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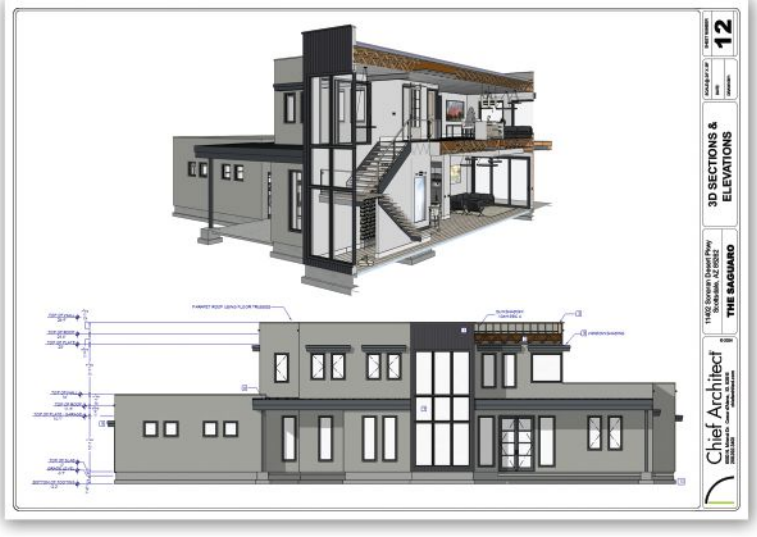

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DEPARTMENTS

On the cover: After removing an interior bearing wall to open up space, crew members of D.P. Boivin Building and Remodeling in Hyannis, Mass., raise a new beam. See the story about engineering requirements for jobs like this on page 41. Photo by Roe Osborn.

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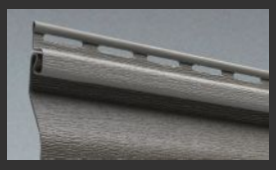

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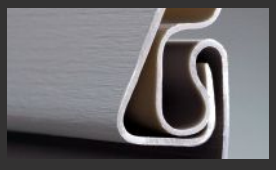

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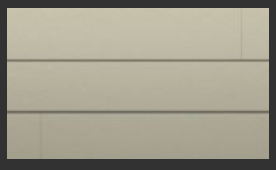

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BY NIELSEN CRIST

Lessons in Scribing

Scribing material is a fundamental skill that carpenters use frequently. If you have ever run the baseplate of a circular saw along a straightedge, you've scribed something, albeit something that is straight. The same idea can be applied when the edge is not straight.

Various tools can be used to transfer the contour of a nearby surface onto a workpiece: a compass, shims, the edge of a pencil, washers, a straightedge, or a site-made jig—whatever can create a line parallel to the edge of the material, however irregular that edge might be. While there are many situations where it is necessary to scribe, I will take you through two common ones: scribing baseboard to an uneven floor and scribing a material to an irregular surface like stone (see page 10).

SCRIBING BASEBOARD

If a customer doesn't want shoe molding or if the floor is so out of level or humped that the shoe mold won't cover the gaps, you will need to scribe to the floor. For example, if you have a straight piece of baseboard and the floor has a 1/8-inch bump or irregularity, you can temporarily attach the piece to the wall to prepare to scribe. Set your scribe tool to the depth you need (in this case, 1/8 inch), and follow the contour of the floor. If you tack your base in place level, then once it's cut, it will drop into level. If it was not tacked level, your piece will drop and be parallel to its tacked position. This is important to note, depending on what you need to align with.

A word of caution: In an old house, if a room is 2 inches out of level (not uncommon), and you choose to run the top of 5 1/2-inch baseboard level, the base over the high spot will be only 3 1/2 inches tall. If there are no level features above the baseboard, then it may look better to run the base out of level. The base can still be scribed, just not as much, and your corner joints may get complicated.

To begin, let's look at a straightforward example of scribing baseboard in the photos below and on the next page.

With the baseboard shimmed level, measure how much it needs to drop (1/8 inch here) to match the plinth block. Tack the baseboard in place to set up to scribe **(1, 2)**.

Photos by Nielsen Crist

Baseboard can be scribed to fit the floor using a scrap of wood cut to the thickness that the baseboard needs to drop. By running a pencil along the scrap and marking the baseboard, you can see what needs to be removed **(3, 4)**. The author makes the first cut with a planer with a 5-degree back bevel, which makes finer adjustments easier and helps the base sit tighter to the floor, but you can use a table saw or jigsaw instead **(5)**.

A hand plane works well for final touch-up; alternatively, a sander could be used **(6)**. The trimmed baseboard meets the plinth block as intended with a clean line at the floor **(7)**. Here, a compass is used to scribe a window sill; this technique can be used for baseboard too. Set the compass to the amount that needs to be removed and run the tool as shown **(8)**.

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See What's in the Box

MATING MATERIAL TO FIT AN IRREGULAR SURFACE

Running finished material into stone is one of the more dramatic looks when it comes to scribing. It doesn't have to be the most daunting, however, if you are willing to take your time. With a very irregular surface such as stone, it may be necessary to cut the material in stages. You can always remove a bit more material, but if you remove too much, you run the risk of ruining your piece.

Remember, too, when you're scribing, the far edge of the workpiece will move toward the scribed edge by the same amount that the points of the scribes are set apart. Make sure you leave yourself enough material so that far edge doesn't fall short. Another key concept is that when you're scribing, the cut edge will be parallel to where the workpiece was when you marked it. If, as you scribe, the workpiece isn't in line with its ultimate desired position, it will not line up when you install it.

Nielsen Crist is owner of Nielsen Crist Carpentry in Bedminster, N.J., and offers training to other contractors in all things carpentry.

Using an AccuScribe Pro, the author draws the contours of the stone onto the workpiece. Be sure to hold the workpiece parallel to its intended position **(9)**. Test the fit and repeat as needed. A rasp, sander, or knife can be used after the first cut with a jigsaw. Patience is important; you won't get it right the first time **(10–12)**.

After the first cuts are made with the jigsaw, back-bevel the workpiece with a grinder or saw and then sand it. This thinner leading edge makes doing fine adjustments for fit easier and helps the material more closely mate to the stone **(13, 14)**. The finished product of a close scribe is always satisfying, but it takes a lot of trial and error. It is best to work slowly up to the irregular edge to be matched by removing small amounts from the workpiece each time. Taking too much off in one area can affect the piece at other points of contact **(15, 16)**.

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Q Electrical outlets are no longer required in kitchen islands or peninsulas under the 2023 National Electric Code (NEC). When they are installed in an island, they can no longer be below the surface of the countertop or work surface. How are other contractors dealing with this change?

A *Michael Anschel of OA Design+Build+Architecture in Minneapolis responds:* Minnesota is one of the states that has adopted the 2023 NEC without amendments. The change hasn't been a problem for us, and we haven't had any pushback from designers or clients.

I've been at this for 30 years, and I remember when the last codes came in, we had to figure out where to put all the outlets that were required, whether they were going to be used or not. So, it's been a relief to us that we aren't required to put outlets in kitchen areas that are clearly decorative or in eating spaces where there is no need to plug in a blender or coffee grinder. We recently completed a big island, and under the old code, we would have had to install eight or nine outlets in it. Instead, the client opted for two pop-up outlet towers that were nicely spaced in the middle of the island to serve the whole area.

Cost is a factor with pop-ups. The ones we used in that island cost around $160 each, giving the client 12 outlets, each with USB (both A and C types). So, we saved money on all the outlet wiring we would have had to do under the old code.

Pop-up outlets range from around $150 to $600 with lots of choice in colors and features. These devices have been around for 20 years or so, and the code-rated ones available now are waterproof and have gaskets to keep out water and debris. The ones we've used seem

Hezi's pop-up countertop outlet, available at Amazon, also provides wireless charging in both the closed (above left) and the open (above right) positions. It retails for about $200 in assorted finishes.

well-made, so I am not particularly concerned about their durability. We just put in a Hezi pop-up that the client purchased from Amazon for $200 that installed well. We have been having discussions in our office about which ones to make standard for our operation. Our electricians have suggested an offering from Hubbell, which makes a discreet single-plug pop-up with USB A/C on the other side (hubbell.com). The downside, of course, is having only one outlet, but this device offers wireless charging on top, which is a useful consolation. Lew Electric Fittings (lewelectric.com) sells a giant tower of outlets for those who want just one pop-up hub, starting at around $250. And Point Pod makes a motorized pop-up that you can finish with a piece of the countertop material; once installed, it is almost invisible with just a narrow edge of the sleeve showing. At about $600, these are among the most expensive of the pop-ups we've seen (pointpod.com).

Amazon and other retailers have hundreds of types and styles, but it is best to check that they are code compliant.

Pop-ups are not the only option, however. We have found two-level counters to be a nice place to put outlets, especially on a peninsula. I have been a fan of that look, as it keeps the cooking mess out of the eating/working area.

We have had some clients opt for no outlets; in those cases, you are required to provide a run from which a homeowner could choose to have an outlet in the future. We run a line to a cabinet and terminate to a junction box. I think this is a good provision of the code, and it provides the homeowners or future homeowners with options.

From top right to bottom right: Connect Silver pop-up outlet by Point Pod; Pur20GACBTQD pop-up outlet with Bluetooth speaker by Lew Electric; and TradeSelect polished chrome pop-up outlet by Hubbell.


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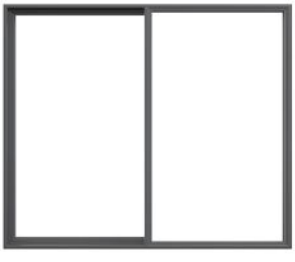

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Installing Box Beams

BY GARY STRIEGLER

Vaulted ceilings are requested by clients in about a third of the homes I build. Even in contemporary homes, the plans often call for exposed beams. Almost always, the design has a main beam at the ridge with partial beams running up the end walls and a pair of full beams dividing the ceiling into thirds. The rake beams running up the ceiling are usually less than 16 feet long, which makes it easier to find full-length finish material for them. We make those beams 11¼ inches deep by 7 inches wide and like to make the partial beams at the wall 5½ to 6 inches wide. Although they don't carry any load, the beams should look like timber framing, so getting the proportions right is important. To that end, we make the main beam at the ridge a couple of inches deeper than the rake beams.

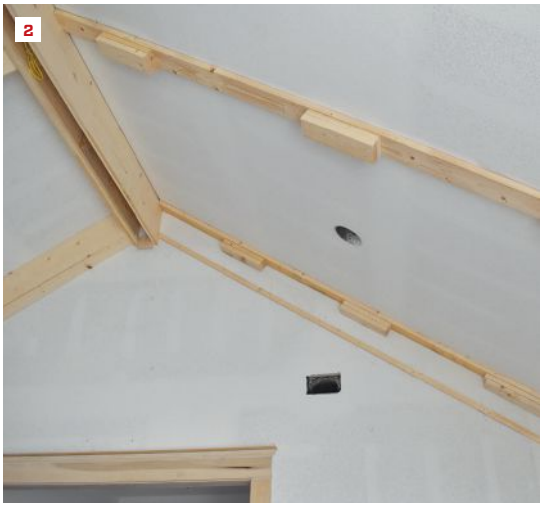
A couple of our clients have bought solid beams for us to install. They are a challenge to cut, lift in place, and secure. Most of our clients, however, are open to the built-up box beams that we make out of 1x12 pine the local lumberyard keeps in stock. We have used other species, but cost, lead times, and difficulty in getting long lengths make pine our default choice. If the beams are to be paint-grade, then we use an MDF product, with a similar process. The beams shown here are built around 2x6 blocking attached to the ceiling.

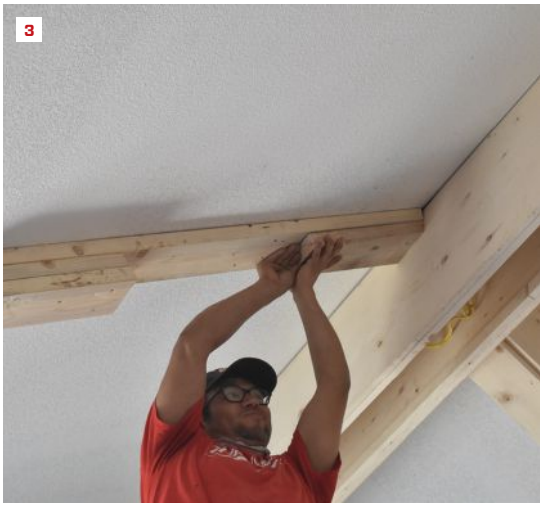
Before the drywall is installed, we like to add blocking between rafters since the beams rarely land on a rafter, and the blocking helps to ensure a straight and secure fit of the beams. We ask the framer to add flat 2x6s on 4-foot centers. If that step is missed or a client changes their mind later in the project, the blocking can sometimes be added from above. If all else fails, we have glued a strip of 1x6 to the ceiling, let it fully set, then nailed a 2x6 to that with success.

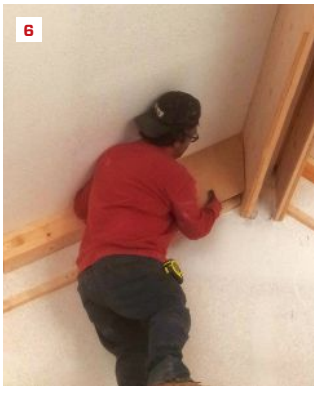
Box beams look like solid timbers but are less challenging to install **(1)**.

I like making big progress as much as anyone, but I've learned that it pays to do a careful layout on the ceiling before we break out the framing nailer. Therefore, I double-check all the measurements before popping chalk lines on the ceiling. I then look through all my 2x6 material and pick the best boards to nail to the ceiling for the first layer. They can be straightened a little as they are nailed up with preinstalled blocking, but starting straight is preferred. The rest are cut into blocks about 16 inches long for the next layers. After the

Photos by Gary Striegler







On the ceiling, 2x6 blocking is installed to the backing with close attention to the layout lines **(2, 3)**. Backing that will receive the bottom beam panel is prepared on the side panels **(4)**. Workers use templates to confirm angles at both the top and bottom of the beam. They also transfer a mark from the template to the ceiling so that measuring the length of the panel is easier **(5, 6)**. Ensuring the cut beam panels remain straight during install is a two-person job. Shims are used as needed while panels are being nailed to the blocking **(7, 8)**.

full-length 2x6 is in place, we add two more layers of blocking about every 32 inches, taking care to build straight down from the ceiling for a straight finish.

The trim part of the project starts with the side pieces of the ridge beam. This should be 3 to 4 inches deeper than the 1x12 rake beams to look like timber framing. To save time, we use pocket screws and glue to add a 3- to 4-inch ripping to a 1x12. It is a two-person job. One person stands on the pieces to keep them lined up while their partner drives a pocket screw in the hole between their feet. With a little practice, minimal sanding is needed at the joint. To create the length needed, we make a mitered splice with glue and headless pins. All the beam sides have a small ripping attached on the inside flush with the bottom edge as blocking for the beam's bottom piece.

When it comes time to cut and fit the side pieces of the rake beams, we use a test piece to check the cut angle and help us measure an accurate length. We make a mark 12 inches from the end cut on the test piece for both the top and bottom and transfer the marks to the ceiling. We then measure between the ceiling marks to find the length and use the test pieces to cut the ends to the right angle. While installing the sides of all the beams, we work to keep the lengths straight and plumb, using shims as needed.

Teamwork is needed again as the bottom panels are attached to the preinstalled backing while the crew uses a 3/4-inch scrap to maintain spacing **(9, 10)**. Corner strips for the beams are routed and ripped on site before being installed with a pin nailer **(11–13)**. With the beams completed and ready for finish, the illusion of solid beams is evident **(14, 15)**.

The most challenging part of box beams is the joint between the sides and the bottom. The goal is to make three pieces look like solid lumber. It is hard to make 16- to 24-foot-long joints, especially up in the air, so we make a 3/4-by-3/4-inch offset, then fill in the corner. If you look at timber framing, it sometimes has a decorative edge, usually a cove or bead cut. We can match that look by fitting cove molding or quarter round in the offset corner joint.

This job had a contemporary look, so we handmade a 1/2-inch trim piece with a 1/4-inch rabbet out of the corner using wood without knots. We started by making a 1/4-inch rabbet (using a Whiteside Multi Rabbet Set) on the edge of a board, then ripping 1/2 inch off the edge. Then we laid that piece on its side and made a second rip at 1/2 inch. When the homemade trim is installed, the beam edge is a 1/4-by-1/4-by-1/4-inch detail. It takes some time to make and install all the trim (we nail it in place with 23-gauge headless pins), but the results are long joints that look perfect. The process can take a couple of days, but carefully cutting and placing solid beams does too. The ultimate approval is when our clients' friends ask where they got those giant wood beams.

Gary Striegler is a trim carpenter and owner of Striegler and Associates in Fayetteville, Ark.

JLC INTEL

Trex

COMPOSITE DECKING INNOVATION

Welcome news for contractors looking to simplify decking construction workflow.

It's no secret the labor shortages that afflict construction haven't spared decking contractors. An aging workforce and difficulty in attracting young pros puts even more strain on a trade that serves a growing residential marketplace.

What's a contractor to do? How do you offer on-trend decking features, maintain margins and simplify, simplify, simplify?

Innovation can help. Consider cable and glass rails, for example.

Enhancing deck views with a stylish cable or frameless glass railing system is a compelling upgrade for many owners. What's more, the ability to offer a specialty railing system can be a powerful differentiator at bid time. Yet, up to now, a cable rail system has also meant exceedingly lengthy material takeoffs as well as challenging installation requirements.

Steven Phillips understands and believes there's a solution.

Phillips is a product manager for Trex Company, the leading manufacturer of wood alternative decking, railing and other outdoor living products. He's part of a team that recently introduced a series of deck construction innovations, including a new cable and glass railing system, that reinvents the deck construction playbook.

NEXT-GEN DECKING INNOVATION

"Some contractors shy away from cable rail for a variety of reasons," Phillips says. "Anybody that's new to cable should definitely give this system a look," explaining how the new contractor-friendly system simplifies cable tension management and eliminates cable swaging and crimping. "The number of SKUs (stock keeping unit) in a traditional cable rail system might top 80 items or more. This entire program is only 11 SKUs. You can write it on the back of a notepad," reports Phillips.

The next-gen cable and frameless glass railing system is just one of several advancements now available to contractors looking to improve homeowner satisfaction while streamlining construction workflow. Here's a look at what is available now at lumberyards and supply centers from Trex:

- **Fasteners.** If you build composite decks, you know this has been a product area with little in the way of innovation. That has changed in a big way. "This has been a labor of love of mine for the last couple of years," Phillips admits. New fastener additions mark a turning point in installation speed, precision and simplicity. Phillips suggests long-time deck contractors look at a picture of the new plugs. "They'll instantly recognize the benefits," he says.
- **Boards.** Composite board technology, namely the new Trex Transcend Lineage line of products, now pushes new boundaries in aesthetics, performance and comfort. "Coming out of COVID, people's tastes changed," observes Phillips. "They went from preferring darker, bolder colors to more subtle, elegant tones." This aesthetic more authentically captures graining nuance while retaining the resistance to stains, scratches, mold, rot, warping, cracking and splintering that made composites a go-to alternative for many owners.
- **Railing Posts.** The all new X-Series Post deploys a modular design that allows any post to serve in the end, line or corner position when installing cable or frameless glass railing. And Trex Signature railing offers posts with brackets that are pre-mounted. "It helps save time," explains Phillips.

"If you have workers on your crew that are rookies, these and other developments should be welcome news," the deck product leader says. As for what's next, Phillips says Trex isn't standing still. "We're working on a lot of products. Stay tuned. There's a bunch more coming."

Learn more about how recent innovations in composite deck construction simplify workflow and installation at www.trex.com.

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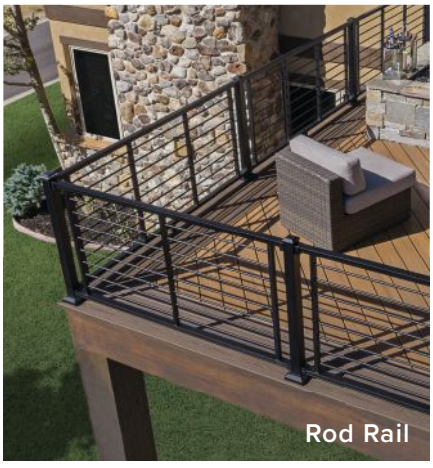

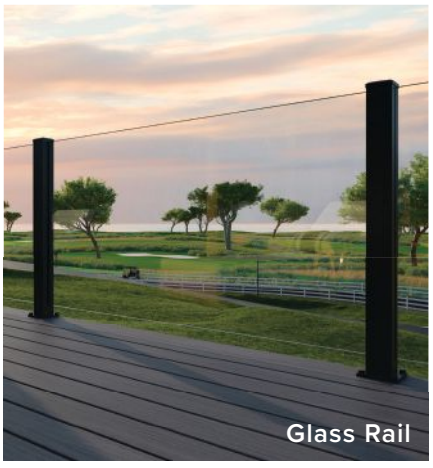

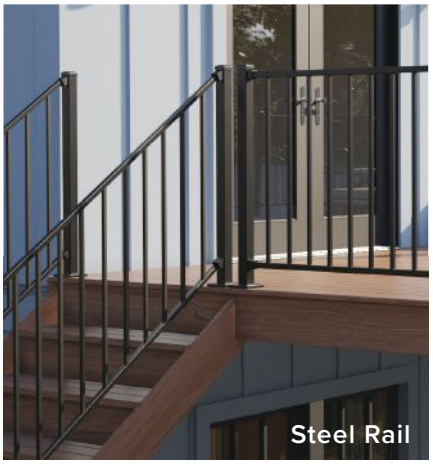

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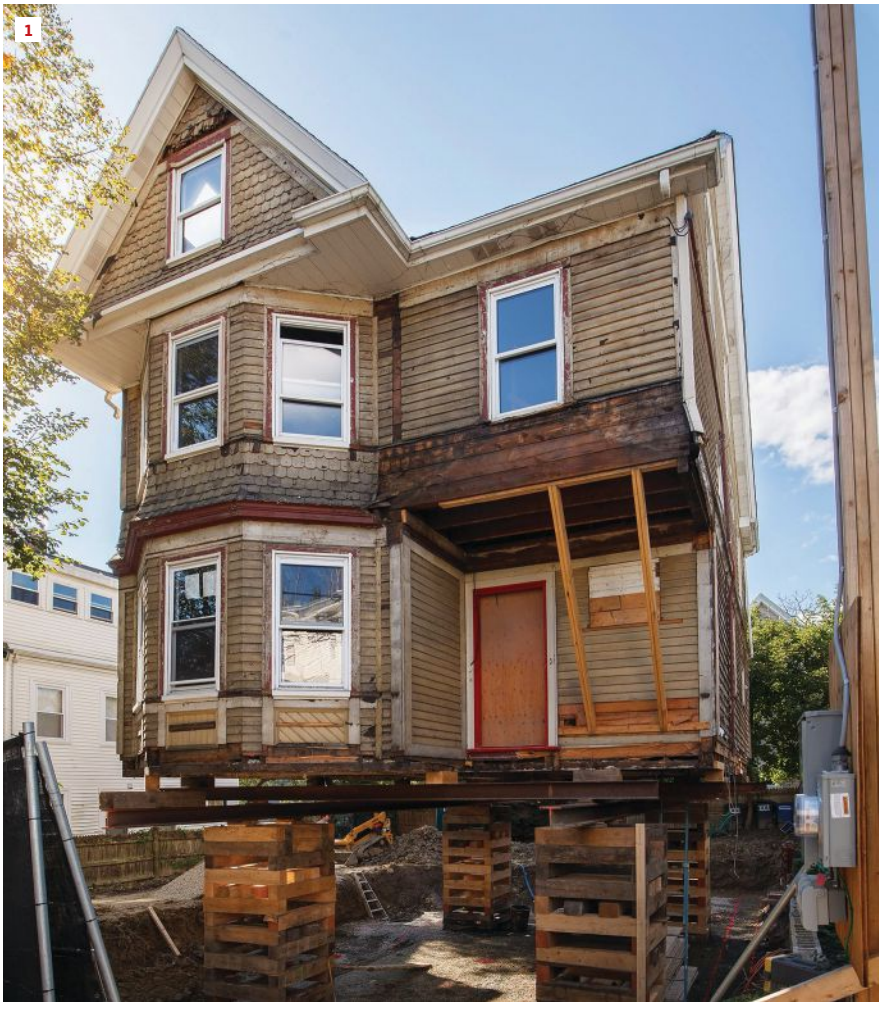
Replacing a House Foundation

BY NICK PORTNOY



Groundwater conditions precluded digging a deeper basement. Instead, the author and his clients opted for raising the house on a new foundation.

When I was approached about renovating a rundown Victorian in Somerville, Mass., the owners of the house were hoping to create an additional 2 feet of headroom in the basement for a future workshop. As this was one of their central goals for the renovation, we were motivated to make it happen. Initially, we considered underpinning the existing foundation with buttress walls and digging down. But after we dug a series of test pits, we discovered that the groundwater elevation would preclude this approach.

Since we couldn't go down (and were still determined to create this basement workshop), there was one direction left, and that was up. We were fortunate to be working in a city that didn't have a fixed height restriction built into its zoning ordinances, although the architects did have to navigate through story calculations, which we were able to comply with.

Ultimately, it was determined that we could raise the house by just under 2 feet and still have the project be "as-of-right." Because the house was sitting on a fieldstone/brick foundation, we knew that we would need to replace the foundation in its entirety. And because the foundation was almost directly next to the neighbor's driveway, we also knew that we wouldn't be able to demolish the existing foundation and dig out for a new one without disturbing the neighbor's property. Our workaround for this was to leave the foundation wall that abutted the neighbor's driveway as a sacrificial retaining wall and then move the house over 3 feet, which would allow enough space for the work to take place around the new foundation.

PREPARING TO LIFT

We engaged a local house lifter, Chris Nastasi of CN Building Movers, to do the lift and move. He would need to set up four cribbing towers, on top of which he would place a series of steel beams to support the house. One of the decisions that I had to make was whether to place the cribbing towers on top of the basement slab or take out the sections of the slab where the towers would sit and excavate to the footing depth grade. Either approach was fine, and I ultimately settled on the former. Since we were maintaining the slab elevation, we needed to drop the grade by only 16 inches (10-inch footing + 2-inch foam + 4-inch slab), and I didn't think that would be problematic. If we had been dropping the slab, I would have probably advocated for the other approach to avoid having cribbing towers sitting on pyramids of dirt after the demo/

Photos by Nick Portnoy

excavation was completed. However, this approach saved us a step and allowed the site work contractor to do their work in (mostly) one mobilization.

With the cribbing towers in place, holes were busted in the sides of the foundation to facilitate getting the steel in. There were two long steel beams that ran front to back and then a series of four beams that sat on top and ran side to side. We cut 2x4s to the length of the future window openings and screwed them into the mudsill. This allowed the house movers to see where the future openings would be and locate steel accordingly. Where the steel did not correspond to a window opening, the area would be patched with CMU.

Once the steel was in place, we were almost ready to lift. To establish a benchmark, we set up a transit and shot the existing T.O.W. (top of wall) in all four corners. Then we took the average of those measurements (no house is ever level) and transferred that to a "permanent" monument (in this case, a temporary electric service pole). We would benchmark all our heights from this.

HOUSE LIFT

The lift itself was straightforward with a hydraulic lifting system. As the house was lifted, cribbing was added to the towers until the bottom of the steel was above the elevation where the formwork would be. In our case, we had 8-foot-6-inch foundation walls, which required using 9-foot-4-inch-high forms.

After the house had been lifted, the site work contractor started the demolition of the foundation. He dug a ramp down into the basement and maneuvered a mini-excavator underneath the house, using that to demo the foundation walls. The site work contractor then removed the debris and basement slab with a skid steer. As we typically do, he also covered the bottom of the hole with 2 inches of crushed stone.

Wherever possible, the house movers located the steel support beams at basement window openings so they wouldn't interfere with the foundation pour **(2)**. The author spray-painted the footing layout as an easy quality-control measure for the formwork contractor **(3)**. Footing forms were lined with GCP Preprufe waterproofing membrane prior to the pour **(4, 5)**.

Once the footing had been poured, the site work contractor placed the subslab stone level to the tops of the footing before the foundation walls were formed and poured **(6)**. Due to lot limits, the formwork contractor had to use a smaller pump truck than usual. About 80% of the pour was done with the pump from the driveway, and the remaining 20% on the far side of the house had to be "dragged" into place **(7)**. The author installed new pressure-treated sills on the concrete with a second kiln-dried layer on top of the PT plate. At the beam pockets, his crew stepped these back so they could be spliced in after the house had been set back down **(8)**.

At this point, Chris Nastasi came back to the jobsite to move the house over the 3 feet we needed. This was the part of the process I was most excited to see. To do it, the house mover first set up another four cribbing towers on the bottom-of-hole grade adjacent to the towers that were holding up the house. He set up a piece of flat steel on the first cribbing tower and then jacked up the two long steel beams enough so that he could get a "skate" underneath the beams. The "skate" is what you might imagine it to be: a skateboard for a steel beam. Chris then used a come-along to pull the beams onto the new cribbing tower.

FOOTING AND NEW FOUNDATION

Once the house was in its final position, we laid out the foundation in partnership with our surveyor. We plumbed down opposite corners of the house, which he used as benchmarks to lay out the rest of the foundation, including additions. Because we were using GCP Preprufe waterproofing membrane underneath the footings, it was important that the footings be formed as accurately as possible and without any board lapping. We spray-painted the footprint of the footings to make the formwork contractor's life easier and to give ourselves an easy and visible quality-control tool.

The foundation work was relatively straightforward. The only thing different was that once we had the footings placed, the site work contractor came back to place stone to the top of the footing. It was a lot easier to do this before the walls were formed and poured and a house stood over it. Beyond blocking out pockets for the steel, it was business as usual for the rest of the foundation work.

Probably the biggest challenge was navigating the pump around the building during the pour. We were constrained by the size of the pump that would fit in the driveway but were able to reach probably 80% of the walls with the pump and "dragged" the rest. The formwork contractor, Bammco Concrete, did an excellent job.

With the foundation placed, stripped, and waterproofed, we prepared to lower the house back down on its foundation. We backfilled and then installed the mudsills, as we typically do, with one layer of pressure-treated (PT) stock and an additional layer of kiln-dried (KD) stock. Since the old mudsills would be lowered on top of these, we had to countersink all the anchor bolts' nuts and washers. We also stepped back the PT/KD stock around the steel pockets so we could splice in new pieces once the house had been set back down.

Setting the house down went quickly. Afterward, we walked around the house to see how it matched up to our new mudsills. The house mover had said he could shimmy it in any direction we wanted, but we were happy with where it came down on the first try—an outcome due, no doubt, to being methodical in all the prior steps.

Nick Portnoy owns Nick Portnoy Builders based in Watertown, Mass.

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Invisible Baseboard Detail

BY DOUG CAMERON

As an artist builder, one of my signature details for the interior of our houses is a minimalist style. On some of the modernist homes we build, we are now doing the interiors with no trim at all. In this article, I describe how we go about creating an "invisible baseboard" to provide a seamless wall surface throughout the house.

Evolution. Back in the day when carpenters used hand tools, it was difficult to cut things perfectly, so carpenters installed what was often called "beauty mold" to cover imperfections and visually align building elements using offset reveals. This created an interior trim style that has become standard in most homes, and I started to ask myself, "Why do we keep doing all this trim?" Of course, interior trim has another purpose besides the visual alignment; it's there to protect against impacts and to keep water off sensitive paper-faced gypsum. This is especially true of baseboard, which brooms and vacuum cleaners and skateboards and such bang into and where water from cleaning floors or wicking up through a concrete or tile floor could deteriorate drywall and create conditions for growing mold.

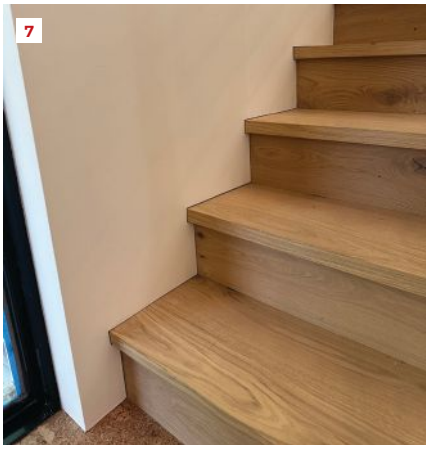
Reaching toward a minimalist style, we started ripping our trim down and evolved to doing flush baseboard that is recessed so it's in the same plane as the wall surface, with a small channel separating the wood from the drywall. But I kept thinking there had to be something even cleaner than that. I experimented on my own home and developed a robust base treatment without wood that would seamlessly blend in with the wall surface and still resist impacts and water.

The "Dens-base" solution. We landed on using fiberglass-mat gypsum board in place of conventional paper-faced drywall for the first 6 to 8 inches above the floor. Fiberglass-mat boards, such as Georgia-Pacific's DensGlass or USG's Glass-Mat panels, are more resilient than drywall. I've done some hammer tests on these products and found the fiberglass-mat panels to be significantly stronger than drywall—and when the panels are backed up by the framing sole plate, they are extremely robust. You can dent them, of course, but the dents are a lot easier to repair than the ones in enamel-painted wood. Fiberglass-mat panels also resist water, although we avoid setting the wallboard directly on finished floors to provide both a capillary break and a clean visual separation between materials.

When we install fiberglass-mat boards, we hold them up about 1/4 inch (3/8 inch, maximum) so we can cap the bottom edge with a metal or vinyl L-bead. We play with the L-bead to create a nice, even reveal (ideally, I like to see 1/16 inch, but no more than 1/8 inch) between the L-bead and the finished floor. Ordinarily, we don't caulk this gap. However, in wet rooms where we want to protect the underlying structure from water seeping back there, we will use tape to mask the edges of the gap, apply a clear caulk, and

To provide the durability needed to protect walls from mops, vacuum cleaners, and skateboards, the author uses DensGlass **(1)** or Glass-Mat **(2)** for the first 6 to 8 inches above the floor. He holds the board off the floor about 1/4 inch and installs an L-bead **(3, 4)**, precisely placing this about 1/16 to 1/8 inch above the finished surface. On the stairs shown here **(3)**, the TrimTex L-bead is installed with spray adhesive, per the manufacturer's instructions.

Photos by Render ATX and 3C Drywall



The installed fiberglass-mat boards are taped in with the rest of the drywall **(4, 5)**, so they completely disappear into the wall. To match the performance of enamel trim paint, the author uses Benjamin Moore Scuff-X paint for the walls to provide seamless wall surfaces **(6, 7)** that stay clean (and clean easily) over time.

then sponge the bead smooth so it is slightly recessed below the surface, where it is inconspicuous and well protected.

Once the drywall is installed above the fiberglass-mat boards, we tape all the seams so the base panels disappear into the wall. We then finish the walls with Benjamin-Moore's Scuff-X, a hospital-grade, low-VOC paint that comes in a matte finish and is super scuff-resistant. It not only resists marking but also cleans well, providing performance as good as or better than a semi-gloss enamel paint, which is what most people use for trim work. I especially like this solution because it saves considerable painting time not having to do all the setup, masking, and spraying for enamel work.

There is some extra time in getting the L-bead installed precisely, particularly around stairs. And we need to have our finish floors installed and protected before drywall. But overall, the cost of the invisible baseboard detail is a wash and often less expensive than wood baseboard.

Doug Cameron owns Render ATX, a design-build firm in Austin, Texas.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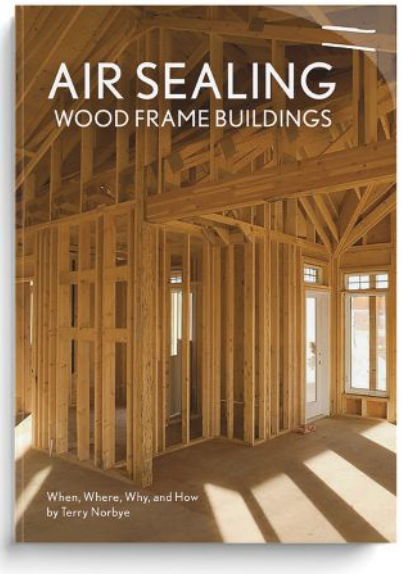
BY TERRY NORDBYE

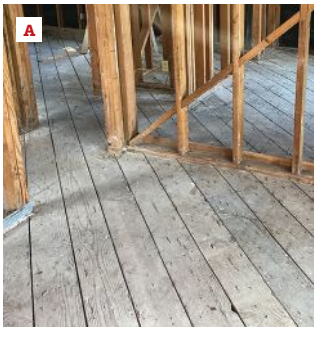
Air-Sealing Lumber Sheathing



Editor's note: Terry Nordbye's self-published manual, Air Sealing Wood Frame Buildings: When, Where, Why and How *(available on Amazon), is based on the author's 25 years of experience air-sealing old and new residential buildings and on the problems that Nordbye witnessed other contractors encounter with air-sealing buildings while he was running trainings organized by California public utilities. JLC is honored to serialize selections of this important work and shed light on techniques to improve the performance of some of the most challenging building enclosures in existing buildings. We began in the previous issue examining ways to air-seal homes with stucco exteriors and, in this issue, go deeper into methods to establish an airtight layer (ATL) on homes with lumber sheathing. The takeaway here is that carefully applying insights from Nordbye's work can reduce the air leakage and improve the energy efficiency and indoor air quality of just about any building.*

Houses built before the 1930s used "lumber sheathing"—a solid wood plank, typically 1x6 or 1x8—for subfloors, sidewalls, and roof decking. Lumber sheathing is typically associated with walls and roof decks. I use the word "planks" to describe it when it is used for subfloors. Plywood eventually replaced solid wood subflooring and sheathing. However, lumber sheathing was still used into the 1960s. Typically, the boards were installed diagonally, with intentional gaps between the wood planks.

Lumber sheathing has no air sealing properties. The gaps are unbroken runways for air to travel from one end of a house to the other. However, in a gut rehab, it is possible to air seal lumber sheathing. If you have full access to the top side of the subfloor and the bottom plates of all the walls, air sealing can be easy and conclusive.



SEALING PLANK SUBFLOOR

A. Subfloor is shown exposed.

B. Planks were covered wall-to-wall with 1/2-inch plywood.

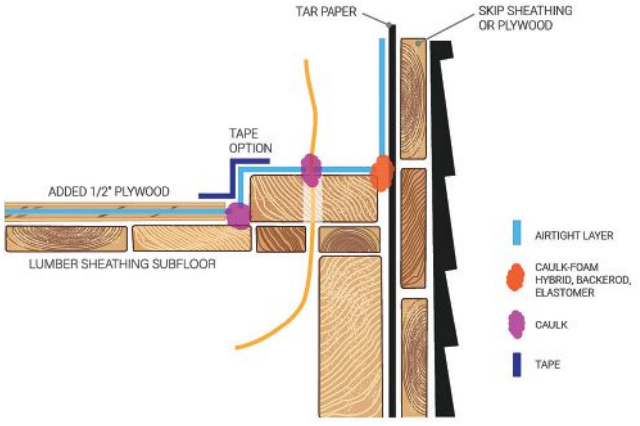
C. A 3/8-inch gap was left where plywood butts up to the bottom plate (white arrow) to allow super caulking (an elastomeric roof patch or equivalent) to fill it. Tape can be used instead of caulk. Note: "Sharpie" pen shows an unusually wide and deep gap behind the plate—too wide for caulk fill or elastomer, so canned foam was used with a flexible straw to reach down into the crevasse. Backer rod or stuffing could have been used in lieu of foam.

D. Wire holes and the 3/8-inch gap were sealed with caulk.

Photos by Terry Nordbye

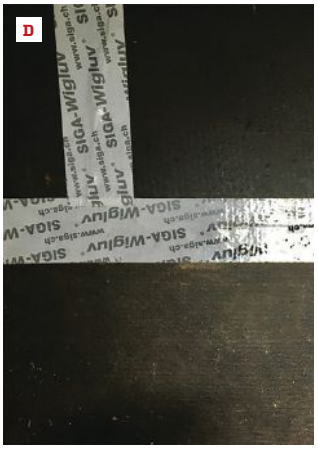
In most cases, the holes at the top of the bottom plate are considered secondary leaks. The primary leak is under the plate, where the hole punctures the subfloor. Sealing secondary leaks may not conclusively stop the air movement.

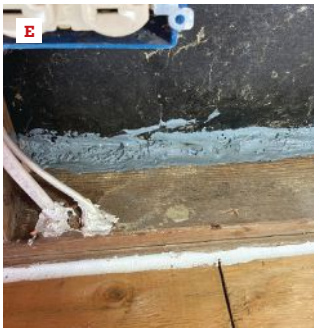
Air Sealing a Wood Plank Subfloor



LUMBER-SHEATHED WALLS AND ROOF DECKS

This pre-plywood 1958 house was entirely wrapped with solid lumber boards. Pictured below is the flat roof deck exiting over the top plates of the wall. The runways of the gaps will easily allow conditioned heated air to pass over the top plate and exit to the outside. Exterior fascia or trim boards will cover the leaks but do little to nothing to stop them.





AIR SEALING BUILDING PAPER FROM INSIDE

Air sealing seams in building paper may or may not have a high yield of air reduction, but it is definitely worth sealing these if you have interior access to the tar-paper seams.

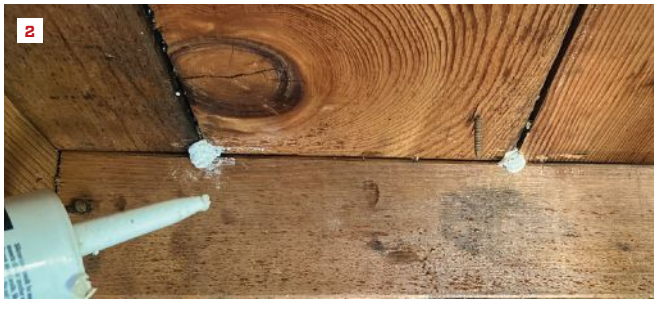
A. Caulk the open seams. In this case, the author is using a rubberized roof sealant.
B. If wood is behind the tar paper, staple the seams shut.
C. The white arrow points to fibered roof elastomer oozing out between the 30-lb. paper.

D. If stucco is behind the tar paper, you cannot use staples. Use tape to seal the seams. Note: Most "super tapes" (such as the advanced tapes made by Pro Clima, Siga, Partel, and others) will adhere to asphalt paper—test them overnight to make sure.
E. A silicone roof coating was brushed on top of the foam filler. If code requires a fire-rated material in wire holes, seal them with good elastomer caulk and squirt the top with a "token" blob of fire-rated gun foam.
F. Brittle tar paper broke off during demolition to expose wood shingles nailed onto skip sheathing. The tar paper would be the ATL.

Any breaks in the paper are direct primary leaks into the wall cavity. If the paper cannot be repaired and sealed, it might be time to "flash coat" all the wall cavities with a two-part spray foam (SPF).

SEALING LEAKS ABOVE THE TOP PLATE

Step 1. Drill 3/8-inch diagonal holes the depth of the wood planks.
Step 2. Fill the holes with caulk.
Step 3. Brush elastomer coating on all the seams of the end block. [See "Whole-House Liquid Air Sealing," Oct/17, for details on sealing with elastomeric coatings.]



PLUGGING LUMBER SHEATHING HOLES FROM THE EXTERIOR

If you can access the end cuts of the lumber sheathing on the exterior, you can effectively stop all the leaks from creeping up the edge of the plate into the wall cavity.

A. Lumber sheathing is shown exiting the building below the bottom plate and on top of the rim joist. Note the gaps between and on top of the lumber-sheathing subfloor because of uneven board thickness.
B, C. A 2 1/4-inch gasket on the face of the bottom plate and rim joist will stop air moving under and up between the bottom plate and exterior plywood/OSB as well as out from subfloor gaps. Gaskets are from Denarco.

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Simplified On-Site Stair Building

Making treads and risers in the shop and assembling the rest on site ensures quality and a perfect fit

BY NATHAN CLARK

You don't have to be a stair builder with a shop full of expensive equipment to successfully build great-looking stairs. Any carpenter with a working understanding of the fundamentals of finish carpentry and some patience can build a strong and attractive staircase on site.

I'm a carpenter in a small town where there's not much specialization in the residential remodeling world. This means that I have my hands on just about all of the carpentry needed in the remodeling projects that I build.

I recently had the opportunity to build a set of interior oak stairs for a customer. The design the customer wanted was simple and tasteful; the project provides a great example of how I approach building stairs.

MEASURE THE SPACE

First, I determined the overall rise and run of the stair. I measured the run from the start of the opening to the farthest point the stairs could reach into the hallway. To find the rise, I set up a horizontal laser level on a toolbox (the elevation of the laser level is arbitrary, so I set it up on whatever is handy), measured up from the finished floor at the bottom end of the run to the level, then added that measurement to the distance from the finished upper floor down to the level.

Next, I punched those numbers into a construction calculator app. The calculator provided all the relevant information for cutting the stringers: unit rise, unit run, number of treads and risers, angle of incline, stairwell opening, and stringer length. I like to write this information down on a scrap board that I hang onto until the job is done.

LAYOUT IS KEY

For stairs, I always create a story pole with each subtread, tread, riser, and the finished floors marked on it **(1)**. A fairly straight 10-foot 2x4 does the trick. I place this story pole in the stairwell to check my math, or I simply measure from the finished floor to finished-floor marks on the story pole to make sure the layout matches the overall rise measurement I took of the space.

Once I'm satisfied that the rise math is correct, I lay out the cuts on the stringer. On this project, I used LVL, a solid choice for stringers because it is straight, strong, and stable. Rather than rely on framing-square stair gauges, which can accumulate error, I use

Photos by Nathan Clark

By including all the necessary measurements on a story pole, the author created a layout tool and point of reference for the duration of the project **(1)**. He cut the first stringer and placed it in the opening to confirm fit and make any necessary adjustments. This stringer would be the template for the remaining two **(2)**.

the hypotenuse of the notch I'll be cutting to lay out where I'll place the framing square. To find the hypotenuse of the triangle, I just punch in the unit rise and unit run and hit the hypotenuse button on the calculator. Then, I add the hypotenuse to itself to establish the first mark and hit the equals button for each following mark. I align the framing square to the hypotenuse marks and trace the square. Once I cut the notches, I set the stringer in place temporarily to check my run math before using it as a template to lay out the remaining notched stringers **(2)**.

BUILD THE TREADS AND RISERS

I prefer to build treads and risers in the shop, as I did for this project, but they can be built on site if space allows. I ripped the subtreads to width from a good-quality, AC-grade plywood. Because the other trades would use the framed stairs before I applied the finished treads and risers, I added subrisers for strength.

For stain-grade treads, I prefer mail-order premade treads, which I used here, from a good stair-parts manufacturer; the oak treads at the home centers are usually littered with finger joints or repetitive veneers that are applied to a poplar core. I plowed a groove just behind the nosing on the underside of the treads and cut them to their final dimensions so that the finished risers and treads would protrude beyond the stringer by a minimum of 1/8 inch per side.

I made the stain-grade risers with 4/4 boards from the lumberyard. I cut them to their final dimensions, making sure the miter saw was dialed in as close to perfect as possible to avoid accumulating errors.

At this point in the process, I prefer to sand the treads and risers to a minimum of 180 grit, then prefinish them with stain (where applicable) and two coats of polyurethane. Once I had done that here, I preassembled the treads and risers in pairs using PL oil-based construction adhesive, followed by pocket screws and corner blocks to hold things square while the glue cured **(3, 4)**. The riser fit into the groove I routed earlier on the bottom of the tread; this negated

Each tread and riser pair was cut, glued, and pocket-screwed together. Reusable corner blocks kept each assembly square while the glue dried **(3, 4)**. After applying a generous bead of glue, the author fastened each tread and riser pair in place. Predrilling and using truss-head or washer-head screws helps prevent blowouts **(5, 6)**.

the need for a scotia/cove molding and ensured that the unit run would be exactly the same from tread to tread, even if the stringer cuts were a little bit off. I didn't preassemble the bottom riser and tread, however, because I like to scribe them to fit at the end.

ASSEMBLE THE FRAMING

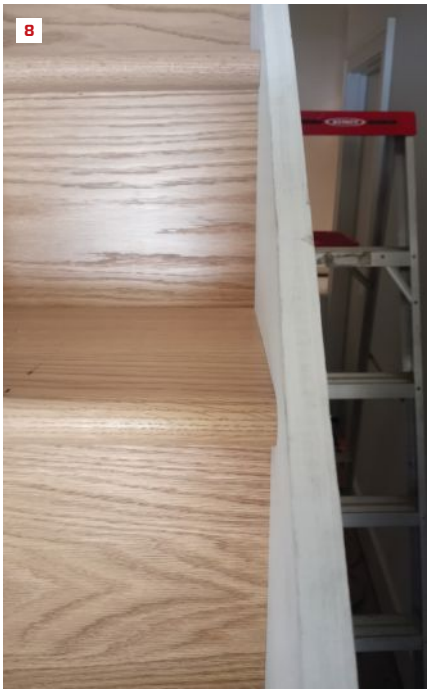
With the treads and risers ready to go, I put together and installed the framing assembly. I assembled it on the floor, using the subrisers and subtreads to keep everything square (temporary diagonals would work if you were not installing subtreads). I set the assembly into the stairwell and applied the subtreads flush to the outer stringers with PL adhesive and framing screws.

INSTALL THE FINISHED TREADS AND RISERS

Starting with the top tread assembly (not the landing tread), I glued the tread-riser assemblies down with PL **(5)**. I face-screwed each tread through the back of the riser, predrilling first to prevent blowout or snapped screws **(6)**.

Alternatively, I could have used a framing or washer-head screw, then blind-screwed the treads to the subtreads from below. And if you don't have subrisers, you can toenail through the stringers to blind-screw the riser to the stringers with a fine-thread pocket screw.

With this stair design, it made sense to install newel posts at this time. Lastly, I installed the lowermost tread.



The pants jig **(7)** the author created allowed him to trace out where the fasteners could be placed for a tight fit of the skirtboard **(8)**. This jig can be saved for future projects. With a lauan template placed on top of the riser, scored lines can be made to match the floor and tread **(9, 10)**. Using a knife to make the lines cuts the veneer, minimizing tear-out.

ATTACH THE SKIRTBOARDS

When the stairs are penned in by finished walls on both sides, I attach the skirtboard by toenailing through the underside of the nosing, which draws the skirtboard tight to the nosing. But since here I could access the sides of the stringers, I face-screwed the skirtboards directly to the end grain of the treads and risers. I used a pants jig **(7)** with a backing block to mark where to place the screws (the depth of the nosing determines how thick the backing block needs to be) **(8)**. I traced the risers and treads onto the back of the skirtboard, then predrilled and fastened the skirtboard to the treads and risers with countersunk framing screws.

BOTTOM AND TOP RISERS AND LANDING TREAD

With the stairs in place and both skirtboards attached, I could

With the story pole clamped in place, lines are plumbed to the wall cap and marked to the handrail **(11)**. By templating, the author could visualize the completed product before drilling finish material. Angle blocks and clamps kept drilling consistent for spindle installation **(12)**.

scribe and attach the bottom riser, top riser, and landing tread. I templated the space for these components using strips of lauan and a hot glue gun. For the bottom riser, I scribed the lauan strip that contacted the floor and then built the rest of template to fit the space. Next, I placed the template on the finish material and traced it with a sharp utility knife. Using those lines, I cut the riser to size for a perfect fit. I repeated this process as needed with the other components **(9, 10)**.

I glued the finished components in place and blind-fastened where I could. There are usually a couple of fastener holes to fill on the top riser and the landing tread, but I keep them to a minimum by toenailing through the top of the top riser and the back of the landing tread.

BALUSTRADE

As with the stairs, I created a story pole for the balustrade, with lines representing the thickness of the balusters at 4 inches on-center. I clamped the story pole at an angle so the lower newel post just barely hid the first baluster mark and the upper newel post (or termination point of the balustrade such as a wall) just barely hid the upper baluster mark. Then I plumbed down from the center of the story pole baluster marks and marked the wall cap (or shoe rail) **(11)**.

I drilled out the wall cap and underside of the handrail using angled guide blocks that I made from the stringer cutouts **(12)**. After starting the holes with a hole saw, I chiseled away some of the waste in the workpiece, then finished drilling the holes with a Forstner bit. An offcut from the handrail served as a guide block for drilling the hanger-bolt hole in both the newel post and the handrail. Then it was a matter of installing the hanger bolts, toenailing the handrail to the wall, and plugging all the holes. I trimmed the plugs flush and lightly sanded the handrail before finishing it with polyurethane to complete the project.

ON-SITE ADVANTAGES

Building a staircase on site is especially helpful if you don't have access to a local stair builder or if you are on a tight time line that local subcontractors can't meet. Site-built stairs with notched stringers, subtreads, and subrisers provide a safe, temporary staircase for use during a new build or a large remodeling project. At the end of the project, the subtreads and subrisers can simply be scraped and mopped clean before the finished treads and risers are installed. On a remodeling project, individual components are easier to stain and finish outside the customer's home, and these smaller parts are easier to move and scribe to fit.

Nathan Clark is a carpenter in Ithaca, N.Y.

JLC INTEL

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HUMIDIFICATION SYSTEMS: THE KEY TO PRESERVING WOOD FLOORING IN HOMES

Protect your workmanship with healthy humidity

Maintaining the beauty and longevity of wood floors requires more than just regular cleaning and care; it involves controlling the environment in which they exist. Humidification systems are essential in preserving wood floors by ensuring consistent moisture levels, which prevents common issues like warping, cracking, and gaps caused by fluctuations in humidity.

THE IMPORTANCE OF HUMIDITY CONTROL

Effective humidity control is crucial in ensuring the long-term success and durability of a home. Proper management of indoor moisture levels prevents issues such as structural damage and compromised air quality. Learn how you can safeguard the integrity of your work and enhance the comfort of future occupants:

- **Preserve Wood Flooring:** Wood expands and contracts with changes in humidity. In dry conditions, wood can shrink, leading to gaps, cracks, and warping. Conversely, high humidity can cause wood to swell and buckle. By maintaining consistent humidity levels with AprilAire Healthy Air solutions, the integrity and appearance of wood flooring can be preserved and structurally sound for years to come, protecting your investment and delivering quality results for your clients.
- **Enhance Comfort:** Proper humidity levels contribute to overall indoor comfort. Dry air can cause respiratory issues, dry skin, and static electricity, while excessively humid air can create a sticky, uncomfortable environment and foster mold growth. Humidification systems allow builders to create spaces that are comfortable year-round, no matter the external climate conditions.
- **Protect Health:** AprilAire Humidifiers can provide relief to those with respiratory conditions such as asthma and allergies, and AprilAire Dehumidifiers can prevent the growth of mold and dust mites, helping to create a healthier living environment.

BENEFITS OF HUMIDIFICATION SYSTEMS

Understanding and leveraging the advantages of humidity control can lead to more resilient homes and greater satisfaction for clients. Here are the key benefits that make humidification systems a valuable investment:

- **Energy Efficiency:** Maintaining proper humidity levels can contribute to energy efficiency. Humid air feels warmer, allowing homeowners to lower their thermostats in winter without sacrificing comfort, thus saving on heating costs.
- **Prevent Wood Damage:** For homes with wood flooring, humidification systems are crucial. They mitigate the risk of damage caused by humidity fluctuations, ensuring that the flooring remains stable and attractive over time.
- **Improve Indoor Air Quality:** Proper humidity reduces the spread of airborne viruses and allergens which creates a healthier environment for the home's occupants.
- **Protect Furnishings and Finishes:** Besides wood flooring, other furnishings and finishes, such as wooden furniture, paint, and wallpaper, can benefit from stable humidity levels. This protection extends the life and appearance of these items.

BUILDERS' GROWING RECOGNITION OF HUMIDITY CONTROL

Builders are increasingly aware of the importance of humidity control in constructing and maintaining healthy homes. Several factors contribute to this growing recognition:

- **Consumer Awareness:** Today's homeowners are more informed about indoor air quality and its impact on health and comfort. They seek homes that incorporate advanced HVAC systems.
- **Building Codes and Standards:** As building codes and industry standards evolve, there is a growing emphasis on indoor air quality, including effective humidity control. Builders are increasingly incorporating requirements from the International Energy Conservation Code (IECC), the Environmental Protection Agency's Indoor airPLUS program, ASHRAE 62.2 standard, and California Energy Commission's Title 24 into their projects.
- **Technological Advancements:** Recent advances in HVAC technology have resulted in units with increased capacity, superior sustainability, improved energy efficiency, and streamlined maintenance processes to make humidification systems more efficient, reliable, and easier to integrate into modern homes.
- **Market Differentiation:** In a competitive housing market, offering homes with quality HVAC solutions can be a significant differentiator. Builders who emphasize these benefits can attract discerning buyers looking for healthier living environments.

For builders, understanding the benefits of humidification systems is essential. These systems play a vital role in preserving the quality and longevity of wood flooring, enhancing indoor comfort, and protecting overall health.

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Opening Up Space

How much can you do without an engineer?

BY CHRIS DEBLOIS

As a structural engineer, I get questions from builders and remodelers about when I need to be involved and when they are safe specifying the work themselves. The most common context for this question is when a homeowner has asked the contractor to open up a load-bearing interior wall, maybe to replace a standard door with a large cased opening or to combine adjacent rooms into a single room with a flush ceiling.

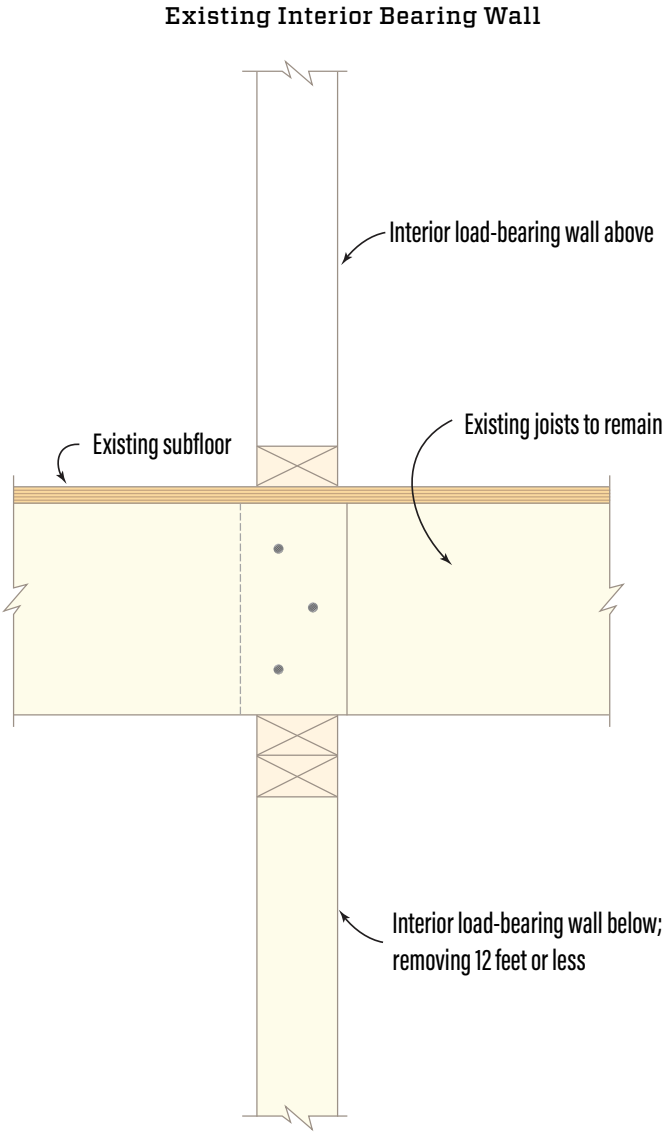
In place of the wall, you will have to specify a new beam with support posts at each end to carry the load to the foundation. You will need to make connections from the existing framing to the new beam and, in some cases, from the beam to supports to the foundation.

You will also need to consider the details of how and where to frame temporary supports to hold everything up during demolition and installation.

Of course this is a common, bread-and-butter framing problem. And in most cases, a thoughtful builder can easily handle it. However, several structural issues need to be considered, and there are situations where getting an engineer's help is a smart call.

Please note that the advice here is only for standard wood or engineered wood beams. If you're installing something else, such as a flitch beam or a steel I-beam, you will need an engineer to specify it.

Photos by Roe Osborn; illustrations by Ola Kwiatkowska



Existing situation. This section drawing shows a bearing wall to be removed to open up space. The illustrations on pages 43 and 44 show different conditions that dictate whether this job could be handled by a competent builder alone or should include an engineer's input.

WHEN YOU (PROBABLY) DON'T NEED AN ENGINEER

If you've been in the business a while, you know how to specify structural wood beams using span charts from the code or engineered lumber manufacturers. If the project is relatively simple, those charts (and your skills and experience) are all you'll need.

You likely will not have to call a structural engineer if most of the following conditions are met:

It's an interior wall. The loads that most interior walls have to support are less complex than those borne by exterior walls, and you rarely need to worry about lateral bracing for wind and earthquake loads.

It's a short span. A good guideline is 12 feet or less. The issue is deflection. Though 12 feet is not a magic number, anything shorter, in my experience, is rarely a problem.

The load will be uniform. The beam will not have to support perpendicular beams, braces, or other concentrated loads.

There's room for posts. If you can install jack and king studs at each end of the beam, and there's a clear and straightforward path to transfer those concentrated loads all the way to the foundation, you should be OK.

You don't have to cut the joists. If the new beam will be installed below the existing ceiling rather than embedded in it, the job is a lot simpler.

The foundation is stout. The posts that support the beam for the new opening will need to transfer their loads to existing grade beams or crawlspace piers.

There are no unusual restrictions. These could include limitations on beam depth or the fact that the homeowner or architect wants to use decorative materials, whether a non-rated wood species or some other material.

You're not drilling through the beam. Drilling should be limited to, at most, a few small holes for wiring.

There are no temporary support complications. Support should be a straightforward matter of building temporary walls on either side of the wall to be removed, as well as below them if there's a basement.

There are no non-technical demands. That means no permitting, zoning, or customer requirements for an engineer.

If nearly all those conditions are true,

then there's likely no need to call an engineer. Use the span charts to identify appropriate beam and support sizes, shore it up, cut it out, frame it in, and you're done.

WHEN IT'S WISE TO SEEK HELP

Although most jobs will be straightforward, there are situations where you will want to consult someone like me. Use the following complicating factors as a checklist to help you make that call.

This is a long list, but don't let it stress you. The most common situations that call for an engineer are the first two: long spans and flush beams with depth restrictions. The other ones are much less common, but you need the ability to identify them.

Long spans. For most beams exceeding 12 feet in length (and for all beams longer than 14 feet), you should run your plans by an engineer.

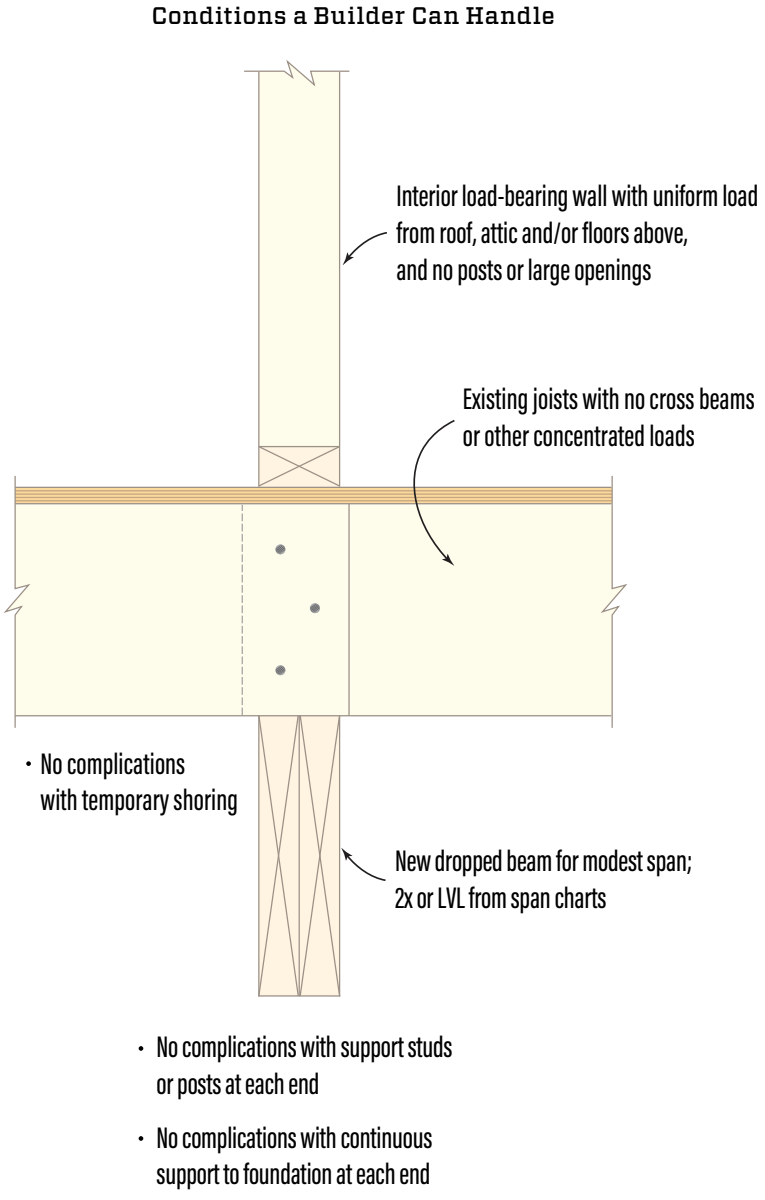
Depth-restricted flush beams. Say that you'll be recessing the beam into a floor system with 2x8 joists and that the span chart calls for an 11¼-inch-deep LVL. If you're OK with 4 inches of beam protruding below the ceiling, there's likely nothing to worry about. But if you want to create a flush ceiling by using multiple 1¾-inch LVLs side by side or perhaps a flitch beam or steel beam, an engineer should specify them.

Concentrated loads. These include cases where there was a post embedded in the old wall that supported a perpendicular beam. The new beam will have to support concentrated loads, and the needed calculations will go beyond the scope of standard charts. An engineer needs to specify the beam as well as the connections.

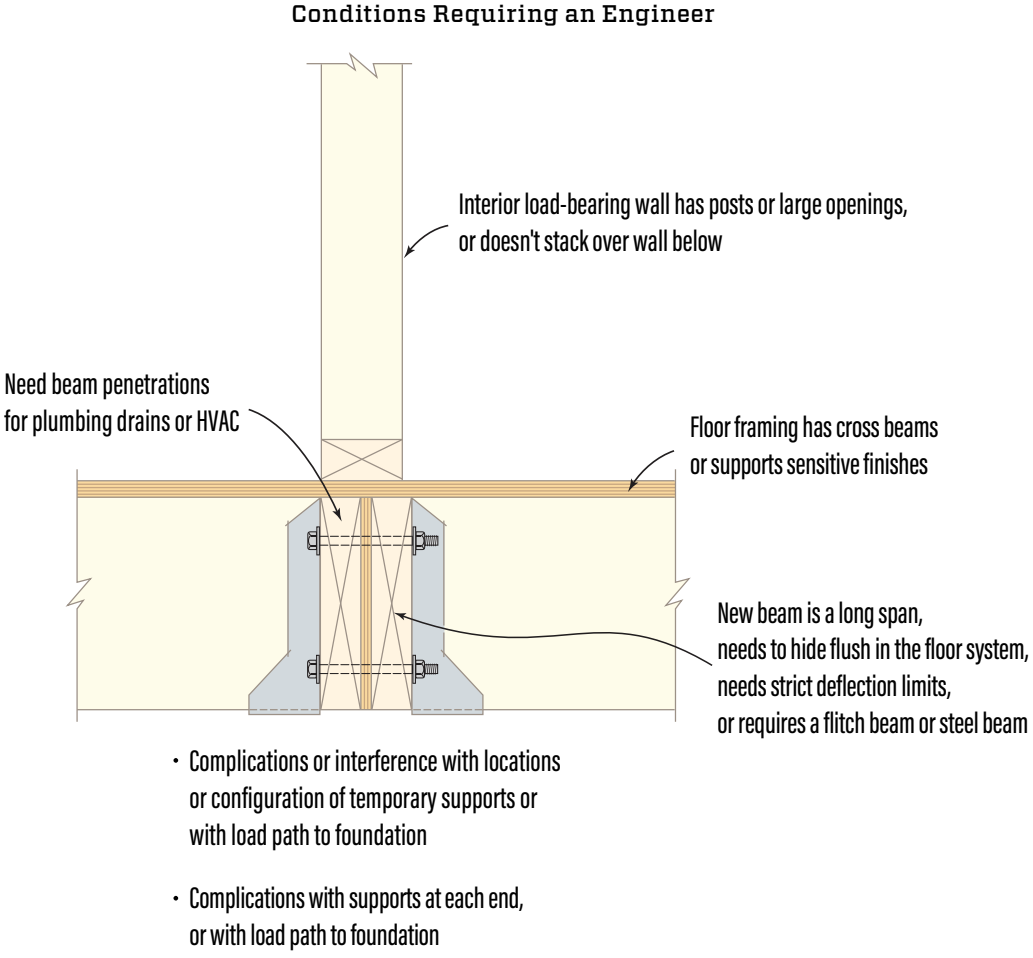
Load path questions. You will need an engineer if you don't have room to install simple supports at either end of the beam extending continuously to the foundation.

A simple load path is where the ends of the new beam sit directly on posts (whether solid posts or built-up 2-bys). To transfer the posts' concentrated loads down to the foundation or footing, you will probably need to add blocking in the depth of the floor system. If you have any uncertainty about how to do this, call an engineer.

You should also seek help if the load path is complicated and less direct. An example is where one of the new posts



Simple load path and span under 12 feet. In the scenario shown above, conditions make it relatively straightforward to define a clear load path to the foundation. In this case, the job can probably be handled by a competent builder.



Call an engineer. In this second scenario, the beam is embedded in the floor joists (a flush beam), and creating a simple load path is not possible. In this case, the builder should seek guidance from an engineer.

lands directly above a basement feature—whether a furnace closet or a countertop in a finished space—which means you'll need to install a beam down there to transfer the concentrated load.

You can't get to the foundation. Let's imagine that there's no clear way to transfer a post's load to the foundation and that your only option is to install a post below the floor system that bears on a 4-inch basement slab—or perhaps on dirt, in the case of a crawlspace. Most contractors will dig and pour a new footing (which includes jackhammering a hole in the slab if there is one). It sounds straightforward, but you should consult an engineer on the required thickness and steel reinforcement.

Unusual restrictions. If the span charts specify a deep beam that won't leave enough headroom, if there's an architectural preference for an exposed timber beam, or if the clients want anything other than a standard beam from code or from manufacturers' span charts, call an engineer.

While we're on the topic, do yourself a favor, and don't let clients talk you into cedar beams. Cedar is a relatively weak structural material, and it definitely won't last as long in an exposed environment as you hope it will. Instead, find better alternatives. Cedar is wonderful for decorative elements, but not for structural members that bear significant loads.

Holes may be needed. If you anticipate wanting to make plumbing or HVAC penetrations through the beam, my advice is this: Don't do it! Yes, the code and manufacturers' literature have guidelines for drilling through joists, but those guidelines don't work for beams. In fact, anything other than a 3/4-inch-diameter hole for wiring should be specified by an engineer.

Deflection limits. Standard span charts generally won't cover situations with stricter-than-usual deflection limits.

For instance, above the beam may be a bathroom with wall or floor tiles that you want to make sure won't crack. Or you may be installing an accordion or sliding door system with requirements for limited deflection in the supporting framing (these doors are rare on interior walls, but not unheard of). In either case, call an engineer.

It's an exterior wall. For new openings in exterior walls, you'll generally need to think about not only how to hold up the weight above the new beam but also how the new opening affects the lateral (wind and earthquake) bracing of the house as a whole. In this case, there's more to it than just the new beam and supports. Call an engineer.

Tricky shoring conditions. This is the same issue as I covered above in load path questions. On most jobs, you can just build temporary walls, sometimes stacked at multiple floor levels, to hold things up while you remove the existing bearing wall and install the new beam and supports. If for some reason you can't do that, such as when you have to bridge over an obstacle in the basement, call an engineer.

Non-technical considerations. Even if the construction issues are straightforward, you may still want or need to bring an engineer on board.

Your local building department may require an engineer's plan or report to specify the work. Or it may require an engineer's letter signing off on the completed work, in which case that engineer will almost certainly want to specify it in the first place.

Removing part of an interior bearing wall to create an opening less than 12 feet long with a direct load path to the foundation is a straightforward condition that most competent builders can handle on their own. However, on the job shown here, an engineer provided by the LVL supplier verified the beam size and bearing requirements—welcome guidance for the builder.

Bringing in an engineer may also make sense to satisfy the owner's concerns. Owners often don't understand what's involved in specifying the new structure, and they sometimes imagine that the work is more complicated than it is. Bringing on an engineer can assuage that anxiety.

Sometimes, an owner or real estate agent will insist that you include an engineer so that when the house is sold, they can show a potential buyer that they've made the renovations in the most thorough way possible.

THE BOTTOM LINE

I want to repeat that there are a lot of projects where an engineer is not necessary. An experienced contractor can handle most jobs that include removing an interior wall without seeking outside help. But if you've been through the checklist of potential complications above, and you find that one or more apply, call an engineer.

Finally, remember that homeowners call you because they want their projects done well and because you're someone who specializes in exactly the kind of work they need. For the same reasons, it may make sense to hand off the structural analysis to a specialist. This frees you to focus on those parts of the project you're really good at. Let the engineer take responsibility (and liability) for the parts he or she is trained for.

Christopher DeBlois, PE, is a structural engineer and principal at CFD Structural Engineering in Roswell, Ga.

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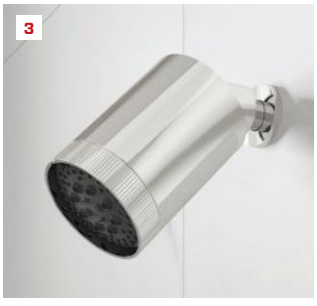
BY VINCENT SALANDRO

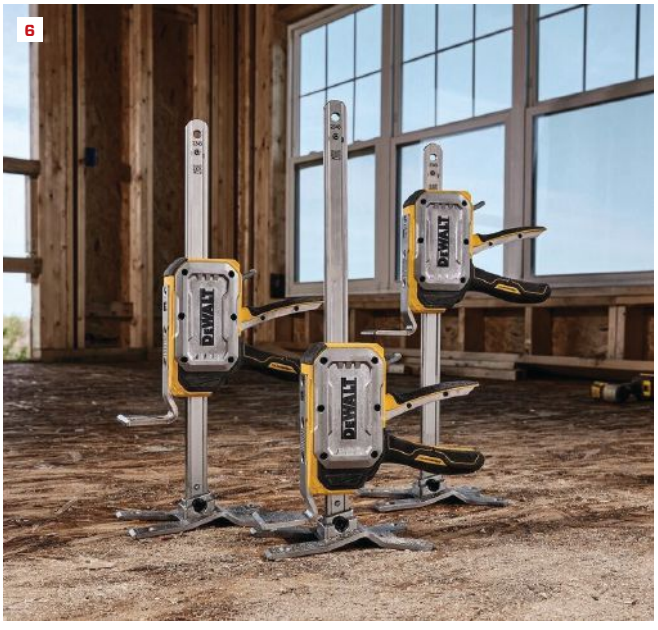


1. Smart Door Lock
Designed for retrofits, Alfred International's Alfred ML2 Smart Mortise Lock can be installed to upgrade most standard mechanical mortise door locks without replacing or rekeying them. Bluetooth connectivity is standard. The touchscreen integrates with the Alfred Home App to allow users to remotely monitor and operate their lock; the manufacturer claims that encryption and tamper-proof technology protect against unauthorized access. The ML2 integrates with smart home systems, including Amazon Alexa and Google Assistant. Pricing starts at $650. alfredlocks.com

2. Adjustable Latch Hardware
True to its name, the Adjustable Latch in Baldwin Hardware's Estate line allows installers to adjust the backset distance between 2 3/4 and 2 3/8 inches and switch between knob and lever strengths. The latch rotates 28 degrees and includes a privacy spacer. It's available in 13 finishes. baldwinhardware.com

3. Multifunction Showerhead
California Faucets' solid brass WaterSconce multifunction showerhead has rain, air, and massage settings and self-cleaning rubber jets. A textured edge detail, either knurled or lined-coin (pictured), supplies an ergonomic grip for switching between functions. The maker says a quick-connect fitting makes the showerhead easy to install. Pricing starts at $1,600 for a polished chrome finish. calfaucets.com

4. Fusion-Welded Vinyl Windows
Sovereign fusion-welded vinyl replacement windows from Alside promise users comfort and energy savings. All seven styles—double hung, bay and bow, sliding, awning, casement, and garden windows, plus sliding patio doors—feature Quad 4 fin seal weatherstripping and a network of airtight insulating chambers to help keep indoor temperatures consistent. Sashes on double-hungs tilt in for cleaning. The windows can be upgraded with an energy-efficient ClimaTech Prime insulated glass package, which includes three panes of low-E glass, argon gas fill, and a choice of several configurations of warm-edge spacers. alside.com



5. Brass Pull-Down Faucet
Minimalist in design, the Seager solid brass pull-down kitchen faucet from Newport Brass incorporates numerous features, including a dual-function spray head that can supply a steady stream or a spray at a maximum flow rate of 1.8 gallons per minute, magnetic docking for the spray head, and an ADA-compliant lever handle. The deck-to-spout-outlet height is just over 10 1/2 inches, while the spout reach measures 8 1/2 inches. More than 20 finishes are available, with prices starting at around $930. newportbrass.com

6. Heavy-Duty Construction Jack
The heavy-duty, hands-free ToughSeries Construction Jack from DeWalt has a capacity of up to 340 pounds and a lift height of 8 3/4 inches. Features include a step-to-lift handle that can alternatively be hand-squeezed, fine-tune adjustments, and a no-load release button. A slim, tapered base allows access underneath the workpiece and has countersunk holes for additional flush-mount support. The jack costs approximately $120. dewalt.com

7. Low-Slope Roofing Base and Cap Sheets
IKO revamped its Roof-Fast Base and Cap sheets for the U.S. and Canadian markets to come in full squares instead of short square rolls, aligning with how roofers measure and estimate materials. The self-adhering base and cap sheets are constructed of a reinforcing mat of nonwoven glass fibers and, when paired together, provide multilayer coverage on low-slope roofs. The cap sheets, which have a granule finish, can also be used alone. iko.com

8. High-Tech Borescope
For taking photos and videos of hard-to-reach places, a borescope is the tool of choice. Klein Tools' Utility Borescope features a compact, water-resistant 5.5mm gooseneck camera with 720p resolution surrounded by six LEDs adjustable to four brightness levels. The 4.3-inch color LCD screen has 854x480 resolution, 3x zoom, and 180-degree view rotation. A case, a 10-foot nylon USB-C detachable snake, and magnet, hook, and mirror attachments are all included. Users can transfer photos and videos via the USB-C interface. A self-storing kickstand can be extended to free up both hands. The borescope sells for around $100. kleintools.com

9. Long-Lasting Sealant

For applications ranging from exterior walls to windows and doors, the solvent-free and low-VOC SuperiorShield SMP Sealant from Master Wall is formulated to adhere to common building materials and resist UV exposure and weathering while remaining flexible. The paintable sealant is available in eight colors. masterwall.com

10. Multiuse Plastic Cap and Staples

Webcap collated plastic caps and galvanized 18-gauge staples can be used to secure synthetic underlayment, housewrap, roofing felt, lumber wrap, and foam board. A reversible design makes them compatible with all strip-cap pneumatic staple tools, both offset and inline, according to the manufacturer. Staples have 7/16-inch crowns and are 7/8 inch long. Caps and staples are available in the U.S. and Canada from the company's website or Amazon. A 2,000-count box (10 reels of 200 caps and 20 strips of 100 staples) runs about $45. webcap.us

11. Easy-to-Use Ladder Leveler

Once installed to the legs of a 225-lb. Type II or 375-lb. Type IAA duty-rated Werner extension ladder, Werner's PK100 LevelSafe Pro Automatic Leveler automatically levels the ladder up to 8 1/2 inches when it's placed on uneven surfaces, according to the manufacturer. If the ladder shifts after being placed on soft ground, the accessory enables users to make fine modifications without lifting or repositioning the ladder. Included are two ladder levels (one per rail), mounting hardware, a template, and instructions. Users can disengage the micro-adjustment function by rotating the handles 90 degrees and find level manually with the included bubble level. We found it online for $200. wernerco.com

12. Multipurpose Woodgrain Surfaces

Wilsonart Woodgrains engineered high-pressure laminate surfaces are designed to look like wood and can be used in a variety of residential applications, including countertops, wall panels, edges, and cabinetry. The collection is available in panoramic 5-foot-by-12-foot or 4-foot-by-8-foot sheets that display no repetition across their full length and width. Surfaces are fabricated with an average of 23% post-consumer recycled content. wilsonart.com

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New Tools and Storage at Makita Power On Event

BY MARC FORGET

Would you like to participate in an inaugural two-day event talking to others in the industry along with playing with tools? That was an easy yes for me! The Power On event was held at Makita's new training and distribution facility in Flowery Branch, Ga., this past October and was the first time Makita allowed anyone outside of the company into the space. Makita has always been a little different from other tool manufacturers in its approach: not the flashiest or the trendiest but always focused on engineering.

Watching presentations and talking with product specialists was informative, but what struck me was the constant attention to end-user details. A belt sander wasn't simply made cordless, the battery weight was placed to balance the tool and aid in its use. A new cordless framing nailer had power and runtime improvements but also an enlarged grip and trigger a gloved hand could operate easily. The new battery storage and multiport charging system was thought-out with the intended heavy-equipment user in mind, allowing dozens of batteries to be charged without overtaxing circuits. Tool and battery security was addressed with a simple add-on that will hopefully impede expensive investments from "walking off site."

This attention to the user particularly showed in the unveiling of Makita's brand-new modular storage system, the Maktrak. Though not the first in a crowded market, it's an entrant that prioritized function from the ground up with user-driven research. The large bins hinge in two directions to allow access from either side—now, reaching over into the truck bed to retrieve a tool won't be such a chore. Handles and latches are oversized for gloved hands. Small-parts cases seal each bin, so no more mixed screws in transport. Instead of deep boxes in which tools become buried at the bottom, long, shallow bins allow longer items like clamps and levels to be stored and accessed. Uniquely, the roller base bin fits a tonneau-covered truck bed, with a pull handle that doubles as a lever for easy lifting off a tailgate; no more Olympic dead lifts of your toolbox out of the truck at the start and, worse yet, end of the day. All of this, in a first for Makita, is fully designed and manufactured in the United States.

These are casual observations of a grateful guest at a well-run event. I'm looking forward to collecting and running objective, real-world reviews of these and other, not-yet-released new (and some unusual) products in upcoming *JLC* issues. Keep an eye out for them in the future.

Marc Forget is an associate editor at JLC.

Photos: Marc Forget

Makita's entire lineup was on display at its training facility in Flowery Branch, Ga., in October **(1)**. Among the newly released products was the Maktrak storage system **(2)**. Look for a review in a future isssue.

Milwaukee 18-Volt ½-Inch Router Kit

BY NATHANIEL CARLSEN

I spent last winter pattern-routing through what felt like miles of 3/4-inch plywood with a guide bushing on a Makita 1/4-inch cordless trim router. Even with a router table available, this little Makita has been a constant and efficient companion, always ready with a roundover or a different dado setting. However, I have been pushing it beyond its recommended use; videos of carpenters running a trim router through actual miles of wall sheathing tell me I'm not alone in this practice. Over the past few years, the cordless router has become a go-to option for many carpenters, though I suspect they've been wishing for a little more "oomph." Now, having spent a good deal of time with a Milwaukee Fuel 18-volt 1/2-inch router, I can say with confidence that our need has been answered.

I first used the Milwaukee to rout a set of maple housed stringer stairs using a top bearing bit with a plunge base (the kit I reviewed includes a plunge base and a fixed base, router, charger, and one battery). The router had plenty of power, and I never felt like it was holding me back. In fact, it had enough power to snap several 1/4-inch collet bits; for demanding uses, 1/2-inch bits are a must. Depth adjustment was a breeze with the macro and micro adjustments working well. Visibility was excellent, aided by two bright LED lights shining down from the router body. Dust collection was both effective and easy to attach using the included hose adapter.

The only downside to using this router for these stairs was that the battery drained quickly because of the hardwood. If we had a second high-output battery on site, this wouldn't have been a problem. The battery charges quickly, gaining most of its bars in the time it takes to buy a sandwich and some wood glue up the street, but it's a limitation for those not already on the Milwaukee platform.

There's more to like, too. The router bit can be locked using either one or two wrenches, allowing quick bit changes and tight setups, depending on the circumstances. The router switches on and off easily, and the bit brake is swift. The included sub-base is compatible with guide bushings. The fixed base features a hand strap that I can't believe I haven't seen on a router before. The tool's ability to accept both 1/4- and 1/2-inch bits gives users access to every router bit imaginable.

Not included in this kit was a guide rail adapter, which is an ideal accessory to maximize precision. The router would be perfect for use in a jobsite router table and ideal in a shop as a secondary option.

The primary virtue of this router shone through once I threw the edge guide on the plunge base and used the router to dado slots in pine plywood for workbench drawers. The router is comfortable to use. The plunge-base handles are perfectly shaped for maximum control. It's well-balanced and heavy enough to sit firmly on the workpiece but light enough to hold one-handed. With an extended edge guide, I could run the dado all the way through the workpiece, flick the power, grab the next piece, and keep going. At that moment, the router felt more like my favorite circular saw than a router ever has.

The Milwaukee 2838-21 18-volt 1/2-inch router kit sells for $600. milwaukeetool.com

Nathaniel Carlsen is a carpenter with TDS Custom Construction in Madison, Wis.


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With comfortable handles and good balance, the Milwaukee Fuel 18-volt router proved easy to control in demanding hardwood **(1)**. Seen here with the guide attachment, the router is well suited for accurate repeat mortises **(2)**.

Photos: Nathaniel Carlsen

DeWalt ToughSystem 2.0 20-Volt Charger

BY MARC FORGET

For years, my batteries and chargers lived in a toolbag that I carted from job to job. I like having batteries all together because it keeps me organized and up on charging. It also makes it easy to bring them inside when it gets too cold. The problem with the bag was that the charger cords would often get tangled and stretched, and the battery ports would get dusty from being open and battered about. Also, the open bag ended up being a catch-all for items that shouldn't be there. So, when I saw the DeWalt ToughSystem 2.0 DWST08050 dual charger box, I thought I would have a look.

This ToughSystem compact box contains a dual charger and storage for 20-volt and 60-volt batteries. I mix my load-out of batteries to suit my needs, but the capacity is six 60-volt batteries or 12 standard 20-volt batteries. Everything is in one place, neatly lined up and protected from dust while the batteries charge (kept cool with a built-in fan). For charging other items, like a phone or earbuds, it has two built-in USB ports: a USB A on the inside and a USB C in a dust-protected port on the outside. The power cord is neatly stowed on the back of the box on retaining hooks and, at 6 feet long, has plenty of reach.

It's a clean setup that lets me have a range of battery sizes that can all be charged in one spot. The charger is not a fast one, however, and it can take an hour or so to charge a 9-amp, 60-volt battery. Is it much better than what I was running with before? Yes. Batteries are securely stored, easily reached, portable, and checked and charged in one spot. It retails for $200. dewalt.com —*M.F.*

With the DeWalt ToughSystem Charger box open, you can see the storage space and the protective lid prop at right.

Photos: bottom left, Marc Forget; top right, James Burgess

Makita Lantern Radio

BY JAMES BURGESS

The Makita GRM04 (MR010G in Canada) 40V Max XGT Cordless Lantern Radio with Bluetooth, and flashlight (see photo, left) packs a lot into a compact design. The radio boasts full sound with good overall reception range thanks to the protective housing around the lantern's lens, which doubles as an antenna. When I ran just the radio starting with a full charge, it played for four work days. Runtime was shorter when I used the Bluetooth and the light functions, but it still outlasted other cordless radios on the site. On a site full of cordless tools, it's nice not having to worry about replacing the battery on one of them, at least for a while.

The connection range for Bluetooth and sound quality are quite good for the lantern's compact design. According to Makita, the range is 33 feet, which is plenty if you are on the floor above or below where the lantern is. The included strap with hook was convenient for hanging it. For the majority of the time I had the lantern, it was suspended just above my miter saw station, which typically is the most open location in a house when you're cutting trim, lending itself well to the lantern's 360-degree sound and light output. However, the LED bulb doesn't get hot, making it safe to hang or place next to walls. The design and light function lends itself well to camping—since you can change the light to amber or use it as a flashlight or strobe—as well as holding up against its competitors on the jobsite.

The built-in USB charging port saved my day, too. While I was traveling out of town for a job in a remote area, my phone died from constantly searching for service. I was in an older vehicle with no charging port, but the lantern had my back, charging my phone in no time; the battery charge still lasted for the next two days, blasting music.

Overall, I had a positive experience with the lantern. For someone already using the 40V Max XGT line of tools, this is a no-brainer, with a purchase price of $170 (bare tool)—a small price to pay for this tool's portability, durability, and quality. makitatools.com

James Burgess is a carpenter and cabinetmaker in Ottawa. Follow him at @jbcwoodwork.

Badger Carpenter Toolbelt

BY TIM UHLER

"Spend good money on a mattress and shoes. If you aren't in one, you're in the other." That adage makes a lot of sense, especially as we get older. As someone who has worn a toolbelt for 30 years, I would argue that the same wisdom applies to toolbelts.

My first rig was an Occidental leather belt in the '90s that I inherited when my dad bought new belts for his crew. I wore that for years, then had, successively, an Occidental 9515, a Diamondback Raptor, a Diamondback Denali, and a Diamondback Grande. They all had features I liked or disliked; mostly, I want something lightweight, with no unnecessary pockets but with large open pockets for easy access.

This brings me to Badger toolbelts. Full disclosure: I am now friends with Joel Thomas, the designer and maker of the Badger toolbelts. I had reached out to him in 2015, when he owned Diamondback and I reviewed the Raptor rig. Some time later, I saw on Instagram that he had started Badger and a friend of mine, Joe (@ CanadianCarpenter), was wearing the bags. I talked to Joel about making an "Awesome Framers" version of the bags, but he was so busy making the bags himself and filling orders that it took three years for us to get a rig together. I didn't know at the time that he had previously made Diamondback bags, and that he was the guy who sewed the Badger bags.

I wanted something minimalist, without extra pockets for tools I don't need to carry, and I wanted access to fasteners. I had Joel make a few modifications to the Carpenter toolbelt. I went with a 4-inch belt (I've never liked the feel of a 6-inch belt). I raised the hammer sleeve to make it easy to pull my Martinez M1 when I'm bent over, and I shortened it, so the hammer never gets hung up. I also asked for a cat's-paw sleeve on my left. I use it a lot, and in this location, it never gouges the back of my leg. This is a perfect setup for me for framing, foundations, and siding. There is not one thing I would change. It was obvious to me that Joel took what didn't work at his previous company and fixed it, and then improved the bags. Four years later and my bags look like they have many more years left. The Carpenter setup starts at $400 at badgertoolbelts.com, with many options both in style and layout.

Tim Uhler works for the family business, Pioneer Builders, in Port Orchard, Wash. Watch his many reviews and instructions on YouTube under AwesomeFramers.

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The pouches on Badger's toolbelt stay open and are large for easy access but not so deep that items become buried **(1)**. The padded belt helps keep the wearer comfortable while working **(2)**.

Photos: Tim Uhler

Jag Masonry Clamps

BY JOHN CARROLL

One of the fascinating things about our profession is that, along with laser levels, cameras that scan inside sewer lines, and other 21st century marvels, we work with simple tools that have been around for centuries. The humble string guideline, used by ancient Egyptian, Greek, and Roman builders, is an example. Carpenters routinely use one to straighten walls, and masons follow a string line for just about every course of bricks or blocks they lay.

Before they can follow a string line, however, these craftsmen must set it up. This typically entails anchoring one end of the string, stretching it tight, then anchoring the other end. In addition, they must set it in exactly the right position, and they need to do it quickly.

Carpenters use nails or screws as anchors, learning how to drive them in the right spot and angle. Masons don't have it so easy. In addition to the difficulty of driving a fastener into masonry, there's the problem of marring and chipping the surface. To avoid these problems, masons usually use line blocks. These hook either on the outside of a "corner lead" they've built using a level or on a square story pole they've set up. The line blocks at each end are held in place by tension created when the masons pull the line tight.

While line blocks are precise and easy to use, they don't work for pulling a line from an inside corner, where there's nothing to hook them to. I've acquired numerous line-holding accessories and come up with a variety of makeshift solutions. One of the best has been to attach a line to a block of wood and clamp the block in place. It worked but was clumsy and took too much time.

The Bon Tool Jag Clamp employs the same principle, but it works a lot better. It clamps to the face shell of cored blocks or the width of a brick. The clamping mechanism is a strong spring clamp, so it sets up quickly. Attaching a string line to the clamp is easy; you simply wrap a couple of turns around a tapered rivet that serves as a cleat. When set, the string lines up precisely with the edge of the brick or block. This is a special-purpose tool, but one that one that masons working from inside corners will use repeatedly as they work up a wall. They won't use it every day, but when they do, it will be handy.

Bon Tools makes two Jag Clamps: the 21-290 and the 21-291. The 21-290 is limited to clamping to surfaces that are 1 1/2 to 2 inches in width, which is great for most CMUs (concrete blocks) but doesn't work for bricks. The 21-291 is adjustable and can clamp over surfaces 5/8 inch to 5 1/2 inches wide, including the face shell of standard CMUs or the width of bricks.

A pair of 21-290 Jag Clamps costs $26. A pair of the 21-291 adjustable Jag Clamps costs $39. I've found that the extra money for the more versatile 21-291 is well-spent. Although it's primarily a masonry tool, carpenters might put it to use for tasks like straightening floor joists or rafters. bontool.com

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

With its spring grip, the Jag Clamp is easy and quick to set up and reset **(1)**. The adjustable model is at right **(2)**.

Photos: Matt Navey

BY CLAYTON DEKORNE

Cooking for the Crew

Recently, I shared with my team my dad's trick of using baling wire to secure cans of Van Camp's Pork and Beans to the manifold of our work trucks. The paper labels were first removed from the cans, of course, and we had to open the cans and eat from them wearing work gloves. But that didn't matter. We had hot lunch.

That trick works on the '50s-era trucks my father favored but not so well on modern vehicles. "Today, when you look under a hood, all you see is plastic and metal shields covering an engine," remarks Rhode Island builder Mike Guertin. "The '50s and '60s trucks had so much room around the motor, you could practically roast a whole hog off a straight-six manifold."

Guertin once rigged up a 55-gallon drum with one end cut open and a piece of 6-inch duct as a short chimney at the other. "Stoked with cutoffs (no precut studs at the time), we'd keep it going all day during winter. At breaks, it kept us warm inside and out. [We'd cook] grilled sandwiches, foil-wrapped potatoes in the coals, hot soup in an old pot or a can resting on top the woodstove."

Guertin also introduced us to the "microdash"—an oven of sorts that a crew member he once worked with made out of a piece of foil-lined lumber fit between the dashboard and windshield. With his windshield facing south, this crew member would heat up whatever he'd packed for lunch, Guertin recounts. "Usually a sandwich but sometimes soup. He'd put his food and left-over morning coffee in the 'microdash' an hour before lunch and enjoy a hot meal, provided the sun was shining."

Pennsylvania builder Mark Clement is adamant about preparing healthy, hot meals for work. Clement argues his body is the best tool he owns, and he recalls former *Tools of the Trade* editor Rick Schwolsky's comparison of career builders to professional athletes. When you're in it for the long haul, it's wise to watch your diet, Clement urges. "Pasta, bagels, salad dressing … They're the reason that bending over becomes a Herculean experience," he quips. "Eggs. Meat. Fruit. Vegetables. That's firepower …"

"I just spent three weeks on the *Extreme Makeover: Home Edition* set as a project manager," Clement adds, "and while craft services [the department on a film set that provides food and drinks to the cast and crew] existed, it was just OK … Brownies are fun, but my shift is 14 hours. Food is fuel."

Back in his home state, Clement "cooks" on the jobsite in a small food warmer **(1)**. "It's a soft-sided insulated bag with a heating element inside," he explains. "By placing the meal in a glass-bottom storage container with a snap-on, gasketed plastic lid, I plug that puppy in when I get to work and, in a few hours, I have piping hot food."

To make that work more efficiently, Clement "meal preps" once a week at home. "I can make eight to 10 meals in the exact same time it takes me to make one. I box them up and yank one out of the fridge as I walk out the door."

Missouri builder Jake Bruton and crew regularly lean on a hot plate to wrangle up hot lunch. A companion to the hot plate in his jobsite kitchen is the cooler one of his project managers made out of scraps of Zip System R-Sheathing **(2)**. This has worked so well, that project manager now assigns making a Zip R cooler to all his new hires. It doubles as a skill-building exercise. How cool is that?

Photos: 1, Mark Clement; 2, Jake Bruton

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