and educator with buildingcodecollege.com.



For an extended version of this column, visit FineHomebuilding.com/knowthecode.



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SUPERPORTABLE SLIDER

Working as an on-site carpenter, I choose my tools based on a host of qualifications. Size, weight, portability, and accuracy are my main requirements, although accuracy tops the list. For years, the now-discontinued 7¼-in. Makita LS0714 sliding miter saw has met all of my needs. So when the company released the XSL02Z, a cordless version of that old favorite, I was ecstatic. The question then became about the tool's performance. Sure, it looked to be a carbon copy of the LS0714, but could it perform the same?

I have found that even with its small blade, this saw's crosscut capacity of 11¾ in. at 90° rivals that of larger saws, and its 36v motor makes it a powerhouse. I have not found a board that will bog the motor down. The small blade doesn't deflect as much as larger blades, and since it spins faster (5700 rpm) than the blades on most saws, it makes cleaner cuts with no splintering. The small blade also seems to help in the dust-collection department, an area where the bigger saws I've used or owned don't even come close.

Compared to the more standard two-rail saw setups, I also like the LS0714's four-rail slide design because it improves the saw's accuracy. Extend the saw fully and try to wiggle the head back and forth, and you will see what I mean—there's zero movement.

This saw also has amazing runtime. On medium-use jobs like cutting cabinet frames and small trim, I find I can run the saw for two to three days on a pair of batteries. Even at a production pace, I am able to get a full day's work and still have some juice to spare.

Perhaps my favorite feature of all is how light and compact this saw is. Just shy of 30 lb. with both batteries, it's a breeze to carry one-handed or via the built-in work supports that slide in and out.



Small yet powerful. Weighing less than 30 lb. (including its two 18v batteries), the Makita XSL02Z can crosscut a 2x12 at 90°.



Two more tubes. A second pair of slide tubes gives the XSL02Z its surprising capacity while maintaining the saw's small footprint.

One of my few beefs with the saw is the microscopic bevel gauge. I only find it to be a problem on odd angles, however, as common bevel angles have larger markings. When beveling at less common settings, I cut a miter in a block at the desired angle and use it for setting the bevel. It's also unfortunate that this saw bevels only in one direction, but I've gotten used to flipping boards quickly. Another downside is the low rear fence. It maxes out at about 2 in., making it impossible to cut crown and base against the fence.

One significant difference between the XSL02Z and its corded predecessor is the location of the trigger safety. The cordless saw's safety is on the side of the handle, and the location makes holding back the blade guard and depressing the safety with one hand a bit more of a challenge.

Overall, I think the positives far outweigh the negatives on this saw, and I had little trouble adapting to and overcoming the short list of problems because the saw's portability and accurate cutting easily made up for any deficiencies.

Nathan Rinne, a finish carpenter in Roach, Mo.

Makita XSL02Z

Blade diameter
7½ in.

Miter
47° left
57° right

Bevel
45° left
5° right

Crosscut capacity at 90°
2½ in. by 11¾ in.

Crosscut capacity at 45°
2½ in. by 8¾ in.

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Better bibs for cold-weather work

This year when I dug out my insulated cotton duck overalls, I realized they were too ragged to offer much protection. While shopping for a replacement, I found several new options. I settled on the Milwaukee Gridiron zip-to-thigh bib overalls. Milwaukee claims that the fabric, made from ripstop polyester, is three times more durable and 25% lighter than duck canvas. Stretch panels make crouching and other movements more comfortable without a break-in period.

I ordered a set for \$149, and the fit was great—consistent with a chart on Milwaukee's website. They were surprisingly comfortable right away and, as advertised, felt much lighter compared to traditional cotton bibs. I like how they zip to the thigh so that you can put them on or take them off while wearing boots. There are plenty of chest pockets and a dedicated tape loop, which I love, but my favorite feature is the integrated kneepad pockets. These overalls are as warm as my cotton bibs but without the bulk, and the ripstop fabric also sheds light rain better.

Andrew Grace, a remodeler in Ligonier, Pa.



Easy out. The side zippers on Milwaukee's insulated bibs reach thigh high, so it's easy to take them on and off, even when wearing heavy winter boots.

Photos: courtesy of Milwaukee

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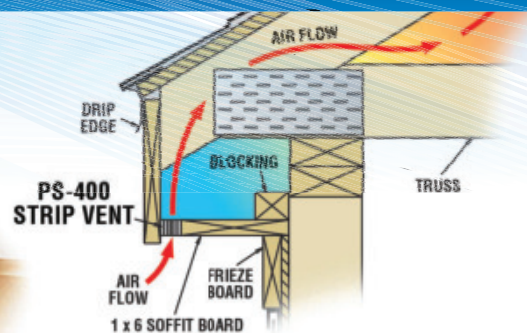


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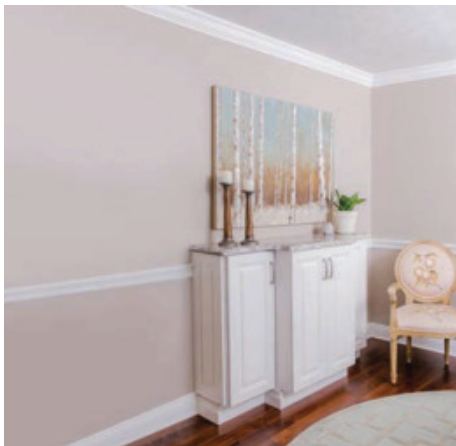
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New technology improves airtightness

Despite five years of successful blower-door tests, airtightness requirements so worried new-home builder T. J. Ryan of Sloatsburg, N.Y., that he told me he would lose sleep wondering if a newly completed home would pass the IRC's 3.0 ACH50 requirement for an occupancy permit. I understand his concern. Failing the blower-door test can hold up closings and lead to a lengthy process of calling back multiple subs to seal holes of unknown size and location. When Ryan's insulation contractor Yudah Schwartz, president of SuperSeal Insulation of Airmont, N.Y., said he could guarantee a pass on the airtightness test, Ryan agreed without hesitation.

Schwartz and SuperSeal are among the first 30 installers of the new AeroBarrier air-sealing system that launched in January 2018. AeroBarrier is a spinoff of Aeroseal (aeroseal.com), developed to seal existing ductwork. Both systems use compressed air to aerosolize a water-based sealant. AeroBarrier uses the pressure from a blower door to force the airborne sealant into gaps and cracks, where it accumulates to block airflow. The system can seal gaps as wide as ½ in., Schwartz tells me; wider gaps are first sealed with canned foam. The amount of sealant being dispensed and a host of other conditions inside the house are monitored and controlled with a pump and computer interface that Schwartz purchased from Aeroseal. His AeroBarrier truck includes an on-board generator for power and an air compressor to convert the liquid sealant into an aerosol.

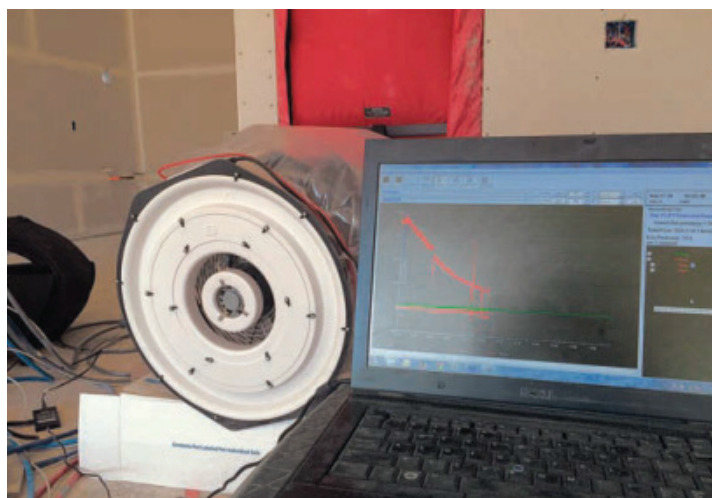
The AeroBarrier installation I witnessed brought the house from 4.5 ACH50 to 1.5 ACH50 in a little over two hours. Although it can be used in existing structures with proper surface protection, AeroBarrier is normally installed on new homes just after the drywall is hung and finished and before any trim is installed. This allows the sealant to flow more efficiently into the small gaps between the framing and the sheathing. The sealant doesn't stick easily to vertical surfaces, but it does settle out of the air on horizontal surfaces, so windowsills and finished floors must be protected. I walked through Ryan's new house immediately after the air-sealing work. The air had the smell of fresh latex paint, and the only residue I could detect, besides the accumulation of sealant around most electrical boxes, was a slight tackiness on the subfloor.

Including AeroBarrier with Ryan's insulation package on the 2200-sq.-ft. house cost an additional \$1500, but Ryan figured it eliminated at least \$500 in air-sealing materials and hours of work. When I asked him about the price, he told me, "It costs a little more money than conventional air-sealing methods, but a failed test could easily cost thousands in trying to fix the problem, and there's no guarantee of a solution. In my opinion, not doing AeroBarrier would be penny wise and pound foolish. It's just one less thing to worry about."

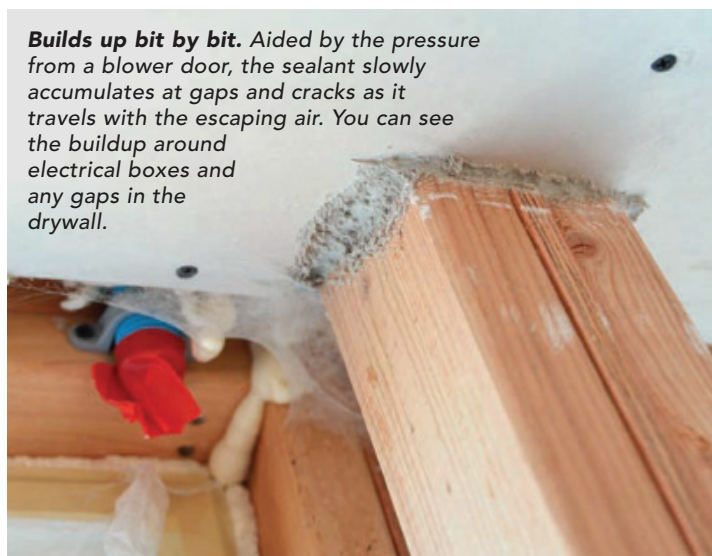
Patrick McCombe, senior editor



Spray air-sealing. AeroBarrier uses a series of emitters and pressure from a blower door to force a latex sealant into gaps and cracks in the building envelope. The process usually takes half a day or less.



High-tech controls. A computer-controlled pump that accounts for the home's interior temperature and humidity feeds the sealant to the emitters. A graph shows the air-sealing progress in real time.



Builds up bit by bit. Aided by the pressure from a blower door, the sealant slowly accumulates at gaps and cracks as it travels with the escaping air. You can see the buildup around electrical boxes and any gaps in the drywall.



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Big saw bests big timbers



Skilsaw Super Sawsquatch

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Skilsaw's new beam saw is designed to cut big timbers fast and accurately, so I put it to work on an assortment of large cutting projects, including pressure-treated 6x6s, parallel-strand-lumber (PSL) columns, and a timber floor frame made from 6x10s. For a saw of its size (27 lb.), I found it to be well-balanced and the adjustments and controls to function as one would expect. The saw has a dust port that allows connection to a dust collector, but I didn't use it.

The saw had more than adequate power to push through anything I cut. Moreover, it seems well engineered, and the overall build quality is solid. A plastic base is a welcome place to set the heavy saw after completing a cut. The carbide-tipped blade cuts with minimal splintering and no sign of deflection, even in full-depth cuts. The one downside to the saw is the blade guard, which sometimes hangs up on the material. You can hold the guard open with your thumb (this works well thanks to the position of the side handle), but it leaves a rather large area of the blade exposed until the saw is completely buried in the cut. Still, this is a well-powered, solid performer, especially at its price.

Ben Bogie, lead carpenter with Kolbert Building in Portland, Maine



Base, no case. A stand holds the saw upright between cuts and during transport.

Photos: courtesy of Skilsaw

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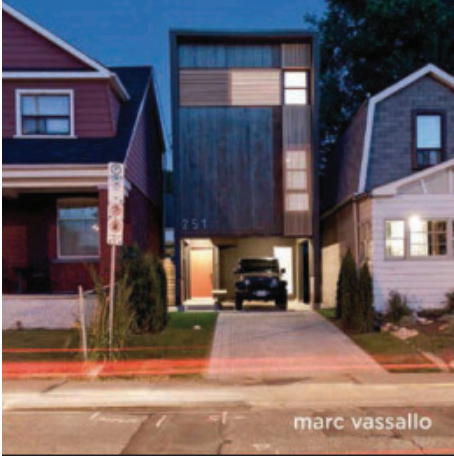
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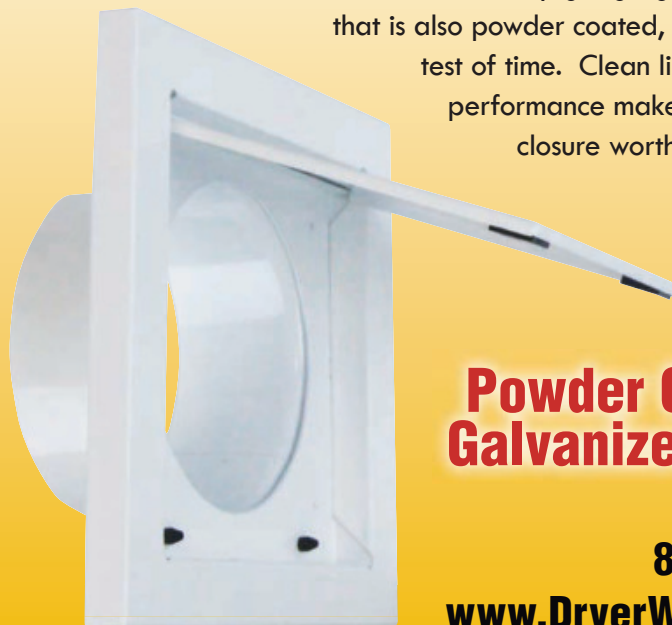


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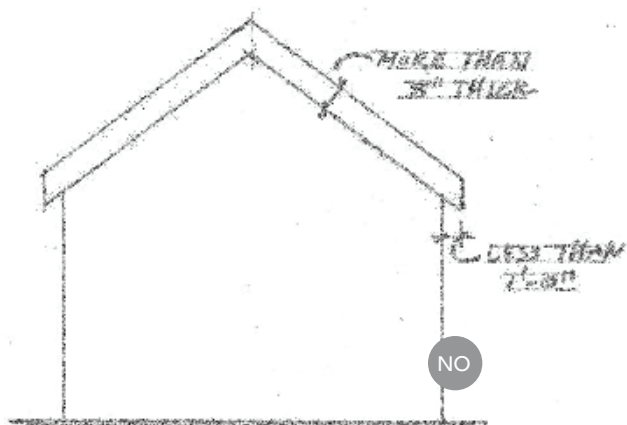
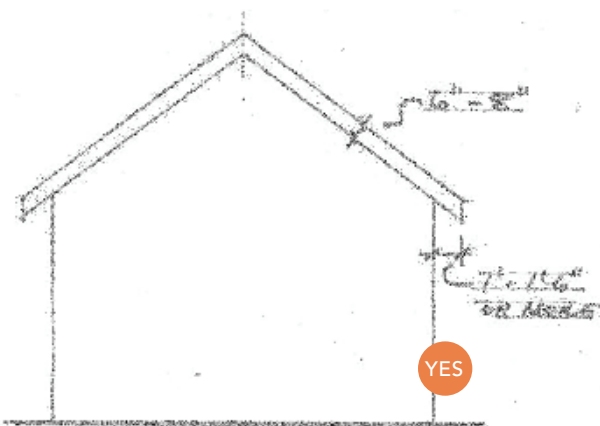
BY MARIANNE CUSATO

The three primary variables to consider when designing the eaves for a gable roof are the width of the gable trim, the projection of the eaves, and the details at the corner of the gable ends. This first installment of a two-part series focuses on eaves that do not return onto the gable. The second looks at the details of boxed-eave gable-end returns.

Marianne Cusato is the author of *Get Your House Right: Architectural Elements to Use and Avoid*. Drawings by the author.

General rules of thumb

Eave design starts with looking at the overall building composition and proportion. When designing a gable-end eave without a return, the dimensions to look at are the width of the trim (set between 6 in. and 8 in. thick) and the overhang from the side wall (set between 12 in. to 18 in., depending on the style of the building). Avoid gable ends that are over 8 in. wide, especially when the eave overhang is less than 12 in.



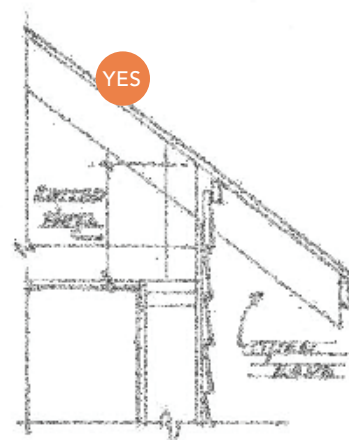
Start with roof framing

The design of your eave is dictated by the construction of your roof. Before manufactured trusses, the simplest roof construction involved extending exposed rafter tails beyond the walls of the house. Trusses streamline construction, but it's important when using them to make sure the resulting eave works with the design of your building.



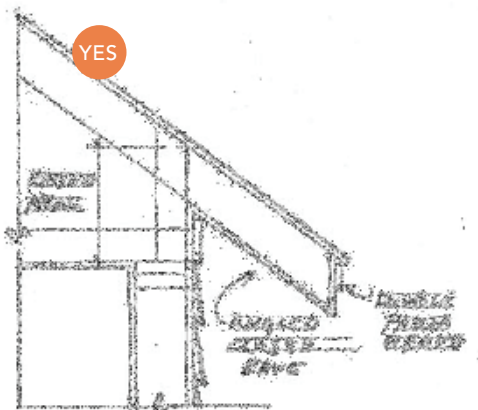
Open eaves with roof rafters

Before roof trusses, the exposed rafter tails were an extension of the roof framing. The ceiling joists pushed the rafters up and gave extra height to the building.



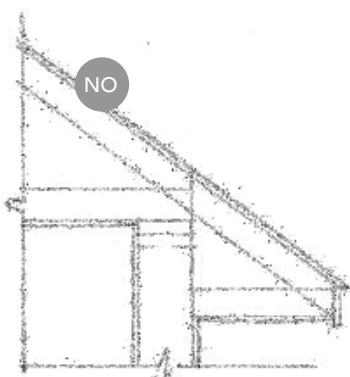
Open eaves with trusses

When designing an open eave with roof trusses, make sure that you raise the heel of the truss and use a thicker top chord. Doing so raises the eave, which prevents it from conflicting with the window head height.



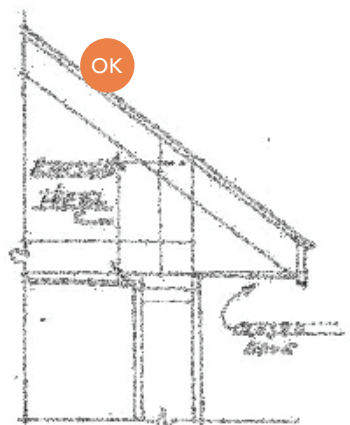
Closed eaves with angled soffit

Exposed rafter tails are more work to install and maintain over time. Moreover, as homes have shifted increasingly to conditioned attics, closed eaves have become more popular. With a closed eave, you still want to raise the heel height of the truss. Also, make the extra effort to install an angled soffit. It looks substantially better than a flat soffit.



Closed eaves with flat soffit and no raised heel

The default in eave design is a flat soffit. While flat soffits work well in some situations, in most, they result in pork-chop eave returns. Proceed with extreme caution when using a flat soffit.



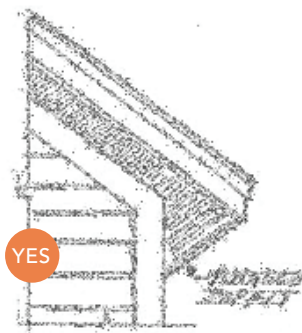
Closed eaves with flat soffit and raised heel

When you do use a flat soffit, make sure to include a raised heel on the truss. This pulls the eave up, giving height to the roofline as well as keeping the eave clear of the window head height.

Gable-end details for closed eaves

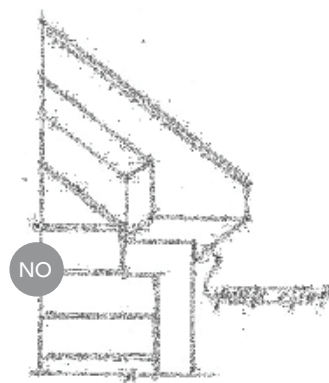
Angled soffit

The cleanest look for a gable end with a closed eave is to angle the soffit, therefore eliminating the need to resolve the eave at the gable end. This configuration gives the look of an open eave, but it has the same benefits—ease of maintenance and energy performance—as a closed eave.



Pork-chop eave

The much-derided pork-chop eave has been covered in depth in many articles. It is the unfortunate result of connecting the geometry of a flat soffit on the side eave with the angle of the gable end. This is a detail to avoid at all costs. If you are not able to use an angled soffit, use one of the two flat-soffit details illustrated below. There is no reason to use a pork-chop eave.



Flat soffit, stopping at end wall

If you must use a flat soffit, stop the flat portion of the soffit at the wall to align with the corner board. This allows the gable projection of the eave to extend down and look like an angled soffit at a glance.



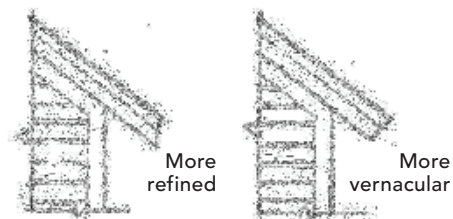
Flat soffit with bracket

While flat soffits are not ideal, one way to mask them is to stop the horizontal soffit at the gable-end wall, as in the previous example, and then add a decorative bracket at the gable end to hide the transition from flat to angled.



Plumb- vs. square-cut eaves

Plumb-cut eaves are perpendicular to the ground, while square-cut eaves are perpendicular to the angle of the roof.



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Crisp Corners

FOR DRYWALL

The right way
to install metal,
vinyl, and
paper-faced
corner beads

BY MYRON R. FERGUSON



I always like to tell my coffee story when I talk about corner beads—the moldings that cover and protect the outside corners of drywall. I typically just drink regular coffee with cream, but when I go to a coffee shop today and look at the menu, there are so many unfamiliar names and choices that I'm not even sure if they sell coffee.

It's kind of the same idea with corner beads. Just try calling a drywall yard to order a box of 8-ft. square-edge corner bead. When I started in the business, that was all I had to ask for, and I would get a box of metal nail-on corner—the standard galvanized bead with the knurled 1½-in. flanges and the occasional hole for nailing. It's not so easy today. Do you want the metal, the paper-faced metal, the paper-faced vinyl, the glue-on vinyl, or the mud-set vinyl? And do you want that in jumbo or standard size? Maybe you even want the corner bead that comes in a roll?

These days there are many options to choose from and a lot of ways to install corner beads, some involving specialty tools. But most square-edge corner beads, including the three shown here, can be installed quickly and easily without anything special. All are designed to sit proud of the wall, creating a space for joint compound to cover the bead's flanges. Most can be cut with a miter saw, but tin snips are also fine for most applications. All should butt tight to the ceiling and be left about ½ in. short of the floor to prevent cracking as the house settles. Beyond that, the biggest difference among beads is how they are installed. □

Myron R. Ferguson (thisisdrywall.com) is a professional drywaller and certified building-performance analyst. Photos by Matthew Millham.

Prep the drywall

Don't try to create crisp corners with drywall alone; that's what the corner bead is for. For proper installation, all corner beads require the drywall to be set back a bit from the corner (the amount of setback varies by bead profile). If the drywall extends even just a little past the corner, the corner bead won't fit tight against the drywall, making it difficult to attach and finish properly. For square-edge beads, the drywall should be set back at least ¼ in., but not more than ⅛ in. To ensure that the edge of the bead sits proud of the wall, avoid putting the tapered edges of drywall on corners.



Mind the gap. Attach one piece of drywall flush with the corner, then attach the next piece up to ⅛ in. back from the corner so that the corner bead can sit flush on both sides.



Bevel the edge. To cut back overhanging edges in places too tight for a drywall saw or where a drywall saw might damage the adjoining drywall surface, use a utility knife to create a chamfer.



Rip long edges. Use a drywall saw to cut back any edges of drywall that hang beyond the framing so that the next piece sits tight to the framing.



Metal

Light-gauge galvanized-metal corner bead is generally the least expensive option and has been used for many years with good results. These beads are attached before taping begins, usually by the drywall-hanging crew. Drywall nails are typically used to attach them to wood framing, and self-tapping metal-framing screws are used with steel framing.

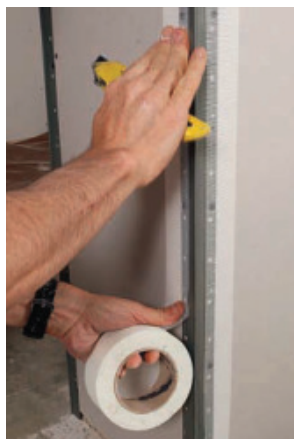
Metal is the only type of bead that attaches directly to the framing, and its hold is tenacious. But because the bead is only attached every 8 in., it's somewhat prone to cracking along the flange edges. Also, despite being galvanized, some corner bead will rust, so it needs to be stored in a dry location before installation and isn't the best option for rooms where high humidity or moisture are expected, such as bathrooms.

Tap it flush. Set the bead on the corner tight to the ceiling, and use the butt end of your hammer to gently tap it into place so that it sits flat on both sides. There's no adjusting once it's nailed on.

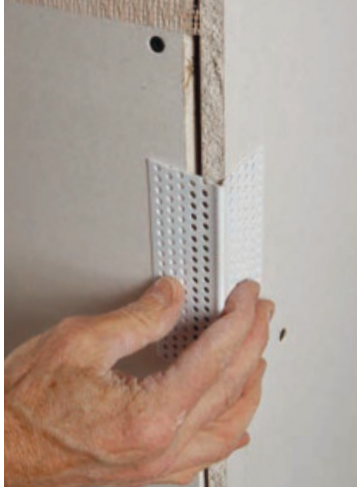


Don't stagger. Fasten every 8 in. along the flanges through the small holes—I prefer drywall nails over screws for this—and always put the fasteners in opposition, not staggered. Staggering can cause the edge on the other side to pucker out.

Avoid cracks. Apply self-adhering mesh tape over the flanges and onto the drywall to help prevent cracking along the edges.



Coat it. Use all-purpose joint compound for the first coat over the mesh tape and flanges. Use lighter-weight compounds for the finish coats.



Glue-on vinyl

These corner beads go on before taping starts, so the drywall hangers often install them. Some manufacturers suggest backing up the spray adhesive with 1/2-in. divergent staples, which have legs that skew slightly when driven into the drywall to resist pullout (see p. 45, bottom right). That's the method I use.

Some manufacturers recommend spraying adhesive onto both the drywall and the bead itself for a better hold, but it really depends on the brand. Manufacturers differ on how long to wait to install the bead after applying the adhesive. Some recommend letting the adhesive tack up first, and others—including Trim-Tex, whose product is used here—recommend installing the bead immediately after spraying the adhesive. If I'm installing the bead when the glue is wet, I find that a medium-heavy coat of adhesive on the drywall alone is sufficient when backed up with staples. If the manufacturer recommends allowing it to tack up first, I spray both the bead and the drywall. In either case, I've found that these beads offer excellent crack resistance.



Spray both sides. Spray a medium-heavy coat of adhesive to both sides of the corner. Don't spray too far beyond the area the flanges will cover.



Set the bead. After setting the bead tight to the ceiling, press it firmly into the adhesive. Finger pressure is typically enough to get a good bond with wet adhesive, but it can't hurt to sweep a drywall knife along the flanges with heavy pressure to help tacky adhesive stick.



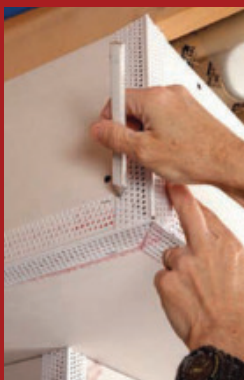
Back it up. Drive divergent staples into the flanges every 6 in. to 8 in. to bolster the bead's connection to the wall.



Wait and cover. Allow about 30 minutes for the adhesive to dry, then apply a coat of all-purpose joint compound to the flanges. Use lighter-weight compounds for the finish coats.

THREE-WAY CORNERS

Trim to fit. Where three wall planes meet at a point, trim the ends of the corner beads at an angle so that they don't overlap. For accuracy, cut and install the first piece, then mark the cut angles for successive pieces in place. Test the fit, then install using the method appropriate for that bead.



Give it a coat. Cover all sides of the corner at the same time with all-purpose joint compound. Use lighter-weight compounds for the finish coats.



Paper-faced metal

The paper on this type of corner bead covers and extends past the metal. Joint compound is formulated to stick well to paper, and these beads have a well-deserved reputation for resisting edge cracking. Actually, the paper on these beads pulls double duty: It helps to bond the bead to the drywall, and it holds the compound that goes over it better than metal alone.

Because joint compound is the glue that holds paper-faced metal and other “tape-on” beads to the corner, these beads are usually installed by the drywall-taping crew—and after the inside corners and flat seams are taped. Tape-on beads, also called mud-set beads, come in various forms, but those without paper facing usually install in similar fashion.

Set tape-on beads with heavier-weight joint compounds such as all-purpose or taping compound, which bond and resist cracking better than other types of drywall mud, and don't skimp on the compound. Use a heavier compound as well for the fill coat, but use lighter-weight compounds for the finish coats.



Cut outside in. Mark the cut line, then use tin snips to cut toward the corner from each side of the bead, meeting in the middle.



Mud both sides. Use a 4-in. to 6-in. tapping knife to apply an even coat of joint compound to both sides of the corner.



Set and press. Set the bead squarely onto the corner, butting it tight to the ceiling, and gently press it into the joint compound.



Swipe the excess. Use the tapping knife to remove most of the excess joint compound from both sides of the bead, but don't yet fully embed the paper flanges.



Check for square. Use the tapping knife as a straightedge along multiple points on both sides of the corner bead to ensure that it's properly aligned. There should be a slight gap between the edge of the knife and the flanges of the bead on both sides of the corner.



Embed the flanges. Use heavier pressure on the knife to remove excess compound from behind the paper flanges so that they sit flat against the wall. Wait until the compound dries to apply fill and finish coats over the flanges.



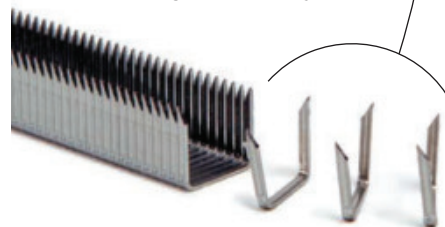
CALL FOR BACKUP

If bubbles appear, use the tapping knife to pry back the paper flange. Apply extra joint compound behind the flange, and smooth it flat to the drywall.



CALL IN REINFORCEMENTS

Apply a small piece of fiberglass-mesh tape over the ends of intersecting corner beads to help prevent cracking at this juncture. If the bead won't sit flat because the corner is slightly under 90°, drive divergent staples through the metal flanges to pull them and hold them tight to the drywall.



Divergent points cause the staple to splay when driven.



9 Upgrades to Windproof Your Roof

Nail down the details to keep asphalt shingles where they belong

BY MIKE GUERTIN

Asphalt shingles are getting better all the time, but the elements can still get the best of them. Nor'easters, hurricanes, and even heavy winds can blow shingles off a roof, leaving a house vulnerable to leaks. Roofs in high-wind regions—areas that experience wind gusts greater than 90 mph according to FEMA—

are the most susceptible to this type of damage. We can't control the weather, but we can take measures to make a new asphalt-shingle roof more wind resistant.

Today's asphalt shingles are likely to last twice as long as the ones I installed when I started building in the late 1970s, but that longevity raises the chances that the roof will



experience severe weather in its lifetime. You only get one shot at taking the extra steps needed to ensure that it can weather the storm—and that's during installation.

To improve my roof jobs, I've adopted and adapted some of the methods promoted by the Institute for Business and Home Safety's (IBHS) Fortified Home program, whose

goal is to improve the disaster resistance of homes from top to bottom. I also take additional measures—although nothing that will break the bank—that I think make a more wind-resistant roof.

Windproofing starts with the sheathing. Roof-shingle manufacturers generally accept a minimum of $\frac{3}{8}$ -in.-thick plywood, $\frac{7}{16}$ -in.

OSB, or nominal 1-in.-thick wood planks. The Fortified Home program's "Gold" standard calls for $\frac{7}{16}$ -in. sheathing at a minimum. When it comes to resisting nail withdrawal, thicker is better. □

Mike Guertin is editorial adviser. Photos by Matthew Millham, except where noted.

1 IMPROVED DRIP EDGE

Metal drip edges can be critical to helping roof shingles resist wind uplift along the perimeter of the roof. To do this, they have to be fastened securely to the roof sheathing and framing. The IRC, which since 2012 has required metal drip edges along rake and eave edges, calls for fastening them with roofing nails spaced no more than 12 in. o.c., with an overlap of 2 in. between sections. I go a step above code and follow the Fortified Home recommendations for hurricane-force winds, fastening drip edges with roofing nails spaced 4 in. o.c. in a staggered W-pattern and overlapping drip-edge joints by 3 in. I nail into framing rather than just the roof sheathing whenever possible. If there isn't solid blocking or subfascia, some of the nails can be driven into the rafters or trusses.

Code requires that the roof leg of drip edges extend at least 2 in. onto the roof deck, but drip edges with narrow roof legs won't reach far enough onto the deck when the fascia leg bottoms out against the fascia. To ensure that this isn't a problem, I generally use drip edge with a 5-in. to 6-in. roof leg. The cost difference between narrow and wide drip edge is minimal, and I think the performance boost is worth it.





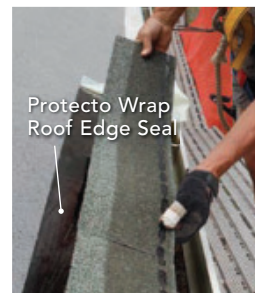
2 ADHESIVE AT THE EDGES

Starter strips along the eave edge not only back up joints in the first course of shingles but also help bond the first course down to the roof deck. If the starter isn't fastened well to the roof deck, the first course of shingles is vulnerable to wind.

For that reason, it's important to secure it with a belt-and-suspenders approach: seal bonding and nails.

The Fortified Home program recommends bedding the starter course in an 8-in.-wide band of roof cement that covers the drip edge and underlayment—an approach that can be used with any nail-down starter. As an alternative, Fortified Home also approves the use of self-adhering starter strips rather than roof cement. I prefer this faster and less messy option. The adhesive backing on self-adhering starter strips sticks them down, but they need to be nailed as close to the bottom edge as possible while still catching the roof deck.

Rake edges are similarly vulnerable to wind uplift, and some roofers like to run starter strips along the rake to help bond the shingles down. This helps, but the self-sealing strip on most starter shingles isn't very wide. As at the eaves, Fortified Home recommends bedding rake shingles in an 8-in.-wide band of roof cement to bond the top lap of each shingle to the roof's edge. In keeping with the spirit of the provision, I use a double-sided peel-and-stick sealing strip—Protecto Wrap's Roof Edge Seal. It installs like flashing tape but also has a release sheet covering the adhesive on the up-facing surface. You can bond the strip to the drip edge and underlayment, then remove the release sheet while installing the shingles.



Starter options

Only a few shingle manufacturers make their own self-adhering starters, such as GAF's Quick Start starter roll (photo above left). Alternatively, Protecto Wrap's Roof Edge Seal can be used underneath standard starter strips to improve their wind resistance (photo above right). Finally, there are also peel-and-stick starter strips from companies that aren't in the shingle business. Options include:

- ✦ MFM Shingle Starter Strip
- ✦ Tarco Quick Roll
- ✦ CoFair Quick Roof Shingle Starter
- ✦ Henry Eaveguard Start-R-Roll

3 NAIL BETTER, NAIL MORE

How and where you nail shingles is extremely important to wind resistance. Overdriven and off-angle nails will fracture the base mat that the shingle is built around, significantly reducing the shingle's wind resistance. Whenever a nail is misdriven, a second nail should be installed about 1 in. away and flush with the surface. There's no need to pull out the offending nail.

Underdriven nails also cause problems. They hold up the shingles lying over them, so the self-seal strip doesn't bond. Over time, a raised nail head can break through the surface of the overlying shingle.

Many shingles require more nails to perform as advertised in high-wind zones. While some shingle manufacturers achieve their wind rating with the standard four-nail pattern, others require a six-nail pattern. Six-nail patterns differ between manufacturers; some want the nails evenly spaced, while others recommend two pairs of nails spaced about an inch apart one-third of the distance from each end of the shingle, along with single nails an inch in from each end. I use a six-nail pattern even when installing shingles that only require four, and I double-nail shingle ends along the rakes.

Wind classifications for shingles

The IRC calls for asphalt shingles to be tested and labeled in accordance with ASTM D7158 or ASTM D3161. The standards use letter designations to identify the wind resistance of shingles based on maximum basic wind speed and maximum ultimate design wind speed. When selecting shingles, it's important to know which test and classification a specific shingle is listed to, because the letter designations can be confusing.

Basic wind speed from local building code	Required shingle wind-resistance class rating
110 mph	ASTM 3161 Class F ASTM 7158 Class G or H
120 mph	ASTM 7158 Class G or H
130 to 150 mph	ASTM 7158 Class H

4 ELIMINATE OVERHANG

Uplift forces can be extreme at a roof's perimeter, and minimizing how much the starter strip and shingles overhang the drip edge limits the wind's leverage on them. Fortified Home recommends a maximum 1/4-in. overhang, but it's better to install both flush with the drip edge along the eaves and rake edges.



5 SELECT THE RIGHT SHINGLES

Selecting shingles that meet or exceed the wind speed in your area is the simplest way to improve roof performance. Lots of manufacturers produce shingles classified at the highest wind rating (H), so you shouldn't have any trouble finding them. Generally, laminated shingles perform better in high wind than three-tab shingles, and some shingles have additional reinforcing strips in the nailing zone to improve tear-through resistance.

When selecting shingles, pay attention to the nail zone's relation to the common bond—the area where two shingles overlap. Ideally, shingles should be nailed through the common bond so that both layers are secured under the heads of the nails, but the

nail zones and common-bond areas of some shingles either don't match up or do so only partly. On shingles with wide nail zones but narrower common-bond areas, installers have to be careful not to nail immediately above the common bond. There is a small void under the overlying shingle just above the common bond, and nailing in the void can fracture the shingle, reducing its wind resistance.



6 BETTER NAILS

The type, length, and corrosion resistance of the fasteners can make a difference in how well and how long the shingles stay where they belong. The IRC requires that a minimum of four 12-ga. nails with $\frac{3}{8}$ -in.-dia. heads be used for installing asphalt shingles and that the nails penetrate completely through roof sheathing that is less than $\frac{3}{4}$ in. thick and penetrate at least $\frac{3}{4}$ in. into thicker sheathing. While 1-in. nails can sometimes meet the penetration requirement, longer nails may be needed when installing thicker shingles. The cost difference between 1-in. nails and 1 $\frac{1}{4}$ -in. nails, or between 1 $\frac{1}{4}$ -in. nails and 1 $\frac{1}{2}$ -in. nails, is about \$1 per square (100 sq. ft.)—an insignificant amount. I use 1 $\frac{1}{4}$ -in. nails at a minimum.

In coastal regions and areas prone to acid rain, the corrosion resistance of nails is a big issue. Even though overlying shingles cover them, wind-driven rain and capillary action cause nails to get wet on a regular basis. Electrogalvanized (EG) nails are the most common type used in roofing nailers, but the quality of galvanization varies, and some low-quality products start corroding in just a few years. For longevity, better-quality EG nails, hot-dipped galvanized (HDG) nails, and stainless-steel coil-collated nails are better options. While HDG roofing nails cost about twice as much as EG nails, they only add about \$2.25 per square. Within 1 km (about 3000 ft.) of salt water, FEMA recommends using stainless-steel roofing nails, which cost about \$16 more than EG nails per square of shingles.

The chances of smooth-shank nails pulling out of the roof sheathing are low even during a high-wind event; the nails are more likely to pull through a shingle than they are to pull out of the sheathing. That noted, ring-shank roofing nails are available, and almost all stainless-steel roofing coil nails are ring-shank.



7 STICK THE HIP AND RIDGE

Like the eave and rake edges, hips and ridges are vulnerable to wind. Key to securing the caps is using nails long enough to penetrate through the shingles below, any hip or ridge-vent material, and the roof sheathing. Check the manufacturer's instructions to install the nails in the proper location. For extra hold, I also put a layer of Protecto Wrap's Roof Edge Seal along the hips and ridge or ridge vent before installing the hip and ridge-cap shingles, and I double-nail the caps into sheathing.

When ridges aren't being used for ventilation, the top lap of the last shingle course along the ridge can be lapped over the opposite roof surface as a means of backing up the cap shingles. This approach can also be used along a hip, where the end shingle in each course can overlap the hip by about 4 in.

8

GET THE RIGHT RIDGE VENT

Select a ridge vent that has passed the TAS 100(A)-95 test, which evaluates the wind-resistance and wind-driven-rain resistance of ridge and soffit vents to meet Florida's hurricane-focused building code. Many have built-in baffles that block wind-driven rain while still allowing free airflow. Nails are sometimes supplied with the ridge vent. When in doubt, I use 3-in. roofing nails to attach ridge vent because they work with all models. The nails should penetrate through the sheathing and protrude through the other side by at least ¼ in.



9

COLD-WEATHER BACKUP

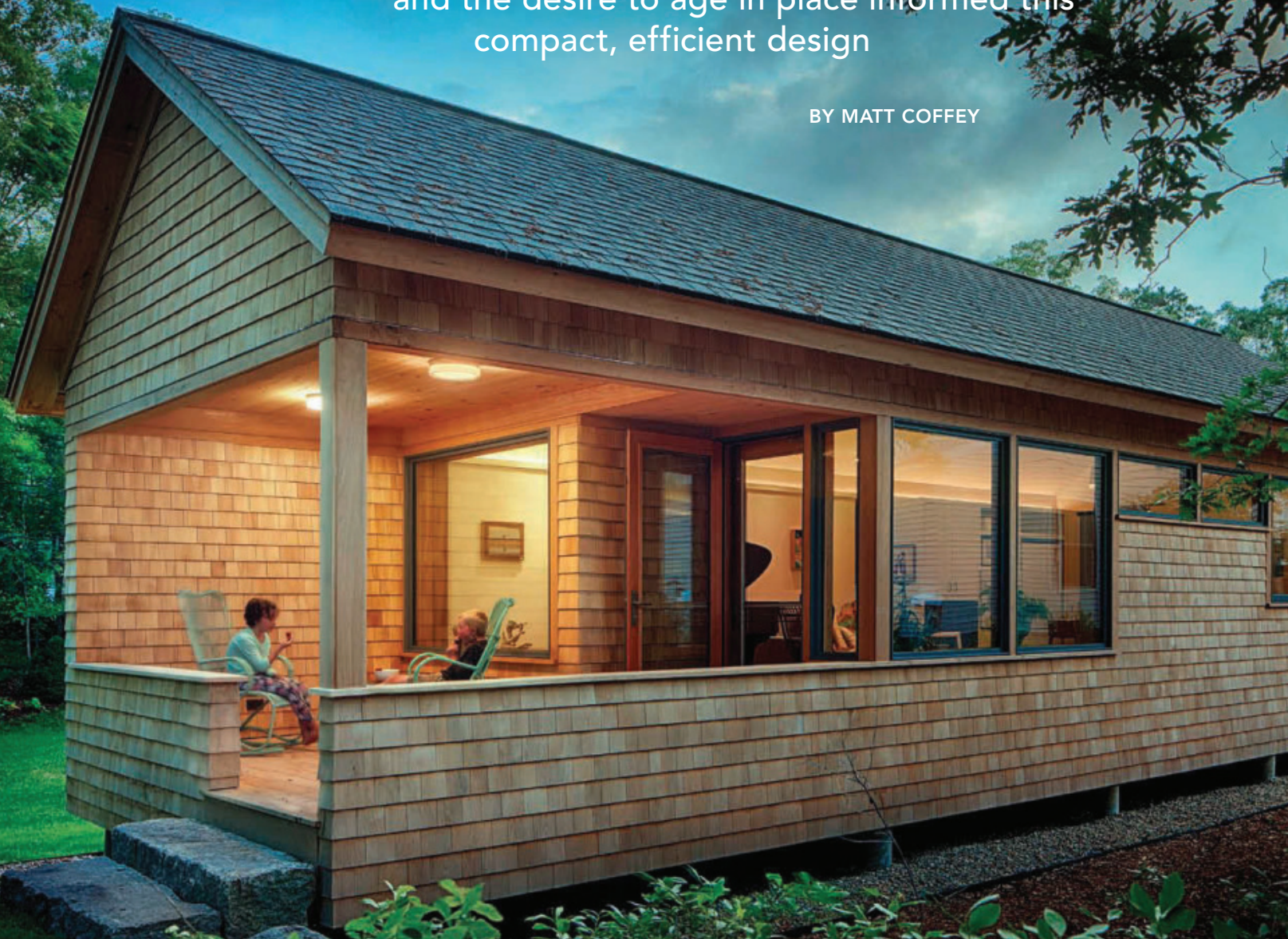
The self-seal strips on shingles typically need warm weather to activate. Roofing in colder seasons can delay this, making a roof vulnerable to winter winds. As a cold-weather backup, apply dabs of roof cement under the edges of field and cap shingles, and beads of cement under the outside edges of rake-edge shingles to help hold them down until the self-seal strips activate.



Small Home Harmony

Tight space restrictions, unique cultural requirements,
and the desire to age in place informed this
compact, efficient design

BY MATT COFFEY





Daylit and private. A continuous stretch of windows along the length of the building brings light deep into the 14-ft.-wide interior, and narrow vertical windows are integrated into the 10-in.-thick north walls to balance views with privacy.



Noteworthy wood. The cypress trim and select millwork are made of old-growth timber harvested from river bottoms in Florida and Georgia. Reclaimed birch sinker logs from a lake in Vermont were used for the flooring.

Ken and Fran Watson enjoy their two-story vacation home for its capacity to host friends and family, but it is far from the house they imagined for their retirement years. Wishing to build a second residence on their half-acre lot nestled in the heart of West Chop Woods, the couple approached South Mountain Company for our help.

Although zoning allowed for an additional structure, it could not exceed 600 sq. ft. of interior space, so an efficient floor plan was key. The Watsons also had a list of must-haves, which included room for a grand piano, discreet storage for sheet music, and a covered porch. The house had to be comfortable for two people, with space for an occasional guest; it needed to function well acoustically; and it

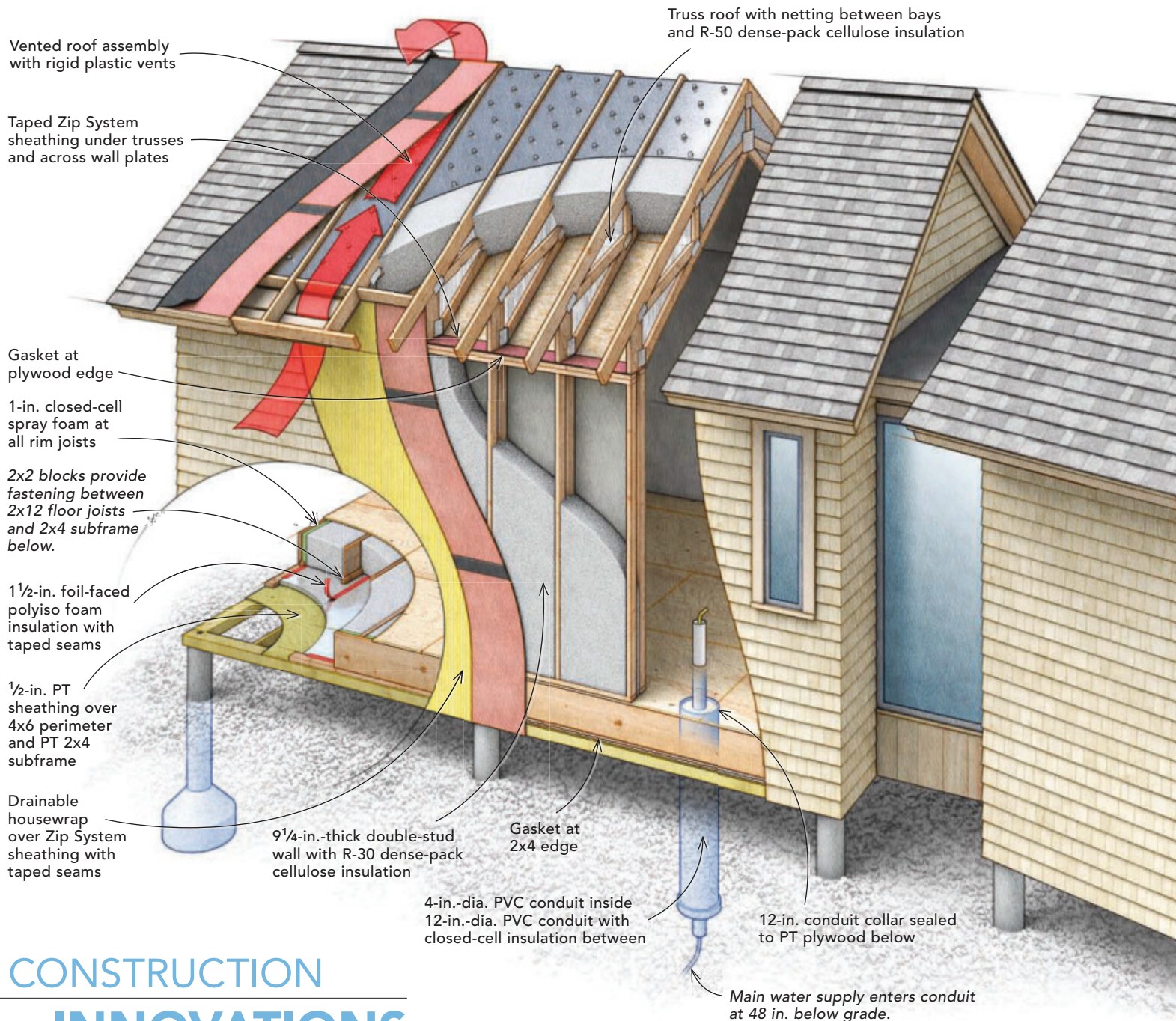
had to feel private, have lots of daylight, and be easy to maintain.

Laying out the floor plan

We began our floor-plan design by asking how compact we could make the bedroom and the bathroom in order to assign more square footage to the public space. Fran and Ken were comfortable with the idea of very modest accommodations and small closets, which allowed us to stretch the west wing to a comfortable size.

Privacy was a leading consideration, too. Because there is less than 60 ft. between the main house and the neighbor's house, we pivoted the west wing 15° to the north. This “kink” in the floor plan opened the entry and shifted perspective from the living space

(Continued on p. 59)



CONSTRUCTION INNOVATIONS

A SITE ANALYSIS REVEALED that the back side of the property would be the ideal location for the new house, despite the homeowners' initial plan to build into the hillside at the front. We realized that if we used a pier foundation, we could abut the septic system and the leaching fields, optimizing the remaining buildable strip of land. The septic code dictates that basements and crawlspaces be a minimum of 20 ft. away from a leaching field. Slab-on-grade foundations can be

10 ft. away. If you build on piers, you can build adjacent to a septic system as long as the piers do not disturb or undermine the system, access from above is maintained, and it is permitted by the local building department and board of health.

Figuring out the floor frame

Because we were building on piers just 18 in. off the gravel bed, we were faced with the problem of how to insulate and seal the raised-floor system. We

had originally planned to build the floor frame upside down on sawhorses—skinning it with rigid foam and pressure-treated plywood for an airtight layer—and then use a crane to flip it over. Instead, we built a skeletal 2x4 floor frame—just enough of a frame to allow us to put down the first layer of PT plywood and the rigid foam. Working from above, we taped the rigid-foam layer in the floor assembly; the plywood below it was not taped because it was outside of the air barrier. We then built

a more conventional 2x12 floor frame on top of that. The subfloor above was taped to keep water out of the assembly during construction, but it was not meant to be an air barrier, so when we pulled up the lightly tacked strips of subfloor to insulate the floor cavity, we did not retape those seams. We had the air-sealing we wanted, and the construction sequence didn't require a crane. Moreover, we didn't have to think in reverse to lay out the plumbing and ductwork.

Regulating the water lines

To get water into the house, we wanted to maintain above-freezing temperatures in the water supply line without electric-resistance heat tape, so we decided to build a custom conduit. The town-supplied water comes up from 4 ft. below grade, and right where it turns to enter the building, we built a custom-insulated double-wall PVC conduit. The ground temperature and the ambient indoor-air temperature thermally regulate the conduit, which is essentially borrowing 55°F from the ground plus warmth from inside the house.

A sheathing lesson

The roof-truss assembly was another component we developed along the way. Because of its low-environmental impact, we wanted to use dense-pack cellulose insulation wherever possible. Putting the air barrier on the roof interior and transitioning it to the exterior at the wall enabled us to do a vented roof and to use all cellulose.

Above the top plate, where we were transitioning the air barrier from inside to outside, we had to tape every seam. There were a lot of nooks and crannies to seal, and this had to be done perfectly or there would be the possibility of a breach. Next time, a better option might be to use eaveless trusses and to run the air-barrier sheathing right up to the roof sheathing. Then we could add a second layer of 2x4s or 2x6s above that, run those out, and add sheathing above that structure. In other words, we would frame a cold roof, using that whole second layer of framing and sheathing as a vented assembly.

DESIGN FOR AGING IN PLACE

People are increasingly interested in planning their homes around possible future needs. To address that, we developed a three-tiered checklist for aging in place. It has become part of our design process and is now presented to every client.

Each level represents an increase in cost and complexity. We try to incorporate all of the Level 1 provisions (shown below) in every project. We offer Level 2 and Level 3 options to give clients choices if they want to take visitability and accessibility to a higher standard. We've found that most clients are interested in incorporating at least some of our Level 2 and Level 3 suggestions.



ABSOLUTES FOR VISITABILITY

- At least one bath on first floor
- At least one zero-clearance threshold entry
- 32-in. clearance for doors at all visitable spaces

SITE AND ENTRANCE

- No-step route to be 1-in-12 slope; pathway slope of 1-in-20 minimum preferred
- Accessible entry-door threshold to be 1 in. maximum, with bevels above finished floor surface on both sides
- Weather protection from elements to fully cover accessible entry door

INTERIOR CIRCULATION TO VISITABLE SPACES

- Readily visitable spaces via a no-step route to include a full bathroom, bedroom, kitchen, and dining and living space
- Cased openings to be 32 in. wide minimum (34 in. minimum for door slab)
- Level changes in circulation route to visitable spaces via a ramp to be less than 1-in-12 slope
- Minimum 38 in. wide (finished) halls to serve visitable spaces

BEDROOM

- First-floor bedroom (or future bedroom) with 36 in. minimum clearance on one side of bed preferred

HALF-BATHROOM

- Minimum 3/4-in. plywood walls or adequate blocking for grab bars at toilet and shower in visitable bathroom at 33 in. to 36 in. above finished floor (2x12 blocking needed for fiberglass units)

FLOORS

- Maximum 1/2-in. thresholds between floor surfaces in accessible spaces

SWITCHES AND CONTROLS

- Electrical switches to be centered 48 in. maximum above floor
- Thermostats at 48 in. maximum or remote controlled

FIXTURES AND HARDWARE

- Lever handles on doors



For a printable PDF of South Mountain Company's full checklist for aging in place, visit FineHomebuilding.com/magazine.

SPECS

Bedrooms: 1

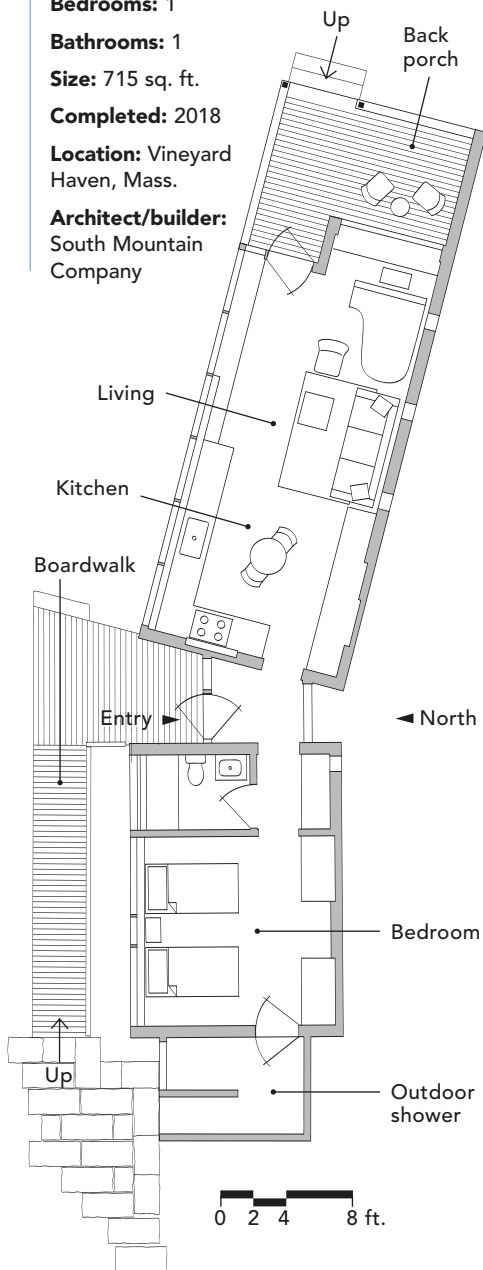
Bathrooms: 1

Size: 715 sq. ft.

Completed: 2018

Location: Vineyard Haven, Mass.

Architect/builder:
South Mountain
Company



TAKING THE LONG VIEW

For comfortable aging in place, we kept everything on one level. The transition from the driveway to the boardwalk and all the way through the house to the back porch is flush—that includes the finished deck, terrace, outdoor shower, and entry.





Built for sound. The piano sits beneath a 12-ft. ceiling and beside the porch door, which was brought into the conditioned space rather than made flush with the window to optimize the acoustics and save square footage.

(Continued from p. 55)

toward the adjacent woods. We concentrated the glazing on the side facing away from the main house, and the modest entry is fully glazed from floor to ceiling to feel open and inviting. As a result of these efforts, when one is in the new house, nearby buildings are largely obscured from view.

Solving the piano puzzle

The grand piano was the bear in the room. We wanted to position it out of the way, yet make it a focal point. And it was important that the person playing it wouldn't feel cramped. To accomplish this, we bumped the west gable end out 3 ft. This subtle shift reallocated space from where it wasn't needed (a small porch entry door) to where it was (the piano niche). We terminated the southern glazing at this juncture to create a solid exterior wall against which the outswinging door

could latch. Sheet music would be stored beneath the large window looking onto the porch, whose sill would extend 20 in. and serve as the top of a custom cypress cabinet with simple bypassing doors.

To get the acoustics right, we worked with Doug Sturz from Acentech. Our initial schematics divided the house into two volumes with shed roofs, but in order to get the volumetric requirements for high-quality acoustics, Doug suggested a minimum ceiling height of 12 ft. He also explained the need for a mix of solid walls (which could be softened with a tapestry or acoustical panels) and hard surfaces (such as windows) off of which the sound could travel. An open shelf above the porch entry door would add volume without increasing square footage. In lieu of a cost-prohibitive, acoustically optimized ceiling, we opted for a smooth plaster finish. The

homeowners knew from experience that small changes in the room, such as a piece of additional furniture or a wall hanging, can affect acoustics. In the process of moving in, they intentionally utilized space to "fine tune" their home.

We recently visited Ken and Fran and found them settled right in. Ken had set up recording equipment by the piano. After performing his latest composition, he shared this sentiment with us: "We have such appreciation and respect for the design, engineering, detail, uplifting spirit, and harmony of our home. We will age happily because we live in this superbly planned and impressively built home." □

Matt Coffey is co-owner of South Mountain Company on Martha's Vineyard in Massachusetts. Photos by Bob Gothard.

Precision



Window Trim

A systematic approach ensures better joints and a faster installation

BY ANTHONY VITALE

Somewhere along the way, we've decided that it's the apprentice's job to run base or to find and mark studs. There's nothing really wrong with that, but I also like to throw window and door casing into the mix. The skills required to case an opening are fundamental to finish carpentry, and the conditions are pretty similar from one opening to the next. Learning how to case from the get-go teaches you prep; detailing; nailing pattern; understanding the difference between level, plumb, and straight; and how to set and sight reveals. You've got 12 different tools you're going to use to get through the process.

The method I teach apprentices started somewhat out of frustration. Various factors can throw off miter joints when you stick-build a casing around an opening, and it can take a lot of time and effort to get the joints right. Throw a junior carpenter into the mix and the results aren't always great. But that's not the case with bench building. Doing the assembly work on a tabletop takes the irregularities of an opening out of the equation and makes the process simple enough that anybody on the crew can do it. That frees up senior carpenters from having to micromanage and troubleshoot, and makes it easy to scale up for big jobs. □

Anthony Vitale is a finish carpenter and the owner of Probuilt Woodworking in Clinton Township, Mich. Photos by Matthew Millham.



OPENINGS NEED WORK

Window and door jambs tend to get banged up and dirty during construction, and we need to clean and repair them so they don't compromise and complicate the trimwork we're installing. Although not comprehensive, the photos shown here reflect some of the most common fixes we make when working our way through a house.



1 Fix the jambs. Lever joints closed, and nail them off. Glue down chips, then sand them flat. Chips and open joints will show in the finished opening and must be fixed while fully accessible.



2 Reestablish the gap. Use a wallboard saw to cut back the drywall around the window, which frees up the jambs so that they have room to be nudged into proper alignment if necessary.



3 Scrape it down. Clean up any errant drywall compound with a scraper or chisel, taking care not to damage the jamb. Skip this, and the trim won't make continuous contact with the jamb.



5 Round it over. Jamb edges often show dings, and even if they don't, a sharp edge doesn't hold paint as well as a slight roundover, which can be added with a compact router and a 1/8-in. roundover bit.



4 Sand out imperfections. Keeping the sander flat, sand across the faces of the jambs to get a clean surface and to flush up the corners. Sanding takes you down to clean wood and ensures a more consistent finish.



6 Ease the corners. Use 150-grit sandpaper to finish off the inside corners of the jambs, matching the router bit's radius where the router can't reach.

DEVELOP A PRODUCTION MINDSET

Keeping the tape measure in your tool bag and marking stock in place eliminates read and transfer errors. Once you've measured the opening and cut the stock to rough lengths, put the tape away. For rough sizing, I like to cut stock about a foot longer than the opening—or even more than that with wider casing. That sounds like a lot, but with this 4-in.-wide casing, it really only leaves 4 in. of wiggle room once you subtract the 4 in. for each miter. I want my crew to be methodical about rough sizing, but I don't want them to lose time doing it. The critical accuracy comes when marking the stock in place on the opening and cutting to those lines.

A quick tip on getting the most out of your stock: Cut the long lengths first (usually door legs and larger openings), and use the cutoffs from those for smaller openings. That way, you're not chopping down 16-footers for 3-ft. windows and can use your cutoffs a bit more efficiently.

When casing a whole house, a lot of the efficiency comes from using production methods. That generally means doing one task with one tool—say, cutting all of the miters for all of the casing in a room or floor of the house—before moving on to the next step in the process. This cuts down on setup and adjustments, and you don't have to keep track of 10 different tools at once.



1 Mark reveals. Set a combination square to $\frac{3}{16}$ in., and mark reveals at each corner. Even on stain-grade work, the resulting crosshairs will get hidden behind the finished casing.



2 Mark in place. Transfer the marked reveals to the stock, and label each piece to indicate its place on the opening—top, bottom, left, and right—and the opening it belongs to.



3 Kiss the line. Cut all of the left-hand miters, then swing the saw to 45° the other way to cut all of the rights. Take most of the line to ensure that the finished casing will hide the reveal marks.



4 Cut the slots. Align a biscuit joiner to a common spot on the casing, aiming to keep the biscuits close to the short point of the miter, which is the more vulnerable to opening up. Register the joiner to the show side of the casing when possible to aid in keeping the faces of the intersecting pieces in plane.

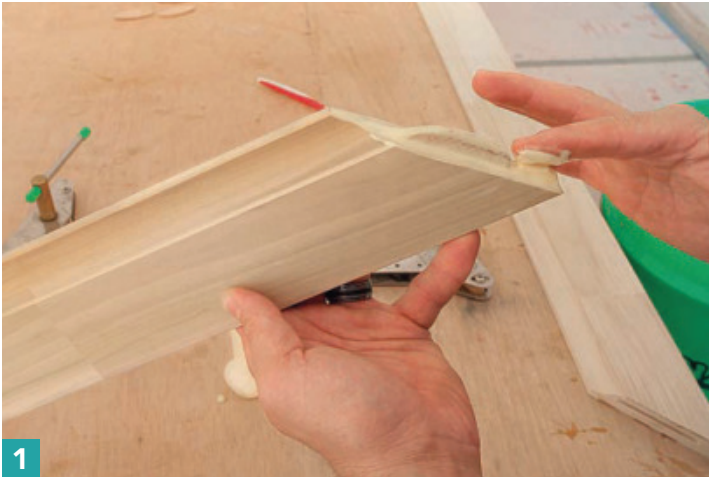


Set the stage.

Arrange all of the parts in their proper position, stage biscuits and clamps at each corner, and have glue and cleanup materials at the ready.

GLUE IT UP, SET IT ASIDE

Have a bucket of clean water, a rag, and a toothbrush at the ready to clean up squeeze-out. I like to use Titebond II for casing joinery because it is thinner than many other glues and has a good open time. Clam Clamps (miterclamp.com; \$60 to \$70 each, plus shipping) are my go-to for mitered casing joints because their multiple grab points lock the casing together in three dimensions, allowing me to move the glue-up as soon as it's assembled and make room on the table for the next. Pinch clamps just don't have the same grab and stability, especially not on wide casing. The process goes quickly—about seven minutes per casing. As each casing is completed, set it against its opening to dry out and fully cure, which takes about a day. Don't rush this; the joints should be completely set up prior to final sanding and fastening them in place. Assemble the casing on a large flat table or workbench. I have a handful of these lightweight torsion-box benchtops (an adaptation of Ron Paulk's bench) that sit on sawhorses. If I need a bigger work surface, it's easy to put two or more of them side by side.



1 **Don't starve.** Squeeze glue into the biscuit slot and onto the face of one side of the miter, insert a #20 biscuit, and smear the glue around with a finger. There should be plenty to coat the other workpiece.



2 **Assemble and clamp.** Starting at the head and going one at a time, assemble each joint flat on the bench, aligning the corners and pushing the miters tight by hand while tightening the clamp.



3 **Clean the joint.** After clamping a miter, use a clean, damp rag to remove the squeeze-out from the face and back of the joint and from the table. Rinse the rag in a bucket between joints.



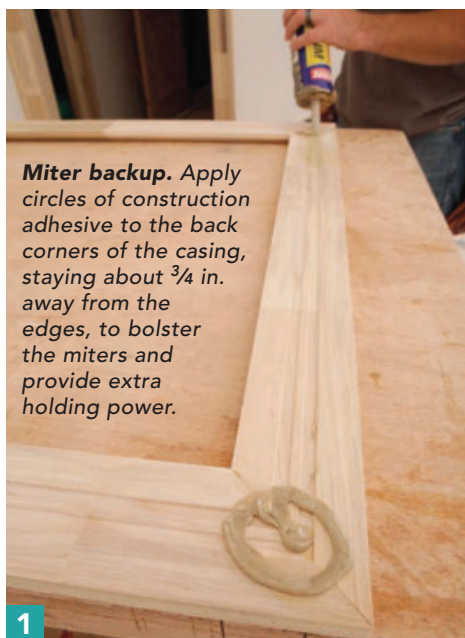
4 **Brush the profiles.** Use a damp toothbrush to remove glue from the profile, wiping the brush clean on a damp rag frequently.



5 **Bottoms in.** Because the legs are already locked in, both of the bottom joints must be assembled at the same time. A few taps with a soft-faced hammer help with positioning.

CASING AND BACKBAND WORK TOGETHER

Rather than install and complete each casing one by one, I nail off the inside perimeter of each casing, then switch nails and fasten the outer perimeter. When that's done, I move on to the backbands, which wrap around the outside perimeter of the casing to add depth and hide the clamp marks. As with the casing, the backband stock is initially cut to rough lengths, usually 4 in. to 6 in. longer than needed. I cut all the left miters first, then the rights.



Miter backup. Apply circles of construction adhesive to the back corners of the casing, staying about $\frac{3}{4}$ in. away from the edges, to bolster the miters and provide extra holding power.

1



3

Nail inside. Use $1\frac{1}{4}$ -in. 18-ga. finish nails to fasten the inside perimeter of the casing, starting at the head. Keep the nails 2 in. off the miters and spaced roughly 8 in. o.c.



4

Nail outside. Use 2-in. 18-ga. finish nails to fasten the outside edge of the casing. Place the nails so they'll be hidden by the backband, keeping them 4 in. to 5 in. off the miters and spaced roughly 12 in. o.c.



2

Head first. Use the crosshair reveals as guides to align the head of the casing first.



5

Mark the backband. Hold the backband stock against the casing, mark it in place, and label it.



6

Leave a hair. When cutting the backband, leave the lines. The tiny bit of extra length aids in getting the miters tight and ensures that the pieces aren't too short.



7

Start low. Start installing the backband at the bottom of the window. Before nailing each piece, apply a bead of wood glue to the backband where it abuts the casing.



8

Nail it off. Center the bottom backband on the casing, and nail through the bottom with 1 $\frac{1}{4}$ -in. 18-ga. finish nails. Keep the nails 4 in. off the corners and spaced roughly 10 in. o.c. For the backband legs, don't nail them off entirely right away; leaving the tops of the legs free makes it easier to align the top miters. Buttress the backband miters with two nails into each as they're assembled, going up into the legs from the bottom and down into the legs from the head.



9

Work to the top. Install the backband legs next and the backband head last, cleaning up squeeze-out as you go. Apply glue to the miters before assembling each joint, line them up by hand, and hold them tight while nailing. After nailing the miters, drive the last nails into the top of the legs.

Final sanding. Use 150-grit sandpaper to flush up the joints, clean up the faces, and break the edges of the backband.



10

Frame Walls Plumb and Straight



Following these steps will make the rest of the build easier

BY BRIAN MCCARTHY

Before becoming a full-time framing contractor, I spent some time in the Marine Corps, so it shouldn't be surprising that I value becoming an expert through repetition. When my crew and I plumb and straighten the walls on one of our projects, we always follow the same steps and in the same order for two important reasons. First, when you do something the same way every time, it's harder to forget a step. Second, knowing the steps makes a process more efficient by eliminating unnecessary and redundant movements. Straight walls are important. They make a house look better, and getting them right makes the construction process easier for everyone down the line. If you don't get the walls plumb and straight, everyone from plumbers and drywallers to finish carpenters and flooring installers has a harder time making their respective parts of the house fit together and look good.

The right time

Although timing is not always something we can control, in general it's easier to straighten the walls on frames that go together quickly in good weather. Walls exposed to multiple cycles of wetting and drying are the hardest to straighten.

There are two schools of thought among framers about the right time to straighten the walls. Some framers wait to straighten until

all the interior bearing and nonbearing walls are in place, but I think the better way is to frame and straighten only the walls that are needed to get the next deck installed. This includes all exterior walls, interior bearing walls, walls with point loads, and any walls that might make framing the stairs easier. If you frame just what you need at this point, not only will you have less bracing in your way, but you will have more room to work when installing the floor joists or ceiling joists above. The remaining interior walls can be framed when the next deck is on and the ceiling is strapped. Plus, I find that the nonbearing walls go up faster and straighter when framed later because it's so easy to transfer the layout to the ceiling with lasers and skip the straightening and bracing part altogether.

Where to start?

Making a house's walls straight starts at the lumber pile. We use the longest, straightest stock for plates, and we pull our stud layout from an outside corner, almost always on the longest wall. We square and sheathe the exterior walls while they're lying on the floor. We then stand the walls, plumb them, and tack the corners. Lightly nailing the corners allows us to straighten them later if things move, as they always do. When we install interior beams with multiple layers (either dimensional or engineered lumber), we tack the plies together with a framing nailer, but we don't fully nail the plies tight. This means that they're easier to push and pull when it's time to straighten them. Once all the structural elements are in place, we install the second top plate.

Rim joist before string

With the second top plate in place, we install the rim joist by toenailing it to the top of the wall. Installing the rim at this point is much easier than when there are multiple braces holding up the exterior walls, which make it harder to move material and to position stepladders, and easier to knock something out of alignment.

Once the rim joist is in place, we can straighten the walls. We start with exterior walls by stretching string along their interior. (If we're plumbing and straightening the top floor, as in the photos, there is no rim joist. Instead, the rafters, not floor joists, bear on the top plate.) Often we stretch string on several exterior walls to save time. One carpenter on a three-person crew can be putting

MOUNT THE BRACING



Steel braces are better. Attach adjustable steel wall bracing to the top plate with 2-in. screws. The 10½-ft.-long braces are made from 1-in. square tubing, so you can adjust them from anywhere along their length with a 1-in. wrench. They have 12 in. of adjustment and are strong enough to straighten even the waviest walls. Again using 2-in. screws, attach the bracing to the subfloor.

PLUMB THE CORNERS



Mount string blocks first. To space the string from the wall, screw small 2x4 pieces to the top plate at both ends of the wall. Drive a pair of nails into the blocks for fastening the stringlines used for straightening. Install the blocks on all the corners before plumbing the corners; otherwise, driving the nails knocks the corners out of plumb.

Plumb with a long level. Using a plate level, plumb the corners starting with the longest wall. Once the wall is plumb, fully nail the end of the wall to the intersecting wall that forms the corner. Plumb all the corners on the exterior walls of each floor, and fully nail them before straightening anything.

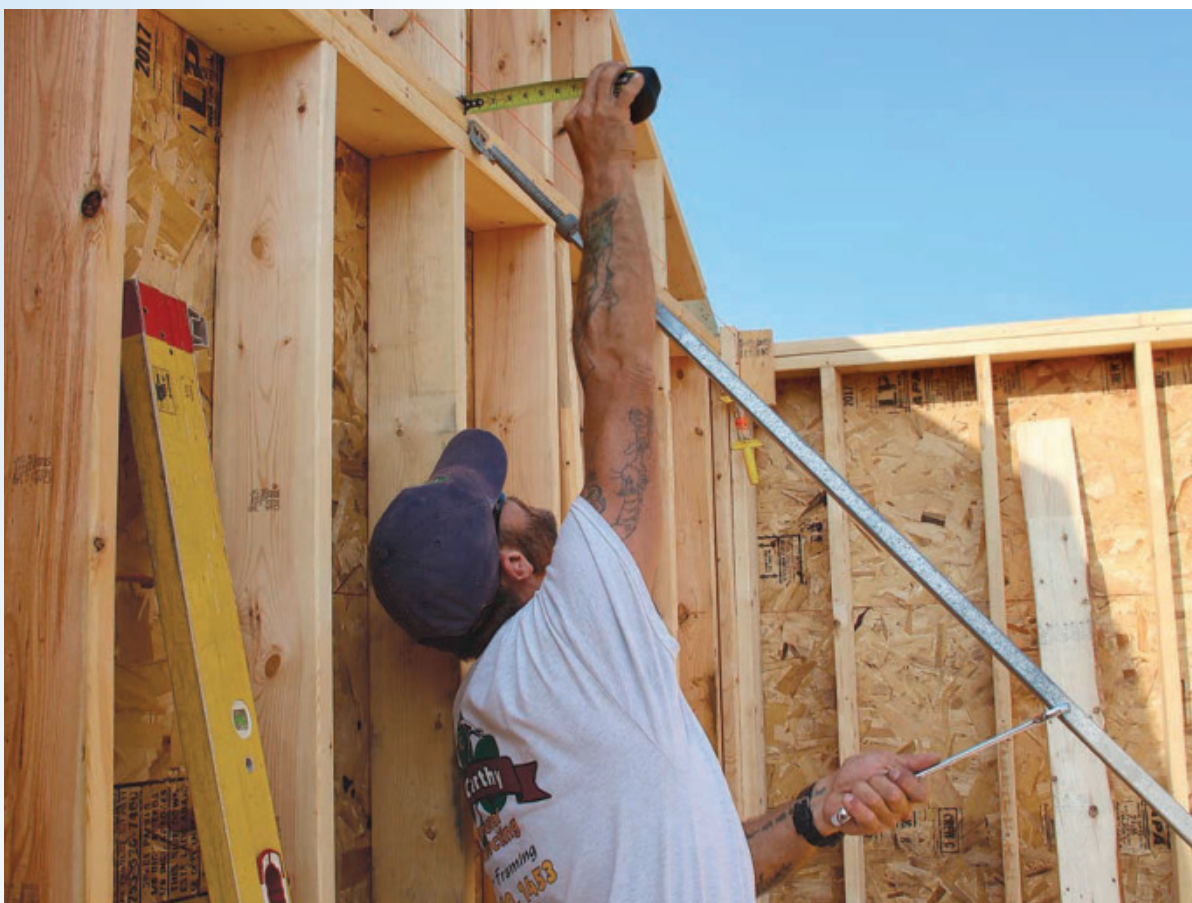


STRAIGHTEN THE OUTSIDE...



Stretch a string. Each corner gets a block with two nails. The upper nail—sunk just shy of the surface—sets the nail about $1\frac{9}{16}$ in. from the plate. After pulling tight across this nail, wrap the string around the second nail to keep it taut.

Gauge the gap. Starting with the longest wall, check the distance from the string near the center brace first, and then check the distance to the string close to the braces on either side, working toward the corners.



Move to the next wall. Once the first wall is straight along its length, move to the next-longest exterior wall that shares a corner with the first straightened wall. Before moving to each new wall, check the center to ensure that straightening the intermediate parts of the wall hasn't moved the center from its straightened position. If you can't completely straighten the wall, average the difference among the braces. It's usually no more than $\frac{1}{8}$ in. over 12 ft. if you've used straight plate stock that's free of weird grain.

up the strings while the others are procuring the bracing from the tool trailer or the floor below. Using scraps of 2x lumber, we space the string 1 $\frac{5}{16}$ in. from the wall, which is just enough room to slip a 2x gauge block between the wall and the string.

Install the bracing

Once the string is in place, we start fastening the adjustable wall braces (qualcraft.com) to the top plate, spacing them about every 8 ft., starting with one at the center of the wall. We make sure the threaded part of the brace is near the middle of its adjustment, and we fasten the top and bottom with 2-in. screws. These braces, which cost about \$55 each, are a good investment for anyone who does even occasional framing. The brace's large screw is adjusted with a 1-in. wrench from 10 $\frac{1}{2}$ ft. to 11 $\frac{1}{2}$ ft., so even the most resistant wall can be pushed or pulled easily and precisely. The wrench fits on the brace's square tubing, so you can adjust it anywhere along its length. Unlike when using wooden spring boards for straightening, the steel braces allow one carpenter working alone to straighten and plumb a wall. I have bought 20 of these braces over several years. In the early days, I got by with fewer of them by swapping the adjustable steel braces for wood braces as the walls were straightened. But now I have enough to frame a 5000-sq.-ft. house.

If you're on a tight budget, concrete-form turnbuckles (ellismanufacturing.com) attach to 2x lumber and adjust in length similar to the Qualcraft braces and work nearly as well for \$25 each.

Plumb corners, then straighten walls

Once all of the braces are in place, we plumb the exterior corners using a plate level. The height-adjustable plate level only touches the wall at the top and bottom plates, keeping any warp in the studs from transferring to the level. When a corner is plumb in both directions, we fully fasten it together before moving on to the next corner.

After we have confirmed that all the corners are plumb, we move on to straightening the walls, generally starting with the longest exterior wall. Once that wall is straight, we proceed to the next-longest adjacent exterior wall until we've made it the whole way around the house. Then we plumb and straighten any interior bearing walls and any interior walls with point loads. Finally, we straighten any structural beams.

... THEN MOVE INSIDE



Structural interior walls come next.

Once all of the exterior walls are braced, move to bearing walls and any walls with point loads (such as those with a perpendicular beam). Then straighten and brace any beams. It's important to wait until all walls are braced before marking joist layouts.



Build the next deck.

Getting joists on as quickly as possible is the best way to ensure that the walls are held straight and plumb and are less likely to be knocked or pushed out of alignment. It also means you can take down the braces, which get in the way of building nonbearing partitions.

With all the structural elements on the floor plumbed and straightened, we frame and sheathe the floor above. This locks everything in place, so we can remove the bracing—which is in the way immediately after we're done with it—and stand the partitions.

In our region, it's common to install perpendicular strapping to the ceiling joists. This allows us to stand partition walls with the floor system above already in place. After we install the strapping on the ceiling, we snap lines on the floor to locate the remaining

partition walls. We frame the partitions lying down on the subfloor and then raise them on the snapped lines. We plumb them with a level and make a few checks with a laser measure to ensure that everything is square. Then we slip in a second piece of strapping between the top plate and the strapping on the ceiling and nail through the top plate into the strapping above. □

Brian McCarthy is a contractor in Stow, Mass. Photos by Patrick McCombe.

This high-performance house embraces local materials, modern lines, and the craftsman's hand

BY MELA BREEN

Arts & Crafts MEETS Modernism

The DNA of the *Fine Homebuilding* House (or “Good Haus” as we’re calling it) is established by the steep and rocky hillside that spills down onto a small neighboring foothill meadow. The site’s limited buildable footprint, seasonal drainage concerns, and an inviting flat outcrop of granite drove the initial design. My own DNA, though, informs the aesthetic.

I am the child of craftspeople, and my rural upbringing is embedded in me like the red

dirt of the Sierra Foothills. I like handmade things and local materials. I believe buildings need to connect and respond to the landscapes we build in. Yet I am drawn to the clean lines of modernism and the illusion of simplicity that relies on rigorous craft and thoughtful detailing. Designing and building our own house was an opportunity to explore finding the balance and harmony between the three intersecting areas of our work: the handmade (and maybe somewhat “imper-

fect”) house, modern architectural forms, and a commitment to high-performance building standards.

Balancing performance and appearance

I start designing around an intellectual idea so that there is a thread of a story that I can come back to throughout the process. In our case, the idea was the notion of design and high performance being inextricably tied



together and overlapping each other—hence the two rectangles intersecting over the main mechanical core and balancing on each other.

The primary rectangle is the long, south-facing first floor. At the west end, a deep porch protects the house from overheating, bridges the seasonal drainage, and links the open floor plan to the landscape with a large outdoor living space. The second-floor rectangle runs perpendicular to the main living space and cantilevers to create a covered

FOLLOW THE BUILD IN THREE PARTS

- **Foundation and framing**
(FHB #277, August/September 2018)
- **Envelope and mechanicals**
(FHB #278, October/November 2018)
- ▶ • **Design and reveal**

In this three-part series, we explore the design and construction of a new contemporary net-zero home in California. This installment recounts the design features and material choices that add warmth, beauty, and a strong outdoor connection to this net-zero modern-style house.

Follow the build at FineHomebuilding.com/California2018 and via our social channels.





Bespoke kitchen. A mix of cabinet styles and finishes lends a furniturelike feel that fits the open living space.



PRODUCT KNOWLEDGE

Stanley FatMax tape measure

- 13 ft. of straighter standout
- Compact case design with less bulk and more comfortable grip
- High-impact ABS case for durability



PRODUCT KNOWLEDGE

FLIR

- C3, a compact, full-feature thermal camera that shares images over Wi-Fi, fits in a pocket.
- After defining a box on the C3 screen, you can determine the highest or lowest temperature in the box.
- FLIR's moisture meters use infrared guided measurement for noninvasive location of leaks.



north entry, while a balcony on the south side cantilevers toward the nearby treetops.

To underscore the architectural volumes, I chose standing-seam metal roofing by Bridger Steel that turns down onto the walls as cladding. Because the same material is used on both roof and walls, the eye doesn't separate the two planes; the intersecting rectangles are therefore reinforced. I used the metal on the sides that are most exposed to the weather. In places that are more protected, however, I used cedar siding that my father had milled for us from his property. The wood beneath the deep north overhangs provides a "softness" in those locations where we will be moving around the outside of the building.



PRODUCT KNOWLEDGE

CabParts

- Custom cabinet boxes and closet components can be ordered directly.
- Flat-packed cabinets in custom sizes come either with Conformat screws or glue-and-dowel assembly.
- Hardwood dovetailed drawers are available.

A kitchen for the extended family

Dave and I have lived in modest spaces since we have had children—first in a one-room cabin and then in a two-bedroom cottage. Our children are now seven and nine, and we are all ready to have a little more separation. The master bedroom is upstairs, and the kids' rooms are downstairs. Their rooms are connected to each other via a hidden bookshelf door, so they can share the space when they feel like it or close it off when they want privacy. The bedrooms are modest in size because we wanted to devote the primary square footage to the main living space and outdoor porch.

As I have thought about what kind of home I wanted to create, it has always been

one where the kitchen is central. The kitchen in this house is integrated with and open to the main living space. We live informally and have a lot of family members who live locally, so there are frequently grandparents and friends at our house. We wanted the kitchen to feel expansive and to accommodate large gatherings, but it also had to feel inclusive and intimate when just the four of us were there.

The kitchen is adjacent to the front door, with the main sink located under a window from which we can see guests arriving and know to greet them at the front door. The island, which will be the primary food-preparation area, spans the length of the kitchen and faces out toward the living room

so that we can interact with our children as they do their homework or with our guests while we cook. The whole space is filled with light and has large windows that look out upon a lovely live oak tree and the forest canopy below.

I generally prefer islands with a lower bar, but because this kitchen is so wide open, we opted for a raised bar to shield the creative mess I usually make while cooking. The island is paneled in Claro Walnut (a species of walnut tree endemic to Northern California) that my father, Dan Guyer, harvested 20 years ago. My dad's barn is a treasure trove of wood he has milled over the years. In his stacks of wood, he not only had the Claro walnut but some beautiful black-oak slabs

that we were fortunate enough to be able to use in the kitchen.

English kitchen designer Johnny Grey has influenced how I design kitchens. I prefer kitchens with a mix of cabinetry types and styles—so that the space feels like it is made up of furniture pieces—rather than a monolithic block of cabinets. We have a mix of walnut cabinets at the island, black oak-faced cabinets and drawers in most of the kitchen, and a few painted pieces.

I like the look and feel of concrete countertops, and we have made our own in the past. However, I have found that concrete stains easily. With two young boys, we wanted durable and repairable surfaces throughout the house, so we chose a quartz product that looks like concrete.

Hearth for a high-performance house

California's brand of modernism embraces the indoor/outdoor connection, which I strive for in my designs. Because of the topography, connecting the house to our site in a beautiful and functional way was a design challenge. We chose to have several covered exterior areas that reach out and extend the house into the landscape. On the western end, the deep porch provides solar shading so that the house doesn't overheat. It also serves as a four-season outdoor room that's an integral part of the floor plan.

Because this is a tight, high-performance house, we decided not to have wood heat in the building. But we do live in a semi-rural area, and there is plenty of firewood to burn. The idea of a hearth and a gathering fire remained important to us, so we opted for a Morso fireplace on the covered porch. With wide French doors, we will be able to open the main living space up to the porch. I expect we will eat outside much of the year, so we included a simple outdoor kitchen that consists of a sink and a barbecue.

The overhanging roof of the porch continues around the north side of the house, which protects the cedar siding and lets us move around the building while being sheltered from the rain.

The size and location of the windows reinforce the house's connection to its natural surroundings. From the entry, the primary sightline is straight through to a wonderful old moss-covered oak, a view also experi-



PRODUCT KNOWLEDGE

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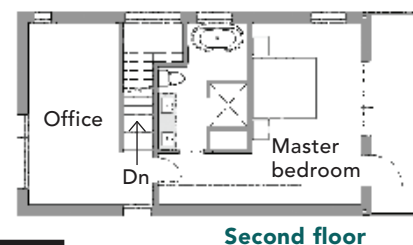
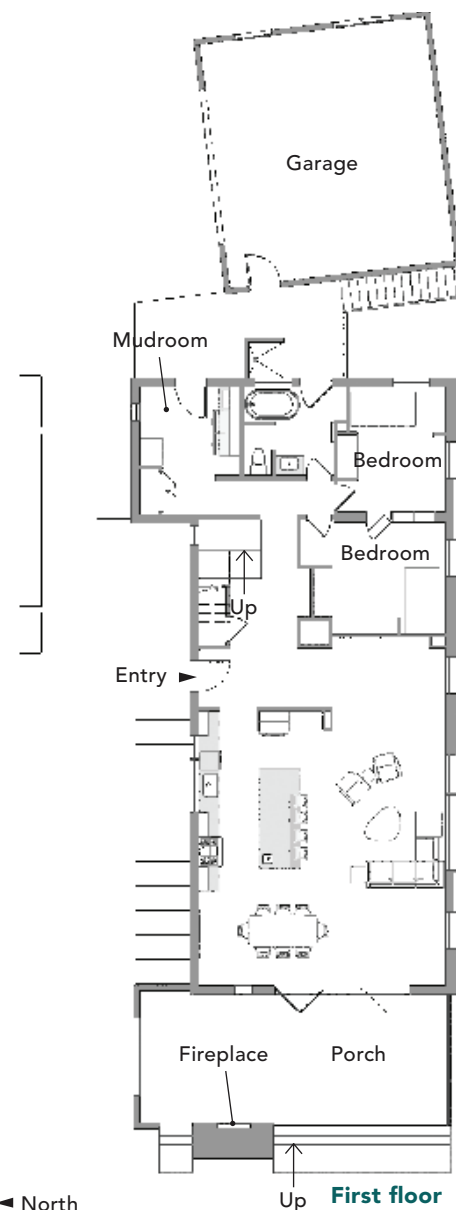


Sheltering room. StepStone concrete pavers at finish-floor height extend the indoors out, while the wall-like chimney and fireplace will ward off a chill.

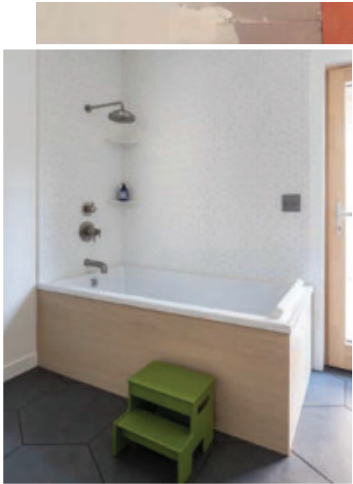


CONNECTING THE OUTDOORS

We spend a lot of time outdoors, and this plan allows access to the property in different ways. The house is oriented so the utility space, garage, shop, and gear storage are on the east side, with the mudroom/laundry adjacent to those spaces. They are connected via a covered breezeway that has an outdoor shower and a separate entrance to the downstairs bathroom. The porch and landscaping on the western end are for gatherings, meals, and sitting around the fire.



0 4 8 16 ft.



PRODUCT KNOWLEDGE

Schluter

- Waterproof Kerdi-Board tile substrate protects the wall assembly.
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enced from the kitchen, the living area, and the master bedroom. The cantilevered balcony off the second-story bedroom is essentially a reimagining of a tree-house porch that allows us to step out into the canopy of the surrounding trees.

Bathrooms for utility and retreat

Even though there is a proper front door and entry, the mudroom—connected to the garage with a breezeway—will be used as our day-to-day entry. It will also house the laundry room; its commercial rubber flooring will be durable and easy to clean. We built a closet, cubbies, a bench, and cabinetry in the laundry room, where we will store various gear, shoes, and clothing before it enters the living spaces.

While we love the outdoors, the downstairs bathroom is also part of my effort to keep the dirt from taking over the house. Although it is primarily the boys' bathroom, it has an exterior door to the breezeway where there is

also a covered outdoor shower. I imagine that we will be able to shower outside for much of the year, removing the dirt and grime from local adventures before entering the house. It is my hope that the kids will at least clean off before running exuberantly through the house that I optimistically painted white! For both of the bathrooms, I chose large-format tiles (with not much grout) for easy cleaning.

The master bathroom is meant to be both functional and a bit of a retreat. For years, all four of us shared a bathroom, and I am ready to have my own space. We try not to waste water, so we stayed away from multiple showerheads and body sprayers, but the tiled stand-alone shower is open and roomy. The tub, a freestanding center-drain model, is from Duravit's new LUV series. □

Mela Breen is founder and principal designer at Atmosphere Design Build in Grass Valley, Calif. Photos by Kat Alves, except where noted.

HOUSES

ARCHITECTURAL CHALLENGES AND SOLUTIONS

BY DESIGN

CURATED BY KILEY JACQUES



ALOFT AND SHINGLED

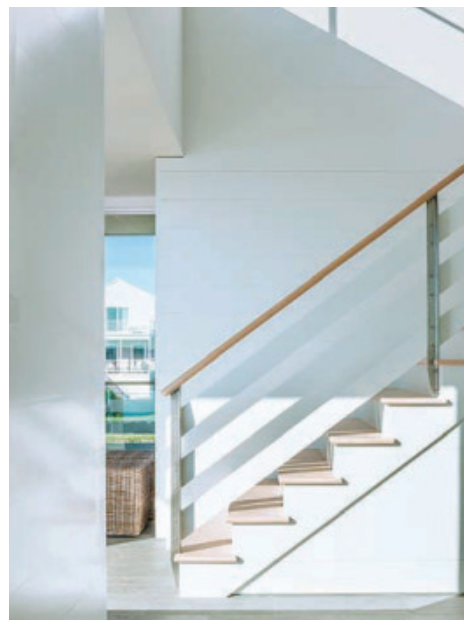
This house is located on the south shore of Rhode Island, near a tidal pond subject to flooding. Due to changing weather patterns and federal mandates for coastal construction, nestling the house into the dunes—a more traditional approach—wasn't an option. The house needed to be at least 10 ft. above grade on piers. This requirement presented some visual and access challenges. A base of wide-board skirting with deep shadow lines visually grounds the house and supports the lighter, more finely grained shingles and large expanses of glass above. Entering a raised house is always a design problem, which Estes Twombly Architects solved with a partially enclosed stair leading up to a second-floor covered deck. The entry is a glass-encased bridge between the two gabled wings; it draws visitors up to and through the house on both levels, while also framing water views. The bridge's flat roof sets off the two main forms and reduces the scale of the house.

Designer Estes Twombly Architects, estestwombly.com

Builder Kinsella Building Company, kinsellabuilding.com

Project location Charlestown, R.I.

Photos Warren Jagger







VERTICAL FIT

Presented with a tight urban lot that needed to accommodate a four-bedroom/four-bathroom home, Clark Richardson Architects conceived a strongly vertical two-gabled modern farmhouse. The city of Austin's height and building-area constraints were a constant battle. The challenge was to maintain a cost-effective structural design, address the desire for high ceilings throughout, drain the deck area effectively, and do all of this in an aesthetically pleasing manner. The solution included a "habitable attic"—an open, vaulted space daylit by dormers—on the third floor that conforms to local code exemptions. The finished attic opens directly onto a floating wood deck atop a recessed roof surface, which allows water to drain directly into the gutter running the length of the primary gable. For a pleasing overall look, gables clad with white fiber-cement siding are outlined in black metal paneling, which wraps into the carport at the front entry, transitioning from roof to wall and down to grade.

Designer Clark Richardson Architects, clarkrichardson.com

Builder Hudson Design Development, hudsondesigndevelopment.com

Project location Austin, Texas

Photos Paul Finkel, courtesy of Clark Richardson Architects





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askthe experts

YOUR QUESTIONS—PRO ANSWERS

Dry joints in brick walls

I live in Sea Bright, N.J., in a converted, two-story brick warehouse that was built in the early 1890s and sits about 300 ft. from the ocean. The walls are all solid with no cavities between wythes and are three wythes thick on the ground floor and two wythes thick on the second floor.

I'm adding a third floor. Upon removing the drywall, I came across an unusual (and disturbing) detail in the brick masonry. Every 32 in. or so up the wall, there is a dry joint between the brick courses with no mortar whatsoever. After noticing this in my building, I have seen identical conditions in several other buildings in town that have exposed original brick walls.

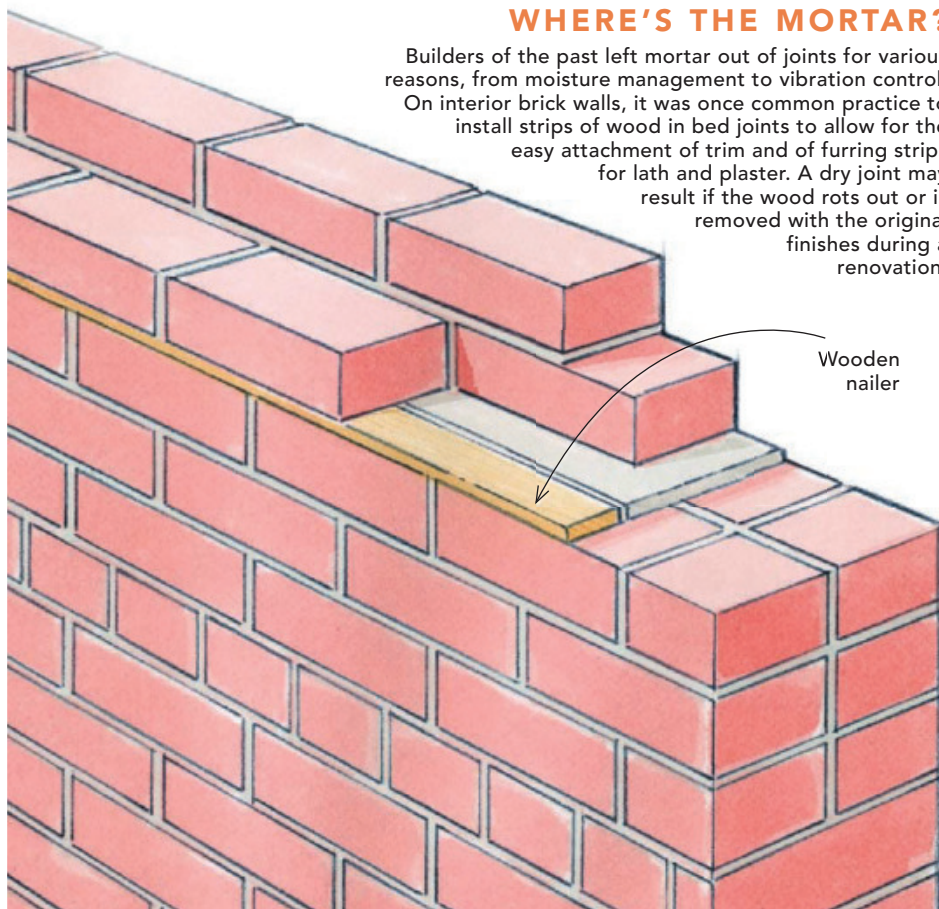
Do you have any idea why this was done and what purpose it served? The walls have been there for over 100 years and seem to be holding up fine, but as I'm adding a floor, I'm sure you can understand my concern. Do you have any suggestions about strengthening or stabilizing the walls at these joints? Or should I just leave well enough alone?

—ROBERT
via email

Brent Hull, a nationally recognized authority on historic design, responds: There are a few possibilities for these dry joints. First, there is a precedent for using an unmortared brick line as a moisture-control barrier. Typically these areas would have been tarred, or a layer of tar paper would have been laid between joints to stop water from wicking. The idea was to prevent water at the ground level from going up or to keep

WHERE'S THE MORTAR?

Builders of the past left mortar out of joints for various reasons, from moisture management to vibration control. On interior brick walls, it was once common practice to install strips of wood in bed joints to allow for the easy attachment of trim and of furring strips for lath and plaster. A dry joint may result if the wood rots out or is removed with the original finishes during a renovation.



water from filtering down from a parapet wall at the top of a building. If the joints are on the second floor, they could be for controlling water migration. If that's the case, it may be difficult to see the waterproofing material from your vantage point.

The second possibility is vibration control. In this case, joints were purposely laid dry so that there would be a break in the mass of the brick wall. This break (mortar not joining the mass together) prevents vibration and minor movement from traveling up the entire wall. We don't see this in Texas, where I live, but it may have been a local practice in Sea Bright, where a railroad passed through from the mid-1860s until well into the 20th century. As you

know, the town is very narrow, and nearly every building would have been close to the tracks in the late 1800s.

If there's a noticeable gap, there's a third possibility. It used to be common to put wood every so often up interior brick walls to have something to nail to, and we see it all the time in our historic work. Often these were just pieces of lath laid on the flat in the joints, and they extend back only about an inch to attach trim or furring strips for lath and plaster. It's possible that the wood was there and has just rotted out or was pulled out during a previous renovation when the original lath and plaster was removed.

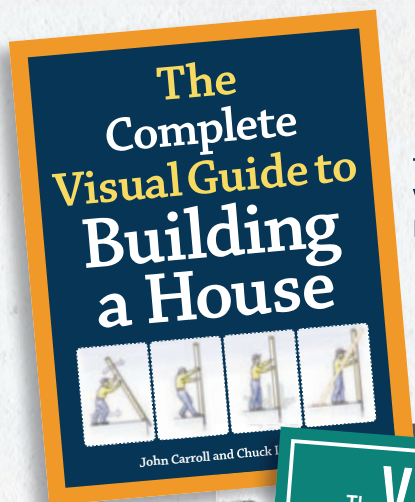
As for what to do now, your walls likely don't need any major remediation. Have a

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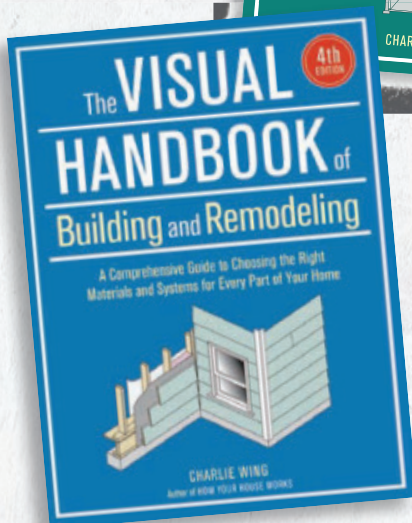
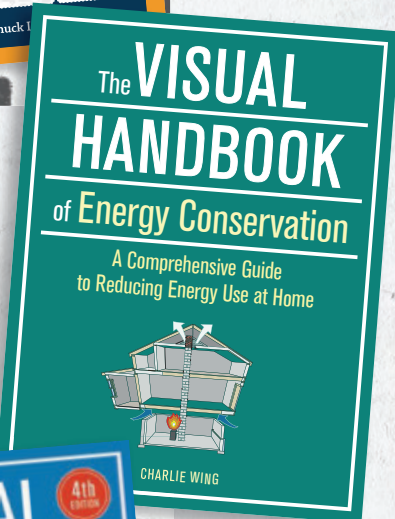
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mason or engineer check them out to see if the purpose of the joints can be determined. If they were there for vibration or moisture control, leave the walls alone. These walls have worked for more than a century. Even if you wanted to “fix” them, I’m not sure how you would go about it. If it’s just a case of missing nailers, the bricks are likely partially supported, but it probably wouldn’t hurt to have a mason repoint the dry joints. Whatever the case, I think this construction technique offers a unique insight into the issues craftsmen faced in the past. It’s a fascinating piece of history, in my opinion.

Re-side over lead-tainted siding

We just bought an 1880s farmhouse in the Catskills and are about to start major renovations. It’s a wood-frame house with traditional clapboard siding and no sheathing or insulation. The siding tested positive for lead paint in a couple of spots, and we’d rather not disturb it if we don’t have to. We’d like to re-side with fiber cement. We know you can’t just install fiber cement over old siding, but can you sheathe (we’d use Zip System) over the existing siding and then install the fiber cement? We are going to gut the inside as well, so we’ll be able to add insulation when we do that. It will save us a huge chunk of money if we don’t need to remove the old siding (and lead paint).

—ELLE
via email

Builder and editorial adviser Mike Guertin replies: Generally you can encapsulate old siding under a new skin of sheathing and install siding over it, but check with your local or state authorities governing exterior lead paint to make sure you can cover it. In some places you have to remove lead paint before re-siding. Assuming you can encapsulate it, you have a few options.

If you’re just worried about looks, the simplest and least expensive solution is to fasten 1x4 furring strips vertically over the existing siding and into the studs, and attach the new siding to those with 1¼-in. roofing or siding nails. Besides providing a flat surface to nail to, the furring strips cre-

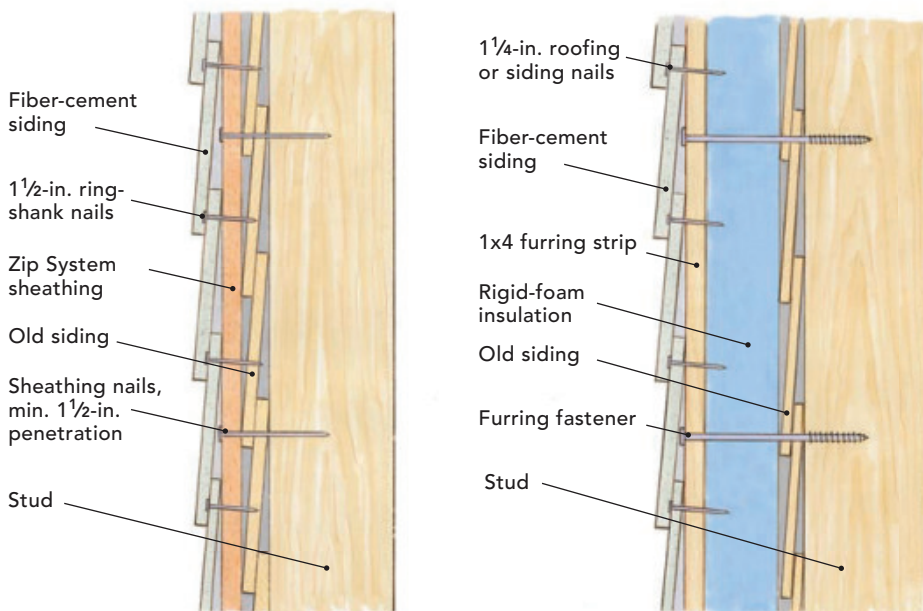
ate a rainscreen space behind the new siding, which is a great installation practice for all cladding.

It’s unlikely that there’s a water-resistive barrier behind the old siding, and if it were my house, I would install #15 ASTM D-226 tar paper over the old siding before adding the furring strips. The tar paper is economical and will help shed water if any of the clapboards are cracked enough to leak. Tar paper also lets moisture vapor diffuse from the inside through to the rainscreen cavity.

If you want to improve your air barrier, a layer of Zip System sheathing and tape—the option you suggested—should do that while also providing a nail base. When you install the new sheathing, use nails long enough to penetrate through the old siding and into the studs by at least 1½ in. Then the fiber-cement siding can be installed with nails or screws. In the Catskills, you should only need 1½-in. ring-shank nails to attach the siding to the new sheathing. Installations in high-wind and coastal areas, however, should follow special fastener measures outlined in the manufacturer’s ICC-ES Report. For best performance, seal the sheathing to the foundation at the bot-

ENCAPSULATING LEAD-TAINTED SIDING

Sometimes it makes sense to cover, rather than remove, old siding. One option is to sheathe over it and re-side. Another is to install rigid foam and furring strips, which can improve the thermal performance of old walls while providing nailers for the new siding.



tom and to the wall plate along the top. Zip System tape should be sufficient to make the seal, but you can also use one-part spray foam or a tube of sealant.

If you want to improve the thermal performance of your walls, consider installing insulating sheathing such as rigid-foam panels over the old siding. Exterior insulation can be combined with fiber insulation in the stud cavities for better energy efficiency. If you are considering spray-foam insulation on the inside, do some research to make sure that the insulation sandwich won’t cause problems with the old siding in your climate zone.

James Hardie has a technical bulletin that outlines methods for installing its fiber-cement plank siding over rigid foam, but only one of these methods works if you leave the existing siding in place—furring strips over the foam. You could add up to 4 in. of rigid foam (minus the thickness of your siding, which counts as a nonnailable surface) to the outside of the house, then attach 1x4 furring strips and install the siding just as you would with furring alone.

Also consider Zip-R panels. The sheathing is bonded to polyiso insulation, and it

can be nailed over the old siding and into the studs. You can then install the siding the same as if you were attaching to standard Zip System sheathing.

Sweaty register grilles

I have a client here in Maryland who is complaining about wet air grilles during air-conditioning season. The grilles get rusty, and there may be mold. It appears limited to the master bathroom on the upper floor, where the vents are in the cathedral ceiling. The air handler for these vents is located in an attic space above the adjacent hallway, where the ceiling is flat. The fiberglass-batt insulation in this attic space is under the roof, not on the ceiling below. The air ducts, which are insulated as well, appear to run between the insulation and the roof sheathing. The client had an HVAC contractor take a look at it, and he said that the duct insulation looks good. I have two questions. First, is the duct location causing the problem? Second, is there a reasonably easy fix, since relocating the ducts would be an expensive proposition given the cathedral ceilings?

—DAVID
via email

Martin Holladay, editor of Green Building Advisor, responds: In order to get this type of condensation, you need two elements: humid air and a cold surface. To eliminate the condensation, you need to cover the cold surfaces with vapor-impermeable insulation or seal up the leaks that allow the humid exterior air to come into contact with the cold surfaces.

It's certainly true that the ducts in this house aren't located properly. Ducts should never be installed in a cathedral ceiling. The best solution is to relocate the forced-air register and the duct serving the register—for example, by building an airtight interior soffit to hide the ductwork.

My guess is that the rafter bay where this duct is located is leaky, allowing hot, humid exterior air to come into contact with the cold register. As a first step, assuming that the register boot is uninsulated, you could try insulating the metal register boot with canned spray foam. If this isn't sufficient, it's time to open up the ceiling so that you can either seal the cracks that allow exterior air to reach the register boot, or move the duct to a better location.

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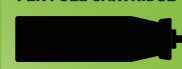
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Climate change for builders

BY MICHAEL MAINES

Built for the future. In the face of stronger storms, longer droughts, and potentially questionable supplies of power, we need our houses to be ready.

When people say, “Earth’s climate has always changed,” I think back to a college geology class I took in 1992. The professor’s PhD research specialty was drilling deep in glaciers, peering back hundreds of thousands of years, and comparing carbon dioxide (CO₂) levels with surface temperatures. My professor would agree that both temperature and CO₂ levels have always varied. But he would add that they have always correlated very closely with each other. The relationship is complicated, with higher temperatures often preceding higher CO₂ levels, but they always end up following a similar path, largely because of what we now know as the greenhouse effect—that CO₂ and other gases prevent some of the sun’s energy from leaving the atmosphere. The problem is that CO₂ levels are now much higher than ever

before, and the temperatures are just beginning to catch up.

Even with supercomputers, scientists can’t predict exactly what the results of climate change will be, any more accurately than they can predict the weather for next week. There are simply too many variables to consider.

But just as we know within a certain range what the weather next week will likely be, scientists have an increasingly informed picture of what the future holds for us—and it’s not good.

In October 2018, the United Nations released a report from its International Panel on Climate Change that included this summary: “Large, immediate and unprecedented global efforts to mitigate greenhouse gasses are required.” Previously, the Paris Agreement had bound 200 nations to keep temperature rise to 2°C, but the IPCC

report cites 1.5°C (2.7°F) as the maximum we can reach without catastrophic results. While a couple of degrees may not sound like much, it will have enormous impacts on the world as we know it: stronger storms, acidifying oceans (and the associated loss of shellfish and coral reefs), a weakening Gulf Stream in the Atlantic that will cause much colder and more extreme weather in Europe, and the decline of species and ecosystems. Increasing drought and higher temperatures will cause migrations that will in turn spark hostility. Some sources seek to inject uncertainty into the UN’s predictions, but the vast majority of the world’s scientists agree and are already measuring the changes as they occur.

Believe it or not, buildings do matter

This is the biggest challenge that humans have ever faced,

and it requires the world to act together against this common cause. We need to drastically reduce carbon emissions, and we need to prepare for the possibility that we won’t be able to prevent climate change from accelerating.

Buildings have a big impact on greenhouse-gas emissions in two ways: (1) their operating energy—the total impact of the energy needed to heat, cool, and ventilate a home or other building, and to power its lights, outlets, and appliances—and (2) their embodied energy, which includes everything needed to create and install a material or product and, some argue, to recycle it as well.

In the United States, both operating energy and embodied energy are heavily dependent on fossil fuels. Globally, almost 40% of energy used is related to building construction and operation. The only country that

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produces more greenhouse-gas emissions than the United States is China, which has twice our emissions but four times our population. According to the U.S. Department of Energy, buildings account for 39% of primary energy consumption and 72% of all electricity consumed domestically, and together they contribute more to total greenhouse-gas emissions than either the transportation or the industrial sectors.

What we can do about it: Small steps

The ways to reduce energy consumption are well known: improve airtightness and insulation levels; install efficient windows, doors, fixtures, and equipment; design to take advantage of the sun's rays (while guarding against overheating); be smart about how you operate your home.

There are some simple ways to reduce operating carbon: (1) Use LED bulbs; with the variety now available there is no excuse for clinging to incandescents or halogens. (2) Air-seal your home; as much as 50% of energy lost in homes is through air leaks. (3) Add insulation. (4) Install more-efficient equipment. (5) Be OK with feeling a little warm in summer and a little cool in winter; people in previous generations were not the wimps that we have become. More-efficient envelopes can be more susceptible to mistakes, so learn the building science that's needed to make them safe, or hire people who already understand how to do it. It's not hard, but it is different from building in the 1950s. Net-zero-energy homes need to be mainstream, not niche.

To go further, I use an energy-modeling program to weigh building options. I prefer BeOpt, which is simple to use and is a free download from the Department of Energy, to show clients the return on investment when they go above code-minimum construction. I tell clients that considering the stock market

The most readily available and affordable rigid foam, extruded polystyrene (XPS), uses blowing agents that are 1400 times more damaging than CO₂. There are two viable alternatives: polyisocyanurate and expanded polystyrene (EPS). I have been designing high-performance homes on

sible to minimize the amount of foam used in a slab-on-grade foundation; I recently designed a small house with a concrete-free slab, which I'll discuss in a future column. I've also been specifying concrete with pozzolan admix, which uses industrial wastes (typically fly ash) to replace part of the portland cement while maintaining or improving the strength. Another new technology injects CO₂ captured from factory emissions into concrete, resulting in a stronger concrete and preventing the greenhouse gas from entering the atmosphere. CarbonCure, currently the only producer in this category, is available at limited plants around North America.

Buildings that use less energy and have less embodied energy require a deeper understanding of construction than we needed a few decades ago, so we should expect that more education will be necessary. There are many educational sources, but one I recommend is finding or starting a discussion group. For the last 10 years, a building-science discussion group has met monthly in Portland, Maine, led by builder Dan Kolbert and hosted by Performance Building Supply. This group was the source of the Pretty Good House concept. Last spring I started a similar group (search "Building Science + Beer" for more info). Similar groups are popping up elsewhere; if you don't know of one, start one. Just getting professionals and interested parties together in one room for an informal, open discussion leads to a surprising amount of learning and relationship building. There are also more formal groups: NESEA, Architecture 2030,

U.S. buildings contribute more to total emissions of greenhouse gases than either the transportation or the industrial sectors.

is due for a slowdown, energy improvements with a return on investment of 5% or higher are a safe place to put extra money.

Traditionally, operating energy has been considered much more important than embodied energy, but with the climate clock ticking, it is critical to reduce embodied energy as well. (Read *The New Carbon Architecture* by Bruce King for a thorough analysis.)

The simplest way to reduce the impact of materials is to use less of them: design and build smaller homes, renovate instead of building new, recycle or up-cycle whenever possible (and use materials that can be reused in the future), shift to multifamily buildings instead of single-family homes. Another way is to avoid materials that contribute more heavily than others; two common construction materials strongly tied to global warming are certain types of foam and concrete.

tight budgets for over five years without specifying XPS, so it is possible—it just requires a little more legwork to get the right materials. Conventional closed-cell spray foam has blowing agents that are almost as bad as those in XPS.

Concrete, the most commonly used construction material in the world, is responsible for 7% of total CO₂ emissions. It's not going away, but it is possible to reduce its impact. The easiest solution is to simply use less of it. Many cast-concrete footings are oversize, built to standard sizes instead of optimized for the site and structure; foundation walls are often thicker than they would need to be if they had proper steel reinforcing and were allowed to cure slowly. Where basements are common they are rarely necessary, and they require more concrete and insulation (almost always climate-damaging foam) than a slab foundation. It's even pos-

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Passivhaus/Passive House, and USGBC, to name a few that I have found valuable.

What we really need to do about it: Giant leaps

Ideas such as those above are a start and should be the minimum level of thought put into any new home. Unfortunately, the situation is dire, and calls for stronger action, too.

We need policy changes to force the free market to respond. There are some things that industry and individuals are just not inclined to do without pressure, even when the result will be strongly positive for everyone. The free market can be a wonderful thing, but it's not good at everything, and it has not proved effective against climate change.

We are at the point where we need governmental intervention to encourage behavior in the right direction—and not just our government, as the United States does not exist in a vacuum. Very little in the market is not controlled in some way, and fossil-fuel production is heavily subsidized in various ways. Instead, it needs to be taxed, with the earnings going toward policies and technologies to help us through this next age of climate change. A carbon tax—the simplest and most often recommended policy change—has already proven effective elsewhere.

Banks need to consider operating costs when making loans. An efficient home that uses \$300 per month less in energy costs than a poorly built home could pay for a \$60,000 larger mortgage to fund the energy improvements and addition of photovoltaics. A few banks are already doing this, but it's rare.

For power generation, arguments against subsidized photovoltaics are valid, as they favor those wealthy enough to afford a PV system. But those are typically the same people who profit from owning stocks in subsidized fossil-fuel companies, so the argument does not hold up to scrutiny. The more

stock contributes much more to operating energy use; we need mass weatherizing and equipment upgrades.

As for materials, one technology that has proved itself elsewhere and is gaining traction in the United States is cross-laminated timber (CLT). It will probably never pencil out for

Your future self, your children, and your grandchildren will know that you had the opportunity to do something now and either chose to or chose not to.

PV that gets installed, the more affordable it becomes, and the more it contributes to a stable, distributed energy-generation system. But those smaller systems are not being built quickly enough; what we really need is industrial-scale renewable power generation. I hate to see the changes these power generators bring to the viewscape, but compared to the alternatives I don't think we have a choice.

We need more housing to accommodate a population that, for better or worse, will continue to grow. Smaller, more-efficient homes are a good start, but we really need to be building multifamily dwellings, which are a much more efficient use of resources. New buildings need to be carbon-neutral to meet the necessary targets, but existing building

single-family homes, but it has long been used in Europe for larger buildings, where it can replace a significant amount of the carbon-intensive concrete and steel normally used.

Whenever possible, we need to use local materials. While moving large quantities of products from one side of the globe to the other can take a surprisingly low amount of energy on a per-unit basis, the heavier the product the better it is to buy locally, especially when doing so supports your local economy. In Maine—the most heavily forested state in the country on a percentage basis—the most-affordable wood siding comes from the West Coast. We are just now getting our first CLT plant, and research is underway on wood-fiber insulation, long common in Europe.

What if we don't do enough?

Consider this common question: "If you could go back in time and change one thing, what would you change?" We are at a critical juncture in human history. Your future self, your children, and your grandchildren will know that you had the opportunity to do something now and either chose to or chose not to. Every decision matters.

With the significant changes that are likely to happen despite our efforts, we need buildings that are more resilient in the face of stronger storms, longer droughts, and potentially questionable supplies of power.

What if we don't need to do anything?

There is the slimmest of chances that climate-change deniers are right; after all, this is science that is impossible to prove with 100% accuracy, and the climate and its interaction with all of the earth's systems is a large and dynamic thing. But what if people breathed cleaner air, had healthier lifestyles, and lived in healthier and more-comfortable homes? What if we supported local economies instead of sending our money overseas and complaining that locals don't have work? What if we were better prepared for droughts, storms, and power outages? What if we understood better the connection between ourselves and our planet's ecosystems? Wouldn't those all be good outcomes?

Contributing editor Michael Maines is a builder, designer, and building scientist in Palermo, Maine.



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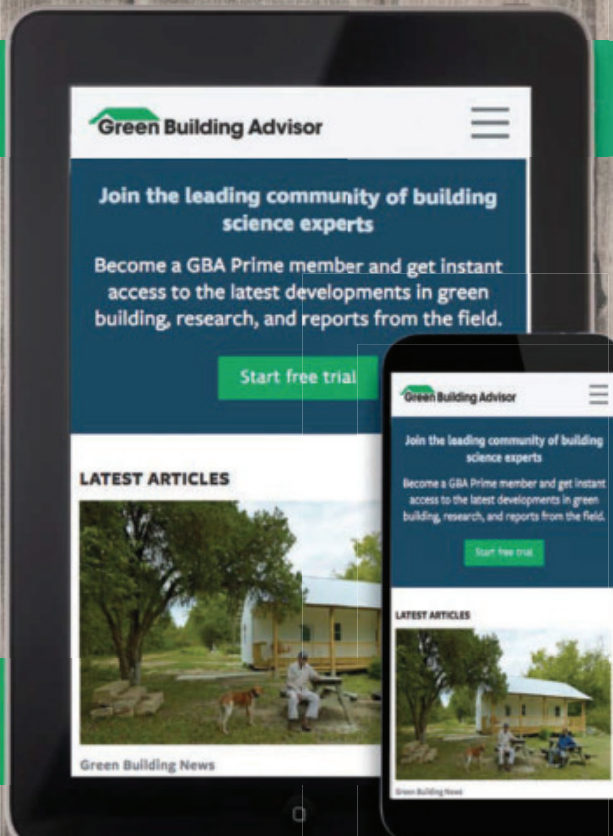
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Starting steps

In the mid-1970s, I teamed up with a buddy doing lump-sum trimwork in a subdivision of modest entry-level homes. The builder's menu consisted of three models: a split level, a raised ranch, and a colonial. The split level and the ranch had wall-mounted handrails, which were easy to install, but the colonial had an oak handrail in the foyer with turned newel posts. The staircase featured a quarter turn with winders between two short flights, plus a railing around the stairwell in the upstairs hall.

At this point in my career I was comfortable running trim and hanging doors, and I had even built a few simple stairs, but I knew next to nothing about the science of handrailing. Nevertheless, there were the stair parts lying on the floor of the garage, and I wasn't about to let a mere lack of knowledge come between me and the \$700 check we typically received for trimming out an entire house.

Like a paleontologist examining the bones of some unknown dinosaur, I scrutinized the newel posts and balusters, which came in three different lengths. I went over to the builder's model home to see the finished product. Ah, the long one goes where the stair rises sharply at

the winders, the short one goes at the starting step, and the medium-length one goes at the top of the stairs. Each step gets a long and a short spindle. Got it.

My first few installations were pockmarked with bent nails and marred by ill-fitting joints. My newels also exhibited a disconcerting wobble, like a slightly inebriated partygoer. It didn't help that we were using hand-drive finish nails and an old-fashioned Millers Falls miter box with a 12-point handsaw. The builder didn't fire us, however, so I soldiered on. Meanwhile my partner got a little peeved about the amount of time the stairs were taking. While I tinkered with the railing, he was banging out the rest of the trim package, which included cabinets and closets as well as trim.

My struggle with the railings might have ended in defeat had it not been for an unlikely angel sent my way. The salesman who furnished stair parts to the builder was a taciturn but likeable gentleman named Hyman Volaski. Hy had been in the New York stair business since forever, so I picked his brain whenever he was in the subdivision measuring houses.

"Yo, Hy!" I would call out in my best Bronx accent.

"Oh, it's you again," Hy would answer, looking up from

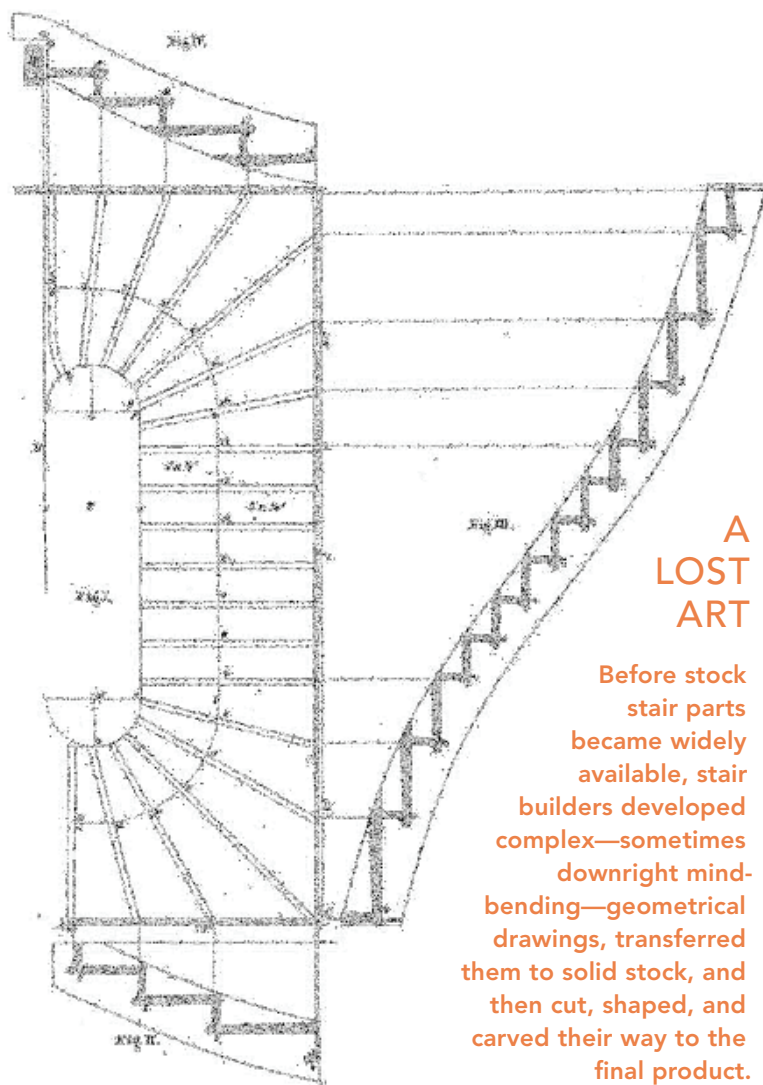
his notepad. "Whadya wanna know now?"

"So Hy, how come my starting newels are so wobbly?" I asked, my brow furrowed in consternation.

Hy paused a moment, tapping the ash of his plastic-tipped cigarillo onto the subfloor. "Have you been sinking 'em into the finish floor?" he asked, as if stating the obvious. "If you get there before the floor guy,

he can lay his oak tight around your post. Otherwise you gotta chop it in wid a chisel." I followed Hy's directive on my next newel, and it stood as rigid as a marine sentry.

Or another time: "Yo, Hy, these bent nails are killing me." Hy clamped his Tiparillo between his teeth and extended a palm. "Gimme a nail, kid." I handed my mentor a 6-penny finish nail, whereupon he picked



A LOST ART

Before stock stair parts became widely available, stair builders developed complex—sometimes downright mind-bending—geometrical drawings, transferred them to solid stock, and then cut, shaped, and carved their way to the final product.



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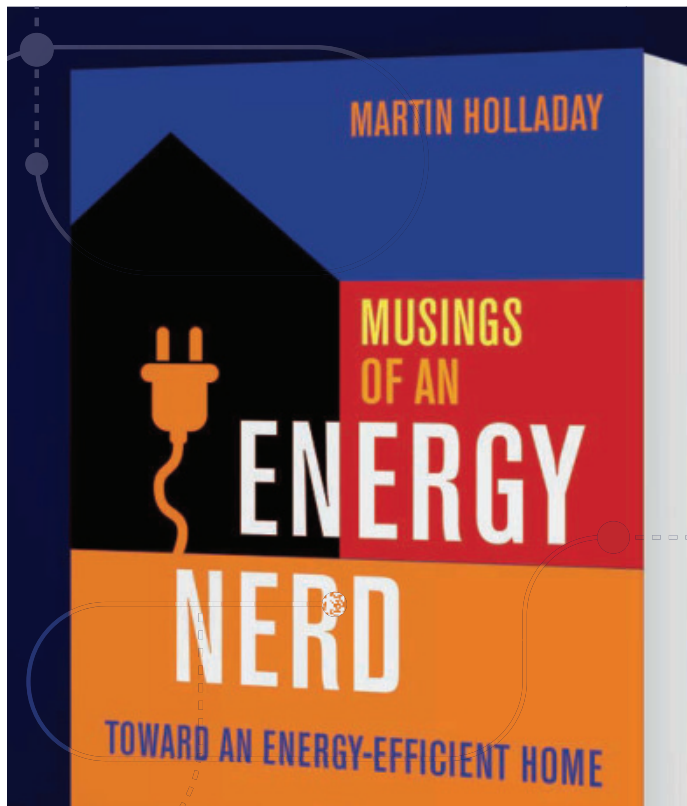
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handed my mentor a 6-penny finish nail, whereupon he picked up my nippers and neatly clipped the point off the nail. Then he twirled the nail once against the side of his shiny nose and handed it back to me. “Try this.” I drilled a little starter hole and gave the nail a whack with my nail set. Blunted and oiled, the nail drove straight home in the oak post.

Another time, Hy saw me struggling to mark the angle cut on a sloping rail. The rail was meant to fit between the upper flats of two turned newel posts that were already standing upright. In spite of all the clamps I had rigged up, I still needed three hands. Without a word, Hy took the rail and laid it diagonally along the nosings of the steps, then scribed against the lower flats of the newels. A seldom-seen grin crept across his craggy face. “Same distance, wise guy.”

Hy wasn’t my only teacher, though. Having gotten a taste of hands-on stair work, I hungrily pursued the subject in books and magazines. One of the most helpful items was a concise eight-page article published in *Fine Woodworking* in the fall of 1981. (*Fine Homebuilding*, launched the same year, would soon take over as The Taunton Press’s vehicle for architectural subjects.) The article was written by Harry Waldemar, a veteran stairbuilder who recorded his knowledge for posterity by writing, teaching, and building scale models for museums. Reading Waldemar’s overview was like finding the Rosetta Stone. After struggling without any training to make sense of all the parts of a basic staircase, I was thrilled to find the rules set

out in plain English, accompanied by lucid illustrations.

I also investigated two classic works that had recently been reprinted: *A Treatise on Stairbuilding and Handrailing* by William and Alexander Mowat, and *Modern Practical Stairbuilding and Handrailing* by George Ellis. These books

splitting theoretical pattern-making geometry that Ellis and the Mowat brothers attempted to explain in their books.

Like many trim carpenters, I would have liked to have done more stair work in my career, but the builders I worked for mostly opted to hire dedicated stair crews. It’s hard to compete

Power equipment was scarce, so railings and stringers with double curvature were carved rather than being laminated.

were originally published in the days when all staircases were built from scratch. At that time, premium old-growth timber was plentiful and power equipment scarce, so railings and stringers of double curvature, known as wreaths, were carved out of thick solid planks rather than being laminated. To guide the fabrication of these complex forms, patterns were laid out on paper and applied to wood. Though fascinating, this was of little use to the average trim carpenter working at the close of the twentieth century. By then, stock stair parts had replaced custom work on all but the highest-dollar projects. As for double-curvature work, tablesaws and heavy-duty routers meant that laminated parts could now be built up on cylindrical forms and shaped without mastering the mind-

with a specialist who knows all the moves, all the sources of supply, and his costs to the dime. But occasionally a special assignment would come along and I would get a chance to stretch out.

I once built a set of closed stairs with a U-shape plan, sometimes called a “dog-leg” stair for the way the lower and upper flights zigzag in elevation. Instead of a landing where the flights reversed direction, this stair featured four consecutive 45° winders. The winders collectively constituted a plunging 180° turn, and their narrow ends converged around the end of a partition that separated the upper and lower flights. The railing, which had a cylindrical rather than a molded profile, was to be wall-mounted to opposite sides of the partition. The challenge was to make a

wreathed section of railing, or easing, to connect the upper and lower flights without interruption. This was a practical as well as an aesthetic consideration, since tripping on winder steps is a common cause of accidents.

I used a footing tube as a cylindrical form, around which I laminated a blank for the easing. The laminations were strips of cherry 1/16 in. thick by 2 1/2 in. wide. I used plastic resin glue for its extended open time and minimal creep. To clamp the bundle of strips around the footing tube, I made clamps similar to ones we had used in a college furniture-making class for laminating chair parts. Each clamp consisted of a pair of horizontal threaded rods with vertical hardwood yokes at both ends. After plotting the correct helix on the footing tube using a story pole, I drilled pairs of holes for the threaded rods. Then I reached inside the footing tube with a yoke in my left hand and inserted the threaded rods from the outside with my right hand. After prepping all the clamps, a helper and I glued up the bundle of strips and lightly clamped it at the top of the twist. Working from the top down, my buddy coerced the wet bundle around the tube like a reluctant python as I slipped on the outside yokes and tightened the nuts with an impact driver. When the blank was dry, I shaped it with a spokeshave, rasps, and sandpaper. The acid test was the first trip down the stairs with my hand gliding over the polished railing. It felt just right—like a fireman dropping down a fire pole, only a bit more civilized.



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Scott McBride is a builder and writer in Virginia.

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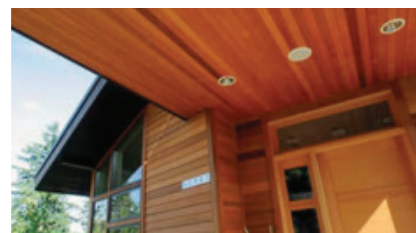
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"I feel fortunate that I've always been able to conceptualize an idea and follow through creating it."

ALEX McKENZIE

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Few professional pursuits forge as strong a generational link as the building trades. You can sense the pride of those fortunate enough to claim themselves a second-, third-, or fourth-generation tradesperson. For those who are carrying on a family legacy, building is bone deep. Alex McKenzie is exemplary in this regard.

While growing up, Alex was drawn to working with his hands and to building things.

When he later learned details of his biological family's history, he discovered where this aptitude may have come from. His great-grandfather was a timber framer who founded the Shelburne Craft School. His grandfather, Lynwood Smith, was a renowned craftsman who taught at the school for most of his life and had work displayed at the Shelburne Museum. Smith eventually met Alex and ended up becoming the biggest influ-

ence on Alex's decision to make building and woodworking his career. "It felt almost spiritual knowing that I was going down the same path as he did without ever knowing it," Alex says, adding, "I would be carrying on a family tradition that would otherwise have been lost."

Alex has carved out a niche with his company, Cypress Woodworks. He and his crew offer services from framing to finish to furniture—with each

discipline informing the other when it comes to construction, precision, and quality. Having such a range of skills has helped his company to gain a reputation for excellence.

Alex hopes people see the care that goes into his work and the craftsmanship in its details. It's all there. What's less apparent, yet ever present, is a family heritage on full display.

—Rob Yagid, executive editor,
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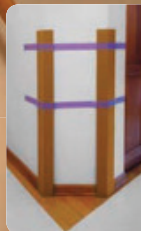
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