

**Designing Kitchens**

---

**Carbon-Neutral  
Building**

---

**Installing EV Chargers**

---



# Chief Architect®

Smarter Design Software



Chief Architect – 30 second rendering.  
See more of this model online.

## Download a Free Trial

Residential Design

Remodeling & Cost Estimating

Kitchen, Bath, & Interior Design

3D Design, Floor Plans, Elevations

Construction Drawings

CAD Tools & Section Details



208.292.3400 • [chiefarchitect.com/FreeTrial](http://chiefarchitect.com/FreeTrial)





**Do more jobs  
with one connector.**



**Now you can use one connector as a tension tie or holdown.**

New from Simpson Strong-Tie, the code-listed LTPP2 light tension tie securely attaches wood joists, studs, or posts to concrete or masonry walls and foundations. With allowable loads 25% higher than previous models, it enables greater design flexibility. This versatile connector has two distinct nailing patterns for horizontal installation as a tension tie with I-joist purlins or 2x solid sawn purlins, plus an extruded anchor bolt hole that accommodates multiple bolt diameters. The LTPP2 also is suitable for vertical installation as a holdown, and can be fastened with nails or Strong-Drive® SD Connector screws.

Put the LTPP2 and Simpson Strong-Tie® fasteners to work. To learn more, visit [go.strongtie.com/ltp2](http://go.strongtie.com/ltp2) or call (800) 999-5099.



**TAMLYN**<sup>®</sup>  
FAMILY. VALUE. SERVICE.

PARTNERED:  
Dan Brunn Architecture

Los Angeles, CA

# MODERN ART MODERN LINES

Create visually stunning shadow lines with a minimalist base trim that allows the wall to appear to float just above the floor surface.

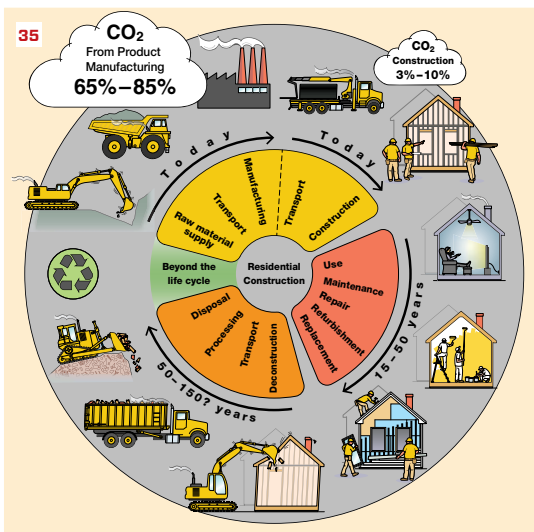
ARCHITECTURAL ALUMINUM TRIM  
**XTREMEINTERIOR**<sup>™</sup>  
BY TAMLYN



WATER MANAGEMENT | XTREMEINTERIOR<sup>™</sup> | XTREMETRIM<sup>®</sup> | XTREMECOLOR<sup>™</sup> FLASHING | SIDING ACCESSORIES | VENTILATION | METAL FLASHING | CONNECTORS

Phone: (800) 334-1676 | E-mail: [info@tamlyn.com](mailto:info@tamlyn.com)

[www.tamlyn.com](http://www.tamlyn.com)



On the cover: David Pollard, principal and co-founder of Liv Companies, a design-build remodeling firm serving Greater Chicago, works out details for an extensive kitchen redesign. See the story on page 27. Photo by Matt Adema/LivCo.

## FEATURES

- 27. The ‘Post-Lockdown’ Kitchen**  
Design guidelines and trends for renovating today’s kitchens
- 35. Reducing Carbon**  
A builder’s guide to carbon-neutral building practices

## DEPARTMENTS

- 6. Training the Trades**  
Framing square basics: octagon layout
- 9. Q&A**  
Wiring for EV charging
- 11. On the Job**  
Shop-built Craftsman-style vanity
- 17. Business**  
Investing in your construction company: the pros, cons, and possibilities
- 23. Troubleshooting**  
Three ways to install drainable EIFS wrong (and one way to make it work)
- 45. Products**  
Kitchen sink; exterior paint; ladder brace; truss braces; roof dryer vent; ventilation hoods; flooring underlayment; more
- 49. Tools of the Trade**  
Circular-saw guides; biscuit joiner; work-van storage system
- 55. Advertising Index**
- 56. Backfill**  
Basket weaving a wall

THE JOURNAL OF LIGHT CONSTRUCTION (ISSN 1056-828X), Volume 41, Number 1, is published monthly except combined issues in Jan/Feb, July/Aug, Sept/Oct and Nov/Dec by Zonda Media, 1152 15th St. NW, Suite 850, Washington, DC 20005. Annual subscription rate for qualified readers in the construction trades: \$39.95; nonqualified annual subscription rate: \$59.95. Frequency of all magazines subject to change without notice. Double issues may be published, which count as 2 issues. Publisher reserves the right to determine recipient qualification. Copyright 2022 by Zonda Media. All rights reserved. Canada Post Registration #40612608/G.S.T. number: R-120931738. Canadian return address: IMEX, PO Box 25542, London, ON N6C 6B2. Periodicals postage paid at Washington, DC, and at additional mailing offices. POSTMASTER: Send address changes to JLC, Box 3530 Northbrook IL 60065-3530.

Building the future of housing.



## JLCONLINE.COM

**Clayton DeKorne**, Chief Editor, JLC Group, cdekorne@zondahome.com  
**Andrew Wormer**, Executive Editor, JLC Group, awormer@zondahome.com  
**Laurie Elden**, Managing Editor, lelden@zondahome.com  
**Tim Healey**, Senior Editor, thealey@zondahome.com  
**Vincent Salandro**, Associate Editor, Products, vsalandro@zondahome.com

**Carolyn Sewell**, Design Director, csewell@zondahome.com  
**Melissa Krochmal**, Graphic Designer, mkrochmal@zondahome.com

**Contributing Editors:** Jake Bruton, Mark Clement, Rob Corbo, Ted Cushman, Dave Holbrook, Doug Horgan, Jake Lewandowski, Roe Osborn, Matt Risinger, Emanuel Silva, Gary Striegler, Tim Uhler

**Cathy Underwood**, Senior Director, Print Production  
**Margaret M. Coulter**, Senior Director, Print Production  
**Stephanie Fischer**, Production Manager, Inside Sales  
**Andrea Leonard**, Operations Coordinator  
**Christina Lustan**, Group Director, Audience Marketing & Circulation

## PUBLISHED BY ZONDA MEDIA

**Jeff Meyers**, Chief Executive Officer  
**Melissa Billiter**, Chief Financial Officer  
**Andrew Reid**, Chief Operating Officer  
**Jennifer Pearce**, Executive V.P., Chief Content Officer  
**Bridget Forbes**, V.P., Digital Strategy and Operations  
**Jennifer Malkasian**, V.P., Audience Development and Analytics  
**Kurt Nelson**, Group V.P., Talent Strategy  
**Amy Dudley**, Executive V.P., National Sales  
**Tim Sullivan**, Senior Managing Principal, Advisory Group

JLC will occasionally write about companies in which its parent organization, Zonda Media, has an investment interest. When it does, the magazine will fully disclose that relationship.

Reproduction in whole or in part is prohibited without written authorization.

Opinions expressed are those of the authors or persons quoted and not necessarily those of JLC.

## EDITORIAL AND ADVERTISING OFFICES

1152 15th St. NW, Suite 850  
Washington, DC 20005  
202.452.0800

JLC welcomes letters and article submissions from our readers at [jlc-editorial@zondahome.com](mailto:jlc-editorial@zondahome.com). Keep copies of all original materials.

## SUBSCRIPTION SERVICES

**Online:** [jlconline.com/cs](http://jlconline.com/cs)  
**Email:** [jlc@zomeda.com](mailto:jlc@zomeda.com)  
**Phone:** 888.269.8410  
**Mail:** JLC, PO Box 3530  
Northbrook IL 60065-3530

You can subscribe online at [jlconline.com/subscribe](http://jlconline.com/subscribe).

**Subscription rates for qualified readers:** 1 year/ \$39.95; 2 years/\$64.95.  
Canada, International: add \$15/year for surface delivery. Sales tax added if required by your state law. Frequency of all magazines subject to change without notice. Double issues may be published, which count as 2 issues.

## JLC BACK ISSUES

JLC subscribers have free access to every issue of JLC since 1986. Enable access at [jlconline.com/register](http://jlconline.com/register).  
**Back issues:** \$4.95 each, plus \$5 shipping per order.  
Call 888.269.8410 for availability.

## ARTICLE REPRINTS

Wright's Media  
877.652.5295, [zonda@wrightsmedia.com](mailto:zonda@wrightsmedia.com)

## JLC UPDATE EMAIL NEWSLETTER

JLC Update is free to JLC readers. Each issue contains industry news and tips on building materials, techniques, tools, and technology. Subscribe online at [jlcupdate.jlconline.com](http://jlcupdate.jlconline.com).

## LIST RENTALS

The Information Refinery, Brian Clotworthy  
800.529.9020, [brian@info refinery.com](mailto:brian@info refinery.com)

**Privacy of mailing list:** We rent our subscriber list to reputable companies. If you do not wish to receive promotional materials from other companies, please call us, toll-free, at 888.269.8410.

## ADVERTISING SALES

**Paul Tourbaf**, Executive Vice President  
847.778.9863, [ptourbaf@zondahome.com](mailto:ptourbaf@zondahome.com)

**John Tatusko**, Vice President  
617.359.8619, [jtatusko@zondahome.com](mailto:jtatusko@zondahome.com)

**Carol Weinman**, Senior Director of Strategic Accounts  
847.778.9861, [cweinman@zondahome.com](mailto:cweinman@zondahome.com)

**Ryan Sneltzer**, Director, Strategic Accounts  
330.904.6177, [rsneltzer@zondahome.com](mailto:rsneltzer@zondahome.com)

**Steve Van Kirk**, Director, Strategic Accounts  
480.277.5422, [svankirk@zondahome.com](mailto:svankirk@zondahome.com)

**Cathy Whelan**, Director, Strategic Accounts  
708.466.6083, [cwhelan@zondahome.com](mailto:cwhelan@zondahome.com)

**Patrick Zazzara**, Director, Strategic Accounts  
571.488.5324, [pzazzara@zondahome.com](mailto:pzazzara@zondahome.com)





WHEN YOU'RE BUILDING TO THE **ZIP** CODE,  
IT'S A DIFFERENT WORLD ENTIRELY.

We make the right products to do the right job, the right way, the first time. No matter what the region or climate, you can count on ZIP System® building enclosures to streamline the performance of your air, water and thermal barriers for structural assemblies. Is your project Built to the ZIP Code™? See why others have made the switch at ZIPSystem.com.

#BuiltToTheZIPCode

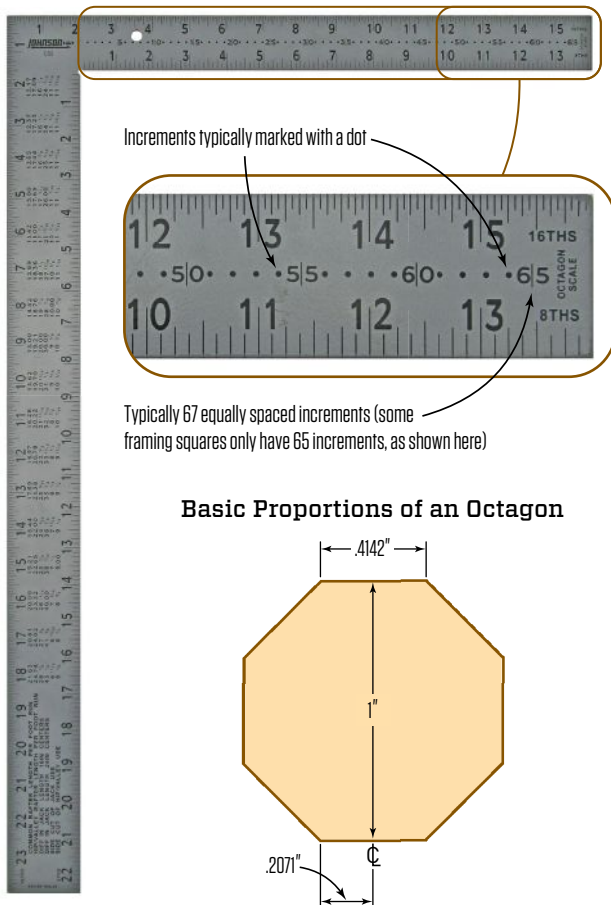


**ZIPsystem**<sup>™</sup>  
BUILDING ENCLOSURES

BY JOHN CARROLL

## Framing Square Basics: Octagon Layout

### The Octagon Scale



Along with various other scales and tables, a standard framing square also includes a useful octagon scale on the tongue of the square. The scale shown here consists of 65 0.2071-inch-long increments, a measurement that is equal to one-half the width of one of the sides of an octagon that is 1 inch wide. As shown in the drawing, the ratio of the width of an octagon to the length of one of its sides is 1 to 0.4142.

**Not too many octagonal—or eight-sided—houses** are built these days, but for a brief period of time between 1850 and 1870, this was a popular architectural style; early Quakers in southeastern Pennsylvania are known to have built octagonal stone school buildings as early as 1760. Nowadays, if you are asked to frame an octagonal structure, it will most likely be a gazebo or a cupola, or perhaps a turret-style addition. You may also be asked to install an octagonal window and so would need to know how to frame the rough opening.

Carpenters have called the octagon “the poor man’s circle” because it approximates the shape of a circle without the problems of bending wood or cutting glass along curved lines. The cuts required to build an octagon are simple cuts, consisting of 90-, 45-, and the occasional 22½-degree angles. So, once you get the layout completed, the building process is straightforward.

The layout of an octagon, on the other hand, is a bit more involved. It is certainly more challenging than laying out a circle or a rectangle, but it’s not as complex as it might seem at first glance. As I’ll show here, you can use a framing square to lay out an octagon up to 67 inches wide without doing any math at all, and to lay out larger octagons using only one simple multiplication computation.

**Octagon scale.** On the tongue of a traditional framing square are a series of lines, dots, and numbers, all of which have bewildered generations of carpenters. Although it is by no means apparent, those symbols make up the octagon scale.

The scale is made up of 67 equally spaced increments. (Some newer squares have only 65 increments because the manufacturer has used the space historically occupied by the last two dots to label the mysterious scale with the words “octagon scale.”) Most of the increments are marked with a dot. But every fifth increment is marked with a vertical line and a number; that’s how the increments numbered 5, 10, 15, 20, and so forth are represented. The increments are 0.2071 inch long, which is exactly one-half the length of the side of an octagon that is 1 inch wide. As you’ll see, for every inch of width of the octagon being laid out, one of these increments will be required.

**Math-free layout.** To see how this works, let’s say you need to frame an octagonal rough opening that’s 31 inches wide for a 30-inch octagonal window. Begin by framing a square opening that’s 31 inches by 31 inches. Now, find and mark the center of each side. From each center point, measure and mark in both directions a distance that’s equal to 31 increments on the octagon scale.

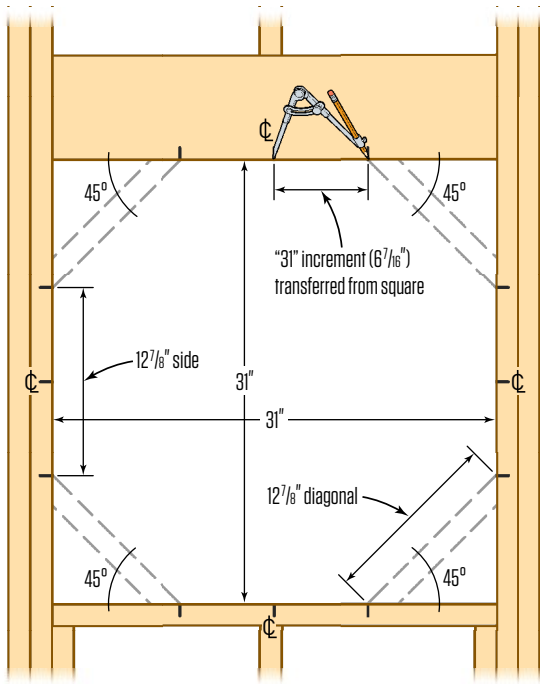
I like to use my divider for this task. I place one leg of the divider at the first line at the beginning of the scale and the other at the dot representing 31. I lock the divider at this setting, then use it to

Photos by Mathew Narey; Illustrations by Tim Healey

## Octagonal Window Layout



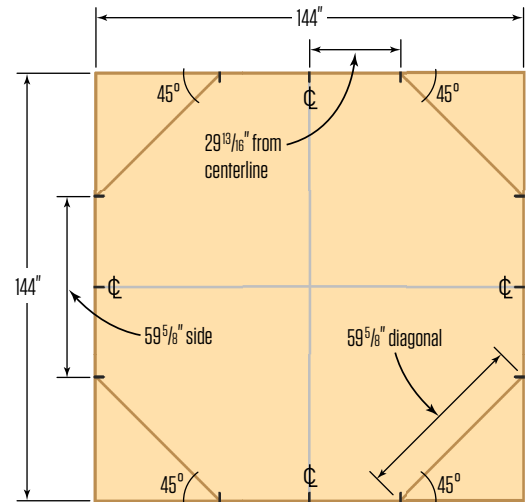
To lay out a 31-inch-wide rough opening for an octagonal window, the legs of a divider have been set to the “31” increment on the octagon scale, which measures  $6 \frac{7}{16}$  inches.



The divider is then used to mark the corners of the octagon within the 31-inch-wide rough opening, as shown above. Each side of the octagon measures  $12 \frac{7}{8}$  inches.

## Laying Out Large Octagons

Example: 12'-0" (144") octagon.  $144" \times .2071$  increment = 29.82" or  $29 \frac{13}{16}"$



For octagons larger than 67 inches, find the length of one-half of one of its sides by multiplying its width by 0.2071. For a 12-foot-wide octagon, for example, that dimension is  $29 \frac{13}{16}$  inches. Each side of the octagon will measure  $59 \frac{5}{8}$  inches.

step out and mark in both directions from the center marks on the four sides of the window opening. These marks represent the eight corners of the 31-inch octagon. All that remains is to measure, cut, and install the four diagonal pieces.

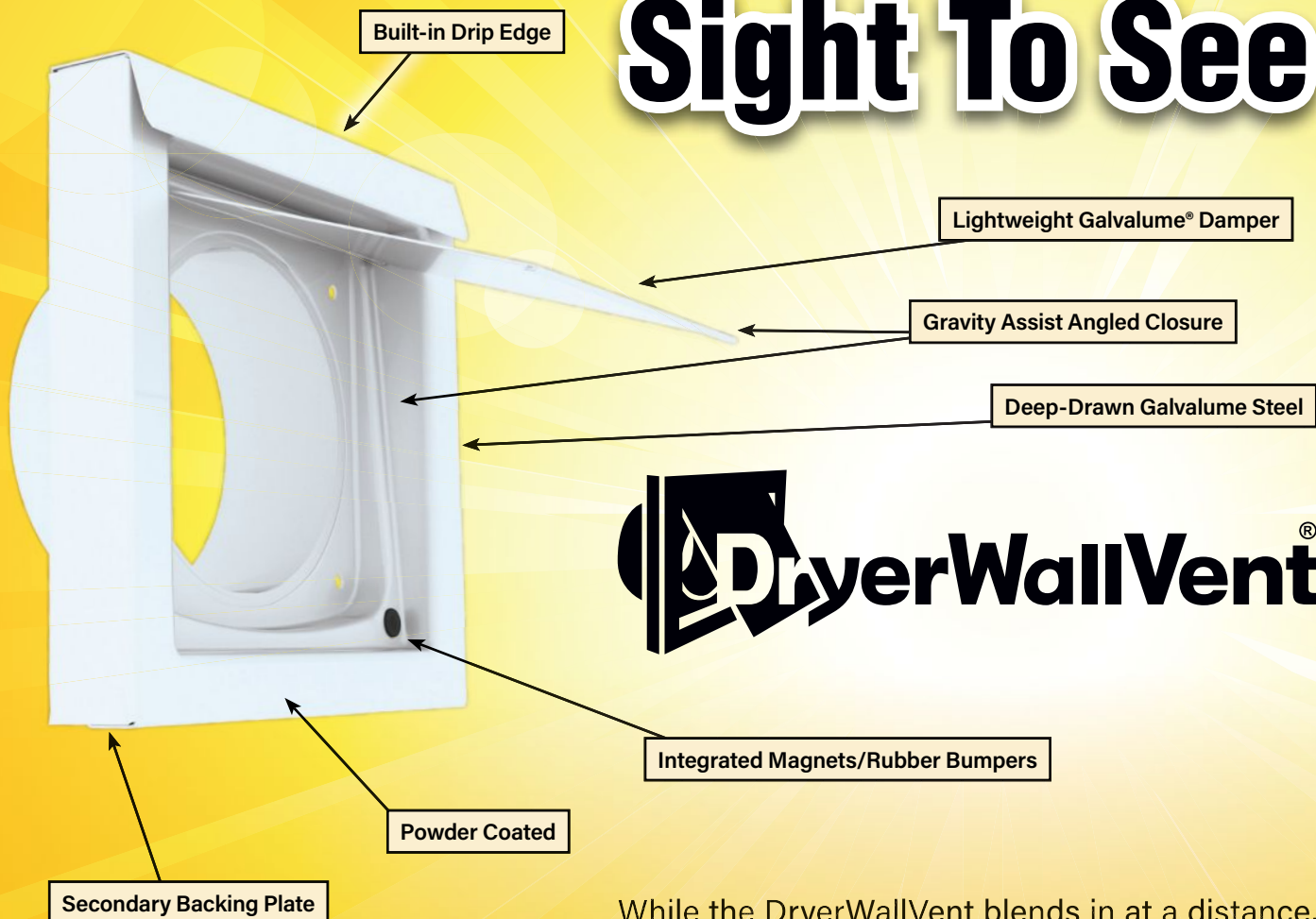
The divider, of course, is not essential. You can use a tape measure, a ruler, or just a strip of wood to take and transfer the measurement. The measurement you need to step out from the center point, by the way, is a hair shy of  $6 \frac{7}{16}$  inches. And the length of each side—and also of the diagonal pieces—is double that, which is  $12 \frac{7}{8}$  inches.

You can use the octagon scale to lay out octagons larger than 67 inches, but it's easier to use math. If you need to lay out a 12-foot (144-inch) octagon, for example, you could set a divider to 48 on the scale and then step it out three times from the centerline to lay out the 144 octagon-scale increments. But as shown in the example above, it would be easier to simply multiply 144 by .2071 to find the dimension needed in inches. That dimension, by the way, is 29.82, or  $29 \frac{13}{16}$ , inches.

*John Carroll, author of Working Alone and Measuring, Marking, and Layout, is a builder who lives and works in Durham, N.C.*

**Upon Closer Inspection Excellence Stands Out**

# Sight To See

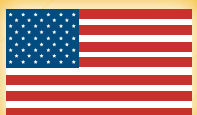


Deep-Drawn Galvalume® Steel  
Powder Coated - Shown White  
Model DWV4W

While the DryerWallVent blends in at a distance, you'll discover unique details that make it stand out when looking closely.

Deep-Drawn Galvalume® steel and powder coating ensure this sharp vent closure will look good now and long into the future.

*The Dryerbox® People*



**Made in the USA**



**888-443-7937**

**Visit [DryerWallVent.com](http://DryerWallVent.com)**

Our clients want us to install an EV charger in their garage, but the electricians we typically use are unfamiliar with EV charging and reluctant to take the job. Is this something an electrician can do or do we need to find a specialist?

**A** Saul Berger, owner of Solar Now, a solar energy consulting firm based in Philadelphia, responds: This is something that any electrician who has wired an outlet for an electric stove or dryer can easily handle. Most electric-vehicle (EV) “chargers” come with plugs that conform to National Electrical Manufacturers Association (NEMA) specifications for three-phase, 220-volt receptacles, as well as adapters that can connect the car to standard 110-volt service. (Note: While charging stations are called “chargers,” the charging is done by the car once it is connected to a proper outlet.) The higher the amperage, the faster the car will charge. So while all battery-electric or plug-in hybrid cars can charge off standard 110-volt service, they do so at a slow rate, adding only 3 to 7 miles to the car’s driving range per hour. Most customers with battery-electric EVs want to plug their car into a 220-volt charging station, so they can add as much driving range as possible while their car is parked at home. These 220-volt “Level 2” mobile and wall-mounted charging stations typically draw 32, 40, or 48 amps (though there are Level 2 units at both lower and higher amps). At 32 amps, the car charges at a charge rate of about 30 mph; at 40 amps, around 36 mph; at 48 amps, about 40 mph; and so forth.

Most of the time, we simply install a NEMA 14-50 or 6-50 receptacle in garages. In my experience, the majority of EV owners are using a mobile connector, like the first-generation, 40-amp Tesla version shown in the photo at left. This has a hard-wired 14-50 plug, for which I wired a 14-50 receptacle about 5 feet above the garage floor using a 6-gauge, 4-wire cable running back to a 50-amp breaker in the service panel.

Wall-mounted, 220-volt stations are typically drawing 32 to 48 amps. We often wire these to a short cable with a 14-50 or 6-50 plug (there are also off-the-shelf molded cable assemblies available at the big box stores) to go into a corresponding receptacle mounted on the garage wall. EV car and charging-station manufacturers usually recommend hard-wiring the wall units to house power, rather than to a cord and plugging them into a receptacle, because you have fewer connections where the ground can be interrupted. But a lot of customers want the flexibility of taking their charging station with them to a second home or when they move. If you are installing a 48-amp unit, a 6-gauge cable will do nicely, but technically it should run to a 60-amp breaker, as the National Electrical Code requires electrical circuits to be rated for 25% greater amperage than the output. And if you’re using a 60-amp breaker in the panel and the home has only 100-amp service, the service should be upgraded, preferably to a 200-amp panel.

Wall charging stations typically have a Wi-Fi-connected software component that allows users to monitor charging from their smartphones. We will bring wall units online for customers, but a lot of electricians don’t want to be involved with the software side and will leave this to the homeowner (most of whom can do this from their smartphone).

At this time, direct current (DC) fast charging is used at some commercial EV charging stations but rarely in homes. These offer very fast charging rates that are often described in miles per minute, but they usually run at a higher voltage (400- to 1,000-volt service) not typically found in homes.



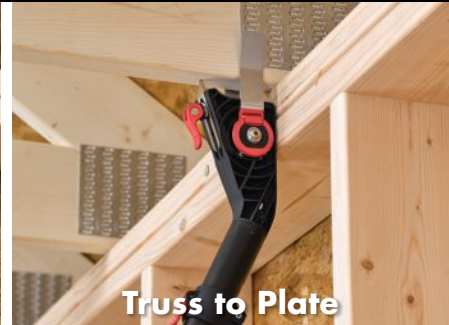
A NEMA 14-50 receptacle wired with a 6-gauge cable running back to a 50-amp breaker in the service panel will work for most mobile connectors.

Photo: Clayton DeKorne

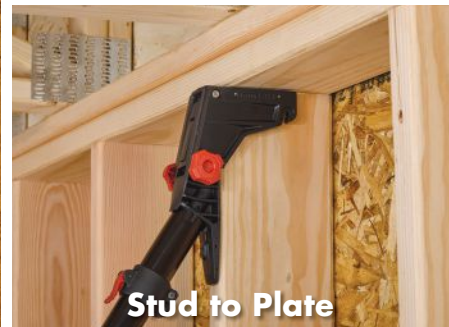


# FrameFAST™

Structural Framing System



Truss to Plate



Stud to Plate



Plate to Rim

## A Better Way To Frame

The FrameFAST™ Structural Framing System by FastenMaster is designed to drive jobsite productivity. FrameFAST is a better way to make critical connections along the continuous load path. One screw, one tool, and three interchangeable heads replace a variety of clips, straps, and ties used to transfer forces from one framing member to the next. For case studies, testimonials and videos visit [FastenMaster.com](http://FastenMaster.com).



[FastenMaster.com](http://FastenMaster.com) 800-518-3569

## Shop-Built Craftsman-Style Vanity

BY GARY STRIEGLER

**I know some amazing furniture makers**, but I'm not one of them. Still, I enjoy building small, custom projects for my clients, especially if it means I get to spend a day working in the shop (though don't stop reading if you don't have a shop; the project shown here could easily be built on a well-equipped jobsite). Most of these projects require only common trim carpentry tools and can be built in a day. Usually, the inspiration for them is a few pictures that a client has found on the internet, or something not being available in quite the right size. In this case, my client had found photos of a couple of vanities that were similar, and we agreed on a design that blended the two options and that I could build quickly using pocket-hole joinery.

**Design.** My biggest concern was getting the height right, because the vanity would feature a vessel sink that would sit on a stone countertop. So I waited until we had the sink on the jobsite before deciding on a 33-inch vanity height and starting to build the vanity.

The design includes four exposed square posts, each with a slight taper at the bottom, and an exposed shelf made of slats about 5 inches up from the bottom of the vanity. There's a single, wide drawer front with matching side insets between the posts at the top. All of the parts that are visible are made from poplar.

**Post construction.** Everything fits between the posts, so I glued them up first, starting with one oversized glue-up that I ripped into oversized blanks. That gave me room to straighten the



After gluing up poplar blanks for the vanity's corner posts, the author scraped off dried glue (1), then planed the blanks to finish size. The posts have tapered legs, which the author cut with the help of a plywood jig (2, 3). After cutting the tapers in the 2x2 posts, the author used a belt sander to smooth away kerf marks (4).



With the help of a Kreg Multi-Mark layout tool and blocks and clamps to position the rails accurately (5), the author joined the rails to the posts with pocket screws (6). The posts are connected by three sets of rails (7). The slats that make up the bottom shelf were milled down from  $\frac{3}{4}$  inch to  $\frac{5}{8}$  inch thick, then rounded over along their edges (8).

legs, plane them to their final dimension (2x2 inches in this case), and cut off any snipes at the end.

I made a simple sled jig for the table saw to cut the bottom leg tapers, setting it up to cut from  $\frac{3}{8}$  inch to zero over 3 inches. To cut safely, I made the jig extra long to keep my fingers away from the blade and turned the saw off after each cut, waiting for the blade to stop before resetting for the next cut. For smooth cuts, I use a Tenryu combo blade on my table saw, but I still had to touch up each cut with a belt sander.

**Rails.** The posts are connected to each other by three sets of rails. The bottom rails support the bottom shelf; another set of rails is located at the top of the cabinet; and a third set sits below the drawer and fixed side panels. I made the rails out of 1-by S4S poplar, with the exception of the upper back rail, which I cut from  $\frac{3}{4}$ -inch plywood. After ripping the rail material to rough width, I set the pieces on edge and ran them all at the same time through a benchtop planer with sharp knives to mill them to their final width of  $2\frac{1}{4}$  inches.

This is a simple cabinet to build, but it is critical to cut the rails

accurately, so I set up a stop on a miter saw and cut each set of rails at the same time. Then I drilled each end of the rails for a pair of pocket screws to fasten the rails to the corner posts. I wanted to make the slat shelf as strong as possible, so I added pocket screw holes to the front and back bottom rails for attaching the slats to them.

Pocket screws make fast, strong joints, but keeping the correct alignment can be challenging. I used clamps and spacer blocks to maintain accuracy and a Kreg Multi-Mark measuring and marking tool to pinpoint the locations of the bottom rails.

I started out by making the front and back panels, screwing the long rails between the posts. Then I screwed the shorter side rails to the back panel. Working off the top of a workbench, I used pipe clamps to hold the front section in place when I installed the last pocket screws.

**Slat shelf.** Like the rails, I ran the 2-inch-wide bottom shelf slats on edge through the planer to get rid of saw kerfs. I also ran them through the planer to thin them to  $\frac{5}{8}$  inch thick, then rounded over the corners. I suppose the slats could be left at  $\frac{3}{4}$  inch thick, but I think the thinner,  $\frac{5}{8}$ -inch-thick slats look a lot better.



# THE WORK. THE TUNES.

3M™ WORKTUNES™ CONNECT WIRELESS HEARING PROTECTOR

Now you can enjoy the workday like never before. Entertains and connects while helping to protect your hearing. Stream your favorite music in high-fidelity audio. Make and take phone calls without missing a beat. No cords. No hassle.

**BUILT TO PERFORM**

# 3M

[3M.com/WorkTunes](https://3M.com/WorkTunes)



© 3M 2022. All rights reserved. 3M and WorkTunes are trademarks of 3M. The Bluetooth® word mark and logo are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by 3M is under license.



The author tacked the shelf slats to the bottom rails (9), then secured them with pocket screws driven up through the rails (10). The author used a beading bit (11) to shape the edges of a length of poplar, then ripped the bead detail to size on his table saw (12) in order to trim the edges of vanity's inset drawer front (13).

After cutting all the slats to length, I did a test layout to get the spacing right, then tacked each one in place with a 21-gauge pin. I notched the first one around the legs, then went from left to right; next time, though, I think it will be easier to start in the middle and work toward each end. The pins were strong enough to keep the slats in place until I added the pocket screws from the bottom.

**Drawer.** I added a 3/4-inch-thick poplar filler to each side of the drawer opening to install the side-mount CSH full-extension metal drawer slides. The front edges of the fillers double as stops for the drawer front.

Because the one large drawer would have a cutout to fit around the drain, my normal 1/4-inch-plywood drawer bottom wouldn't work. For strength, I instead used a full 3/4-inch-thick MDF bottom, which I pocket-screwed into the 1/2-inch Baltic birch drawer sides. I filled in the front and mitered around the back with more Baltic birch plywood using 21-gauge pins at the joints.

The drawer front and side panels are plywood with a simple bead detail—a molding that I make with a Whiteside beading bit

mitered around the plywood. To size the plywood panels, I subtract two times the molding thickness plus 1/8 inch for a slight reveal. I nailed plywood scraps behind the side rails to serve as mounting cleats.

I attached the drawer hardware and adjusted the drawer to sit level and square in the opening. My final challenge was fitting the inset drawer front. I used shims to center it (this is where cutting all the parts carefully pays off) and ran screws in from the back.

I really enjoyed building the cabinet. It didn't take a lot of material, and I probably could have built two in close to the same time as it took to build one, but there is only so much storage room in my shop. Besides that, I wouldn't want to mess up the chance to spend another day working there.

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

# ECOVIEW WINDOWS OPENING SHOWROOMS IN WALMART



© Can Stock Photo / OG\_vision

**NOW IS THE TIME TO START YOUR OWN INCLUSIVE ECOVIEW WINDOWS  
BUSINESS & SHOWROOM AT A WALMART LOCATION NEAR YOU**



**ECOVIEW**  
WINDOWS & DOORS

## **BENEFITS INCLUDE:**

- Outstanding Retail Presence with multiple Walmart locations available
- Expert Sales Training
- Professional Web Presence
- Deeply Discounted Factory Direct Pricing
- Zero Franchise or Royalty Fees
- Nationally Recognized Company
- World-class Homeowner Financing
- Ongoing Training & Support
- Business Management Software
- National Healthcare Program with BCBS
- Plus Much More!



"With 90% of America shopping at Walmart every year, EcoView Windows is proud to offer Walmart's value conscious customers our premium quality windows and doors. You too, could become an EcoView licensee and secure one or more of Walmart's 4th wall store showrooms. This is a rapid growth opportunity with significant customer acquisition due to showrooms continuous foot traffic. Lead generation will never be an issue because 90% of the population lives within 10 miles of a Walmart location. This EcoView Windows opportunity is one you won't want to pass on!"

**To find out if your market is still available call 1.855.621.1616  
or visit [ecoviewwindows.com/dealer](http://ecoviewwindows.com/dealer)**



# Create their favorite gathering place.

Build an outdoor space meant to be enjoyed, not maintained, with Fiberon. With a suite of beautiful, durable outdoor living products built to last weekend after weekend, you'll build a foundation they'll enjoy for years to come.

EXPLORE OUR PRODUCTS AT [FIBERONDECKING.COM/PRODUCTS](https://www.fiberondecking.com/products).



Help them imagine their dream deck.



Fiberon Discovery AR App

Promenade PVC decking in Shaded Cay. Brio railing in Serene Black.

Actual board colors may vary from photography.

©2022 Fiberon. All rights reserved. FIBERON and the Fiberon logo are trademarks of Fiber Composites, LLC. Registered trademarks are registered in the U.S. and may be registered internationally.

## Investing in Your Construction Company: The Pros, Cons, and Possibilities

**As the owner of a construction business,** you understand the need to invest in your company. You realize that at the very least “you will make a huge investment of both spirit and time,” as one veteran general contractor puts it. You will also plow a substantial amount of the money that your company earns back into it. You must do all of that if you want a company that remains productive and strong enough to weather the ups and downs of the economy.

To begin with, you will invest in your employees. You will make sure they feel respected. Respect, along with autonomy, is at the very top of the list of what employees want at their jobs. You will provide them with every financial benefit that your company can afford, from tool allowances through good wages and profit sharing. Or at least you will do that if you have your wits about you. As I have emphasized in my new book, *Building Freedom, A Construction Pro's Path to Financial Independence*, and will again in an upcoming article, respect and generosity toward employees are acts of enlightened self-interest. If treated well, employees stick around; you don't have to constantly replace them with new people.

Turnover costs you. It may not be visible on a balance sheet or an income statement. But if you have more than a bare minimum of turnover, it's eating away at your company. Advertising for prospective new employees, interviewing them, processing their paperwork, and then training and meshing them with your existing workforce costs time and money.

Along with compensating your employees as well as possible, you will need to provide them with good equipment. Investing in good equipment is part of the respect you want to show to your employees. Wally Staples, a veteran builder in Maine who has created a thriving design/build company, says that whenever he sees equipment that can protect his workers against injury and/or improve their productivity, he buys it. The enhanced safety says to workers, you matter to us; we don't want you to get hurt. The more efficient equipment says we want to support your efforts to be excellent at your craft.

Investment in workers is a must not only at the jobsite but in the office. There, too, you must spend for systems and tools that enhance productivity and safety. All that investment pays off for you and your company as well as each of your employees. It reduces or eliminates workers' compensation claims and the attendant, often severe, rise in insurance costs. And it keeps your company competitive and profitable.

You may or may not find it worthwhile to spend money on marketing beyond doing good work for your clients and relying on their references to bring in new projects. If you try it, just make sure it is returning more than it costs. I once read an article by a popular industry consultant who recommended a marketing program that clearly, as evidenced by their own numbers, would cost more than it returned in company profits!

Finally, as discussed in my earlier article on cash management (“Taking Charge of Your Cash,” Jun/22), you must put company earnings into a working capital account. Just as an individual needs money in the bank for basics when hard times come, a company needs capital in reserve to get through down years for the economy. That's emphatically true for our industry. When the economy slides into recession, construction can experience depression. Construction projects are largely optional, or at least not urgent. They can be postponed. They can be dropped altogether. And during hard times, they often are.

**Some construction pros settle on a strategy for putting earnings back into their construction company that, in my experience, appears to often be ill-advised and misguided.**

When we move beyond essential expenditures like broad compensation for employees and building up of capital reserves, just how earnings should be put back into a construction company is less clear cut. Some construction pros settle on a strategy that, in my experience, appears to often be ill-advised and misguided: They plow their capital into fancy new trucks rather than maintaining sound, older vehicles, into impressively big shops that largely sit empty or unused. And into unnecessary layers of office staffing and site supervision or handsomely remodeled offices.

What drives those investments? A range of motivations, I

imagine. But definitely in some cases, a dream of “building a brand,” selling the business, harvesting much cash, and riding off into financial freedom. Victoria Downing, the president of Remodelers Advantage, says she regularly hears that dream from new clients who enlist in RA’s educational programs. When she explains what it takes to build a company that can be sold for a significant amount of money, many of her clients shelve the dream.

### CHARACTERISTICS OF A SALEABLE COMPANY

Creating a construction company that can be sold for enough money to enable financial freedom is a serious challenge. To understand how a construction company owner interested in selling their company might meet the challenge, I interviewed business brokers as part of my research for *Building Freedom*. They all stressed the importance of selling when times are good, not hesitating in the hope that a boom will continue and your company’s value will rise. They underscored, as well, what a company must not be and called out the characteristics it must have to be saleable.

To begin with, the company must not be “a hub and spoke” operation. The owner can’t be at the center and handling all the critical tasks from marketing through project management. Instead, a competent management team, versed in the use of effective systems, must be responsible for those tasks.

The well-organized management team must serve customers so well that they give the company high marks for performance. The company must be profitable. It must stay clear of debt. It must have clean books—that is, no financial records for submission to the tax authorities, on the one hand, and under-the-table cash flows on the other. Why is that? Because the hidden income cannot be considered when the company is valued, for its existence cannot be proved.

After considering all those requirements, you may think you can meet the challenge. Even so, before deciding that building a brand is the path you want to travel to financial freedom, consider what you might actually get for your company.

#### The Saleable Construction Company

- Is not a hub-and-spoke company with the owner at the center handling most vital business functions.
- Has a management team that is responsible for all operations from marketing through estimating and project delivery.
- Has efficient systems in place for all office functions including estimating and accounting and for production in the field.
- Enjoys high customer satisfaction ratings.
- Enjoys a strong and recurrent revenue stream.
- Is free of debt.
- Has clean books.
- Has been consistently profitable.

### REALITIES OF SELLING

When I inquired of brokers what a typical construction company might go for, they offered a range of factors that can be multiplied by a company’s profit to suggest a market price. As you can see in the sidebar below, the brokers indicated that the sales value of a construction company is between one and four times its average profits—or perhaps somewhat higher for a plumbing or HVAC company. The cases I have seen suggest the midrange multiplier of two to three times profit is realistic.

#### Multipliers for Determining the Market Value of a Construction Company

From the least optimistic brokers: 1X Profit

From moderately optimistic brokers: 2X to 3X Profit

From highly optimistic brokers: 3X to 4X Profit for remodeling, drywall, or painting companies and 3.5X to 5.5X Profit for HVAC or plumbing companies

\*Note: “Profit” here means average profit over the past several years at least. It refers to actual company profit after owners pay for running the company, which is not profit but part of overhead.

If you have spent decades building up a remodeling company, and it is earning \$500K in actual profit (as distinct from owner’s pay), then you might expect to get one million to one and a half million for it. Bear in mind, however, that even if you are fortunate enough to actually sell your company, your take will be reduced by taxes along with legal and other frictional costs of the sale—notably the broker’s commission, typically 10% of the sales price. The broker gets their commission even if you aren’t paid in full. If you do not sell for all cash, and the buyer falters and fails to pay you, the broker will be long gone with their commission.

All in all, the prospects are daunting for reaching financial freedom via sale of your construction business. There are good reasons for that. Typical small construction companies are not worth much. They are too vulnerable to the ups and downs of the economy. They are besieged by competition from newcomers who will underprice and thereby win jobs en route to going out of business. That’s why, when they are sold, it is often to employees—folks not likely to know much about investing.

### SELLING TO EMPLOYEES

An owner can sell directly to one employee. They can sell to a group of or even all their employees via the legal arrangement called an Employee Stock Ownership Plan (ESOP).

ESOPs are far too complex to explore fully in this short



# WORLD LEADER IN HELICAL PILES



**DO YOURSELF A FAVOR, USE TECHNO METAL POST FOR YOUR ADDITION FOOTINGS**

- AFFORDABLE AND EFFICIENT
- NO EXCAVATION AND LOW FOOTPRINT
- EASY ACCESS EVEN IN TIGHT SPACES
- SIMPLE AND QUICK
- CODE COMPLIANT
- WARRANTY

 **Techno Metal Post helical piles are engineered and guaranteed.**



[info@technometalpost.com](mailto:info@technometalpost.com) | [technometalpost.com](http://technometalpost.com)

article—though in *Building Freedom*, I have sketched the basics and suggested a resource for readers who want to learn more. Ownership of several construction companies in my area has recently been transferred to their employees via an ESOP. During the recent boom period, the companies appeared to be continuing on successfully.

ESOPs, however, are costly, requiring expensive legal services, and they can be risky for an owner. ESOPs may finance the purchase of the company by taking a bank loan. Banks know that construction companies are vulnerable business entities that often collapse. They are not eager to extend a loan secured only by such a business. So they require that the owner's assets serve as collateral. If the ESOP falters and becomes unable to pay off the loan, the bank can take those assets.

Even when no ESOP is involved, a sale to employees can be hazardous for an owner. The founder of one respected company sold it to an employee who had been with him for years. He thought he had the right guy to take over the firm. He agreed to take payment in installments. The new owner soon bankrupted the company, never paying his final installments. In other cases, new owners have realized they were in over their heads trying to run a company. They handed the company, sometimes badly damaged, back to the original owner.

#### ACHIEVING THE DREAM

For all the challenges and harsh realities, I want to emphasize that the dream of building and successfully selling a company is not an impossible one. Now and again some builder does realize the dream.

There are, in addition to employees, buyers for construction companies. There are buyers from outside our industry who want to break into it. There are buyers interested in growing revenue via acquiring other companies operating in the same or a similar niche. There are existing companies interested in expanding into new areas. For example, the owner of a large cabinet shop in my area acquired a general contracting company that today dwarfs their cabinet operation.

The owner of even a small construction company can list it for sale with a business broker and turn it over to a new owner for cash on the barrelhead. That is what Paul and Nina Winans accomplished. Paul has described their journey in articles for *JLC*. With an eye toward creating a saleable company and then retiring from construction, Paul and Nina developed systems for all aspects of their company's work and trained employees in using them. They methodically upgraded their projects and increased profitability. Ten years after beginning their program of improvements, they engaged a broker who found them a buyer that paid them not in installments but in full at the time of sale.

Accomplishing a sale like the Winans' can take more than



**START STRONG! FINISH STRONG!**

**LOW VOC!**

**SEMI-TRANSPARENT HARDWOOD FINISHES**

Finishing any hardwood project means your choice of brand may make or break the results. So why use anything other than an industry leading brand with the reputation to back it?

**Make the right choice, the WiseChoice™.**

**For more info call 866.427.2547 or Chat Online**

**DeckWise.com**  
The Ipe Clip® Fastener Company, LLC

**Manufacturers of Hidden Deck Fasteners & Accessories**

methodical hard work. It can require luck. Paul candidly reports that was the case for himself and Nina. They were fortunate, he notes, to exit the construction industry when they did. They happened to sell at the end of the building boom terminated by the Great Recession of 2008. Not long after their sale, the recession began. Construction companies, including the Winans' after the sale was completed, began winking out of existence. Selling their company during that recession, Paul points out, would have been difficult at best.

#### A DIFFERENT INVESTMENT STRATEGY

Early in my career, I concluded that investing in a construction company, especially one engaged in the kind of custom work I was doing, was a dubious strategy and a dicey path to financial freedom—which I was hell bent on achieving. I opted for a different path: It did include making the essential investments in my company, especially creating an employee-centered company free of turnover. It incorporated a commitment to doing such good work that satisfied clients constantly referred us to their friends and relieved us of the costs of marketing. And it involved organizing an ultra-lean company with the lowest overhead consistent with our other values.

By working out of a compact office and storage area and honing systems so efficient that only minimal office help was needed, I

drove out-of-pocket overhead below 2% of revenue. I also minimized my owner's pay. Consequently, virtually all markup remained in the company for profit—both for my own use and for distribution to employees. I put my share of that profit into diverse investments outside of the company—largely real estate, stocks, and bonds, though only when they have been available at historically moderate prices and never during bubbles. While those investments, too, have their ups and downs and complications, they do produce more reliable returns than companies operating in the turbulent world of construction. And they require far less management time.

That investment strategy worked. I reached financial freedom at a young age—much faster, I observed, than certain fellow builders who elected to plow earnings back into “building a brand”—and I have strengthened it ever since. Additionally, I enjoyed a benefit not available to people who sell their companies. Because I still own David Gerstel/Builder, if the urge strikes, I can fire it up and take on a project. And I like that, for though financial freedom is delicious, I still love construction.

*David Gerstel is a builder and the author of the construction industry best-sellers Running a Successful Construction Company and Nail Your Numbers. This article is adapted from David's newest book, Building Freedom: A Construction Pro's Path to Financial Independence.*

# ZIPWALL®

DUST BARRIER SYSTEM

800-718-2255

## Do it right.

**Start every job with ZipWall®.**

- Sets up in just a few minutes – brings in business for years
- No ladders, no tape, no damage

See how easy it is at [zipwall.com](http://zipwall.com).



PROVIA® ENTRY DOORS + SCHLAGE® HARDWARE

# STYLE + SECURITY

*The perfect combination*



**Electronic** Collection



**Vintage** Collection



**Classic** Collection

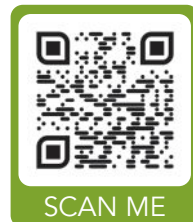


ProVia is pleased to offer a range of handsome and durable **Schlage handlesets for our fiberglass and steel entry doors.**

Select from Schlage Vintage, Classic, and Electronic styles, for great curb appeal your customers will love.

**View more options:**

[provia.com/doors/hardware](http://provia.com/doors/hardware)



DOORS | WINDOWS  
SIDING | STONE | ROOFING

## Three Ways to Install Drainable EIFS Wrong (and One Way to Make It Work)

**The original EIFS (exterior insulation finishing system)** was a very problematic system when used on wood buildings. There was no drainage or drying space behind the synthetic stucco. If any water leaked anywhere into the wall, it was stuck there and would soak the wood and cause rot, biological growth, and permanent damage.

Manufacturers realized pretty quickly that they had to reinvent the system to be less likely to fail, and they came up with “drainable” EIFS (or “drainage” EIFS). As you can tell by the name, drainable EIFS has pathways for water to drain out, should it get in. In theory these are great, but as they say, “in theory, theory and practice are the same, but in practice they are not.” (I first heard this from Joe Lstiburek, but the saying’s been around a while.) We’ve had the opportunity to fix a few problems with drainable EIFS—and even nearly make our own mistake with it—so let me share what we’ve seen.

**Vertical grooves.** Several of the systems use foam base sheets with vertical channels cut into the foam facing the wood wall. Water can drop down in the channels and drain out the bottom of the system.

Someone should have explained that to the crew that installed the foam board on a house we stripped and re-stuccoed when the EIFS failed in several areas. They ran the channels up and down on the main parts of the walls, but for unknown reasons, they ran the channels horizontally at the rim-joist level all the way around the house, totally blocking the drainage at every level.

**Vertical adhesive.** Another style of drainable EIFS uses ordinary, flat foam boards, but they’re adhered to the wall with a thick adhesive applied with a notched trowel. The idea is to make vertical drain channels between the beads of adhesive.

On our first install with this system, I watched a very skilled troweler carefully float out a dip in the wall, then scratch the channels in the last layer of mud. However, we had apparently failed to communicate that the channels had to be vertical because he elected to run them horizontally in this area, probably more to do with how he had to stand while working on it. We took advantage of this learning moment to reiterate to the entire crew that the vertical channels were a key part of the install, and they were happy to do it correctly.



“Drainable” (or “drainage”) EIFS has vertical drain channels behind the foam insulation board. The channels can be molded into the back of the foam (1) or made with adhesive applied with a notched trowel (2).

Photos by Doug Horgan



Drainage channels (arrows) were installed horizontally at the band-joint area on this house, blocking the vertical channels above (3). (We had already replaced the sheathing visible here, since the trapped water had rotted out the original OSB.)

I think we got that job done right, but I still don't love this system. Even if the installers are on board with the concept, it's too easy to squeeze the adhesive beads flat so they cover nearly the entire area, leaving only tiny drain spaces—or worse, to inadvertently fail to line up the gaps between boards, which again will completely block the vertical channels.

**Drain exits.** Another issue we've seen is where vertical channels are all run properly, but the exit path is blocked off. On one house, metal head flashing was installed above every window and door, which should have directed draining water out. But, someone had very carefully caulked above the flashing, completely sealing any draining water into the wall. (This may have been a different crew or even a later caulking replacement job, but either way, it blocked the drainage.)

We had been working on the house because of a persistent leak at a bad roofing connection. Water in the drain spaces was blocked at the window below and could only soak into the header and seep around the sides of the window, where it caused further damage.

Another house had a plastic track installed at the bottom of the EIFS. The weeps in the track were the outlet for the drain channels on the walls, but the small weep holes were blocked by caulking installed between the track and additional EIFS installed on the foundation wall below. Water soaked into the sheathing in the area of the track.

It should be noted that as with other types of draining systems, long-term, repeated water entry will eventually cause damage even with properly installed WRBs and drainage gaps. I've seen this on a few houses. Good wall practices handle small amounts of incidental water, but a consistent source that keeps the drain space wet will result in failure.

**Drainage matrix.** Ultimately, I've seen enough trouble with these vertical groove systems that I find myself drawn to another



In this view from above of what should be an open drainage space (arrow) between the white EPS board and the blue substrate, it's apparent that adhesive has filled the whole space (4). We had the crew remove the board, revealing that the vertical channels were blocked by the additional adhesive used to flatten a dip in the wall (5).

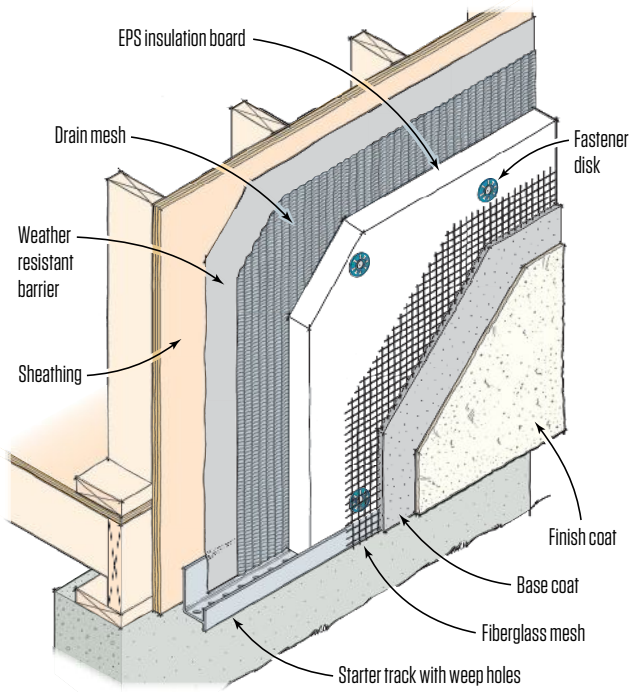


The heavy bead of sealant on top of this window head flashing blocked the drain path from the vertical channels above the window (arrow) (6).



Heavy caulking blocked the weep holes in this plastic track installed at the bottom of the drained EIFS on the wood walls (7). The trapped water caused water staining all along the bottom of the wall, visible in the background.

### Drainable EIFS System



Drain-mesh material allows vertical drainage as well as drying in every direction, with better airflow than small vertical channels. It's now commonly stocked at suppliers and works with standard flat foam boards.

way to install EIFS so it drains: Use a drain-mesh product behind the foam boards. These plastic mesh materials create a gap in front of the WRB and are sold by several manufacturers; brands include Cedar Breather, Home Slicker ([benjaminobydke.com](http://benjaminobydke.com)), Driwall ([keenebuilding.com](http://keenebuilding.com)), MortAirVent ([advancedbuildingproducts.com](http://advancedbuildingproducts.com)), and competitors. We started using it behind wood, stone, and stucco and now use it behind EIFS foam boards.

The advantages of drain mesh are that it's hard to mess up and block off the drain path, and additionally (unlike vertical channels), it allows sideways movement of water and moisture, which should add some resilience when someone does unintentionally block off an entire window flashing or whatever. It also allows more drying in multiple directions, which again should allow more water to be successfully handled by the system. Our stucco and EIFS crews are very familiar with these materials these days, too, and we don't have to explain how to install them, so there's another whole set of potential failures that we avoid.

We haven't recommended EIFS to a client in quite a while. In fact, we usually discuss removing and replacing it altogether, and several clients have had us completely re clad their houses because this is viewed as helpful at resale (EIFS is a red flag for many buyers). But as remodelers, we're still repairing it, tying additions into it, and even sometimes adding it to make additions match existing houses. I'm pretty confident that drain-mesh installations will work well over time, as long as we don't dump a lot of water into the gaps.

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



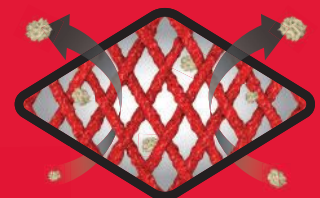
# SandNET™

The **ULTIMATE**  
**SANDING**  
**SOLUTION**



**10X** UP TO  
**LONGER LIFE**  
VS. STANDARD SANDPAPER

Diablo's full-range of premium SandNET™ discs and sheets features  
**THE MOST ADVANCED SANDING TECHNOLOGY**



**ANTI-CLOGGING DESIGN**  
**RESISTS PITCH BUILD-UP**

-  **Clog Reducing Net Design**  
for up to **10x** Longer Sanding Life
-  **Premium Ceramic Blend**  
for Fast Material Removal
-  **Reusable Technology**  
for Repeated Use & Longer Sanding Life



Scan here to learn more about the sizes and configurations available in SandNET™



**Learn More at [DiabloSandNET.com](https://DiabloSandNET.com)**



[DiabloTools.com](https://DiabloTools.com)



[@DiabloTools](https://www.facebook.com/DiabloTools)



[@DiabloTools](https://twitter.com/DiabloTools)



[@DiabloTools](https://www.youtube.com/DiabloTools)



[@Diablo\\_Tools](https://www.instagram.com/Diablo_Tools)



[@DiabloTools](https://www.tiktok.com/@DiabloTools)

# KITCHEN DESIGN



## The ‘Post-Lockdown’ Kitchen

### Design guidelines and trends for renovating today’s kitchens

BY DAVID POLLARD

So central to family life, the kitchen, of all the rooms in the house, took the brunt of the pandemic’s heightened demands, which made clear which design features were working—and which were not. Versatility became critical, with islands being used for home offices and countertops for home-school desks. A cluttered kitchen became a hindrance to productivity and exacerbated existing problems of insufficient appliances and a lack of good design for cooking. More recently designed kitchens were better equipped for these challenges, but older kitchens brought all these issues front and center. So although the pandemic did not inspire any radical shifts in kitchen

design, it magnified the importance and desirability of many trends and improvements introduced in the last several decades.

#### VERSATILITY OF AN ISLAND

The kitchen island has continued to prove its worth and is here to stay. The range of uses for this massive chunk of wood and stone is seemingly endless. A quartz top, which resists staining from a wide variety of spills, is perfect for an art table, and the height makes a decent standing desk. Islands can be as big or small as you need, which means the depth can increase to incorporate additional storage and seating. These elements can also support a

range of functions: plumbing fixtures, appliances, charging stations, garbage cans, coffee makers, and more.

## Design Guidelines for Islands

- Make the island large enough to seat the whole family. Only four chairs for a family of five means someone is always left out of the party.

- Consider overhangs and seating on the end or ends as well as the back of the island—it is nicer to have a conversation or play a game sitting perpendicular to each other instead of next to each other. The alternative—one person stands on one side while the other sits on the opposite side—is not the way you would spend time at a restaurant, for example, with a friend or family member.

- Maximize storage on all sides—a 4-foot-deep island provides 24 inches on the kitchen side and 12 inches on the back with a 12-inch seating overhang. Those 12-inch-deep cabinets are the perfect seasonal storage for appliances used a few times a year, extra place mats, and the holiday mug collection.

- Plan the front, or kitchen, side of the island for as much daily-use storage as possible. Being at the center of the kitchen space, it's perfect for holding school lunch supplies, daily silverware, a microwave, a beverage drawer, and garbage-can pullouts. Keep the heavy-duty cooking and baking supplies on the perimeter with the range where the cooking functions happen.

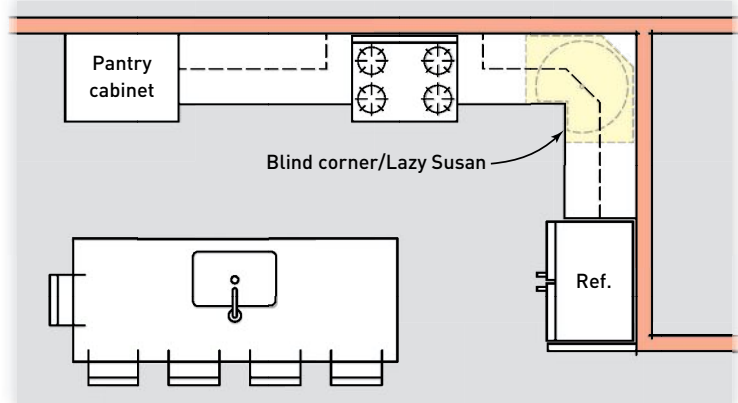
## Trends in Islands

- Countertops without sinks or cooktops are increasingly common on islands. Having a cooktop on one has long been a questionable decision, but we are seeing more and more clients trying to move the sink and faucet elsewhere as well, even if it compromises the work triangle. One big, clear, and easy-to-clean surface offers the most versatility and sharpest aesthetic.

- Single-level surfaces are preferred to the multitiered island design of the past. The 42-inch serving counter above the 36-inch work surface served a purpose of concealing the mess beyond on the counter, but advancements in storage, large-format quartz slabs, and showpiece faucets have made a single, large surface the more practical choice.

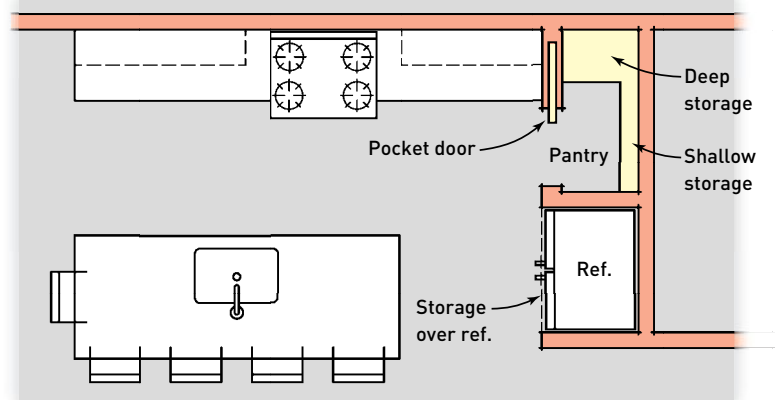
- Owners are now willing to invest in both the durability and aesthetic of cabinet panels for island ends and backs. The cost-

## Corner Cabinet



Blind corners can be awkward. Though Lazy Susans and pullout accessories have improved, the big blind-corner base cabinet can still be difficult to access.

## Walk-in Pantry



Before using a blind corner as a default, the author likes to explore other options, including a walk-in pantry, as shown in this example.

effective gypsum-board wall ends and back have not held up well to increased activity from home school and work-from-home.

## CLUTTER MANAGEMENT

Spending all day and into the evening working and learning in a sea of our stuff reinforced the importance of kitchen storage. There are things we own that bring us joy and we want to put on display to share, and there are many more things in a kitchen that serve a specific function, and we prefer not to look at them. Thoughtful storage solutions as simple as garbage pullouts and as helpful as charging drawers have come to the forefront. That



A walk-in pantry with plenty of outlets allows kitchen equipment to be used without having to move it and keeps the clutter out of sight when not in use (1). A dedicated coffee bar (2) is one option for creating functional kitchen organization. In lieu of a pantry, smart cabinet solutions at the end of counters (3) offer ample storage for bulky kitchen items.

toaster the homeowners received as a wedding gift may be used every morning, but there is likely a design solution that doesn't require them to look at it, and all of the crumbs, on their counter all day.

### Design Guidelines for Clutter Management

- Understand your client's life situation and what they currently need to put away in their kitchen. Also help them plan for the future. If they like open shelves, talk to them about what they are planning to put on them. Be thoughtful about everything that they will be seeing out in their kitchen on a regular basis.
- Whenever possible, consider a walk-in pantry. This space will allow owners to store food and brooms and also get those clunky appliances out of the way. Imagine what having that dirty coffee pot, toaster oven, and microwave in their own room does for

the cleanliness of a kitchen and the ability to be more efficient with countertop space and cabinet storage. Be sure to consider clearances and requirements for dedicated appliance outlets when planning the pantry, the same way you would planning the main kitchen spaces.

- If a walk-in pantry isn't possible, consider smart cabinetry solutions. Tall corner cabinets above the countertop height are an ideal place for lift-up appliance garages. Or look toward another dedicated space for those functions, such as a coffee bar.
- Blind corners can be messy and clumsy. While mechanisms for Lazy Susans and other pullout accessories have improved, the big, empty blind-corner base cabinet still leaves much to be desired. It can be difficult to access and is often simply full of stuff that sits there until your clients sell the house and move. Before using a blind corner as a default, we like to explore other options: for



Big drawers, and plenty of them (4), offer a storage solution for everything from glasses and dishes to cookware. Kitchens increasingly are planned with one entire wall dedicated to windows and glass doors to connect with the outdoors (5).

instance, a walk-in pantry, a butler's pantry, or a longer island with no cabinets or tops on the return wall.

### Trends in Clutter Management

- The microwave hood is out. One thing we have learned over the years is that the least attractive place to put a microwave is right at eye level as the focal point of the kitchen. In the last few decades, the microwave hood, the least expensive appliance in the kitchen, has been comfortably perched above the owner's showpiece range, holding the dripping bacon grease on a metal screen. Today, there are so many options to move that microwave down and out of sight. In addition to a countertop unit in a walk-in pantry, built-in units either with a drawer or door are becoming more commonplace and available from major manufacturers.

- Built-in desks are out, as well. Too many families learned the hard way that the seemingly brilliant built-in desk designed for homework and planning the meals for the week became a highly visible landing spot for junk mail and Amazon deliveries. While the extra space and storage is handy, the workspace is not. It is more comfortable to open your laptop or tablet at an island than to sit in a low chair staring at a wall. We have now seen a conversion of these old desk spaces to beverage bars, pantries, or closed storage for mail and electronics recharging. The space can still be useful but can be closed off out of view with the swipe of a hand.

- Lots of big drawers are in. Today's cabinet hardware and drawer-box construction allow for deep and large storage drawers to house everything from plates, to glasses, to cast iron frying pans. Our kitchens are typically planned with multiple three-drawer banks for pots, pans, and daily serving dishes. Similar in cost to a cabinet with a top drawer and two roll-out trays, the drawers provide more efficient storage and a simple open-and-grab to retrieve what you need. We typically try to keep drawer banks to 27 to 30 inches so they provide ample storage but are not too heavy to open and close.

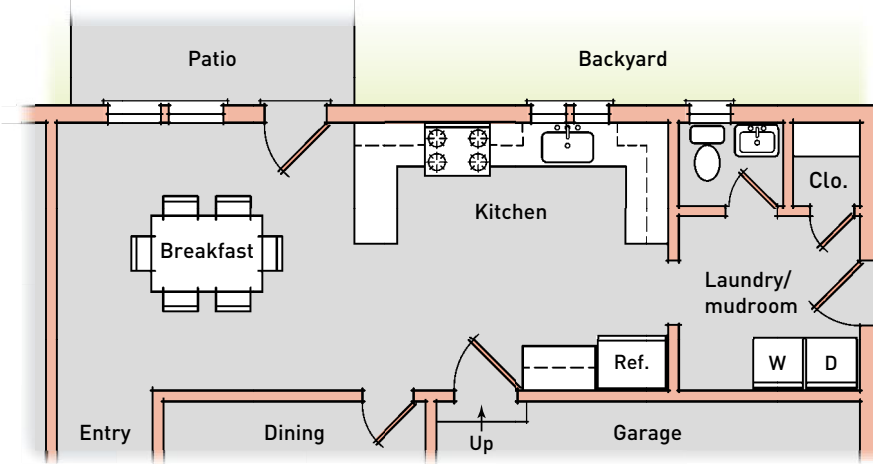
### CONNECTION TO THE BACKYARD

Families today have learned to appreciate their outdoor space in a different light. What was once a dirt playground full of toys and soccer balls has become an oasis for retreat and entertaining complete with outdoor kitchens, living room setups, fire pits, and string lights. Most owners now want to engage with that space more than is possible through the half-glass back door and one or two windows in the original house design. Replanning the back of a home from the inside out begins with freeing up exterior wall space to allow for more windows and doors; the island and storage solutions mentioned above help to make this possible.

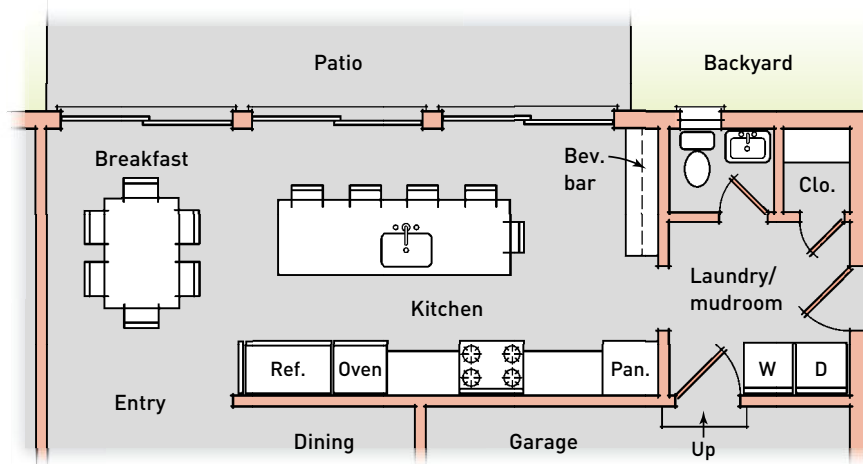
### Design Guidelines for Connecting to the Backyard

- Depending on the layout, consider moving the perimeter kitchen

### Cabinets on Exterior Wall



### Cabinets Moved to Interior Wall



Depending on the layout, consider moving the perimeter kitchen cabinets to an interior wall: By flipping the kitchen, the exterior wall can now be sliding doors or large windows, allowing backyard access or sunlight directly to the island seating area. This layout also provides a perfect opportunity for a sink in the island; owners can look outside while using it, just like the good old days of watching out the kitchen window.

cabinets to an interior wall: By flipping the kitchen, the exterior wall can now contain sliding doors or large windows allowing backyard access or sunlight directly to the island seating area. This layout is also perfect for a sink in the island, since clients can look outside while using it, as they did in the good old days with a kitchen window above the sink.

- Include lots of windows to the backyard. If the perimeter cabinets are on the outside wall, first design the back wall with the maximum number of windows. Using smart island and pantry design, plan for the rest of the cabinetry to store everything that would traditionally be in those perimeter upper cabinets.

#### Trends for Connecting to the Backyard

- There are significant advantages to a kitchen design that reduces or eliminates upper cabinets. Typically, the top two shelves of an upper cabinet are not easily accessible because of their height, and the idea of having unused storage space heavily hanging on your wall in plain sight doesn't make sense. If the storage from the bottom two shelves can be relocated to lower drawers and a pantry, opportunities for windows, doors, artwork, and tile arise.

- Access to the backyard is more of a priority now. At the very least, half-glass back doors are being replaced with full-glass ones, but we are also seeing openings being enlarged for slider doors, and in some cases, made large enough for folding or pocket-door systems, enhancing the indoor/outdoor connection between the kitchen and backyard.

#### HAVE FUN

With so many activities and functions beyond cooking happening in today's kitchen, the space has become a place to celebrate family and show a little personality. In a kitchen remodel, owners are able to customize with many variables and options. From appliances, to countertops, to cabinets, to tile, the possible combinations designed for both function and personality are endless. Make sure to guide your clients to embrace the possibilities of their customization and have fun along the way.

#### Fun Design Guidelines

- Start with countertops or backsplash first. Often, homeowners have seen a countertop or backsplash pattern in the past that they want to have in their kitchen remodel, and it may even be the inspiration for their remodeling project in the first place. If they do, then that is a great starting point to get nailed down early. It will help guide cabinet colors and finishes when you can compare them to the tops or tile.
- We typically focus on two cabinet colors or finishes to begin with.

## THE 'POST-LOCKDOWN' KITCHEN



Both kitchens above demonstrate the trend toward having few upper cabinets in lieu of more windows and ample wall space. While white-on-white is in decline, white is used to contrast with a darker island (6) or darker wood ceiling (7).

Sometimes clients will add another along the way, but beginning with a different island and perimeter finish is an easy start.

- Give the clients homework. We have found the best way to keep clients busy and focused on moving the design forward in their free time is to facilitate shopping for kitchen appliances. We work with certain appliance vendors that have large showrooms where clients can see, touch, feel, and price their appliances early in the process. The relationships we've developed mean the salespeople can guide owners within our process and help them arrive at appliance resolution early. This piece is also a huge variable in the overall cabinet design and layout, so the sooner it is defined, the better.

- Think about how your clients live and their personalities: Do they have a huge wall calendar to organize their lives? Do they love displaying their children's artwork? Do they have friends and family visit often? These are just some of the important questions that can help guide clients toward creative and personalized spaces designed and built for them.

### Fun Trends

- White-on-white kitchens are becoming less common, and if we do see white, it is usually against a contrasted element like dark trim, a wood top, or wood hood vent. Often, we will see white on one portion of the cabinetry used to set off a unique wood or color accent on another portion. A deep walnut, blue, green, or orange island has a little more energy next to clean, white cabinetry. One thing is for sure, though: Owners are excited to have fun and take risks with cabinet colors in specific areas.

- We have seen more and more clients move away from white subway tile, bringing in some texture for fun and personalization. Most often this happens with backsplash tile, but we also see wallpaper and open wood shelves adding a custom feel.

- Huge swaths of industrial stainless steel are being replaced by cabinet panels on refrigerators and dishwashers. By softening these appliances with wood or paint, the range and range hood can be the singular focal point.

- Large, heavy-duty, and well-designed ranges continue to be important elements in many of our clients' homes. Both for their powerful cooking abilities and impactful appearance, these expensive appliances deserve a well-designed layout to help them shine.

Having so many families spending so much time in their kitchens the last few years has expedited a shift toward function and joy. While the tips and trends mentioned here may be more prevalent in our particular market, they came from deep discussions and discovery of our clients' needs. No matter what geography or demographic you are working, be sure to dig deep to understand both client needs and pain points and propose thoughtful solutions. There has never been a time in recent history when homeowners have had such focused opinions on the dysfunctions of their kitchens, so keep asking questions to tap into these opinions, and, most importantly, listen.

*David Pollard, AIA, is an architect, builder, and co-founder of Liv Companies (LivCo), a full-service residential design-build firm delivering award-winning projects throughout Chicago's suburbs.*



# Malco®



## Fiber Cement Siding **TurboShear**® EC



**Straight Shearing**



**Precise Arcs**



**Fine Trimming**



**Easy to Use!**



Non-Slip, Hex Driveshaft fits 1/4 to 1/2 in. (6.35 - 12.7 mm) drills plus 1/4 in. Quick Release

Chucks on popular Impact Drivers.

Drill Not Included.

[www.malcotools.com](http://www.malcotools.com)



**TSF1 Fiber Cement Siding Shear**

U.S. Patent No. 7,093,365

**Transform your drill into a Fiber Cement Siding Shear!**

Versatile and Portable. Cuts 5/16 in. (8 mm)



**360° Rotating Head** secures in any position for optimum tool clearance and material flow.

**360°**

Malco Products, SBC • Annandale, MN. U.S.A.

# BUILD FEARLESSLY IN ANY WEATHER



West Fraser



1 YEAR NO-SAND GUARANTEE

**DURASTRAND**  
*pointSIX* **EDGE TECHNOLOGY**

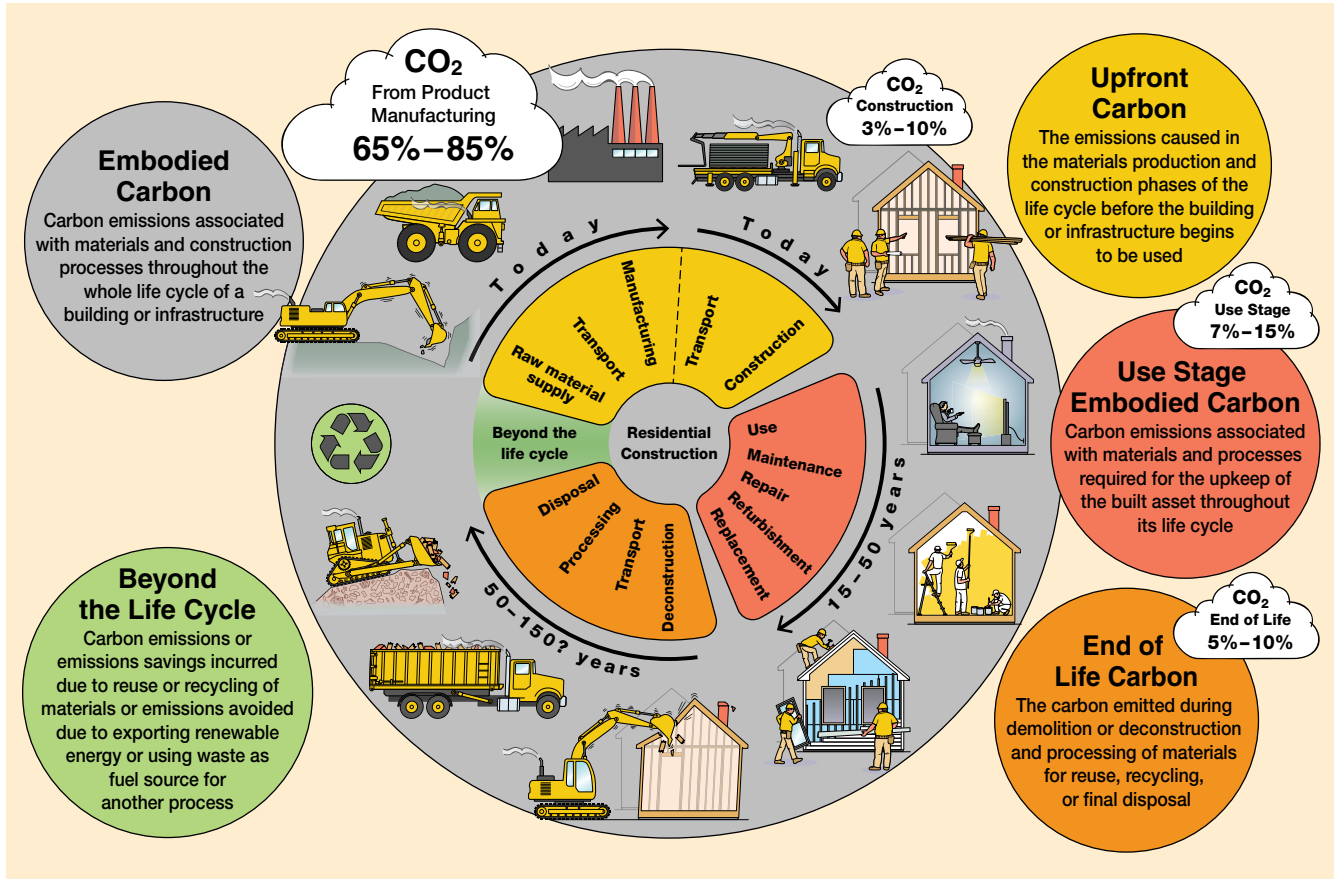


## SMALL TAPER, HUGE ADVANTAGE

Proven in the Pacific Northwest, its patented tapered edge holds the line on all four edges. A proprietary blend of resins and waxes blocks moisture, meaning sub-floors go down flat and stay that way. Engineered for strength, durability, overall performance, and backed by our 1-year no-sand guarantee, nothing can hold you back. **Specify Durastrand pointSIX sub-flooring for your next build.**

LEARN MORE AT [WESTFRASER.COM/OSB](http://WESTFRASER.COM/OSB)

# CLIMATE CRISIS



## Reducing Carbon A Builder's Guide to Carbon-Neutral Building Practices

BY CRAIG SAVAGE

As a custom homebuilder in North Idaho in 1978, I wasn't thinking about carbon, I was thinking about saving energy. To build my first superinsulated house, I used double, staggered 2x4 studwalls stuffed with fiberglass pink stuff and wrapped with newfangled plastic white stuff—Tyvek. Driven by skyrocketing fuel costs (sound familiar?), I was trying out innovative techniques and materials to make my houses energy efficient.

Some 40 years later, energy efficiency has become just one part of constructing green, resilient, and sustainable buildings, which the Environmental Protection Agency defines as "... creating structures ... that are environmentally responsible and resource-efficient throughout a building's life-cycle from siting to design, construc-

tion, operation, maintenance, renovation and deconstruction."

New building codes require tighter, better insulated buildings, which use less energy to heat and cool and, as a byproduct, put less CO<sub>2</sub> into the atmosphere. This category of CO<sub>2</sub> savings is referred to as "operational carbon."

Now, however, there's a growing awareness of reducing a second—many believe, more critical—type of CO<sub>2</sub> emissions known as "embodied carbon" or "upfront carbon," which consists of the total CO<sub>2</sub> emitted when we extract, manufacture, transport, and install all the materials that go into our buildings. (See "Carbon and the Carbon Cycle," page 37.)

What is eye-opening to those of us who have struggled to squeeze out every extra Btu through energy-efficient construction

Illustration adapted by Tim Healey from the World Green Building Council report "Bringing Embodied Carbon Upfront"

(as with Passive Houses, for example) is that the amount of embodied carbon in a new building is huge. In fact, the quantity of upfront carbon released into the atmosphere to construct even a zero-energy home can equate to more than 30 years of the CO<sub>2</sub> emitted (operational carbon) by using that house. So, builders striving to make a large and immediate reduction to CO<sub>2</sub> going into earth's atmosphere must find ways to lower the amount of embodied carbon going into their buildings. Looked at another way, construction material emissions are “today” emissions; they are released into the atmosphere even before the building is built. If our goal is to reduce emissions now, these are the emissions that are happening now.

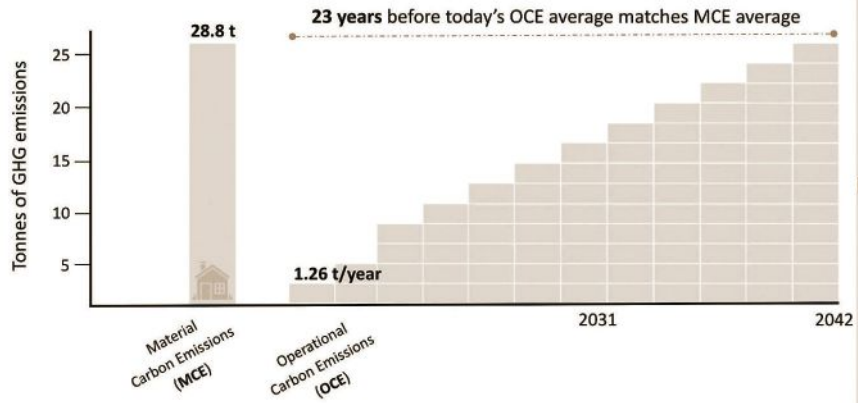
In this article, I'll look at design and material choices that designers, builders, and remodelers can use to reduce the amount of embodied carbon in both their new and remodeled buildings. I will also explore strategies that won't force you to abandon your favorite building systems such as SIPs, ICFs, or studwalls.

## KEY STRATEGIES

There are three key strategies to lower—to zero and even negative—the amount of embodied carbon in our buildings: reusing infrastructure, designing to minimize carbon emissions, and using lower-carbon materials. And since reducing upfront carbon is an additive process, you can use these approaches individually or in any combination to reduce a building's overall carbon footprint.

**Use existing infrastructure to lower embodied carbon.** When it comes to building with low embodied carbon, the best thing you can do is reuse a building or its parts. It may not be cheaper, but whole-building renovation and reuse have been calculated to save up to 75% of embodied carbon emissions compared with constructing a new building. This is because most embodied carbon resides in the foundation and the structure—especially if they are concrete and steel. By retaining those, that carbon is already accounted for.

If you cannot reuse the whole building, look to salvage and reuse its materials—brick, metals, broken concrete, and wood. Reclaimed materials, in general, have a much lower embodied-carbon footprint than new materials because the carbon to manufacture them has already been spent. Even the additional carbon impact of salvaging materials and making them fit for reuse is often lower than manufacturing new materials.



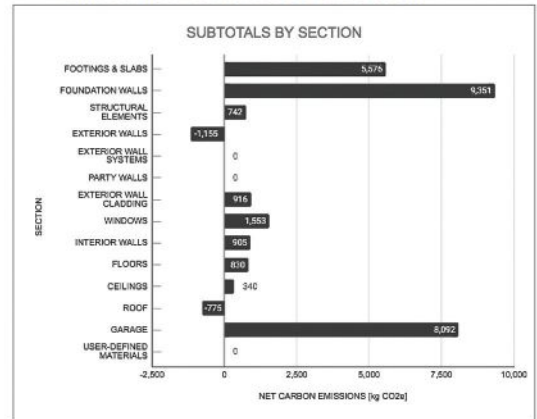
A study prepared by Builders for Climate Action examining the carbon emissions from homes built in two Canadian cities showed that it would take 23 years for the operational carbon emissions to reach the level of material carbon emitted during construction.



Scenario A - Lot 13-36

SECTION	NET CARBON EMISSIONS [kg CO <sub>2</sub> e]
FOOTINGS & SLABS	5,578
FOUNDATION WALLS	9,351
STRUCTURAL ELEMENTS	742
EXTERIOR WALLS	-1,155
EXTERIOR WALL SYSTEMS	0
PARTY WALLS	0
EXTERIOR WALL CLADDING	916
WINDOWS	1,553
INTERIOR WALLS	905
FLOORS	830
CEILINGS	340
ROOF	-775
GARAGE	8,092
USER-DEFINED MATERIALS	0
<b>NET TOTAL</b>	<b>26,376</b>
<b>NET TOTAL PER SQ. METRE</b>	<b>73</b>

EMBODIED CARBON BY SECTION



A sample calculation of the embodied carbon in various building components clearly shows that assemblies with concrete and steel account for the largest carbon emissions.

For example, not only does reclaimed wood siding save the energy that would have been spent cutting, transporting, and processing new siding, but the tree you didn't cut down is still doing the work of capturing and storing (sequestering) carbon. Another example is reusing broken-up concrete slabs for landscape, riprap, or even just backfill, which eliminates the (continued on page 38)

## CARBON AND THE CARBON CYCLE

The atomic element carbon is the main component of the earth's biological compounds and many of its minerals, including limestone. Limestone is significant because it's the raw material for most cement. To put that in perspective, global CO<sub>2</sub> emissions from cement production add up to approximately 829 million metric tons, accounting for about 3.4% of global CO<sub>2</sub> emissions from fossil-fuel combustion and cement production.

The carbon cycle is the sequence of events describing the movement of carbon as it is continually cycled throughout earth's biosphere and includes the process of carbon storing (sequestration) in "carbon sinks" and the subsequent release of that carbon as the cycle repeats.

Here's how carbon cycles, in the form of CO<sub>2</sub>, when first captured in a tree, then turned into lumber, and finally back to CO<sub>2</sub> in the atmosphere: Once a tree seed germinates, it begins to capture and process the CO<sub>2</sub> in our atmosphere. Using the energy of the sun, along with water and other minerals and elements, the plant assembles various proteins into the parts of a tree—roots, bark, leaves, branches, trunk, and so forth. Through the years, the tree captures and stores (sequesters) significant amounts of CO<sub>2</sub> from the air. According to the U.S. Energy Information Administration, one silver maple tree will sequester about 400 pounds of CO<sub>2</sub> in 25 years.

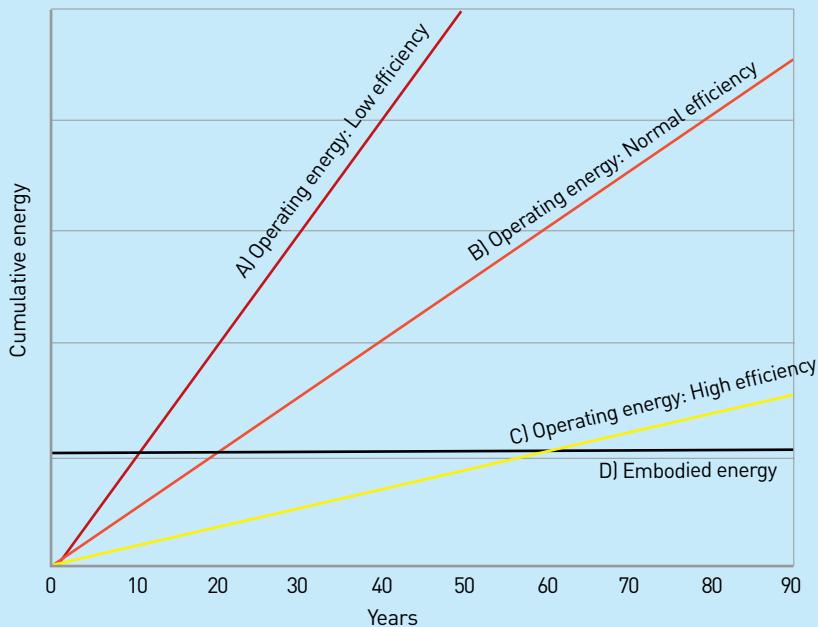
If the tree is burned, perhaps as pellets to heat a house, the CO<sub>2</sub> is returned to the atmosphere immediately—or its stored CO<sub>2</sub> could be returned over time if the tree dies and

rots. Alternatively, if we process the tree into lumber and account for the energy expended in cutting, hauling, and milling (its embodied energy), much of the CO<sub>2</sub> remains captured in the lumber (scientists are still trying to quantify the CO<sub>2</sub> left behind in roots and slash). That CO<sub>2</sub> is released only when the building is burned, demolished, put in a landfill, or simply left to deteriorate. You probably notice that stored CO<sub>2</sub> in the lumber (or hemp, bamboo, rice stalks, cellulose, and the like) is only for the life of the structure; ultimately, the carbon is released and the cycle repeats—as it has for millions of years.

**So why do we care about stored carbon?** For years, buildings were leaky and energy was dirty, resulting in massive amounts of CO<sub>2</sub> being released into the atmosphere to heat, cool, and operate them. As we tighten up and insulate the building envelope, and heat, cool, and run buildings with clean, renewable energy (decarbonized energy), the amount of operational energy gets much smaller relative to the upfront, or embodied, energy, which becomes significantly more important (see chart, below).

Our goal is to put embodied carbon into storage, not into the atmosphere, even if only for the life of a building (or longer if we can reuse, recycle, or otherwise extend the building life). This helps to lower the CO<sub>2</sub> going into the atmosphere and to keep the resulting heat from CO<sub>2</sub>'s greenhouse effect within survivable human limits, hopefully until other mitigating efforts can come into play. —C.S.

### Changing Energy Use in Buildings



As buildings become more efficient, the amount of energy needed to operate them falls. The more efficient buildings become, the more operational energy approaches the energy embodied in the manufacturing of the building materials. Energy is often seen as a proxy for carbon emissions—a comparison that is fairly accurate when the majority of energy comes from fossil fuels. As more energy is decarbonized (generated from non-fossil-fuel sources) the reduction of operational carbon will accelerate, and embodied carbon will become the dominant source of carbon emissions from buildings. This is what Canadian architect and educator Lloyd Alter calls "the ironclad rule of carbon."



If a house is built on a structural slab, consider finishing the slab surface (1) to avoid introducing yet more materials into the home. Montreal-based Carbicrete has developed a process for producing structural concrete products with steel slag instead of with carbon-intensive cement (2).

(continued from page 36) carbon that would have been emitted hauling and dumping the waste, as well as saving money on fees.

**Lower embodied carbon by design.** From the start, building designs should aim for low-carbon, carbon-neutral, or even negative-carbon outcomes. Stated simply, your design should incorporate materials with the least embodied carbon, and a significant reduction in upfront carbon can be made by reducing the amounts and changing the makeup of three materials: concrete, insulation, and cladding/interior surfaces—in that order.

Since most of the embodied carbon is in the structural components, the design should strive to achieve maximum structural efficiency. One example is to use optimum value engineered (“advanced”) wood framing, which saves wood, money, and embodied carbon.

In addition, designs should strive to minimize waste. Perhaps your residential designs already incorporate 2-foot modular layout using common materials like 4x8 plywood, 12-foot drywall, and precut structural members. Sam Rashkin, architect for the Department of Energy Building America program, cleverly suggests adjusting the roof pitch so that roof rafters can be sized to use standard lumber lengths to eliminate waste. A centralized subpanel might reduce copper runs. Kitchens and baths can be grouped near each other and water heaters placed nearby to reduce piping and heat loss through plumbing runs (see “Architectural Compactness and Hot-Water Delivery” by Gary Klein, Jan/20). Split HVAC systems can replace steel ducting with a much smaller volume of copper and reduce the heat losses associated with ducts.

Designing a building so it can easily be remodeled—future-proofing—can lower the carbon footprint of a building over time. For instance, designers can incorporate clear spans in their plans so spaces can later be reconfigured by moving nonbearing walls with-

out significant demolition, effort, and waste. And using structural components such as modular wood interior wall panels that are screwed in place and can easily be taken apart and used again can guarantee a longer building life and fewer future emissions.

While the building envelope is critical for the energy performance of the building, the façade and roof are more expendable. These building elements are under constant assault from rain, snow, ice, and sun, and necessarily need repeated maintenance and repairs. The use of durable, local materials not only reduces the cost and frequency of repair but also reduces the use of material replacement and its associated carbon footprint.

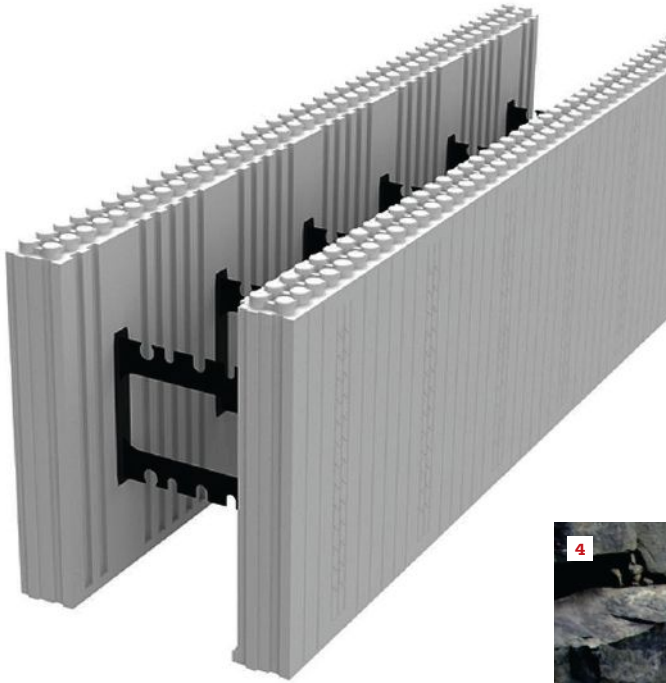
**Select low- or negative-carbon materials.** Four material categories contribute substantially to a typical residential building’s carbon footprint: concrete (35.5%), insulation (15.3%), cladding (12.5%), and interior surfaces including flooring, wall and ceiling materials (12.2%). When deciding on materials, you want to choose low-carbon or even negative-carbon alternatives. Replacing steel or concrete in the structure with wood or using wood cladding instead of cement or vinyl can reduce the embodied carbon in your project.

When choosing materials with low embodied carbon, you’ll often encounter conflicting claims, because the science continues to evolve and because some manufacturers “greenwash” their product’s carbon footprint. To understand a product’s impact from a life-cycle perspective, we now have Environmental Product Declarations (EPDs)—documents that transparently report objective, comparable, third-party-verified data about products and services.

However, EPDs for an entire project can be hard to find and overwhelming to a designer or builder who wants to build with a low carbon footprint but also wants to get on with the job. Fortunately, there is an increasingly wide range of software tools and strategies

Photos: 1. Hard Rock Concrete Castings; 2. Carbicrete

3



Insulated concrete form (ICF) blocks inherently make efficient use of concrete. The ICFs from Logix (3) are made with a low-carbon foam developed by BASF. Those from Nexcem (4) are made with cement-bonded wood waste. Instead of carbon-intensive steel rebar, consider fiberglass reinforcing, such as Owens Corning’s Pinkbar Fiberglass rebar (5).

available to help in design and material decisions. BEAM, EC3, One Click LCA Planetary, and EC Calculator are a few. In writing this article, I chose BEAM and will discuss it below.

Also, try to use materials with high recycled content, especially metals. The carbon footprint of virgin steel, for example, is five times greater than that of high-recycled-content steel. Again, this is because the impact from raw material extraction is accounted for only the first time that material is processed. Subsequently, the recycled material includes only the reprocessing impacts.

You can also use fewer finish materials. One way is to showcase structural materials as finish. Using polished concrete slabs as a finished floor saves the embodied carbon from carpet, tile, or vinyl flooring, not to mention noxious and toxic adhesives and coatings. Finishes may help with the acoustics and thermal conditions inside living spaces. Yet, they have short lifespans due to wear and trends in fashion. The additive consequence of replacing these elements numerous times over the life of a building can have a measurable

impact. So, finishes should include low-carbon materials and allow for the easy recovery of those materials for recycling or reuse.

**Negative carbon.** In some cases, it’s possible to select materials that not only have a low carbon footprint but that also remove and store carbon from the atmosphere, a process known as carbon sequestering. For instance, some concrete mixes actually absorb and store small amounts of carbon. Others add CO<sub>2</sub> captured in other industrial processes (such as capturing CO<sub>2</sub> in coal-fired power plants) into the mix.

Our buildings can also be designed to remove and store embodied carbon, becoming carbon “sinks” that can help reverse the accumulation of the CO<sub>2</sub> catastrophically warming the planet. In their book, *Build Beyond Zero: New Ideas for Carbon-Smart Architecture* (Island Press, 2022), from which I borrowed many of the ideas presented here, Bruce King and Chris Magwood re-envision buildings as one of our most practical and affordable climate solutions.

Using materials made from what today is considered “agricultural

Photos: 3, Logix Brands; 4, Nexcem; 5, Owens Corning



A range of low-carbon building materials: structural straw panels made by New Frameworks of Burlington, Vt. (6); Neopor low-carbon rigid foam panels from BASF (7); EcoCocon straw wall system from Build With Nature (8); hemp insulation from Nature Fibres (9).



waste”—products such as wheat or rice stalks that are commonly burned—can make a big impact on a project’s carbon footprint because they sequester carbon that would otherwise go into the atmosphere as methane when they’re allowed to rot, or as CO<sub>2</sub> when burned to make electricity. Wood may be the first material to come to mind, but other options include straw or hemp-based materials, say for insulation, which—unlike wood—not only store carbon but are annually renewable. And cellulose insulation, which has been successfully used for decades, is a no-brainer choice, with its negative carbon footprint.

## SPECIFIC MATERIALS OVERVIEW

In this next section, we’ll take a brief look at concrete, steel, and insulation materials from an embodied-carbon viewpoint.

**Concrete.** For all the benefits of concrete, the “moldable rock” used since it was invented by the Romans, it must be the primary

target in our efforts to lower embodied CO<sub>2</sub>. Worldwide, the cement sector represents about 7% of CO<sub>2</sub> emissions. In most cases, concrete is the biggest source of embodied carbon in virtually any new building project—representing 20% to 50% of the total material carbon emissions (MCE) for a low-rise building. The good news is that there are a growing number of ways, both in design and material composition, to lower concrete’s impact on a project’s total upfront carbon.

For one: Use less. Engineers love safety margins when designing, so if you make them aware of the impact concrete has on a project’s carbon footprint, they may, for example, be able to specify smaller footings, or recommend alternative foundation systems, such as concrete piers, steel helical piers, treated posts, or just thinner stem walls. Also, the strength of concrete is largely a factor of the amount of cement in the mix. A 6-sack mix may be needed for a foundation spread footing, but is it needed for a 4-inch-thick

Photos: 6, New Frameworks; 7, BASF; 8, Build With Nature; 9, Nature Fibres

SPRAY POLYURETHANE FOAM – CLOSED CELL					
Spray polyurethane foam - Closed Cell (HFC gas) / R 6.6/inch / SPFA [Industry Avg   US & CA]	100.0 ft <sup>2</sup>	100%	FALSE	409	
Spray polyurethane foam - Closed Cell (HFO gas) / Huntsman / Heatlok Soya HFO & Heatlok HFO / R 6.5/inch	100.0 ft <sup>2</sup>	100%	FALSE	78	
SPRAY POLYURETHANE FOAM – OPEN CELL					
Spray polyurethane foam - Open Cell / R 4.1/inch / SPFA [Industry Avg   US & CA]	100.0 ft <sup>2</sup>	100%	FALSE	44	
SHEEP WOOL INSULATION					
Wool / Havelok Wool / Loose-fill / R 4.4/inch	100.0 ft <sup>2</sup>	100%	FALSE	24	
Wool / Havelok Wool / Batts / R 3.6/inch	100.0 ft <sup>2</sup>	100%	FALSE	31	
MINERAL WOOL BATT INSULATION					
Mineral wool batt / [BEAM Avg]	100.0 ft <sup>2</sup>	100%	FALSE	53	
MINERAL WOOL LOOSE FILL INSULATION					
Mineral wool loose fill / NAIMA / R 3/inch [Industry Avg   N.America]	100.0 ft <sup>2</sup>	100%	FALSE	48	
FIBERGLASS LOOSE FILL INSULATION					
Fiberglass loose fill / ~R2.6/inch [BEAM Avg]	100.0 ft <sup>2</sup>	100%	FALSE	31	
FIBERGLASS BATT INSULATION					
Fiberglass batt / R 3.6/inch [BEAM Avg]	100.0 ft <sup>2</sup>	100%	FALSE	21	
HEMP FIBER WOOL INSULATION					
Hemp fiber batt / NaturFibre / Hemp Wool / R 3.7/inch	100.0 ft <sup>2</sup>	100%	FALSE	-17	
CELLULOSE INSULATION					
Cellulose / loose fill / R 3.7/inch / CIMA [Industry Avg   US & CA]	100.0 ft <sup>2</sup>	100%	FALSE	-33	
Cellulose / dense pack / R 3.7/inch / CIMA [Industry Avg   US & CA]	100.0 ft <sup>2</sup>	100%	FALSE	-66	
WOOD FIBER INSULATION					
Wood fiber batt / [BEAM Avg   EU]	100.0 ft <sup>2</sup>	100%	FALSE	-76	
Wood fiber batt / Pavatex / Pavaflex / R 3.8/inch [EU]	100.0 ft <sup>2</sup>	100%	FALSE	-87	
HEMPCRETE INSULATION					
Hemcrete / Cast in-situ / USA / R 2.1/inch, Avg. mix using NHL & PHL	100.0 ft <sup>2</sup>	100%	FALSE	-93	
Hemcrete / Cast in-situ / IsoHemp / Europe / R 2.1/inch	100.0 ft <sup>2</sup>	100%	FALSE	-187	
STRAW BALE INSULATION					
Straw Bale / Wheat & barley straw / SNaB (UK) / R 2.8/inch	100.0 ft <sup>2</sup>	100%	FALSE	-167	
Straw Bale / Wheat & rye straw / (Germany) / R 2.8/inch	100.0 ft <sup>2</sup>	100%	FALSE	-238	

A BEAM calculation of the embodied carbon in insulation materials reveals a wide range of variability, from a high of +409 with carbon-intensive closed-cell spray foam to a low of -238 with carbon-sequestering straw bales.

sidewalk? For that matter, will 3 inches work instead of 4 inches?

Try using the knowledge of your concrete supplier; it often can specify low-carbon mixes that use additives such as fly ash, slag, calcined clays, or polymer fibers. The cement industry realizes the impact its product has on the environment and is making an effort to come up with lower embodied-carbon solutions. And newer substitutes such as hemcrete and carbon-neutral CMU block can work in many applications. Carbicrete of Montreal, with funding from the Quebec government, has developed a method of making concrete without cement by replacing it with a by-product of steel production, steel slag.

**Steel.** The steel used to reinforce concrete is also a huge contributor to a building's carbon footprint. Of course, concrete needs some-

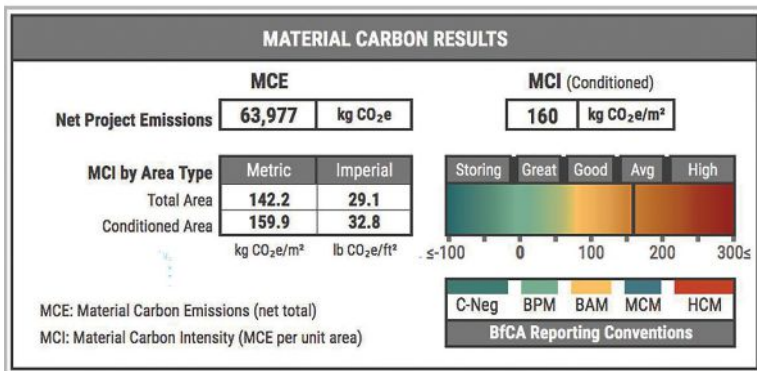
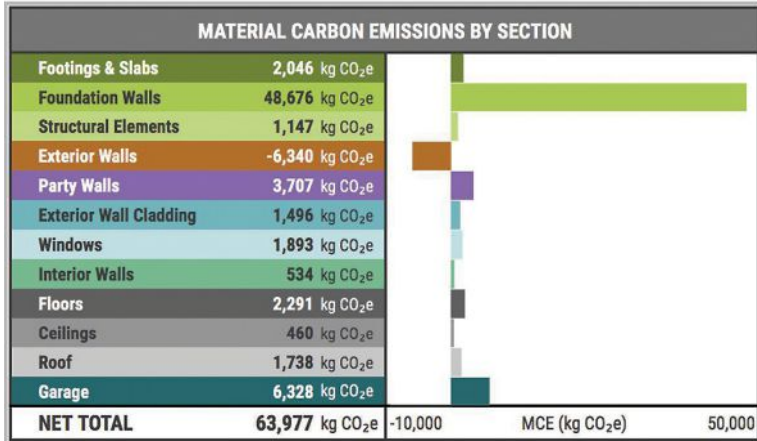
thing to give it tensile strength. One alternative is to use rebar made from recycled steel. An even better alternative is to use fiberglass rebar, which has been around for several years but is only now getting attention as a sustainable choice. As a steel replacement, fiberglass rebar weighs less, costs less to ship, and even allows the use of unwashed sand and salt water in the mix because corrosion and subsequent spalling is no longer a problem. And there are many fiber additives that strengthen concrete. Again, your ready-mix supplier probably can provide low-carbon mixes—just ask.

**Insulated concrete forms (ICFs).** For those builders who do not want to abandon the many positive benefits of ICFs, fiberglass rebar and fly-ash-enhanced cement can reduce the carbon content in what is a relatively high-embodied-carbon building-envelope system. ICFs such as Logix Platinum Series, which uses BASF Neopor low-carbon-content foam, can also reduce a project's carbon footprint. And concrete form blocks, such as Nexcem, made with wood chips or other natural fibrous materials, eliminate high-carbon foam while offering a comparable resilient, energy-efficient building system.

**Structural insulated panels.** If you are a committed SIP builder, and I'm one of them, you have a growing number of options to reduce the amount of embodied carbon in the structural insulated panel. A SIP is a composite sandwich composed of two skins laminated to an insulative "spacer," typically 4 to 6 inches of expanded polystyrene (EPS) or extruded polystyrene (XPS).

OSB is the most common skin material, but there are lower-embodied-carbon substitutes for OSB including "boards" made of compressed straw stalks of wheat or rice or other agricultural carbon-sequestering "waste" material. Cementitious materials such as magnesium oxide (MgO) boards are being used as skins, and although they may have comparable carbon footprints to OSB, their moisture, fire, mold, and insect resistance can allow wall assemblies to eliminate additional layers—such as WRB, cladding, and gypsum drywall—and thereby lower the overall carbon footprint. Neopor with lower carbon can be substituted for EPS or XPS, which unfortunately have high carbon footprints. Other panels are available, such as Straw Bale SIP Walls by NatureBuilt, which have 1-inch-thick cement- and lime-plaster skins and straw filler between.

**Wood framing.** If you traditionally frame using 2x4, 2x6, or larger stud- or timber-framed walls, you are already on a path to a lower-carbon-footprint building. "Wood is good" because the material takes significantly less processing energy to extract, transport, and process (mill and kiln dry). And the carbon in the lumber, cladding, flooring, and so on is stored (sequestered) until the wood burns or decays—which returns the carbon to the atmosphere. However, the complete carbon cycle isn't as clear cut and dried (pun intended) as it looks, since there are consequences to removing trees that could still be capturing carbon if left in the forest, and it's not clear how the roots



With BEAM, you can compare the material carbon embodied in different building assemblies for a project (top) and see the results for the whole building (above).

of cut trees and branches and slash contribute to atmospheric carbon.

Of course, you can simply use less wood by using advanced “optimum value engineering” (OVE, also commonly called “advanced framing”): 24-inch-on-center stud spacing, single top plates, box headers, and other wood- (read: carbon- and money-) saving tactics.

**Insulation.** There is a marked difference between glass-fiber materials or petrochemical-based materials, such as closed-cell spray polyurethane foam at 409 kg CO<sub>2</sub> net emissions, and bio-based products that store carbon. Some bio-based materials can contain more atmospheric carbon in the physical substance (that gets stored and therefore not emitted to the atmosphere) than was emitted in producing the material. For instance, cellulose is carbon negative at -66 kg CO<sub>2</sub>; hempcrete at -187 kg CO<sub>2</sub>; and straw bale with a whopping -238 kg CO<sub>2</sub> net emissions.

## BEAM CARBON CALCULATOR

As mentioned earlier, there are several software tools available to help designers and builders calculate the amount of embodied

carbon in the materials, assemblies, and buildings they build. But as a builder who wants to spend time building, I want a tool that I can use out of the box without a large learning curve. BEAM, which stands for Building Emissions Accounting for Materials, is a user-friendly, climate-science- and methodology-based software tool, built by a team at Builders for Climate Action.

You can get a free copy or make a donation to the Builders for Climate Action website ([buildersforclimateaction.org/beam-estimator](http://buildersforclimateaction.org/beam-estimator)) and log in to use the BEAM Estimator. The tool is a sophisticated Google Docs online spreadsheet that is, relative to other calculating tools, simple to use, especially for builders because it’s based on 12 construction categories: footings and slabs, foundation walls, structural elements, and so on up to the roof.

With BEAM, you can compare embodied carbon in materials, such as different types of insulation (see screenshot of chart on page 41); you can build assemblies and compare them (see sample at left, top); and you can compare whole buildings built with different materials (see sample of results for one building at left, bottom).

BEAM has a concise user guide to help you get started and comes preloaded with all the residential EPD data the creators could locate, and they continue to add more as it becomes available, which is a good reason to donate. You can toggle between metric and imperial measurements, a huge relief for U.S. builders unfamiliar with metric measurements like kilogram per square meter.

You will need to have a good understanding of building design and construction to navigate the assembly sections and make appropriate selections. Within each assembly section are categories of materials that will be appropriate for your project and likely many that will not be. It is up to you to build assemblies that are feasible and meet all the energy-performance and legal requirements for your project. BEAM doesn’t provide any warnings or suggestions about appropriate selections.

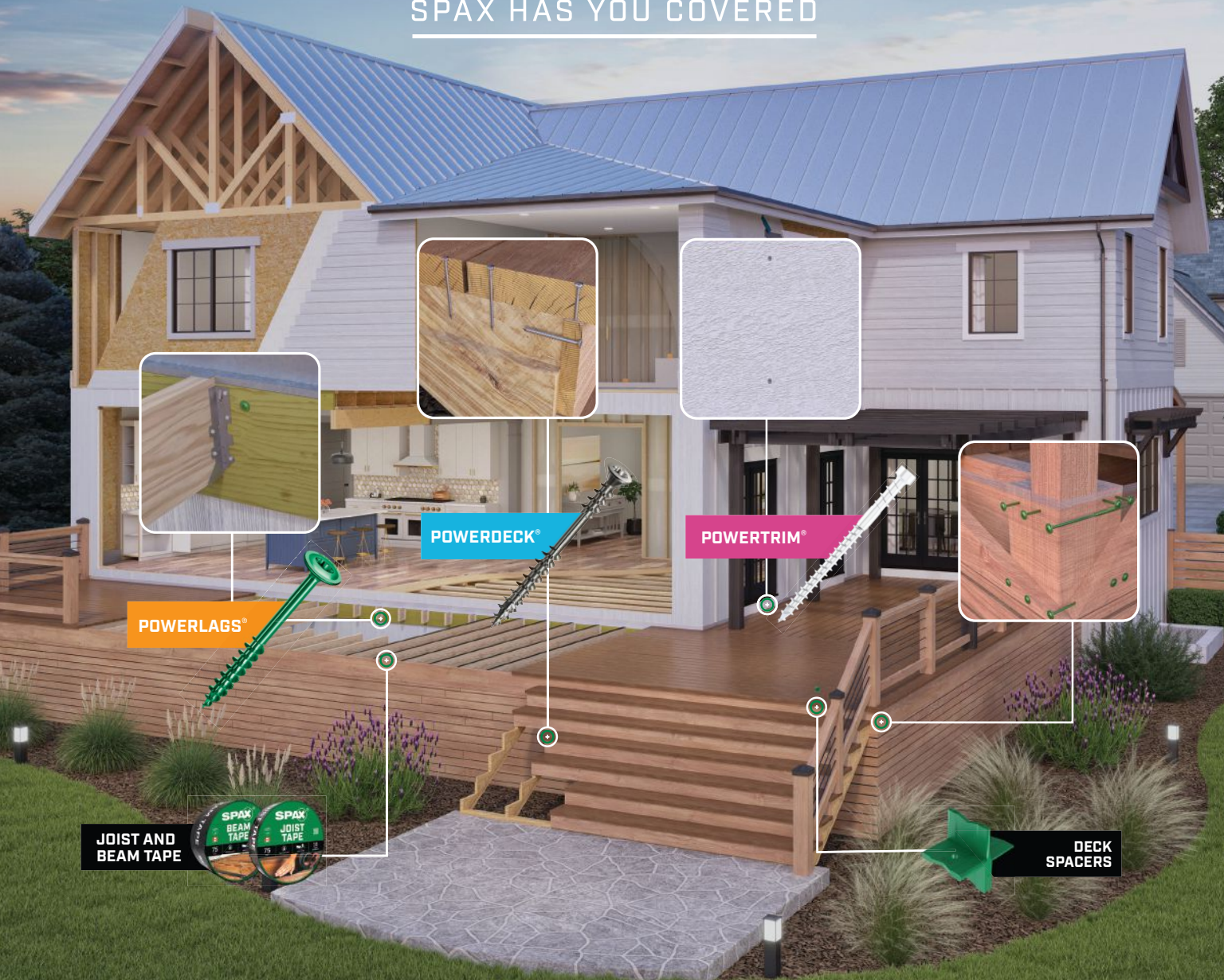
It’s worth noting that BEAM Estimator is a work in progress; nevertheless, the results are the best results possible given the current state of Life Cycle Analysis. Data in EPDs and the resulting outcomes are not 100% accurate numbers, so users should view them as guides to their selections of low-carbon materials. But as the authors make clear, especially for the three largest carbon-footprint categories of materials, reducing material amounts or making lower upfront carbon substitutions is more important than a few percentage points of error. Saving carbon now is much more critical than saving carbon over the next 30 years.

*Craig Savage, a former senior editor and publisher of JLC, is currently in charge of building technology and innovation at Cypress Community Development Corp., a not-for-profit housing corporation specializing in innovative housing solutions for disaster rebuilding and workforce housing.*

EVERYTHING FOR THE DECK  
BUT  THE

# LUMBER

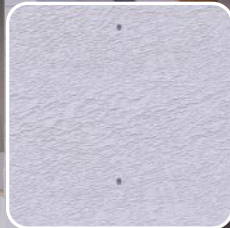
SPAX HAS YOU COVERED



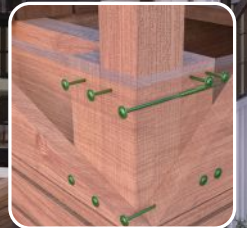
POWERLAGS®



POWERDECK®



POWERTRIM®



DECK  
SPACERS



JOIST AND  
BEAM TAPE

# Manufactured stone that **SHIPS IN DAYS**



Robust manufacturing and fast fulfillment allow ProVia to ship our stone in days, not weeks or months. So you can take delivery, install, and move on to the next job quickly. **No long lead times, no work delays, and no disruption to your schedule.**



DOORS | WINDOWS  
SIDING | STONE | ROOFING

To learn more, visit  
[provia.com/ships-in-days](https://provia.com/ships-in-days)

BY VINCENT SALANDRO



### 1. Workstation Sink

Ruvati's epiStage sink, made from 80% crushed granite and proprietary resins, is a durable, nonporous surface with the look of natural stone. Available in 30- and 33-inch widths with a 9-inch-deep single basin, sinks can be installed with top or undermount designs. Integrated ledges allow workstation accessories to slide into place—the sink comes with a solid composite cutting board, a folding drying rack with stainless steel bars, and a food-safe silicone grid; other accessories are sold separately. Retail price for a 33-inch-wide model is about \$500. [ruvati.com](http://ruvati.com)



### 2. Lightweight Aluminum Swinging Door

Counter swing doors from Midland Door Solutions are made with a lightweight, durable aluminum frame and laminated or tempered glass options. The factory-assembled door includes a mounting frame for simplified installation and an electric, 24-volt actuator for optimal lift. Customers can select from a variety of size and color options. [midlanddoorsolutions.com](http://midlanddoorsolutions.com)



### 3. Acrylic Exterior Latex Paint

Aura Exterior from Benjamin Moore is a 100% acrylic exterior latex paint that allows low temperature application down to 35°F. The manufacturer says its proprietary “color lock technology” delivers color depth, fade resistance, and reduced chalking, while the product's acrylic resin resists film formation, UV, and fading and provides superior gloss retention. Available in four finishes and a catalog of color options, Aura Exterior retails for about \$80 to \$100 per gallon. [benjaminmoore.com/en-us](http://benjaminmoore.com/en-us)



### 4. Ladder Stabilizer

The Ladder-Lock is a ladder conversion kit designed to increase user safety by improving an extension ladder's stability. Compatible with most 16- to 24-foot extension ladders with hollow rungs, the Ladder-Lock features two adjustable legs that connect at the ladder midpoint, and two adjustable arms that anchor to the ladder's lowest rung. Aluminum rods can be inserted through the hollow rungs of both sets of legs and braces, generating a sturdy base capable of bearing loads over 450 pounds. Kits will be available in December for about \$400. [ladder-lock.net](http://ladder-lock.net)

## Products

### 5. Steel Roof Support Brace

TrussBrace supports from FastenMaster provide both lateral and diagonal restraint. They are designed to be left in place, allowing framers to set, space, and brace roof trusses in a single step. According to FastenMaster, the design allows for easy web-member bracing and roof-sheathing application, and the product increases jobsite safety since framers can install it by walking along the bottom chord. The retail price for a box of 30 TrussBrace units is about \$185. [fastenmaster.com](http://fastenmaster.com)



### 6. Enhanced Wood Stain Formula

Nova USA Wood Products says that it has enhanced the color retention of its ExoShield Wood Stains. The improved formulation includes proprietary polymerized oil resins as well as the highest amount of UV blockers that can be added while allowing the formula to stay in suspension. The combination of the new resins with the manufacturer's blend of tung oil, UV blockers, fungicide, and trans-oxide pigments is designed to provide long-lasting results with superior penetration. Available in six colors and a clear finish, a gallon retails for \$125. [novausawood.com](http://novausawood.com)



### 7. Extra-Clearance Dryer Vent

Designed for venting a dryer through the roof, the extra-clearance DryerJack 486 is manufactured with heavy-gauge Galvalume steel like the original model 477, but is taller for use with higher-profile tile or in moderate snowfall zones. The hood's wide opening, protected from water intrusion by a curved damper, enables efficient airflow, according to the manufacturer. A removable access door facilitates duct cleaning, and a flange with nail holes helps speed installation. DryerJacks are optimally designed for a roof pitch between 3/12 and 12/12, the manufacturer says. [dryerjack.com](http://dryerjack.com)



### 8. Geometric Brass Faucet

Isenberg's Satin Brass matte finish in the Serie 260 Collection of faucets and fixtures helps to make watermarks and fingerprints less apparent. The fixtures, crafted from solid premium brass, offer a contemporary look with a juxtaposition of hard and soft, and the faucets are characterized by a rounded base and a flat panel on the spout. [isenbergfaucets.com](http://isenbergfaucets.com)





### 9. Smart Ventilation Solutions

Dacor's new ventilation hoods include sensors that automatically activate a four-speed fan based on temperature and smoke production. Fan speed and timers can be controlled from a glass control panel or remotely from a smart device. The Hood Liner (pictured; a 30-inch model costs \$1,500) has a silver stainless finish, while the Pro-Canopy Wall Hood, Chimney Wall Hood, and Island Hood are also available in a graphite stainless finish. The units' integral LED lighting is more energy efficient than standard halogen lighting, according to Dacor. [dacor.com/us](http://dacor.com/us)



### 10. Breathable, Warm-Weather Workwear

Helly Hansen's BRZ workwear is designed for use in warmer months, with breathability and temperature regulation in mind. Pants are constructed with a lightweight fabric weighing less than 250 grams, and have a zipper down the outside of the leg to provide ventilation. The men's Chelsea Evolution BRZ Collection, which retails for \$170, features a four-way stretch fabric, Cordura reinforcement on the knees, and kneepad pockets. [hhworkwear.com](http://hhworkwear.com)



### 11. Mass-Timber Fasteners

Simpson Strong-Tie's expanded line of Strong-Drive premium screws provides fastening solutions for the construction and repair of mass-timber assemblies and structures. The family of yellow-zinc-coated, 10-millimeter screws includes a selection of countersinking fasteners with fully or partially threaded shanks, and cylinder or flat heads. According to the manufacturer, its mass-timber fasteners and connectors are ideal for CLT construction. [strongtie.com](http://strongtie.com)



### 12. Insulating Flooring Underlayment

QuietBoard recycled acoustical and insulating fiber board from MP Global Products is engineered to provide support for luxury vinyl plank and tile, laminate, wood, and carpet. The manufacturer says that the underlayment's dense construction both reduces impact noise and provides insulative value. The manufacturer also says that the underlayment is suitable for use over concrete, as the antimicrobial-treated fibers can absorb moisture, while an integrated metallicized film barrier acts as a moisture barrier protecting the overlying flooring. [mpglobalproducts.com](http://mpglobalproducts.com)



# All-in-One Solution: Storm and Entry Door System

New from Therma-Tru, in partnership with LARSON.

Therma-Tru and LARSON have combined 120+ years of innovation and market-leading solutions to deliver high-quality products you can trust.

Therma-Tru, in partnership with LARSON, is introducing the first door system of its kind in the market.\* Engineered to work together, the Impressions integrated storm and entry door system takes the guesswork out of finding the right storm door for your project. So you can provide an on-trend aesthetic and protection against the elements, all in one.

Here's how you can add the integrated system to any home:

1. Have the homeowner select a Therma-Tru entry door\*\* that complements the home's architectural style.
2. Then, select a coordinating or contrasting Impressions storm door color.
3. For the full-lite aluminum storm door, you can choose Low-E glass, offering lower solar heat gain between the storm door and entry door, or clear-glass options.
4. Select Therma-Tru lever-style MPLS handlesets that pair with the QuickFit hardware.\*\*\* Both feature on-trend designs and finishes.
5. Seamlessly install both doors at the same time with the composite brickmould and aluminum storm door panel that comes standard with the system. For extra protection from rotting, you can also add a composite frame with Tru-Guard composite technology.



The system comes complete with an interchangeable screen, so homeowners can enjoy a fresh breeze while keeping pets and kids safely inside – and insects and debris out. The storm door features a

modern profile with mitered corners for a sleek look that emphasizes the beauty of the entry door.

One integrated system simplifies what you need to order and makes it easy to install at the jobsite. Convenient features like the concealed hinges with retractable pins and the revolutionary hidden closer with LARSON Click&Hold™ technology enable a quick and intuitive setup. After installing the entry door, you can complete the job in just a few simple steps. ■

\*Patent pending.

\*\*Compatible with most 6'8" single-entry Therma-Tru doors.

\*\*\*Not suitable for use with Therma-Tru grip-style handlesets.

©2022 Therma-Tru Corp. All rights reserved. All trademarks and images featured are owned by their respective company and used with permission. Registered trademarks are registered in the U.S. and may be registered internationally. Therma-Tru Corp. and Larson Manufacturing Company are part of Fortune Brands Home & Security, Inc. — an industry-leading home and security products company.

©2022 Larson Manufacturing Company. All rights reserved. LARSON is a trademark of Larson Manufacturing Company. Therma-Tru Corp. and Larson Manufacturing Company are part of Fortune Brands Home & Security, Inc. — an industry-leading home and security products company.

Explore the new integrated system at [thermatru.com/impressionsjlc](https://thermatru.com/impressionsjlc).

## Weigh In!

Want to test a new tool or share a tool-related testimonial, gripe, or technique? Contact us at [jlctools@zondahome.com](mailto:jlctools@zondahome.com).



# TOOLS OF THE TRADE

## Skateplate and Skateguide Circular Saw Guides

BY RICK ARNOLD

**The Skateplate and Skateguide** are actually two products that are packaged as one. Together, they allow a circular saw to make perfectly straight and repeatable cuts (cross or rip) on pretty much any type of construction lumber.

**Skateplate.** The Skateplate is a base plate with wide rollers near the front and rear that fits directly onto the base plate of many different brands and models of saws. There are two versions, one for sidewinders and one for wormdrives. Initially, it took me less than five minutes to attach a Skateplate to my sidewinder. The second time, it took me about 15 seconds to mount or remove the plate from my saw. The time frame for mounting the Skateplate to my wormdrive was about the same.

The Skateplate alters the saw by raising the bottom of its plate off the workpiece, preventing the saw from marring it. Since the rollers are wide and precisely integrated into the plate, they help keep the saw oriented in a straight line as it's pushed. The rollers also reduce the friction between the workpiece and the saw, so you need to apply less force to move the saw, which translates into better overall control.

**Skateguide.** The Skateguide is similar to the basic rip guide that often accompanies a new saw, but is much better. Like the Skateplate, the Skateguide has integrated rollers along its guiding edge. These rollers allow the guide to move smoothly and effortlessly along the edge of the work, again reducing friction and allowing much better control than a standard guide. The Skateguide slides into the Skateplate, and a thumb screw locks it at the desired setting for the width of the cut.

The Skateguide packaged with the Skateplate combo pack (\$80) has a 17-inch bar and a four-roller head that is about 5 inches wide. There's also an optional Skateguide-Zilla (\$73) with a 34-inch bar and

a larger, 10-roller head. The bars and roller heads are interchangeable.

**In use.** To test the guide and plate, I made crosscuts and rip cuts in different thicknesses of sheathing as well as in some 2-by stock using both the 5-inch and 8-inch roller heads, as well as the two different length bars that the roller heads attach to. The shorter bar allowed for up to about a 13-inch rip on both saws, depending on which side I fed the guide into the plate. With the longer bar, I could easily rip a 4-foot-wide sheet of plywood in half.

The longer guide bar with the wider, 10-roller head provides excellent control of the saw. I used the smaller head on the shorter guide and had no problem with the shorter rips. Using the wider head with the shorter bar would be helpful for budding carpenters.

When I tried ripping 1/4-inch-thick sheet stock, the rollers dropped below the edge of the panel, which rendered them useless. But I found that by moving the head up to

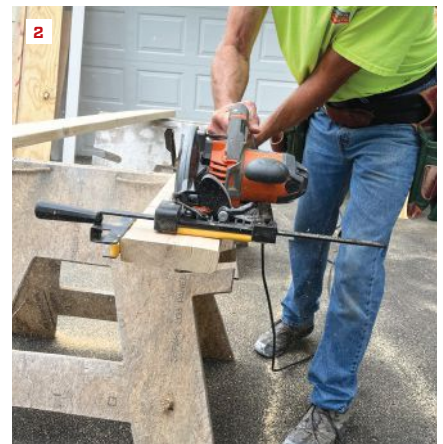
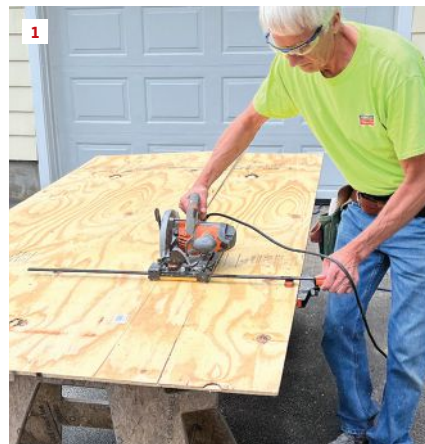
the holes in the bar used for the handle, the rollers worked fine. I'm not sure if the guide was designed for that, but it worked.

All of the narrower rips, as well as a few cuts ripping 2x6s in half, were easily controlled with one hand on the saw. And when I ripped a sheet of PVC, there were no plate marks trailing behind the saw along the cut, as is always the case with an aluminum or dirty base plate.

The Skateplate is made from high-impact nylon and the polyurethane rollers are attached with high-quality bearings and stainless steel. I had two inadvertent drop tests with no consequences.

After working with the Skateguide and Skateplate on a few jobs, I can say that they have rightfully earned some real estate in my construction trailer, especially since now I won't need to lug my table saw around quite so often. [skateplate.com](http://skateplate.com)

*Rick Arnold is a veteran builder, an author, and a frequent presenter at JLC Live.*



The Skateplate's wide rollers reduce friction and improve accuracy. Rips to the center of a sheet of plywood are possible when a Skateplate is fitted with the optional 10-roller Skateguide with a 34-inch bar (1). The standard four-roller Skateguide with a 17-inch bar comes kitted with the Skateplate combo pack (2).

## DeWalt 20V Max Biscuit Joiner

BY MIKE WHALEN

**We don't have any power biscuit-joiner users** on our crew, but we do occasionally use this specialty tool for tasks such as reinforcing the miter joints on trim. And since we are already on the DeWalt 20-volt battery platform for many of our other tools, we were interested in trying out the company's DCW682B brushless cordless biscuit joiner.

We used it on a few of our recent remodeling projects, such as a window job that needed a few extension jambs. That was a good opportunity to put it through its paces.

Weighing just a little over 5 pounds without the battery, the tool itself is light and comfortable to hold in the hand, and the brushless motor proved to have plenty of power. We really liked the 20-volt cordless option, which is convenient on site compared with running an extension cord and plugging into an outlet.

There is a depth selection knob that allows for the use of #0, #10, or #20 biscuits; for joining the mitered corners of our extension jamb frames together, we ended up using #10 biscuits in order to achieve a nice, solid connection. Adjusting the height of the fence was easy, thanks to its dual rack-and-pinion design. Adjusting the fence to a 45-degree bevel to make the cuts for the miter joints was just as easy as setting

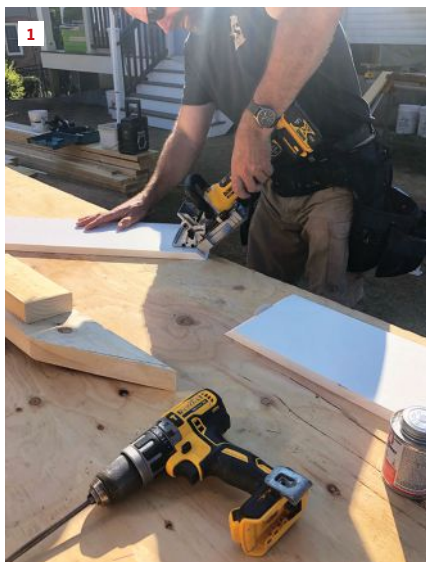
the depth and height of the cut, since all adjustments are tool-free.

Once adjusted, the 4-inch-diameter blade made quick, clean cuts in the 1x10 PVC trim stock that we were using for the extension jambs. There's a paddle switch instead of a trigger for turning the tool on, and an electric brake for stopping the blade and quickly moving on to the next cut.

Since we were cutting PVC stock, we were happy that the tool comes with an angled dust port and dust bag, which did a good job of collecting those little plastic particles that would otherwise fly everywhere and stick to everything. For even better dust collection, the joiner can be connected to a standard 35mm dust extractor or to DeWalt's proprietary AirLock system, though we didn't test this.

We added some PVC glue, inserted the #10 biscuits, and assembled our extension jambs, confident that this small extra step—made easier by DeWalt's cordless biscuit joiner—would give the miter joints extra strength. \$280 (tool only) online. [dewalt.com](http://dewalt.com)

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



DeWalt's DCW682B cordless biscuit joiner is compatible with all of the company's 20-volt Max batteries (1). The integral fence is easily adjusted without tools for angles between 0 and 90 degrees (2). The tool comes with a dust port and bag (3).

Photos by Mike Whalen



## **Amp up your reputation with energy-efficient innovations.**

Whether you're performing major renovations or taking on a smaller job, we can help you identify and implement energy-efficiency improvements that will elevate building health, safety and comfort. All while keeping costs in check.

**Find more opportunities in more places at  
[ngrid.com/business-jlc](https://ngrid.com/business-jlc)**

**nationalgrid**

*These programs are funded by the energy-efficiency charge on all customers' gas and electric bills, in New York and Massachusetts per state regulatory guidance.*

# Bott Smartvan Work Truck Storage System

BY TOMMIE MULLANEY

**When it comes to van shelving for tool storage**, getting creative with a few sheets of plywood is the standard approach for most tradespeople, myself included. But not only is this time consuming, plywood shelving is heavy, unsafe in a collision, and quite a challenge to change once everything has been fastened together. That's why I was happy to discover the bott Smartvan storage system, which has dramatically enhanced my ability to organize my current work vehicle, a 2021 Mercedes Sprinter 2500 with a 144-inch wheelbase.

After many successful years in Europe, this German modular shelving system finally made its way to the U.S. It is designed to precisely fit the dimensions of your specific vehicle with zero drilling required and is configured when you order the system on the company's website ([systainersystems.com](http://systainersystems.com)). All that is necessary to install the shelving are a few Allen keys and Torx bits, which are included in the welcome kit that comes with the shelving components. There's no complex measuring and no wasted space; just affix the brackets to the frame and bolt them for a perfect fit.

**Installation.** Two weeks after I ordered my system, it arrived in two large Gaylord boxes on a wood pallet. The boxes contained a lot of parts, but once I read the illustrated instructions, things started to make sense. During installation, I was impressed by the accuracy of the brackets, which use preexisting holes in the van frame, so no drilling was involved.

Then I added Systainer runners, which are the slides that mount to the brackets to hold the Systainers. They come in two styles to fit both the older generation T-Loc and newer generation SYS3 Systainers. T-Loc runners are cradle-style shelving mounts that hold the T-Loc and SYS3 Systainers as they sit inside of the shelf. SYS3 runners work only with SYS3 Systainers, which have integrated rail slots on their sides. Older T-Loc Systainers require a little more room between units than the newer SYS3 versions due to the runner design, but in both cases, I was able to fit more Systainers in a given space than I could with plywood shelving. In addition, the T-Loc runners accommodate the original style Systainer, which is now being used by brands such as Makita.

Galvanized steel shelving is available in several widths, heights, and depths depending on your needs, and each shelf comes with a rubberized material mat inside to stop cargo from sliding while also reducing noise. To get further organized, I added several different bottBox kits, which come in various sizes and fit neatly inside of the shelf. These work great for loose handheld items, such as tape measures and Allen keys.

Among many other available options are slide drawers, perforated panels with the company's configured accessories—such as spray-can and caulking-tube holders—and cable hooks for things like air hoses and saw blades. They make a huge difference in terms of cleanliness and organization.



The components of the bott Smartvan storage system mount to epoxy powder-coated MIG-welded brackets with reinforced folds (1). Runners that mount to the brackets are available to fit both older-style T-Loc Systainers and newer SYS3 Systainers (2). The FastCap guide-rail holders mounted on the ceiling aren't part of the bott Smartvan system but are a useful addition to the author's van storage (3).

Photos by Tommie Mullaney

# JLC Virtual

Powered by  
**Zonda™**  
Events

## Join Us! For the 2022 Event

December 16, 2022 | VIRTUAL EVENT  
1 PM ET - 4 PM ET

### Featured Speakers



**Christine Williamson**

Building Science Expert



**Christoph Lohr, P.E., CPD**

VP of Strategic Initiatives  
IAPMO



**David Pollard**

Principal/Co-Founder  
Liv Companies

## Resiliency, Risk, & Reward

Join us for the final 2022 virtual JLC event to learn strategies to manage water risks, improve residential air quality, and streamline your design-build process once and for all.

Register Today at: [experttoolbox.jlconline.com](https://experttoolbox.jlconline.com)

Thank you to  
our sponsor



Showcase your products and services in front of the senior-level decision-makers.  
For sponsorship opportunities, please contact John Tatusko at [jtatusko@zondahome.com](mailto:jtatusko@zondahome.com).

**Ceiling-mounted guide rails.** To mount my Festool guide rails to the van's ceiling, I secured 1/2-inch-thick strips of plywood to the roof frame with threaded rivet nut inserts, a common fastening method used for camper vans. Then I fastened FastCap Track Racks (\$25 a pair; fastcap.com) to the plywood with 1/2-inch-long wood screws. Metal rails tend to move and vibrate a lot during transport, and these guide-rail holders secure them nicely. They aren't part of the bott Smartvan system but are a great addition to my work van.

**Security.** bott Smartvan is one of only two companies worldwide to receive an ECE R17 crash test safety rating. This standard, which simulates a collision of an obstacle with a fully-loaded vehicle at 32 mph, focuses on fixing points, flooring, sidewalls, and overall construction of the shelving system. The bott Smartvan system is designed to keep tool cases and storage boxes firmly in place. The frames have integrated lashing rails that work specifically with optional bott Smartvan lashing straps and anti-slip mats to help prevent loads from sliding around. Lashing brackets that attach to the frame with T25 Torx bits are also available, allowing loads to be secured in any position.

Not only am I able to securely carry more tools and equipment, but I also have more space down the center aisle than I did with plywood shelving. This makes life much easier when I have to carry a big load of materials to a jobsite or (as I recently discovered) move my home. And once I had the new shelving and partition installed, I realized how unsafe I had been before with my plywood shelving. I've also noticed better gas mileage due to less weight, and the chassis of the Sprinter van feels more rigid, which has made driving on windy highways much easier.

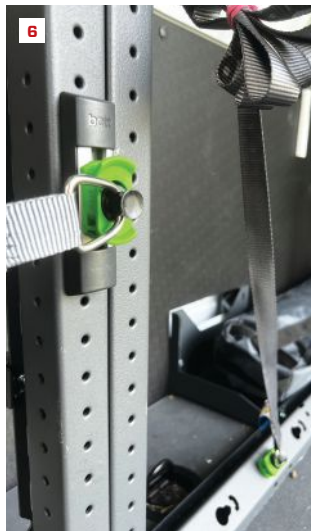
**Price.** After researching other shelving systems, I found that the bott Smartvan was priced competitively, especially considering the top-notch quality and customization. The rep I dealt with told me that I could add or subtract items as we went, so to become familiar with the system, I started with the Essential kit (\$3,800) with some shelving and the frames, and then ordered runners, large Systainers (for extra storage) to add to the ones that I already owned, and accessories such as hooks, anchors, and lashing straps a few weeks later. I chose this option to ensure I didn't end up with any accessories I couldn't use.

The Advanced kit (\$5,560) includes the same frames but also includes medium and/or large Systainers, drawer boxes, and a few more shelves. By the time I added extra shelves and Systainers to my Essential kit, I essentially made myself an Advanced kit.

I chose large Systainers to fit an assortment of smaller items that would otherwise roll around on the shelves, as well as for bulky items such as vacuum hoses and fittings that I like to store together in one place. And some of my existing Systainers are already maxed out with tools; the new, larger Systainers provide overflow storage and will keep everything more condensed.

You can also build your own system a la carte to be exactly the way you want it. The price is determined by the type and amount of items you choose to complete your build. [bott-usa.com/vehicle-conversions](http://bott-usa.com/vehicle-conversions)

*Tommie Mullaney owns Black Label Carpentry in central Florida. You can visit his web page at [blacklabelcarpentry.com](http://blacklabelcarpentry.com) or follow him on Instagram at [@BlackLabelCarpentryCo](https://www.instagram.com/BlackLabelCarpentryCo).*



The shelving and Systainer rails are installed with T25 Torx screws, which go into predrilled holes on the brackets, making alignment and installation easy, with zero drilling required (4). In addition to the Systainer rails and shelving, the system can be configured with different-sized bottBox storage boxes (5), lashing points for cargo strapping (6), and spray-can and caulking-tube holders (7).

# Advertising Index

Advertiser	Page #
3M Construction & Home Improvement Division	13
Chief Architect	C2
DeckWise	20
Diablo Tools	26
DryerWallVent	8
EcoView America	C4, 15
FastenMaster	10
Fiberon	16
Grabber Construction Products	C3
JLC Virtual	53*
Malco Products	33
National Grid	51
ProVia	22, 44
Simpson Strong-Tie	1
SPAX Engineered Fasteners	43
Tamlyn	2
Techno Metal Post	19
Therma-Tru Corp.	48
Trus Joist by Weyerhaeuser	53*
West Fraser	34
Zip System by Huber Engineered Woods	5
Zipwall	21

\*Advertising appears in regional editions

# Classifieds

## ECONO RUNNER

Economical padded protection for just about any surface. The best value in reusable protection.

- ✓ Non-porous top surface prevents liquids from penetrating.
- ✓ Reverse wound for easy application.
- ✓ Ideal for dry and cured hardwood, stone, tile, counters & table tops.
- ✓ Stays in place without staples, tacks, or tape.






Visit us at:  
[ProtectiveProducts.com](http://ProtectiveProducts.com)  
Call: (800) 789-6633

## The Ultimate Door & Window SILL PAN SYSTEM

# ASTROpan™



Patent Pending

## 1-800-334-4474

[www.astroplastics.com](http://www.astroplastics.com)

Would you like to place an ad in JLC?

---

Contact:

**John Tatusko | 617.359.8619 | jtatusko@zondahome.com**

BY LOU DUPONT

## Basket Weaving a Wall

Even though our architectural woodworking shop has worked on plenty of unique projects, I'd never seen anything quite like the basket-weave wall detail that we were asked to duplicate in the Pinnacle, a historic summer camp on Lake Champlain built in 1896 by William J. Van Patten, a wealthy businessman and former mayor of Burlington, Vt. (see "New Railings for the Pinnacle" by Nate Plasha, *Professional Deck Builder*, May/21). I had been contacted by Bush Holstein, who worked for the general contractor restoring the home and transforming it into a year-round residence; our job would be to reconstruct a woven covering on a water-damaged parlor wall.

When I arrived on site, Bush and the owner showed me around this remarkable "camp" with woven wall paneling and other fun and idiosyncratic detailing (1). Though the section of original basket weave that we'd be replacing had been removed, Bush and the owner had saved a few pieces, one of which I brought to my shop to serve as a guide. I also snipped off a few samples and sent them to Paul Frederick at Vermont's Department of Forests, Parks and Recreation to nail down the species. He in turn forwarded them to the U.S. Forest Service's Forest Products Lab in Madison, Wis., which identified the samples as black or white ash. We were 98% certain that the samples were white ash, a light-colored hardwood with straight grain that grows abundantly in Vermont.

To duplicate the weaver's 3/64-inch-thick by 1 3/8-inch-wide warp (vertical) and weft (horizontal) elements, I sourced plainsawn white-ash veneer, which I straightlined, then ripped into 1 1/2-inch-wide strips. To clean up the edges and bring the rippings down to finish width, I packed them in a 3-inch-wide box that I made and ran them through a wide-belt sander. Then, to bring the rippings down to their final thickness, I used double-sided tape to fasten about 32 strips at a time to a 10-foot sheet of plywood and made a couple of passes through the sander.

For help installing the wall covering, I contacted an old friend, Tim Sienkiewicz, a talented carpenter and furniture maker with some basket-making experience. In my shop, we mocked up a wall

section to work out details and techniques. Before transporting the 2,400 lineal feet of milled material that I estimated we'd need, we finalized the color with the client and applied a quick-drying wiping stain called Woodsong II from M.L. Campbell (mlcampbell.com). For the warp, we used a golden oak stain; for the weft, we applied a darker, mission-oak mixture.

Back at the Pinnacle, we started by stapling the tops of the vertical strips to the substrate (mostly tongue-and-groove pine) (2). Then we wove horizontal strips through the verticals, tapping them into place with small blocks and checking every third course or so with a string line to make sure that the strips were straight. As we wove, we were careful to hide splices behind the verticals, and stapled the verticals at every fourth or fifth course. Occasionally, a strip would break or splinter, in which case we'd snip out the damaged section and splice in a new strip. This was at least a two-person job, and for the parlor wall, Tim enlisted his son, Lee, to help out (3). Small trim strips at the top and just above the baseboard, along with a 1/2-inch quarter round on each side, concealed the fasteners and helped secure the work to the wall.

A few months after finishing the parlor wall, we returned to address a smaller section of wall in the main stairwell. In some ways, this part of the restoration was trickier, because the weft strips had been originally finished with a green stain that had faded over the years. We theorized that the color was created with an aniline dye manufactured by one of the original owner's businesses (among other interests, Van Patten had become an expert in aniline dyes, and the company he worked for made a fortune for itself—and Van Patten—producing them). Here, we removed the original basket weave and replaced it. This time, instead of using veneer, I sawed the strips from 3/4 white ash, then used a wide-belt sander to bring the strips to finish size, as before.

Lou duPont is co-founder of Stark Mountain Woodworking in New Haven, Vt. Visit [starkmountain.com](http://starkmountain.com) to see more of his work.



Woven wall panels are one of the unique architectural details at the Pinnacle (1). New ash strips were milled in the shop and woven on site to replicate the basket-weave panels found in the rest of the house (2, 3).

Photos: 1, Tim Healey; 2 and 3, Tim Sienkiewicz

**“THE PANELMAX® SYSTEM MAKES  
EASY WORK OF ANY DRYWALL**

**FABRICATION ASSEMBLY”**



**PANELMax**



[WWW.GRABBERPRO.COM](http://WWW.GRABBERPRO.COM)

Level up your drywall fabrication with PanelMax, the portable board milling machine from Grabber. Create perfect drywall shapes on or offsite every single time. Less labor, fewer materials, more profit. Just how we like it.

“Grabber assisted in the PanelMax setup and then conducted two-day onsite training. Punch in your design specifications and the system does the work for you. While it’s processing the drywall, our guy is free to do other things, saving us time and money. The PanelMax system makes easy work of any drywall fabrication assembly. No more manual fabrication of drywall.”

— Ernie Hanson, General Manager, CCE Specialties, LLC

For ornate, intricate, and precise drywall installs, PanelMax is changing the game. Contact your local dealer for more details.



# ECOVIEW WINDOWS OPENING SHOWROOMS IN WALMART



© Can Stock Photo / OG\_vision

**NOW IS THE TIME TO START YOUR OWN INCLUSIVE ECOVIEW WINDOWS  
BUSINESS & SHOWROOM AT A WALMART LOCATION NEAR YOU**



## **BENEFITS INCLUDE:**

- Outstanding Retail Presence with multiple Walmart locations available
- Expert Sales Training
- Professional Web Presence
- Deeply Discounted Factory Direct Pricing
- Zero Franchise or Royalty Fees
- Nationally Recognized Company
- World-class Homeowner Financing
- Ongoing Training & Support
- Business Management Software
- National Healthcare Program with BCBS
- Plus Much More!



"With 90% of America shopping at Walmart every year, EcoView Windows is proud to offer Walmart's value conscious customers our premium quality windows and doors. You too, could become an EcoView licensee and secure one or more of Walmart's 4th wall store showrooms. This is a rapid growth opportunity with significant customer acquisition due to showrooms continuous foot traffic. Lead generation will never be an issue because 90% of the population lives within 10 miles of a Walmart location. This EcoView Windows opportunity is one you won't want to pass on!"

**To find out if your market is still available call 1.855.621.1616  
or visit [ecoviewwindows.com/dealer](http://ecoviewwindows.com/dealer)**