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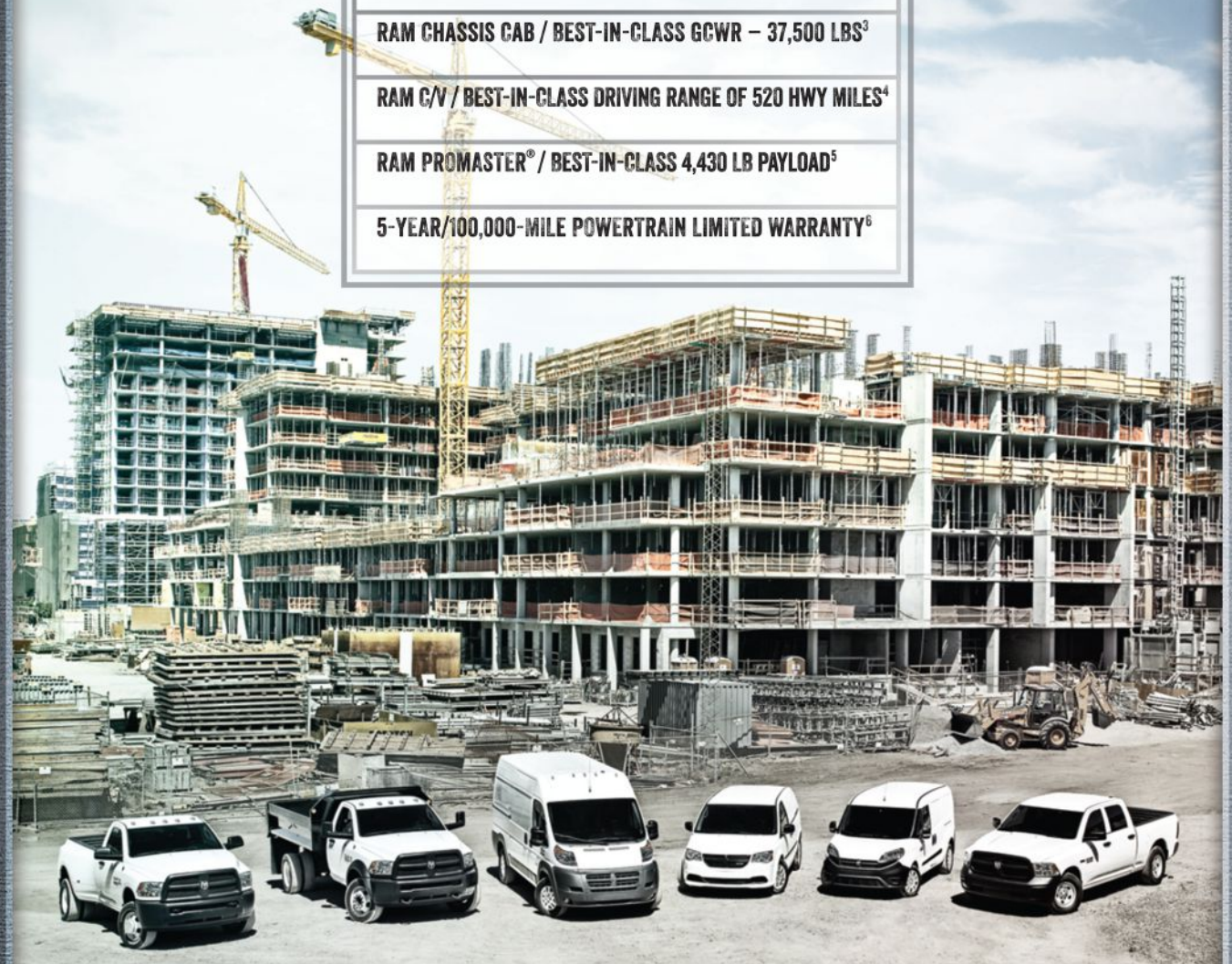

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On the cover: Tile installer Tom Meehan, of Cape Cod Tileworks, sets the tile-top strainer into place for a linear drain in a shower that is part of a home remodel in Harwich Port, Mass. Photo by Roe Osborn

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"IS A CONTRACTOR REALLY A SALESPERSON IF HE OR SHE HITS SEND?" BY SHAWN McCADDEN (ONLINE, 9/17/14)

I disagree [with the article's conclusion], from a small restoration company's perspective. I will email proposals to prospective clients and have done so for years. It is fast and efficient, and allows both the client and business owner to look over the proposal for any desired changes, omissions, missed items, etc. As I am the person who actually performs the work, it is easy for me to produce an accurate proposal for a given project and it is usually very accurate and contains everything the client and I had discussed on my primary visit. If changes are desired, then I will make another trip out to review the changes the client wants and revise my proposal accordingly. *—Mike LaBelle*

"ON THE JOB: STRAPPING CEILINGS," BY MATTHEW ANDERSON (SEP/14)

In [this article], I'm wondering if there would be a problem with cold return-air jumping joist bays. More importantly, is there a problem with fire containment? *—Mike Blumer, Wexford, Pa.*

JLC editors respond: On the issue of air returns, the joist cavity would have to be panned before strapping is installed. But—and this is an important "but"—you should never be using joist cavities as any type of HVAC return plenum or supply duct. The reasons are spelled out in detail on page 17 of this issue, where Jeff May explains the many problems with panned joist bays.

On the issue of fire containment, we went to Glenn Mathewson, a building official in Westminster, Colo., who responded as follows:

"There are limitations on the size of the floor/ceiling assemblies when using open-web floor trusses or furred ceilings below. The maximum area is 1,000 square feet before draftstopping is required. Many fire-resistive floor/ceiling assemblies require metal channel, instead of wood strapping, to attach drywall to. Metal channel is also used for sound mitigation.

If you're using wood furring strips, and the ceiling area is more than 1,000 square feet, it's easy to draftstop along a joist by putting strips down the length of the joist in between the main strips."

Mathewson is careful to note that "draftstop" has a specific meaning, and is different from firestopping and fireblocking.

Fireblocking is for wood-frame construction in concealed locations only. It is used to separate different portions of building assemblies so that fire and smoke can't travel through the house structure. Common examples in a house are the blocking that separates stairs from floors, floors from walls, and walls from attics.

Firestopping is used in any construction to protect a penetration in a fire-resistive assembly. For example, in a 1-hour wall between apartment units, any penetration of the membrane on either side would require firestopping to protect it. "Fire caulk" and "fire collars" are two common methods of firestopping.

Draftstopping is for wood-frame construction and is similar to fireblocking in its function, but is used to break large areas of one single space up into smaller spaces. Whereas fireblocking separates a wall from a floor, draftstopping breaks that floor up if it's too big. Draftstopping uses similar—but not exactly the same—materials as fireblocking. The IBC has expanded provisions for draftstopping where it is used in multifamily buildings.

"DO FIBER-CEMENT BUTT JOINTS HAVE TO BE CAULKED?" BY MARK PARLEE (ONLINE, 10/4/14)

StuBrooks: I can't speak about all fiber-cement siding manufacturers, but James Hardie says "No" to caulking butt joints (not including ends butting trim, which should be caulked on installation). All cut ends also have to be primed or painted before installation. If the end of a board exposes the interior due to cuts or manufacturing, it should be painted.

Amovida: We're currently halfway through a fiber-cement siding job. I used 5x6-inch metal flashing to channel water out of the joints. This serves another purpose in giving the two boards a very even surface to rest on, helping them to be level in two planes. Finally, we're using stainless steel screws for blind nailing (screwing) the corner fastener next to the butt joint. This allows us to control the pressure by backing out or turning in the screw and gives some "adjustability" to the joint. The screws are countersunk and then the heads are caulked. We have yet to try anything but factory-to-factory edges.

One of the most important aspects has been to get [and keep] this material dry.

Red Harmony: You can use anything that sheds water under the joint, but paint it first; otherwise you will have painfully obvious joints if the boards shrink apart, as they do here in the Southwest.

Published letters and comments may be edited for length and clarity.

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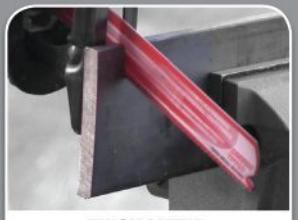
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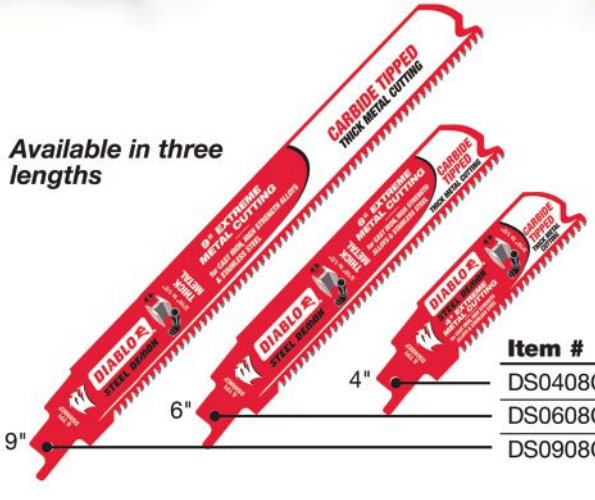

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Q Is it OK to use a joist bay for a return-air plenum in an HVAC system?

A Jeff May, an indoor air-quality specialist from Tyngsborough, Mass., responds: The type of plenum that you refer to is known in the industry as a "panned bay." It's made by simply attaching sheet metal to the bottoms of two or more adjacent joists to create a duct for returning air to the HVAC system. While this type of return duct is convenient and inexpensive to install, I've seen a number of problems associated with it. In short, it should never be done.

For one, panned bays are often leaky. In some cases, the leaks are due to penetrations for wiring, piping, or ceiling strapping **(1)**, and in others, to inadequate air-sealing at connections between the bay and the ducts or between the joists and the sheet-metal pan. **(2)** Because the air pressure in a return duct is lower than the pressure in the rest of the house, ambient air can be drawn into the system through any gaps or openings. Many of these panned-bay returns are located in basement ceilings, and if the basement is moldy and smelly, then air that's drawn in through breaches in the duct can introduce mold spores and bad odors into the supply air that will be distributed throughout the house. I've seen many instances—in both new and old homes—where sheet metal was attached to the bottoms of joists that already had mold growing on them, which contaminated the HVAC system before it was even turned on. This situation is unhealthy, especially for individuals who suffer from mold allergies.

Pulling unwanted basement air into the return ducts also results in system imbalances, which could pressurize the upper floors and cause house air to be forced into wall cavities. In cold weather, moisture from this air could condense inside cold (exterior) wall cavities, supporting mold growth.

Another problem has to do with the location of panned returns. If these ducts are installed in a cooler space, such as a crawlspace, temperatures inside the ducts may drop below the dew point. (In some parts of the country, dew points can reach as high as 70°F in the summer.) When that happens, moisture in the air may condense on the inside metal surfaces of the ductwork, allowing mold to grow in the accumulated dust.

In systems that have moldy or allergenic dust present, periodic duct cleaning is essential if any of the occupants have allergies to these contaminants. But panned-bay returns can be impossible to thoroughly clean because of obstacles such as pipes, wires, and cross-bracing.


1


2

Photos: 1, Jeff May; 2, Clayton DeKorne

If you must install a return-air duct in a basement joist bay because of limited headroom, you can line the bay with ductboard (with the foil facing inside the duct, where air will flow over it) or with a closed-cell foam, such as Armaflex, that doesn't have a fibrous inside surface that could trap dust and mold spores. Sheet metal is another option. But even foil-faced insulation board can be used to line a joist bay, as long as it's securely attached. Just be sure to use sealant or foil tape to make all the joints in the duct airtight.

Finally, filtration is an essential part of every air-handling system. ASHRAE recommends that an air conditioning system be installed with a filter no less than MERV-8 (middle-of-the-road efficiency); MERV-11 is better for occupants with allergies. An efficient pleated filter (not less than 2 inches deep) should be installed on the air handler rather than on the grille for the return air. The access to the filter should never be open. Install coarser (MERV-3) filter material as a pre-filter behind every return grille to help capture much of the airborne dust and debris that would otherwise accumulate in the duct and support microbial growth. The pre-filter also extends the life of the more expensive media filter.

Q What is the best way to finish an exterior wooden door?

A Scott Burt, owner of Topcoat Finishes, a high-end residential paint company in Jericho, Vt., responds: From a finishing standpoint, exterior doors rank right up there with decks as the most complicated surfaces to protect and maintain. As a critical, high-traffic barrier between the interior and exterior of a home, the finish on a door is at high risk.

In my corner of the Northeast, winter exposures for the exterior side of a door can be brutal, with intense sun, sub-zero temperatures, high winds, snow, and ice. But just 2 inches away on the inside of the door, the wood stove radiates a dry 68°F. These conditions are a true torture test for wood, particularly at any joints, such as between the stiles and rails. And, as if that isn't enough, the door must maintain its elegance and integrity as it is kicked, slammed, and banged by those using it.

Types of clear finishes: For use on an exterior door, waterborne finishes are getting better, but oil finishes still rule. Clear oil finishes come in two basic flavors: either penetrating or film-forming, and each has its pros and cons.

Penetrating oils are beautiful and easy to maintain, but they aren't as durable as film-forming coatings. And although they won't peel or flake, penetrating oils fade rather quickly and can become a breeding ground for mildew if not regularly maintained. I sometimes use penetrating oil on exterior-grade doors that are in sheltered areas, such as under a protected entry or on a porch. When not exposed to the direct sun that can fade the wood, or exposed

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constantly to precipitation, a penetrating oil finish will usually work just fine.

The rest of the time, film-forming coatings get the nod. These coatings are more chemically complex than penetrating finishes, but they are much more durable and appealing to the senses of sight and touch. Their popularity and effectiveness for finishing the bright work on boats makes them the best choice for protecting exterior wooden doors that are exposed to harsh weather elements year-round.

My "go-to" finish system for exterior doors is a combination of two products: Pettit Marine Paint's Captain's Varnish and Epifanes' Wood Finish Matte. These must be applied in multiple coats with meticulous initial and in-between coat prep.

On new construction and remodeling projects, I recommend that builders have doors bored, mortised, hung, and swung before proceeding with finish. Do all the handling and fit-up first, then pull the door slab and put in a blank, or close off the opening while the door is being finished.

The initial prep is key. Preliminary sanding must be thorough. I typically start the sanding at 150 or 180 grit, which cleans away surface blemishes without burnishing the wood, leaving enough "tooth" or slight roughness to adhere the first finish coat. Using a higher grit can compromise the adhesion of the first, most critical coat, which bonds between wood and finish and forms the foundation for subsequent coats.

Meticulous sanding is crucial because clear finishes instantly show even the slightest swirl mark, fingerprint, or smudge mark. Sanding with a short-stroke random orbital sander with high-quality abrasive discs is most efficient (I use Festool sanders and discs). I attach a dust-extraction device to prevent the dust particles from being ground into the wood grain or from being left to heat up and swirl at the surface.

When preliminary sanding is complete, I check the prep work by wiping the surface with a lint-free rag lightly dampened with paint thinner. This tack wipe removes any fine dust from the grain and provides a reliable visual of how the surface will look when finished. The thinner quickly evaporates, and if everything looks right, you can move to applying the first coat of finish in minutes.

The first couple of coats I apply are Pettit's Captain's Varnish, an exceptionally hard, high-gloss finish that can be brushed on or sprayed. The first coat acts as a sanding sealer coat. At this stage you "lock in" the raw wood substrate with the finish and then build on that initial layer with the finish coats that follow.

Whether you're brushing or spraying, place the door horizontally on clean, padded sawhorses. This makes it easier to apply a heavy finish coat. The key is to lay on the finish and to let it level out. Drying times are slow with varnish, and conditions must be dust-free, so I don't recommend trying to finish doors on a jobsite. Allow at least 24 hours of drying time, then flip the door on the horses and repeat the process on the opposite side. Make it a habit to do the prep sanding and tack wipe right before applying a coat. Be sure that the door is completely dry before flipping it over, or it may stick to the horses while face down. The side facing down should rest on the smallest amount of non-stick surface possible.

When brushing, I always work from the center of the door outward, brushing the inner panels and rails, and then coating the stiles last. After flipping the door, I coat the perimeter edges first, then proceed to work from the center out.

Between coats, I start sanding with 240 grit, following the same sequence as I did when prepping for the initial coat. After the second coat of Captain's Varnish, I sand, working up to 320-grit paper to dull the surface completely. This creates a very smooth, hard base for final finish coats.

For the final coats, I use Epifanes' Wood Finish Matte. Like Captain's Varnish, Epifanes' finish can be brushed on or sprayed. I recommend applying at least two coats of Epifanes on top of the Captain's, sanding with at least 320 grit between coats.

Remember to be patient: It takes several days to properly finish an exterior door to a marine-quality standard. When you've finished applying the varnish, allow a few more days of cure-time with the door in a vertical position to let the finishes fully harden. Then, carefully wrap the door in moving quilts and transport it to the site for final installation.

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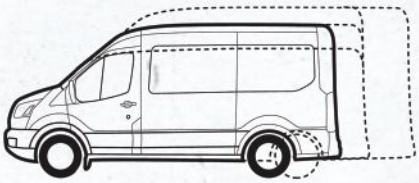

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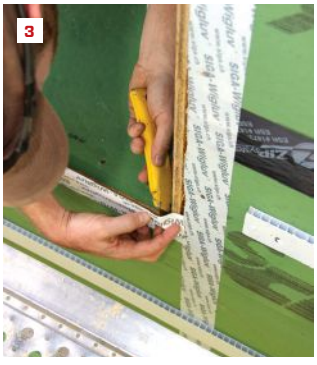
BY TED CUSHMAN



Photos: Ted Cushman

Installing Windows in a Deep Wall

As a specialist in meeting the stringent Passive House energy-efficiency and air-tightness spec, Boston design/build company Placetailor aims for extremely high-level performance. But as a developer, the company often has its own money on the line, so it can't afford to invest in labor or materials whose cost won't be earned back.

In that business environment, Placetailor must come up with designs that work effectively but are simple and cheap to build. And since many of the company's key personnel are both architects and hands-on builders, it's common to see designs evolve on the fly during the construction process. "We won't change a facade or a floor plan without consulting everybody and getting buy-in all around," says development director and company co-founder Declan Keefe. "But if the project managers want to modify an assembly for practical reasons, they might just do it."

The project shown here is a two-family townhouse in the Fort Hill neighborhood of Roxbury. Placetailor's deep wall system is simple: a 16-inch-thick double stud wall framed with 2x4 studs, connected with gussets at mid-stud height **(1)**. With dense-blown cellulose insulation, the wall is calculated at R58. The window openings are boxed out with bucks made from Zip System panels, and the wall sheathing, taped at the seams, forms the building's air control layer. The builders expect to hit the Passive House air-tightness standard of 0.6 ACH50.

The home's rainscreen siding detail is also simple but robust. The Zip System sheathing and joint tape form the weather-resistive barrier. To hold the vertical shiplap board siding off the wall and create a space for drainage and air-drying, Placetailor uses strapping made from corrugated plastic signboard, bought for a few

dollars a sheet at an office supply store and ripped into strips **(2)**.

TAPING THE SEAMS

Because the air control layer of the building is at the exterior skin, including the windows, all of the seams in the window buck and window opening are taped using Siga Wigluv tape. The outboard window faces are taped to the OSB—tape is applied first to the sill **(3)**, then to side jamb joints **(4)** and the head jamb **(5)**. Strips of tape are also applied in the window buck at joints and in corners **(6)**. Finally, a small patch of tape is applied over the complicated corner intersections of the sill with the jambs and the wall sheathing **(7)**. Everything inboard of the window plane, including the inner part of the window bucks, is left untaped so that the wall can dry to the inside.

BLOCKED IN PLACE

Before the windows are set (Placetailor is using European-made, triple-glazed Schuco tilt-and-turns), temporary 2x3 rails are fastened across the window opening to serve as positive stops that hold the window flush with the wall sheathing **(8)**. Inside the house, each window is lifted into the opening **(9)** and positioned tightly against the 2x3 rails, where it is secured with two temporary blocks screwed top and bottom to the window buck side jambs **(10)**.

FASTENING

The temporary 2x3 rails and blocks hold the window in plane while the crew fine-tunes the window's placement. First, the window is roughly centered at the head jamb with shims, then it's precisely centered at the sill by measuring off the window buck **(11)**. The crew fine-tunes the hinge jamb using pry-bars and shims **(12)** and makes a final check for plumb **(13)**. They repeat the process at the sill, first checking for level **(14)**, then fine-tuning with shims **(15)**.

Schuco windows are held in place by self-tapping lag screws supplied with the units and driven through holes predrilled in the frame. This window gets eight screws: three through each side jamb **(16, 17)**, and two through the top rail.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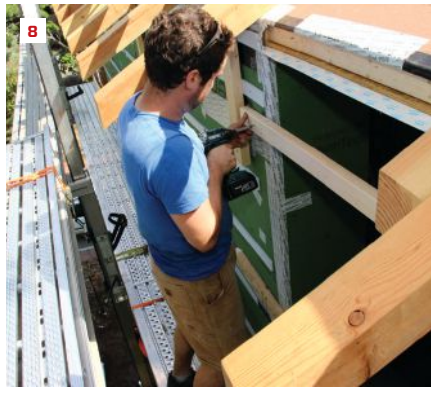
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The bolted connection is quick and simple to make and has the advantage of holding the window in position front to back as well as from side to side (the positive thread connection means the windows couldn't rack—even without the shims). Also, the bolts don't get in the way of air-sealing and insulating: The crew will first inject foam sealant into the gap, then trim the foam on the inside and tape the window face to the inside buck before drywalling the opening.

According to Placetailor, the Schuco windows selected were cost-competitive with double-glazed double-hung units from a mainstream U.S. manufacturer. The designers varied the window glazing characteristics to fine-tune the performance of the envelope. Windows on the south face of the building have high solar heat gain coefficients, while east-, west-, and north-facing windows were chosen for low emissivity to minimize heat loss instead of maximizing solar gain.

EXTERIOR TRIM

Setting the windows flush to the exterior sheathing makes it simple to integrate them into the weather-resistive barrier and drainage plane by taping the exterior face of the window frame to the Zip sheathing with Siga Wigluv tape **(18)**. Placetailor trims the window out with a simple custom trim package **(19)**. Where the vertical ship-lap board siding butts against the trim **(20)**, the joints are left uncaulked to promote drying.

Windows that are set this way may allow some conductive heat loss across the framed corners at the outside window edge—in fact, modeling has shown less conductive heat flow around a window when it's set in the wall center. But installing the window to the outside of the opening is closer to traditional practice and makes for simple, economical exterior trim details. Plus, the wide interior sill makes for an attractive amenity.

Photojournalist and carpenter Ted Cushman, a former JLC editor and a frequent contributor to the magazine, edits JLC's Coastal Connection newsletter. tedcushman@gmail.com


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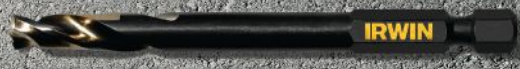

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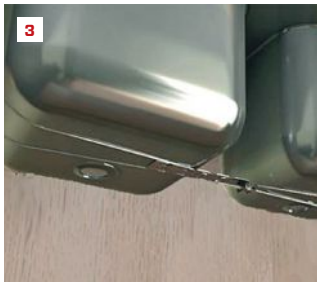

Repairing Cracked Granite at Sink Cutouts

BY JOSEPH CORLETT

I recently repaired two granite countertops that had failed reinforcing rods at the kitchen sink cutout. One was an Uba Tuba top **(1)**, and the other was a Bordeaux top **(2)**. In each case, the cause was a compounding of failures rather than just a single problem: Latex caulk was used instead of silicone between the undermount stainless steel sink flange and the underside of the granite; particle-board scraps glued with polyester adhesive were used to support the flange of the undermount sinks instead of a Hercules Universal Sink Harness **(3)** from Braxton-Bragg (braxton-bragg.com); and plain steel rods, instead of stainless or fiberglass ones, were embedded in the granite with polyester adhesive instead of epoxy, the material recommended by the Marble Institute of America.

Water from activity in and around the sink had leaked past the failed caulk and ponded on the sink flange until the granite absorbed it. It passed through the polyester adhesive to the steel reinforcing rod, causing the rod to rust and expand, which cracked the granite.

In the case of the Uba Tuba top, the homeowner had attempted to repair the crack—or to at least disguise it—by filling it with black caulk, but the only solution for a problem like this (short of replacing the top) is to remove the rusting rod and reset the sink using the proper supports, adhesives, and sealants.

MAKING ROOM TO WORK

To do that, you need access to the rod as well as room to grind the granite from underneath, so I began by removing the face of the cabinet. With frameless cabinets, sawing through the metal dowels holding the cabinet front to the sides of the box does the job **(4)**. The false drawer front also may need to be removed—because the sink behind it restricts access to its screws, I pry it off by wedging two scraper blades between it and the cabinet rail, then driving a chisel between the scrapers. If you don't have scrapers in the truck, you can use two drywall knives—the goal is to provide hard surfaces for the chisel to push against

Photos: Joseph Corlett

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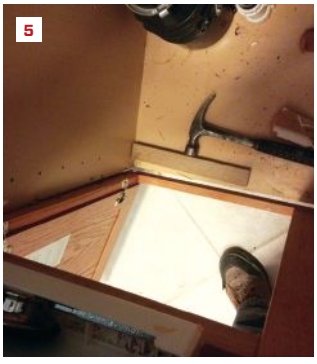
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while also protecting the drawer facing from being damaged.

With framed cabinets, I first remove any screws holding adjacent cabinets together. Then I use a hammer and wood block to separate the face frame from the box in a single piece **(5)**; it typically pops off easily, with no damage. You can remove the cabinet door first, but I find that to be unnecessary.

Once the cabinet front is removed, it's easy to see how a leaking sink flange delivers water to the bottom of the rod **(6)**. Tapping a scraper between the sink flange and the underside of the stone will remove the sink without damage to either.

REMOVING THE RUSTED ROD

To remove the rod, I grind away the adhesive on both sides wherever the rod is rusted **(7)**. One deep cut into the stone on one side, then a gentle tap with a chisel between the rod and stone on the uncut side will usually free the rod.

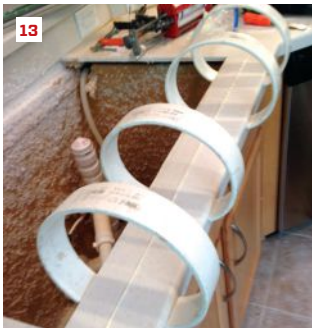
To keep the dust down, I cover the sink cabinet and surrounding area in poly **(8)**, but containing the dust is an uphill battle. Sometime after I had made the two repairs shown here, I bought a vacuum attachment for my grinder (at dustdirector.com). I've also been experimenting with fans to create negative pressure and pump filtered air to the outdoors. But in my experience, no matter what you do, there will be some dust in the air, and I make a point of explaining that to my customers.

There aren't too many things that are more unpleasant than lying on your back under a plastic tent and grinding out a rod using a diamond-blade Metabo while wearing safety glasses, hearing protection, and a respirator. I grind as close to the ends of the rod as I can before the Metabo bumps up against the sides of the cabinets. I have had rods that were short enough to completely remove, some that could be wrestled out by hand on the ends, and some that had to be cut, leaving a small end in place. Fortunately, in these two repairs, the rust didn't extend to the ends of the rods.

After exposing the rod, I cut it off with a grinder and pry it out. Typically, I don't have to pry very hard before the rod pops loose. In one recent repair, for instance, the homeowner called me in just as his countertop had begun to fail, so it was relatively easy to completely remove the rod, clean the slot with acetone, and pack it full of anchoring epoxy **(9)** before filling and polishing the cracked stone surface. But the Bordeaux top had been cracking for a long time, and when I pried on the rod, the granite broke into several pieces and fell away **(10)**. It was my mistake for failing to reinforce the granite, which I usually do by hot-melt gluing blocks to the sink shoulders **(11)**.

REPAIRING THE STONE

After removing the rusted rod, I then had to repair the broken granite at the sink surround. I used the melamine cabinet front I had sawn out—after screwing a 1x4 along its length to create a "T" brace to hold it flat—to support the pieces of granite **(12)**. I coated the melamine with WD-40 so that any epoxy that squeezed out when I glued the granite wouldn't bond to it. Then I glued up the granite, letting the epoxy fill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any small voids. I used Dani clamps (dani clamp.com) to hold everything together **(13)**. (The photo is actually of a solid-surface repair; for stone, I wrap one clamp around another for more clamping power and use more clamps.)

Having the Bordeaux top fall away happened on the first repair. I learned a valuable lesson from that, and when I started the Uba Tuba repair, I decided that the cracking was extensive enough that prying the rod would risk breaking the granite. So instead I made a sacrificial cut on each end through the bottom and sink edge **(14)**. This approach worked perfectly, breaking the sink-side section of granite exactly where I wanted and exposing the failed rod **(15)**.

Here is the Uba Tuba top after glue-up and clamping, but before grinding and polishing **(16)**. Prior to reinstalling the sink, I cleaned the rod slot with acetone and pumped it full of Quikrete FastSet Anchoring Epoxy. At $20 a tube, the epoxy is pricey, but it's waterproof and strong, and—most important—it will stay put upside-down right out of the tube. It is rock- hard in minutes.

The rod is no longer needed because the cabinet will provide all the necessary strength in tension for the granite. In fact, rods are mainly used to support the granite during transport and installation, but these days rodding is expensive, unnecessary, and old-school. The invention of the Omni Cubed Sink Hole Saver (also available from Braxton-Bragg) has eliminated the need to reinforce most types of granite at sink cutouts.

FINISHING UP

The final step is to polish the repaired area. My goal is to match the existing top, so the repair doesn't always have a super gloss but it blends nicely with the surrounding granite **(17, 18, 19)**. When I publish my work online, I like to use my least-flattering closeups. It keeps me humble, and it also sets customer expectations. I probably could have made these repairs look a bit better, but the meter is running on these jobs and that's always a trade-off. These repairs couldn't be discerned by touch and, while the customers said the tops weren't as good as new, I got HomeAdvisor ratings of 4.5 (out of a possible 5).

Repairing a failed rod is somewhat comparable to fixing a totaled car. The difference is, there are plenty of blue Chevys with nearly the same mileage as the one you wrecked, and finding one is relatively easy. But there may not be many replacement slabs of granite that match a particular damaged top, and finding one may be difficult and take a long time. Therein lies the problem—and the value of rod repairs. Even the $25-per-foot granite countertop guys couldn't have matched and replaced either of these tops for the $1,000 or so I charged for each of these repairs. Repairs that reuse the existing granite are relatively inconspicuous and can't be detected by touch. And unlike with replacements, the finish, particulates, movement, edge profile, and color match perfectly.

Joseph Corlett (josephcorlett.com) has more than 30 years' experience in the cabinet and countertop industries and specializes in surface restoration. His columns appear monthly at countertopiq .com. Email him at loosedeckcannon@gmail.com.

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BY SHAWN McCADDEN

Estimating: From Yellow Pad to Excel

Knowing what to charge clients for the work you do can make the difference between long-term success and eventual failure for your business. Many contractors look at estimating simply as a way to determine the cost of a project. In the traditional design-bid model of project delivery, this simplistic approach may work, assuming that the sell price generates enough gross profit to cover overhead and net-profit requirements. If your business model is design/build, however, and your current estimating system is limited to producing the project sell price, you're missing out.

Many contractors learn how to estimate using what I refer to as the "yellow-pad method." Using paper and pencil, they can create estimates on the fly anywhere at any time. As a business grows, however—and particularly when it grows to the point where the person who sells the job is no longer the same person who builds it—the yellow-pad estimate may not give the production team the information they need to build the project on their own. Also, the yellow-pad estimate may not be organized in a way that makes it easy to find the information they need.

I came to these realizations as I built my company, and as a result, I formalized my estimating method and started using a better tool. I learned a lot by attending seminars and reading articles, as well as through plenty of trial and error. In this article, I share the basics of what I learned.

When an estimate is built in a spreadsheet, information such as burdened labor rate can be entered once and used in many calculations. It's also easy to update totals when quantities or prices change. Free-form "Task Description" fields allow you to organize line items by phase, room by room, or in some other way that better suits the project.

PROJECT ESTIMATE SHEET

PROJECT NAME:	Jones Deck					
DESCRIPTION:	New 10 x 10 deck with rails and stairs, includes staining					
ESTIMATE DATE:	1/12/2014					
ESTIMATE BY:	John					
BURDENED LABOR RATE	$49.50	Per Man/Hr				
MARKUP	50.00%					
Gross Profit Margin	33.33%			Estimated Man Hours	27.75	
Sales tax on materials	6.75%			Estimated Admin Hours	2.60	
General Production Costs (GPC) factor						
Enter here your materials cost in $	$500,000			General Production Costs factor is	2.40%	
Enter here your GPC in $	$12,000					
Permit Fee in $ (fixed cost)	$150.00					
Admin hrs. to add for Lead Carpenter, per 8 man hours inside this estimate	0.75					

TASK DESCRIPTION	QUAN.	@	MAT.	HRS.	LABOR
Demo Porch			0.00	2.00	99.00
footings	2	40.00	80.00	16.00	792.00
aluminum flashing	10	1.40	14.00	1.00	49.50
2x10 ledger	10	0.85	8.50	2.00	99.00
6" lags/washers	16	1.85	29.60	1.25	61.88
2x10 joists	200	0.85	170.00	5.00	247.50
2x8 joist hangers	8	1.65	13.20	0.50	24.75

THE GOOD

To be clear, I think yellow-pad estimating is the best way to learn how to estimate. When you estimate on paper, you start with a blank canvas, which allows you to be creative and experiment with the estimating process and the way that information is organized. For example, using a yellow pad, I could organize the estimate in critical-path order—the same order I promised my client and the order I wanted my production team to follow. For another client, I could assemble the information room by room so he could more easily reduce the project's scope if the total cost came in higher than his budget.

Using a yellow pad, I could also do estimates on the fly for small projects. This often helped me to sell a job at the first visit, as long as I could also easily write up my proposal, ready for a signature. (That was back in the good old days when there was work aplenty and handwritten proposals were the norm.)

THE BAD

Eventually, though, I became frustrated with the limitations of yellow-pad estimating, including the following:

- Numbers needed to be added up using a calculator at least twice before I had enough confidence to give the estimate to prospects. If the totals didn't match, I needed to enter all the numbers again, then once more to double-check. And if even one line item's price changed, I had to add it all up yet again.
- Cutting and pasting to insert missed tasks required literally cutting and pasting using scissors and tape. And if a prospect who several months before had rejected my price called back to give me the go-ahead, it was often impractical to make updates to the existing estimate—I had to create the estimate all over again.
- If a customer wanted to make product substitutions or wanted suggestions to value-engineer the project, I had to refigure each option to be confident about the price differences.
- After handwriting an estimate and proposal, I (or my staff) also had to handwrite the subcontractor agreements and materials lists. And when I wanted to prepare an estimate for a similar project, reusing an existing estimate wasn't as simple as copying and pasting or changing the quantities; it was more like starting over.

ESTIMATING WITH EXCEL

Over time, I incorporated what I had learned from the yellow-pad method into an Excel spreadsheet that I created. The spreadsheet included direct costs to build the project—materials, labor, subcontractors, and equipment. And it also applied the markup I needed to cover labor burden and all of my overhead costs—the expenses I incurred just by being in business, whether I had any work or not. It not only improved the speed and accuracy of my estimates, it also provided most of the information the production team needed to build the job without my being on site—leaving me free to sell more work.

If you believe in design/build as a way of doing business, your estimating system should be a tool that facilitates how you do business, not just a way to get to the price. Typically, a yellow pad and calculator won't suffice here; you need a computerized system that allows the estimator to concentrate on estimating, not on adding up numbers over and over again. The system should also allow for on-the-spot "what-if" adjustments. The estimator must be able to quickly estimate the effects of changes or suggested alternatives to the project without having to worry about forgetting some component or corrupting earlier versions. This also helps qualify client decisions during design by providing instant feedback about how those decisions affect the project's budget.

Your estimating system should be a tool that facilitates how you do business, not just a way to get to the price.

ACCURACY & DETAIL

To ensure accuracy, any estimating system should operate in parallel with a company's job-costing system. Ideally, both functions should take place within the same software package, but—at a minimum—information within both the estimate and the job-costing systems should be broken down to a level of detail that gives you the insight you need to make future adjustments based on past experience.

For example, it may be beneficial to estimate each component—floor, wall, roof—of an addition frame as a separate item rather than treating the entire frame together in one line item. That way, if framing costs are higher or lower than estimated, you can use job costing to pinpoint exactly where in the framing process the variance occurred. If roof framing is consistently underpriced, you can make an adjustment only to the roof-framing line item on future estimates.

OUTPUT BEFORE INPUT

The overall estimating system format may be the most important consideration because how information is entered into the estimate can either restrict or enhance how it can be used and by whom. Strive for a format that allows the information created by the estimator to be easily shared throughout the company.

An estimate report that follows the order in which you build the project creates a critical path for production that is ready-made for use by your production supervisor or project lead carpenter. By providing a predefined path showing labor and material breakdowns, your estimate enables your team to predict and schedule resources, including subs, material quantities, ordering lead times, just-in-time deliveries, and overall labor requirements. If it's done correctly, you can also use individual project information to create a master schedule for all company projects and resources. You will know when and where you need which employees or subs and will be able to identify schedule conflicts or shortfalls before they occur. This critical path can also help you identify cash flow needs during the project and establish payment schedules.

KEEP COSTS & QUANTITIES SEPARATE

Another formatting consideration is how to break apart the information for each line item within your estimate. Rather than entering lump-sum amounts for materials and labor—such as total cost of wall studs or total cost of flooring and installation—separate the costs from the quantities. By formatting your information in this way, you can quickly apply what-if options for material substitutions, changes in room size, or additional labor requirements. This also facilitates quick pricing updates when a client calls back two years later and wants to go ahead with a project. There's no need to redo the entire estimate because you're not sure how the lump sums were determined—the quantities will likely still be the same. Just check for pricing changes.

Shawn McCadden (shawn@shawnmccadden.com) founded, operated, and sold a successful design/build company. A co-founder of the Residential Design/Build Institute, he speaks frequently at JLC Live and consults with remodelers about owner issues, management, lead paint regulations, and other industry issues.

This article is adapted from The Design/Builder's Blog *at shawnmccadden.com, where you can download McCadden's Excel estimating template.*

/LEGAL/

Settling Construction Disputes

BY ALEXANDER BARTHET

There's no escaping the fact that we live in a highly litigious society, and construction litigation is all too common: There's a 1 in 4 chance that a contractor will have a potentially devastating lawsuit filed against him. Becoming involved in a lawsuit is at best an expensive proposition and at worst a gut-wrenching experience. Even if you are able to adequately recover your litigation costs, the process of dealing with construction disputes is both long and emotionally draining and is sure to challenge your patience and test your will.

For contractors, accepting the threat of litigation in your future is the first step; understanding how to best resolve any dispute that arises is the more difficult next step. Always know that somewhere—likely buried in the positions put forth by the opposing parties—lies a resolution, where each party compromises its demand just enough to eliminate the necessity of a costly judicial action.

Finding that place isn't always easy, but it is almost always possible.

SETTLE WITH EVERYBODY

It gets more complicated when there is more than one contractor involved, as in the following example. A college hired a general contractor to renovate one of its residence halls, including some bathrooms and shower stalls. After completion of the project, the school discovered that there were a number of leaks being caused by defective work in the bathrooms. The college sued the general contractor for breach of contract and sued the plumber for breach of its warranty, alleging improper installation of shower pans and drains in the bathrooms. The plumber quickly settled. Eventually so did the general contractor.

Case closed? Not quite.

The GC cross-claimed against the plumber, seeking payment of the monies that the GC paid to the college. The plumber cried foul, saying that his company had been released from claims for improper work when it settled with the college.

But the plumber was wrong. The court concluded that just because the plumber settled with the college, that didn't mean it was released from claims for indemnification being made by the general contractor. A tough lesson for the plumber who had forgotten to make the general contractor part of its settlement with the college.

THREE PARTS TO EVERY SETTLEMENT

Settlement agreements are interpreted and governed by the law of contracts, so it is critical that the parties not only reach an agreement conceptually, but that they also sign a document that's clear and concise, and that lists the actual terms of the settlement. This will demonstrate that the parties have mutually agreed upon the essential elements of their resolution.

When settling any type of construction dispute, make sure you formalize the settlement in a written document. Have it signed and dated, and include:

1) The names of all the parties that may be involved or have anything to do with the dispute;

2) A description of the what, when, and where of the incident that led to the dispute; and

3) The consideration for the settlement—what the parties are giving and getting to obtain a release and settlement of the dispute.

Settlement agreements are highly favored by judges as a means of conserving judicial resources, and therefore courts will enforce them when possible. Parties will do themselves a favor in making sure that any settlement they reach is one that is reduced to a written document and signed. Case after case has been unnecessarily litigated because the parties never got around to formalizing their settlement. Courts are reluctant to enforce what one party only thought the other party agreed to.

As a contractor, you have a 1 in 4 chance that a lawsuit will be filed against you.

It is bad enough to find yourself in the middle of a dispute; it is ever so much worse to think that you have settled a controversy and then be hauled into court because the deal was never actually formalized or signed. Remember to always ink the deal.

Alexander Barthet (alex@barthet.com) is a principal of The Barthet Firm, a 12-lawyer commercial law practice focusing on construction-related matters. This article is for informational purposes only. It is not intended as legal advice. Consult an attorney before taking any action.

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BY NATE ADAMS

How Small Jobs Killed My Business

Energy-efficiency rebate programs from gas and electricity utilities have become pretty common nationwide. They provide homeowners with rebates for replacing a furnace or adding insulation to a home. But while these programs may seem like a good idea, if not designed properly, they can be toxic to small businesses.

One such program from my gas utility, Dominion East Ohio, was a primary cause behind the death of my insulation contracting business—a business that in 2012 was one of only 97 businesses nationwide to do more than 100 projects with the Department of Energy's Home Performance with Energy Star program. That made me a Century Club contractor.

And now I'm out of business.

Here is the story.

FROM BLOW-'N'-GO TO POKE-AND-HOPE

I started my insulation contracting business in 2009. As with any business owner getting started, it took me a while to figure out the value of what I was doing and what to charge for the work. My initial projects were often in the $1,500 range for pretty much just blown insulation with very little air sealing. In the industry, this is known as "blow-'n'-go." (Air sealing is a tough service to sell because most homeowners don't see the value of it. And frankly, there is little benefit if you aren't measuring and finding air leaks with a blower door.)

After going out of business as a contractor working in energy-efficiency programs, Nate Adams has turned to consultative sales. In his new work, he's not limited to small jobs, and he's making a bigger difference improving the energy performance of homes.

Photo: Josie Adams

I soon met an energy auditor, Karl Balla, who introduced me to the concept of home performance and whole-house retrofits. I took a Building Performance Institute building analyst class and upped my air-sealing game from that day forward.

The Dominion East Ohio program, which offers up to $1,250 in rebates for energy-efficiency upgrades, paid my business $40 per hour toward air sealing. It also paid 30 cents per square foot for insulation anywhere in the building (attic, walls, ducts, and the like). So now I could have the air sealing paid for by rebates and (I thought) do a better job. I was thrilled, and my jobs jumped to the $2,500 to $3,000 range, while still costing the consumer only $1,500 to $2,000. It felt like a big win. It bumped my 2011 sales from $300,000 to $400,000—all due to rebates.

But (there's always a but) trouble lay ahead. My new "big" jobs were in the $2,500 to $4,000 range. A job that size is still more of a "poke-'n'-hope for the best" project, rather than a comprehensive systems-based one. We were able to do a little more work, but not a lot more. Too often, as we eventually learned, this work wasn't enough to actually solve the homeowner's problems.

FREE MONEY

Chasing incentives takes the homeowner's and the contractor's eye off solving problems and puts it on getting as much rebate with as little out of pocket as possible. The job becomes more about maximizing the incentive—obtaining free money—than about designing a solution. The biggest problem is that the program limits the job size.

Most homeowners I worked with were willing to spend between $1,000 and $2,500 for attic insulation. The budget was often set by "bid/no-spec" pricing, meaning the program called for a contractor who was willing to say "I'll do it for somewhere between here and here," without actually having a spec that spelled out what the job entailed. With up to $1,250 in rebates, the program essentially limited job sizes to $2,500 to $4,000 with a traditional sales process.

PROBLEMS WITH SMALL JOBS

The problems created by small jobs are myriad. These are the big issues:

Too much time spent quoting. A $2,500 to $4,000 project will keep a crew of three busy for one day. So if you're going to keep a crew busy with a 50% closing ratio, you have to run two quotes a day, or 10 quotes a week. But running all of those quotes is a lot of work.

Getting a job took between 10 and 15 hours of work: Figure 30 minutes on the phone to chat and set up the quote; one hour of drive time for each quote, plus two additional hours at each home to scope out the job and one hour to write it up (my quotes were also work scopes and detailed what the crew needed to do). Add another two to four hours of emailing or calling back and forth with the homeowner asking questions and scheduling the work; one to two hours to complete the invoice and the rebate paperwork, plus time to create the material list and order the materials. This doesn't factor in the usual business administration stuff, which included time to write my blog and other marketing materials. I was working 60 to 80 hours per week most of the year. Just thinking back on it makes me feel tired.

The small jobs could often be accomplished in 10 to 20 labor-hours, which was not even a full day's work split among three crew members. This meant that I spent as many hours landing a job as it took to actually accomplish it. This model was neither sustainable nor one that encouraged or rewarded quality results.

Poor referral rates. Because I spent all of my time running from one quote to the next, I didn't have time to check up on jobs. A client saw me only once. It was the contractor equivalent of a one-night stand.

Early on, when I was intimately involved in every project, I ran referral rates in the range of 30% to 40%, and one job often led to another. When I was confined to running after small jobs, my referral rate fell to less than 5%—not much of a way to build a business, even with spectacular Angie's List reviews.

Low-dollar margins. I ran about a 40% to 60% gross and 20% net. So a $3,000 job should have a $600 net. (We'll ignore the fact that I found larger jobs had substantially higher net margins, which helped to offset the lower margins of smaller jobs.)

But $600 was not a lot to work with. If a $300 problem came up, I couldn't just eat it. I would have to spend time selling it. If the homeowner agreed, we would bump up the project cost a bit, but it was usually a no-profit upsell. Or worse, sometimes that detail would get skipped and buried under a foot or two of insulation, never to be addressed unless a problem festered.

Chasing incentives and getting free money for the consumer takes your eye off solving problems. The result: Home performance suffers.

Callbacks. A callback could easily cost $200 to $600 (between paying someone to go get materials, the cost of the materials, time spent dealing with the complaint before, during, and after, and lost productivity on another job). Warranty reserve? No room for that in a small-job budget. One callback and the job was tanked.

Poor diagnosis. Every house needs to be diagnosed, and this diagnosis can't be done in just a one- to two-hour quote. It takes time to get to know a house and to understand the occupants' problems. This was time I didn't have. I had to rush the diagnosis and do a lot of guessing or I wouldn't make the 10 quotes per week my business required to survive.

Mediocre results. My results, while typically OK, were not what they could have been nor what I would have liked them to be. Before I got sucked into too many small jobs, I had typically attained substantial reductions in air leaks in the range of 500 to 2,000 cfm50. Now we were consistently seeing only 200- to 400-point reductions—the sort of reduction that often happens just from blowing an attic.

Low-quality methods and materials. However unintentional, poor program design often results in lower-quality methods and materials. When rebates pay for labor-intensive methods, you tend to specify labor-intensive solutions. For example, single-component gun foam is an air-sealing material that doesn't cost much, but requires more labor to install. Two-component closed-cell spray foam is faster to install and creates a better seal, but it's a much more expensive material. The $40 per hour that the program paid for air sealing wasn't enough. Three inches of spray foam would have been lovely for knee walls, but I was paid only 30 cents per square foot for insulation, so instead I used fiberglass or cellulose and then did additional air sealing on top of it.

While not explicitly excluded, our options were limited by the rebate structure. A $3,000 job may have qualified for the full $1,250 in rebates. Fast-forward to what I'm doing now—consultative sales in home performance—where I'm not limited by job size and I design a home-performance package that actually fixes problems. With this work, a $10,000 job might qualify for only a $500 rebate (if I were even seeking those incentives, which I'm not; my new jobs wouldn't qualify under the old program rules). Yet that $10,000 job will likely save a good bit more energy and lead to a far better result.

Little margin for error. It's easy to forget a sash lock for sealing a hatch, or a length of duct line for venting a bathroom fan, or some other little thing. On a bigger job, you'd be returning to the job and would just grab those things on the way the following day.

But on smaller jobs, an overlooked detail becomes a crisis. Often the only vehicle on the job is the box truck with the blowing machine, so you have to disconnect the blow hose and hope that no one needs anything off the truck while you run out to a store you don't know hoping to find the part you need. One tiny mistake can kill productivity and hurt job flow. Yes, you can carry more stuff on the truck, and that's what we ended up doing, but you're always going to miss something, somewhere. There is little margin for error.

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Low crew morale. All the little pressures imposed by small jobs take a toll and lead to low job satisfaction. Every day involves showing up, introducing yourself to a new homeowner, trying to figure out what the sales jerk (me, in this case) meant in his work scope, getting your head wrapped around a new site, laying out drop cloths and setting up, doing the air sealing, venting bath fans out of the house, fixing attic ventilation if needed, keeping the client happy and chatting a bit with them, showing them what's being worked on, blowing the insulation, cleaning up, picking up what's needed for the next day, ordering supplies from the supplier, and, oh yeah, having a life outside of work.

The pressure killed my crew lead. I knew it was too much for him, but because I was off chasing quotes, I couldn't help him. Meanwhile, the other crew members saw the lead talking on the phone, chatting with the homeowner, and so forth, and got jealous because the lead was getting the "easy" work. It was the beginning of a long downward spiral, which might have been solved through better communication. One of my biggest mistakes was not running weekly meetings with the crew to touch base. But I was too busy trying to keep them busy. Problems festered that could easily have been handled if caught early.

On Jan. 2, 2013, the crew members all got so ticked off at one another that they refused to work together anymore. Talk about a crisis! At the time, I had three weeks of work booked. And I had been trying for months to replace a crew member who I knew was cancer for us, but I couldn't find anyone (there was not even one response to the job ad I had posted). I was stuck. The cancer had metastasized.

THE MOVE TO SUBCONTRACTING

When my crew imploded, I knew I had to change something. I also had a baby on the way at home. The pressure of keeping the crew busy year-round was crushing me. I needed to simplify my life. So I looked into subcontracting the work.

I turned to a reputable weatherization company that I had met when I sold them cellulose in my old job. The owner hired one of my crew members; the crew member I had had trouble with took unemployment; and I kept my crew lead on for quality control and sales.

But subcontracting didn't work out much better. All of the problems associated with small jobs remained. We continued to have to rush jobs, which led to low quality and lots of callbacks, and meant that we weren't doing so well at reducing leaks (which was what we were hired to do). And my crew lead, now sales and QC man, was burning out. It had taken me three years to reach that point of overload; he was approaching burnout in three months.

Our burnout must have been evident to clients, because my closing ratio suffered. And despite doing about half the job volume, I was getting two to three times the number of job callbacks. Quality issues—once rare—now occurred almost weekly. Maybe it was that my crew had been far better than the

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sub, or that my lead now wasn't watching as closely, or that the inspectors from Dominion might have been watching more closely, knowing that I had made a change. Whatever the reason, I was hemorrhaging money.

My closing ratio was already falling, and part of that was because I had raised prices to try to cover a margin for both myself and my sub. My competition didn't raise their prices, so I got fewer jobs since most clients didn't fully grasp how much better of a job I was capable of (except that now I wasn't capable of it). I lost money most months while subcontracting. In 2013 I made one-quarter to one-third what I had made during the previous two years. And most of that measly sum had been earned during the first quarter before switching to subcontracting.

THE END OF CONTRACTING

I stopped contracting. The night I told my wife I was quitting, I felt more jubilant than I had in years. There's something wrong with that picture. Shouldn't helping people to solve problems be enjoyable?

While I had made some mistakes, the real culprit here was the program design that forces small jobs. Programs have no accountability for performance, provide no guidance on how to sell consultatively, and start out the consumer-contractor relationship all wrong—by focusing on optimizing the incentives rather than on designing for excellent outcomes. At the time, I had no idea that the rebate structure was having these effects. I only see it now, almost two years after I shut down my contracting business and went solo with a new process of true, consumer-focused, design-oriented consultative sales.

In this new home-energy performance consulting business, my projects average about $20,000 and we're actually making a difference.

On bigger jobs, less time is spent on ordering and picking up supplies, taking emergency midday trips to the not-so-close supply house, figuring out the job and dividing up work for the day to keep the crew busy, and setting up and tearing down. The guys I recommend to do the work are happier. Small mistakes stay small, and crew members (who are paid hourly) typically get more working hours. Plus, the jobs are more fun to sell (like selling pieces of art instead of junk). I spend more time with customers and far less time with prospects. The only time I don't get paid for is the 10 minutes we initially spend on the phone.

I'm not skimping, and the outcomes are excellent. But I am doing it all without a program, and common knowledge would say this can't be done. I don't have good financing. Property values in Cleveland are some of the lowest in the country. Utility rates are low. I'm working solo. Everything should be working against me. Yet I'm selling comprehensive home-performance jobs. It's early, I'll grant you, but I'm selling them.

Nate Adams runs Energy Smart Home Performance, a building-performance consulting company in Cleveland. For more on this saga, and to learn about the recommendations for running a successful energy-efficiency program, read his blog at energysmartohio.com.

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Conditioning Homes
A recipe for eliminating interior callbacks

BY MATT RISINGER

This is a story that began with hardwood flooring, but it affects all interior woodwork, including trim, panel doors, and cabinets. I started my building career in production housing where it was pretty standard to spend (at the time) around $1,500 per house on a warranty fund to cover the touch-up required after the house "settled." This typically occurred a year after the owners took occupancy. Of course, the defects we were touching up didn't have to do with settlement, at least not the settlement of soils or of the foundation, as we ordinarily think of the term. Most drywall cracks and nail pops, open miters in woodwork, warps and bows of doors and panels, or buckling and open joints between floorboards are due to moisture. Specifically, these problems are caused by the expansion and contraction that occurs as wood moisture content reaches equilibrium. The problems are most extreme (and expensive to fix) with wood flooring, but all of the issues can lead to some pretty negative perceptions by clients until the problems get resolved.

In the time that homeowners are waiting for the warranty touch-up, they may be stepping over ridges in the flooring or staring at open miters in woodwork and wondering what kind of a builder could be responsible for such shoddy workmanship. I remember clients calling and saying, "I know I'm supposed to wait 12 months,

Photos: Matt Risinger

but this looks really bad. Can we take care of it now?" That could happen at any time after the owners had moved in. And we'd have to say, "Yes, we can take care of that now, but we'll have to charge you if we come back later because only the first visit is free." That kind of discussion begins to set up an adversarial relationship. If I can eliminate that, I'll vastly improve my chances for getting the referrals that are essential to my business.

I am now building exclusively high-end custom, architect-designed homes. In this market, I can't afford to have many interior defects, and certainly no adversarial relationships. So instead of paying into a warranty fund to cover the cost of touch-up, I spend on average about $2,000 per house to dry and condition the interior. Since I've been doing this, I have never had to come back to fill cracks in woodwork or deal with drywall cracks, nail pops, or loose or buckled floorboards. No touch-up required.

The benefit of taking this approach has been huge for us, not only in eliminating callbacks but also in preventing negative client perceptions. In fact, when an architect or client walks the job and sees how we are using portable dehumidifiers and packaged AC units to control jobsite conditions, it confirms that we care about craftsmanship and are doing everything possible to deliver and maintain a well-crafted home.

STABILIZING WOOD ON SITE

In a previous article, I described the steps I take to monitor and control the moisture content of the framing before closing up the walls ("Drying Wet Framing," May/13). Not every house needs to have the frame dried out. There are plenty of times here in Austin, Texas, when it's barely raining or doesn't rain at all and we're able to frame and dry-in a house without worrying too much about high moisture levels in the frame. Also, our houses are often complex, and we might have six months or more from the time the house is framed until it's ready for drywall, and in that time the frame has plenty of time to dry, even if it did get rained on a bit during framing. As long as the frame doesn't get soaked, we're not typically dealing with dehumidification or conditioning until after drywall.

But every house needs to be conditioned once it's enclosed and the drywall is hung. All that curing drywall mud and paint and concrete and grout and tile adhesive dumps moisture into the indoor air. Add that to the high relative-humidity levels we typically

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see here in Austin, and the probability of problems demands that we dehumidify at the very least, beginning post-drywall until we bring the home's HVAC online.

Beyond dehumidification, we temporarily condition the indoor space with air conditioners and (when needed) heaters to keep the temperature at a moderate level. We do this largely to keep the house comfortable to work in. It makes a big difference with worker productivity. (Subcontractors love working on my jobs, too.) But most of the time we are cooling, which also helps dry the air.

To monitor climate conditions, we place a number of temperature and humidity meters around the house **(1)**. These have an outdoor sensor, which we can tape to the soffit or put outside a door or window, to keep track of temperature and relative humidity levels outside as well as inside the house. The Accu-Rite meter shown in the photo is reading 80% RH outdoors (top display) while we're keeping the indoors at 58% RH (lower display). Under these conditions, the woodwork is able to maintain near 10% moisture content (MC) (see Moisture & Interior Building Materials, page 53). These meters also have a trend indicator (small arrows on display), so you can tell if outdoor conditions are trending up or down, which helps you plan your dehumidification strategy—to know if you should be paying attention to keeping equipment running or whether you can relax a little and not focus so much on that part of the job.

During the day, the house is constantly opened when the trades are coming and going. It's not realistic for us to keep the house on lockdown all day. But as long as we can condition and dehumidify overnight, we can keep the indoor air stable. We'll also run cooling and dehumidification equipment over the weekend. That's enough to dry things out and allow the wood to reach equilibrium.

EQUIPMENT FOR CONTROLLING HUMIDITY

Here in the hot, humid South, the work of conditioning a job, starts with dehumidification, and that starts at the drying phase when finish materials are curing. For this we use a combination of big fans and industrial dehumidifiers.

Jobsite fans. Good commercial-grade fans start at about $300 each, or they can be rented for about $10 per day or $150 per month. I own several two-speed Quest C1000s, which draw 2.4/2.8 amps (low/high) to move up to 1,000 cfm (2,700 fpm). The Quest A3000 box fan operates in the same range, but its airflow is more diffuse **(2)**.


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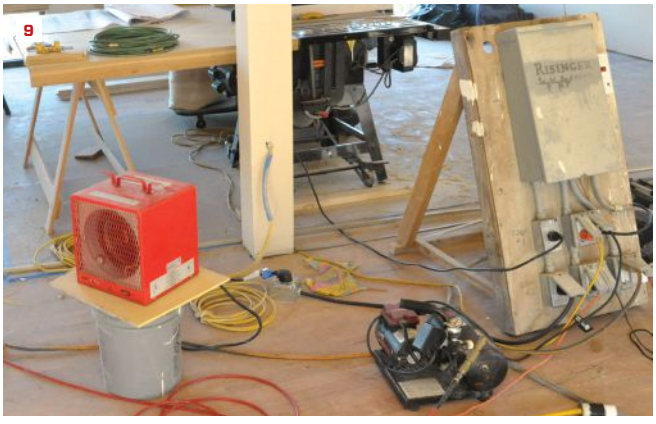
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Dehumidifiers. My first industrial dehumidifier was the Dri-Eaz DrizAir 1200 **(3)**. This manufacturer specializes in equipment to dry out structures after flooding. I've been using the DrizAir for about eight years and it's still running strong. My one complaint is that the filter clogs easily and needs to cleaned every day by blowing it off with compressed air.

We've since acquired a couple of Quest PowerDry 4000s **(4)**. These units can pull up to 22 gallons of water from the air per day, and treat up to 4,500 square feet of space. At the air intake, they have a pleated paper filter, which can handle a huge dust load without compromising the units' effectiveness at drawing water out of the air.

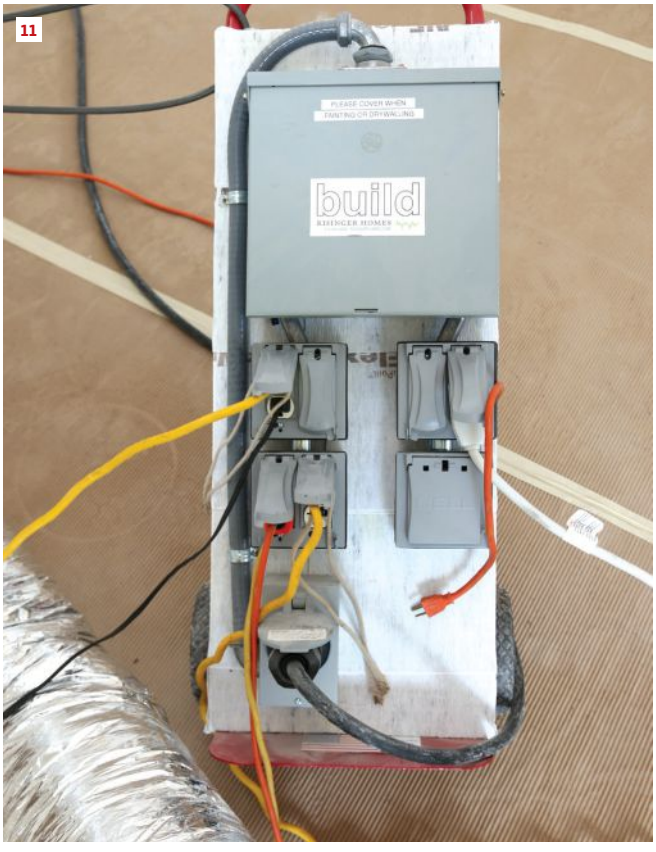
TEMPORARY CONDITIONING EQUIPMENT

To condition the air, we started out with portable AC units but have since switched to using a larger packaged unit. All of this equipment is temporary until the home's HVAC system goes online. As long as dust is being created on site, we don't want to bring the permanent equipment online—coating the evaporative cooler or lining the duct system with a thick layer of drywall dust and sawdust would lead to problems later on.

Portable cooling. The first unit we used was a Quest Cool ACS 12 1-ton portable air conditioner **(5)**, after which we acquired a portable 2-ton Movin Cool Classic Plus 26 unit **(6)**. These are small package units, meaning the evaporative coil and the condensing coil are in the same package, so we have to duct-in air to cool the condensing coil from outside and also duct-out the hot air coming off the condensing coil. To do this, we fill the opening of a sliding door with a sheet of OSB with holes cut in it for the two duct openings to the exterior—one that pulls cool air in and one that exhausts hot air out **(7)**. Or we may use a temporary swing door with cutouts for the ducts **(8)**.

The cool-air supply on the evaporative side blows either out the top of the 1-ton unit or through a couple of short ducts that can be angled in different directions on the 2-ton unit. We sometimes attach a long piece of flex duct to one of these short supply ducts to move the cool air to a different room. These units only cool.

Portable heating. In colder months, we use electric resistance units. We started out with a few 19,000 Btu, 220-volt units from Northern Tool & Equipment. While we paid more at the time, they now cost about $100. They're glorified hair dryers with a fan to push the air. The one shown here **(9)** is in a house that tested to about 1.7 ACH50—rea-



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sonably tight. It doesn't take much to make the interior comfortably warm. During the finish stage of construction, you don't need to bring the interior up to 72°F. You only need to heat it to 50°F or 60°F to make it relatively comfortable for working in. Of course, it doesn't get that cold in Austin (we never use more than one heater per jobsite).

We also have a Quest Power Electric Heat EHS 31 Pro **(10)**, a 30-amp, 31,000 Btu unit that pushes hot air out the top of the unit and warms a larger space than the little box units do. We plug it into one of several temporary power centers that I had my electricians wire up for me to roll around the jobsite as needed **(11)**.

When heating the jobsite in winter, it's particularly important to avoid the use of propane heaters. Water is a product of combustion. A salamander or a tank-top heater will add moisture to the house and can also produce carbon monoxide, creating a noxious work environment. Propane heaters are also a concern for fire. With electric-resistance heaters, we worry less about fire and will run them all day while the crew is on site, but we never leave them on overnight. But with the packaged heat-pump unit, we can leave it running overnight and over the weekend.

Packaged heating and cooling. We recently acquired a 5-ton heat-

MOISTURE & INTERIOR BUILDING MATERIALS

In the Austin climate, floorboards are usually delivered dry at 7% to 10% moisture content (MC), which is equilibrium moisture content (EMC) for wood in air at about 40% to 55% relative humidity (RH). But when wood acclimates to a higher RH, it takes on a higher MC and expands. We typically see the daily high RH averaging between 70% and 90% year-round—midsummer has the highest RH, and the lowest are in August and early September. If flooring is installed dry, as it is delivered, and then hangs out in these high-humidity conditions, it will absorb moisture from the air and expand. And when the floorboards expand, they have nowhere to go when they're installed tight, resulting in permanent ridges where the boards press together (known as "compression set"). Or worse, they expand so much that whole boards buckle out of place. Either is an expensive fix. In colder climates, the reverse is usually true: The hardwood is installed at a higher MC and becomes bone-dry in the first heating season, causing gaps to open up between floorboards. Our goal is to keep wood materials at their dry, delivered moisture content around 10% MC by keeping the interior air at 40% and 60% RH.

We begin conditioning the interior as soon as the house is dried-in and the insulation and drywall has been installed. Wood is not the only concern at this stage. While drywall is taped and finished, the curing mud adds moisture to the air, so we use industrial dehumidifiers to pull that moisture out of the air and industrial fans to move air around to promote drying. The fans and dehumidifiers also speed production of drywall taping; when outdoor air is 80% RH or better, a coat of drywall mud may not dry by the next day when a new coat needs to be applied. We also have to keep the dehumidifiers running while the interior's being painted, tile beds and grout are installed, or any interior masonry work is being completed, as all those curing materials add moisture to the interior air. This is a slow process of reducing the moisture load in the air; it's not going to compromise curing of cementitious materials that benefit from slow cure rates.


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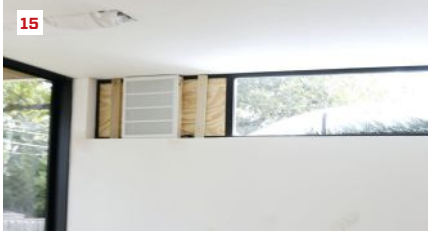
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pump package for cooling and heating, which we set up on staging outside the house **(12)**. The really nice thing about this unit is that you set it up once. There's nothing to move around on the jobsite. With the smaller units, you end up moving them around quite a bit during the course of a job, and you have to be more concerned about locking up the smaller units while they are on site to prevent them from being stolen. And, since the package unit sits outside, we don't need to dump the heat. It's set up as it would be if it were a permanent piece of equipment, with a supply side **(12)** and a return side **(13)**, which we duct to temporary window or door openings **(14, 15)**.

BUDGETING FOR HOUSE CONDITIONING

When I first got into this, I rented industrial dehumidifiers and was dissatisfied with the equipment. Sometimes we got a unit that was a dud—the pump was broken or it would leak. Out of frustration, I bought my first dehumidifier in 2009. Most of my jobs are cost-plus, and so I'd always put a temporary conditioning line under the utility line item in my construction budgets to cover the equipment rental.

Now that I own the equipment, I still add this line item—but now, in essence, I'm renting the equipment to myself. I bring this to the attention of my clients when we're discussing budget, and I explain that they are getting about a 10% discount over the cost from the rental yards. I also explain that this is a necessary cost to cover storage and maintenance of this equipment. I spell this out on the disclosure form that the clients sign, so they know there's nothing fishy going on. This is one way that I differentiate myself from my competitors. It really makes a difference when you take an architect or a client out to a jobsite and they see what we're doing to ensure perfect fit and finish of the interior.

Because I own it, I have great equipment that I ensure is well-maintained. Every six to 12 months, we'll pull the condensate pump out of each dehumidifier to clean it, making sure there's no drywall debris or other material that will clog it and cause a leak. We inspect the condensate line and clean the whole unit to make sure that everything is operating well. This gives me peace of mind, knowing that I can leave the unit going for a period of time without a leak that would spoil a finish floor or otherwise cause a mess. And I know it will do the job I need of pulling humidity out of the air and drying the interior.

Matt Risinger owns Risinger Homes, in Austin, Texas, and is a regular contributor to JLC.

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A Room for All Seasons

Enclosing an old porch gains much-needed floor space

BY KYLE DIAMOND

Photos: Kyle Diamond

Last November, my company began remodeling a French cottage-style home in the Hudson River Valley region of New York. Built in the late 1960s, the existing wood-framed structure was set on a slab-on-grade foundation. It had half-round transoms above the doors and windows, a cementitious exterior veneer, and a hip roof with steep, unequal pitches and a curved "flare" at the eaves—all in keeping with its architectural style.

Currently, the owners use the cottage as a weekend get-away from the city, and to accommodate their growing family, they decided to make much-needed improvements to the home's size and comfort. Working with architect Jonathan Lanman, they created a scope of work that included tearing down the existing 13-by-18-foot screened porch on the south end of the house **(1)** and replacing it with a larger, 15-by-22-foot sunroom; providing a new bedroom and sitting area above the new sunroom; remodeling part of the existing second floor adjacent to the new living space; adding new dormers to both the existing and new roofs; and reroofing and re-stuccoing the entire home. In this article, we'll focus on the work relevant to the four-season room.

We decided to break up the job into two phases because of the late-November start date. For the first phase, our plan was to complete the demo work and foundations, then button up the place before


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the snow started. Once spring rolled around, we would begin work on the framing. All in all, we planned for the whole project to take four months, with approximately three idle months during winter.

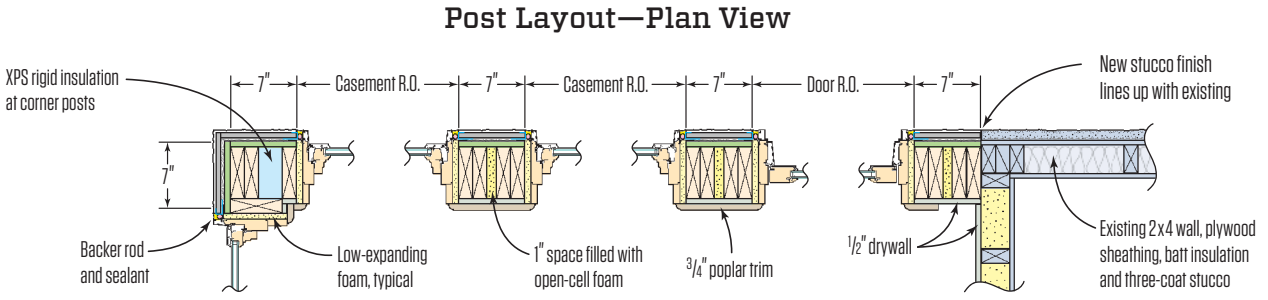
FIRST PHASE

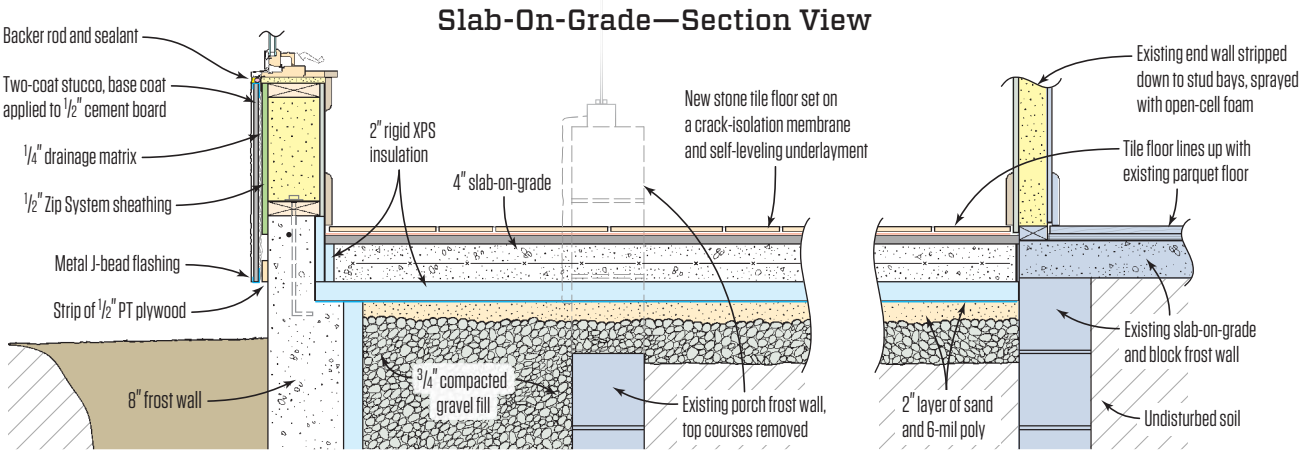
We began by removing the existing porch roof. It was a trapezoidal shape and had a flat top covered with single-ply EPDM. We stripped off the shingles, cut up the sheathing, and carefully removed the rafters by hand so as not to damage the main house. Then we turned to the porch walls, which were stucco-clad. The posts and top portion around the existing half-round windows were wood-framed, with short block "knee walls" at the base. We pulled them down with the help of a skid-steer **(2)**, which we also used to remove the top courses of the existing block frost wall and slab, and to help clean up the debris.

New foundation. To gain an additional 100 square feet or so for the sunroom, the new frost walls were aligned with the foundation walls of the main building. We left the bottom block courses of the existing frost wall and poured footing in place, using them to hold back the soil on one side of the trench. After excavating to about 4 feet, we formed 10x16-inch (HxW) footings, ran two #4 rebar, and poured 4,000-psi concrete **(3)**. We waited a day, then formed the 8-inch-thick stem walls **(4)**, which included a 3-inch-wide shelf to catch the edge of the slab. The tops of the walls were set at a height that would allow the new slab to match the finish floor level in the main house as well as maintain proper clearance above grade (see illustration, facing page). We padded out the forms with 2x10s to create the shelf, ran #4 rebar top and bottom, then poured the walls with 3,500-psi to 4,000-psi concrete and wet-set anchor bolts every 4 feet.

After stripping the forms, we installed 2-inch-thick XPS insulation on the interior side of the frost wall, then backfilled with ¾-inch compacted crushed stone to the interior side and with site soil to the exterior. We didn't install perimeter drainage because the house sits on a slight hill and, other than some ledge on the east side, the existing soils are "bony" and drain well.

Buttoning up. While removing the roof, we had left the EPDM membrane hanging in place. We now refastened it, along with a piece of Tyvek, to provide protection to the exposed gable-end hip roof of the main house. To protect the two exterior doors, we covered them with plexiglass panels left over from the screened porch. At grade, we





spread a 2-inch layer of sand over the crushed stone to improve site walkability and to create a smooth, level surface for the future sub-slab insulation. Finally, we covered the exposed top of the frost walls and future slab area with insulated concrete blankets. Although the owners now had use of their home for the winter, they occupied it intermittently, so I made periodic inspections to make sure things were OK. It took about two weeks to complete the first phase.

FRAMING THE SHELL

Back on the jobsite in the beginning of March, we uncovered the foundation and started framing. The owners wanted to take full advantage of the home's great views of the valley below and of adjacent landscaping, as well as introduce as much natural lighting into the sunroom as possible. This meant maximizing the amount of glazing and minimizing the amount of wall area. The architect chose large French casement and fixed-transom windows by Marvin (along with its Clad Ultimate in-swing French doors) in lieu of matching the half-rounds of the existing windows and doors. This break in style helped differentiate the new sunroom from the main house, giving it the feel of a glass room.

With the windows selected, I used Marvin's rough-opening dimensions and the architect's plan for 11 posts to hold up the new hip and second floor to determine that we'd need 7-inch-wide posts. I decided to make each one from two sets of double 2x6s with a 1-inch space in the center—later on, the space would serve as a channel for wiring for sconces mounted on the posts. For the two corner posts, though, the four 2x6s were configured a bit differently: A single 2x6 was spaced 2½ inches from a doubled 2x6, and a fourth 2x6 was set at a right angle to close up one side, yielding 7 inches in both dimensions (see illustrations, above).

Wall framing. The plan called for a sunroom ceiling height of 10 feet above the finished floor. Factoring in the 2x6 PT mudsill, the curb created by the foundation, and a double top plate, the posts were about 9 feet 6 inches long. We framed the posts like stud walls—on the ground between top and bottom plates—then stood them up. We installed only one doubled 2x6 at each post location—except at the two outside corners—adding the second doubled 2x6 in place later. This reduced the weight of the walls, making them easier to stand up. We then framed the second floor using 2x12s at 16 inches on-center, running perpendicular to the house. We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used LVL for end joists and doubled it up to serve as a header on the long wall of the sunroom. For bridging at midspan, we used solid 2x12 blocks.

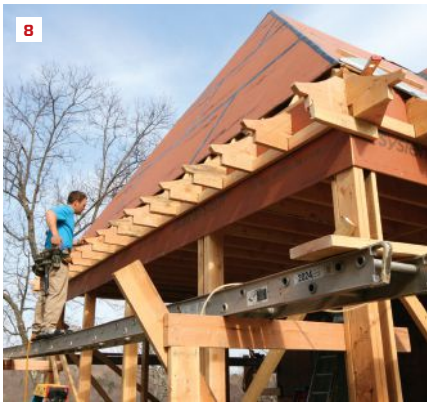
Roof framing. We framed the roof using Douglas fir 2x10 rafters, which were doubled up at the hips **(5)**. We cut the seats so the top of the rafters ran flush into the rim joists; we would add the overhangs later to match the flare of the existing roof. The steep pitches—13:12 at the main roof and 20:12 on the end—required rafter bevel cuts well beyond the 50 degrees our saws would cut. Instead, we cut the inverse bevel on one end of a block that ran between the king common rafter and the hip, then cut the longest jack square to butt up against it. We repeated this with each jack, running a block from the longer adjacent jack to the hip, square-cutting the next jack and installing it against the block. It required a little more material, but saved a lot of time.

We sheathed the new roof with Zip System panels taped at the seams **(6)**, which we like because they dry in quickly and are easy to walk on. Where the new sheathing met the existing roof plywood, we fastened a layer of Grace Tri-Flex synthetic underlayment, the same material we would eventually use under the new shingles on the main house **(7)**. We prefer this material to felt paper because it's lighter and stronger, it comes in wider rolls, and—especially important in this case—it can be left exposed for up to 6 months without bubbling, curling, or degrading. Since we needed to open the roof in a couple of places while we built dormers, we needed durable weather protection for several weeks.

When it came time for roofing, we ran a 36-inch-wide band of Grace Ice-and-Water shield at the eaves. At the new roof, we left most of the release paper in place until the applied eaves were installed, then peeled it off and adhered the membrane to the flared sheathing.

Applied eaves. We used salvaged eaves material to make a template for the applied eaves that would not only match the soffit, fascia, and crown molding on the existing house, but would also match the concave flare in the roof plane. Working on site, we used the template and a jigsaw to cut profiles from 2x12s. We laid out the applied eaves at 16 inches on-center—using a 2x4 ledger to keep everything in line **(8)**—and fastened them off with 10d commons, eight per tail.

We used a double layer of ¼-inch AC plywood to sheathe the flare, running it about 3 inches past the end of the applied eaves so it would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catch the crown molding. After laying down a bead of glue, we bent the first piece in place—orienting the grain side to side between the eaves blocks—and fastened it with 8d ring-shank nails **(9)**. At the corners, we let the plywood run long, fastened it, and cut the miter in place **(10)**. After the first layer was installed, we added the second layer, staggering the seams and fastening with nails only. At the corner, we again ran the plywood long and trimmed it in place **(11)**. Once the eaves were fully sheathed, we snapped a line along the edge of the doubled-up plywood and cut a clean edge **(12)**. Then we pulled the release paper off the Grace membrane and adhered it to the surface of the flare.

Because the roof pitches were unequal but the soffit depth remained constant, the flare appeared to be more pronounced at the steeper roof (see photo, page 57). This matched the existing roof detail at the other end of the house, and it inspired a little head-scratching when we were trying to get the sheathing miters right at the corners. But having a consistent soffit profile made the fascia and crown molding work go a lot faster **(13)**. We installed Lifespan solid select for the fascia and the same type of clear pine for the crown.

With the trim in place and the dormers framed up, we reroofed the whole building. That involved stripping the rest of the existing roofing from the main house, applying white, factory-painted drip edge at the perimeter, and covering any remaining exposed areas of sheathing with Tri-Flex underlayment. We used Owens Corning Duration architectural shingles, and because the site is fairly windy and the roof pitches are steep, we used the double-nailing pattern recommended for high-wind areas (see "Roofing With Asphalt Shingles," May/14).

NEW SLAB

Moving inside, we turned our attention to the gable-end wall of the main house. At the bottom, the cladding extended down into the space that would be occupied by the slab, so we decided to complete all of the demo first. After laying tarps on the slab fill to catch the debris, we stripped the wall down to the studs, removing the three-coat stucco, metal lath, building paper, plywood sheathing, and fiberglass batt insulation.

To prepare for the slab, we laid a 6-mil poly vapor barrier over the compacted sand fill, taping the seams. Then, we ran 2-inch-thick XPS insulation over the poly, extending onto the frost wall's 3-inch-


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wide shelf. To create a thermal break where the slab met the stem wall at the perimeter, we ran two strips of 1-inch-thick XPS insulation vertically along the edge (see illustration, page 59). For the slab, we used 4,000-psi concrete with welded wire mat reinforcing. After it was poured, it needed to cure for 28 days before we could begin installing the radiant tile floor (see the upcoming December 2014 issue of *JLC* for details of the tile installation). We used that time to install the windows and apply the interior and exterior finish materials.

WINDOW INSTALLATION

To complete the window openings, we built short 17-inch-high walls between posts, then sheathed them and the posts with Zip System panels. The architect didn't require us to install any special wall bracing, noting that the new roof tied to the existing house acts as a shear wall. Next, we waterproofed the walls by taping both the sheathing seams and the rough sills with Zip tape **(14)**. (For more on Zip System window flashing, see "Using R-Sheathing," Oct/13).

We mulled the French casements and fixed transoms on site using Marvin's mull kit. We had never used this mull kit before, but it was surprisingly easy to figure out. After removing the top nailing fin from the casement window, we ran a couple of beads of construction adhesive on both sides of the accessory groove along the window's head. We then attached Marvin's steel mull reinforcement strip, fastening it to the frame with #7 x ⅝-inch self-tapping wood screws. We followed the same steps for the transom's sill as well. Next, we joined the two frames by hooking the two "complementary" mull reinforcement strips together, making sure the windows were properly aligned and the reinforcement strips were fully engaged. Finishing up, we installed foam backer rod in the "joined" gap, then the mull cap (on the interior we planned to cover the gap with poplar trim).

Once mulled together, each window assembly weighed about 150 pounds, and we needed two men to lift each one into position. After checking for plumb and level, we tacked the windows in place **(15)**. We wanted to be able to adjust them after they were all installed to ensure that they were properly aligned, which would make the interior trim work go smoothly. Once all of the windows were permanently fastened in position, we applied a strip of Zip tape at each jamb, running a few inches above and below


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the window frame, then ran a strip at the head flashing. After finishing each window, we rolled all of the tape with a J-roller to set the adhesive.

INTERIOR FINISH

After the rough wiring was completed in the sunroom, we insulated the knee walls, the open space in the posts, and the stud bays of the gable-end wall of the existing house with "Thermoseal" open-cell spray foam (hitting the gaps at the windows with low-expanding foam). We sprayed the whole roof assembly as well, leaving the sunroom's ceiling uninsulated. After hanging ½-inch drywall on the posts and all of the walls, we converted the two exterior doors in the existing gable-end wall into interior doors. This involved removing existing weatherstripping and the exterior sills. We planned to forgo having thresholds, instead running the tile to meet the existing oak parquet under the doors when closed. This meant we needed to extend the existing jamb trim to make up for the removal of the two thresholds. Last, we sanded and filled holes and installed ball catches and handles to close the door from inside the sunroom.

We installed 1x6 finger-jointed pine bead board on the sunroom ceiling, and used poplar for window and door trim. To match the profile of the windows, we milled a decorative bead on the casings. This complicated the window trim at the intersection of the mulled jambs with the trim at the post **(16)**, so we miter-cut the mull jambs—chiseling out the extra material—to receive the 1½-inch-wide horizontal mull trim **(17)**. We took great care with the joints, even though all surfaces in the room, including the wood trim and ceiling, would be painted white **(18)**.

EXTERIOR FINISH

The existing house was clad with traditional three-coat stucco. We were tasked with trying to match its finish not only on the new sunroom, but on all of the dormers as well (this included the three new ones we built and the four existing dormers that had water damage and needed new flashing and cladding). Also, because three-coat stucco is a time-consuming process and is dependent on good weather to dry properly, I discussed alternatives with our stucco subcontractor, John Mortillo, during preconstruction meetings. Initially, we were going to go with EIFS,


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but we were concerned about having to deal with a thicker wall assembly. The EIFS would have helped with any thermal conductivity issues related to the wall assembly, but because there was such a small amount of wall area (compared with the glazing), we decided to go with a modified system of two-coat synthetic stucco (made by Total Wall) with fiberglass mesh embedded in the base coat. It would be applied over ½-inch Durock cement board, which would be installed over ¼-inch Keene DriWall drainage matrix membrane; the WRB in this case would be the Zip System sheathing. As for the existing three-coat stucco, the plan was to clean the surface, roll on a bonding agent, and apply just the finish coat of synthetic stucco.

John's crew fastened the Keene DriWall to the Zip wall with ⅜-inch staples and used 1 ½-inch-long Durock screws to fasten the cement board to the sheathing **(19)**. To protect the exposed ends of the Durock, they installed metal J-flashing along the bottom edge of the walls, as well as around all window and door perimeters. They "taped" the Durock seams with fiberglass mesh, then power-washed the existing stucco on the entire house with a bleach solution to remove any mold and mildew.

Starting with the dormers, they applied a 1/16-inch-thick butter coat of Total Wall T-2000 Base Coat over the Durock **(20)**, then quickly embedded pre-cut lengths of Total Wall reinforcing mesh **(21)**. They worked the mesh into the butter coat starting at the center and troweling toward the edges, overlapping runs of mesh by a minimum of 2 ½ inches. Then they applied additional T-2000 Base Coat mix, thick enough to embed the mesh so that its pattern wasn't easily visible. After a day or so, the crew installed backer rod and sealant around the dormer windows and applied the finish coat. Using a plastic float, John troweled on a thin coat of Total Wall's Total Premium Elastomeric Finish over the surface **(22)**, providing a medium sand-blast texture. The finish coat was tinted, so no further finishing was required.

Where the new sunroom abutted the existing wall, they rolled Total Wall's Stucco Bond liquid bonding agent onto the existing three-coat, then covered the seam with fiberglass mesh. Next, they applied the T-2000 Base Coat mix, feathering it onto the existing stucco surface **(23)**. With the base coat on and the sunroom's windows and doors caulked, they applied the finish coat **(24)**.

FINISHING UP

The final touch on the exterior was replacement of the gutter and downspouts. This work was subcontracted to Ken and Ryan Parsons of The Brothers That Just Do Gutters, in LaGrangeville, N.Y., who installed 5-inch K-style custom copper gutters and 4x5-inch leaders around the addition and approximately half the main house **(25)**. Inside, we installed a wall-mounted Fujitsu mini-split prior to the final coat of paint **(26)**. The mini-split would perform the bulk of the heating (and cooling) duties, while the radiant mat in the tile floor was chosen for added comfort. See the upcoming December 2014 issue of *JLC* for details of the tile installation.

Kyle Diamond is a partner with his father, Dale, at New Dimension Construction, in Millbrook, N.Y.

Photo: Roe Osborn

Lineup of Linear Shower Drains

An installer's look at options from different manufacturers

BY MICHAEL BYRNE

Linear drains have been manufactured for many years, mostly for commercial and industrial applications. In recent years, however, linear drains have been finding their way into our homes, providing a sleek alternative to the ubiquitous circular center drain for shower drainage. In addition to their stylish look, one of the more practical applications for linear drains is for accessible, curbless showers. The single sloping plane required for a shower floor with a linear drain makes for easier navigation and a more stable surface for a wheelchair user than the conical shape required for traditional center-drains.

But usefulness aside, most linear drains are being used in projects by designers and architects as a design element that offers a clean, elegant look for both curbed and curbless showers. The flat plane of the shower floor allows the installation of large-format tile, which expands design possibilities even further. Also, linear drains can be made practically invisible through the use of a tile-top strainer in place of a conventional metal grate or strainer. In this configuration, drain water seems to vanish as it exits through the open grout joints surrounding the drain **(1)**.

With the almost endless design and application potential of linear drains, I only wish that they had been readily available for residential installations when I began installing tiles back in the 1960s.

Manufacturers seem to come out with new linear drain offerings almost daily. This article takes a look from an installer's point of view at some of the available options. It's not intended to be an evaluation, rating, or comparison of the different brands. It's more of an outline of the basic components of each system and an explanation of how they are installed and how each system's drain connects to a shower or bathroom floor membrane.

Because the floor for a linear drain requires a single sloping plane instead of the curved shape needed for a center drain, linear drains can make fabrication of a shower faster and easier. In curbed showers, the linear drain can be located against the curb or along any of the shower walls. For curbless showers, the simplest configuration locates the linear drain at the transition from the bathroom to the shower **(2)**, allowing the drainage slope to be built directly on top of the subflooring. But with appropriate construction, a linear drain in a curbless shower can also be positioned against the wall opposite the bathroom floor **(3)**. With proper methods and accessories, two or more linear drains can be joined to create a long continuous drain or an L-shaped one along two walls that meet in a corner **(4)**. For best results, all linear drains should extend the full length of a shower wall; for longer lengths, some linear drains are available with two or more drainage holes to increase their drainage capacity.

On the Internet, linear drain prices vary greatly, running anywhere from $327 for a 32-inch drain to $1,035 for a 60-inch drain. But I found discounts for every kit I looked at, so I didn't include prices for the linear drain kits in this article—it pays to shop around. Prices also varied between brands depending on the components available, as well as on what was included in the kits (such as sloping and extension panels to create the necessary sloped floor for the linear drain installation). And oddly enough, tile-top strainers are often less expensive than metal strainers.

FREESTYLE LINEAR DRAIN

The Noble Co.'s FreeStyle linear drain kit includes the drain body, membrane flashing, a cartridge of sealant that's compatible with the flashing, a drain grate, and hardware **(5)**. Drains come in lengths from 24 inches to 60 inches; custom lengths are available in quantities of 50 or more. There are four stainless grate designs that can be ordered with the kit, along with a tile-top strainer that allows ceramic or stone tile to replace the standard stainless

Photos: 1, Schluter Systems; 2, Roe Osborn

steel grate. The drain body (or trough that collects the waste water) connects directly to ABS or PVC waste lines and can be joined to two or more additional drains. Versions are available with center or off-center drain outlets.

The FreeStyle drain is designed to be used with its companion surface-applied sheet membrane (NobleSeal TS); however, with an adapter kit, the drain can also be used on mortar-bed installations. The FreeStyle drain can be installed directly on top of a code-compliant plywood subflooring or concrete slab, or it can be recessed into a concrete slab, which would entail blocking the drain up (for a pour) or chiseling out the concrete in an existing slab. The drain can also be installed flush with a plywood floor in a slot cut into the subflooring, but this scenario would require supplemental framing to tie the floor together and fully support the drain.

The FreeStyle drain's clamping ring **(6)** secures the drain to the membrane flashing (included in the installation kit), which is then joined to the main membrane with the kit's sealant. The clamping ring can also secure the drain directly to a continuous membrane that covers the entire floor of the shower.

Both the printed and online instructions for the FreeStyle Linear Drain are clear and to the point. Particularly helpful for a first-time user is an online installation sequence animation that gives an easy-to-understand overview of the drain, membrane, and tile installation process for the FreeStyle drain system.

Find more information at *noblecompany.com.*

PROLINE DRAIN

The ProLine linear drain system by QuickDrain USA consists of a variety of drain bodies, connectors, strainers, and other components that let you use the system with both wood subflooring and concrete slabs **(7)**. ProLine offers standard length options from 18 inches to 68 inches, with custom lengths available up to 100 inches. Nine strainer styles, including a tile-top option, are available.

Connection to the waste line is through a hubless connector; for increased capacity, ProLine offers drain bodies with two or three drain outlets. Connectors are also available for multiple-drain installations. The drain outlet for the ProLine Drain is available centered or off-center. ProLine has an extensive array of other auxiliary components, including flat panel supports, sloping panels, and preformed curb sections.

Photos: 3, Roe Osborn; 4, Stormtech; 5&6, Michael Byrne

The hardware included in the kit can be used to install the ProLine linear drain on any floor surface, thin-bed, or thick mortar bed. The company's flat panels and sloping panels are made out of an innovative honeycomb material **(8)** and bond to the plywood or concrete subflooring (and to each other) with thinset mortar, which also fills the individual honeycomb cells for increased compressive strength.

A section of membrane flashing (that comes from the factory already bonded to the flange of the drain body) is then joined to the main membrane with the system's adhesive tape. Inside and outside corners as well as curb covers complement the system's sheet membrane system.

The company's website contains instructions and drawings for a wide range of drain positioning: for either curbless or curbed showers; for drains mounted in the front, rear, or side of the shower; and for installations over plywood subflooring or concrete. The list of instructions and illustrations is rather lengthy and a bit daunting for the installer to get through, but the ProLine system appears to have all the bases covered.

Find more information at *quickdrainusa.com.*

KERDI-LINE LINEAR FLOOR DRAIN

Manufactured by Schluter, the Kerdi-Line system's drain body (called the channel body) **(9)** and grate assembly **(10)** are sold separately. The Kerdi-Line system is designed to work with Schluter's Kerdi or Ditra sheet membranes, waterproofed backerboard, and shower trays, as well as with the company's line of tile-finishing profiles. Depending on the style you choose, Kerdi-Line drains are available in lengths from 20 inches to 72 inches with either centered or off-center drain outlets that connect to the waste line by a hubless connector. The company offers three grate options—a perforated stainless-steel strainer, a solid stainless steel cover, and a tile-top strainer. To complement its system, Schluter also makes expanded-foam curb sections, sloped waterproof panels, and membrane-covered backerboard.

Product brochures and online brochures provide descriptions of the Kerdi-Line products along with some illustrations. These brochures are detailed, but for the best version of Schluter's installation instructions, visit the Kerdi-Line website and watch the videos there.

Find more information at *schluter.com.*

Photos: Michael Byrne

HYDRO BAN LINEAR DRAIN

Manufactured by Laticrete International, the Hydro Ban linear drain system is available in six lengths, from 24 inches up to 60 inches. The company offers three stainless steel grate options—brushed bronze, polished bronze, and oil-rubbed bronze—in addition to a tile-top strainer option. The Hydro Ban drain body is available with a standard vertical drain outlet or with a horizontal drain outlet that exits the drain body at 90 degrees. Two or more drain bodies can be connected for applications longer than 60 inches. Connection to the waste line is by hubless connector. The drain body connects to the membrane section using Hydro Ban Waterproofing/Anti-Fracture Fabric that bridges between the setting bed and drain body **(11)**. The fabric then embeds in Hydro Ban liquid membrane. The Hydro Ban drain can be installed over plywood subflooring or concrete slabs, for showers with or without a curb.

The Hydro Ban Linear Drain system is rather simple in that it comprises a drain body and a strainer **(12)**. Each grate strainer has four adjustable feet for positioning it to sit 1/16 inch below the surface of the finished tile for optimal drainage. The drain body is simply positioned in the mortar bed, which is required to provide a slope of ¼ inch per foot to the drain **(13)**. Once the properly sloped mortar bed has been installed and allowed to dry, and backerboard has been attached to the shower walls, Hydro Ban liquid membrane is applied to the walls, floor, and drain body flange (and to the mortar bed curb, if one is incorporated in the design) to make the installation waterproof.

The online installation instructions for Laticrete's Hydro Ban Linear Drain system are concise and easy to understand. With my experience installing tile, applying liquid-applied membrane systems, and reading blueprints, I got the gist of how to install the Laticrete system from the four drawings found in the five-page brochure. These four drawings condense the complete details onto just two pages.

Find more information at *laticrete.com.*

MAPEI SHOWERPERFECT

The final entry into our linear drain lineup is the Mapei ShowerPerfect Linear Drain system. The day it was delivered to my office, the size of its box made a memorable first impression—it was

Photos: Michael Byrne


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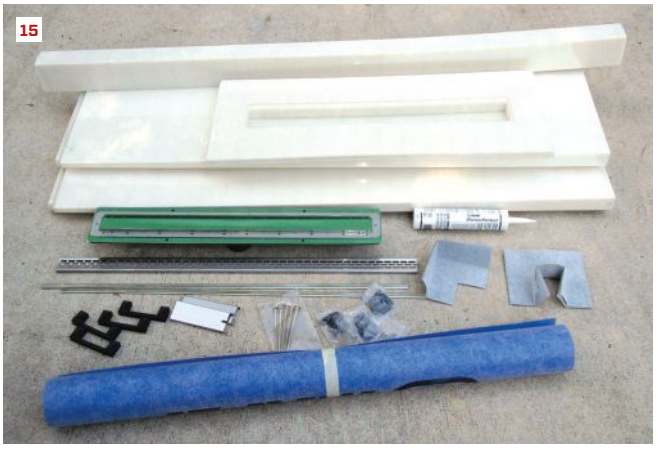
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huge. It turns out that the ShowerPerfect system is designed to convert a space that was previously occupied by a bathtub into a shower stall.

Sizes for the ShowerPerfect system kits run from 26 inches by 32 inches (for smaller showers), up to 36 inches by 61 inches (for the more typical tub/shower conversion). There are three grate options, plus a tile-top strainer. The ShowerPerfect's drain outlet **(14)** can be connected to the waste line with either a standard glue-in connector or a hubless connection. As with other drains in this article that use a hubless connection, instructions call for an elongated hole so the screws on the connector can be tightened from above. The ShowerPerfect linear drain can be installed with either a sheet-membrane or a liquid-applied waterproofing system (both manufactured by Mapei). In both cases, the membrane section supplied with the kit is site-bonded to the drain body flange.

A unique aspect of this system is that the materials needed for installation (with the exception of the actual waste-pipe connector), are all available from Mapei sales outlets. These materials include the Shower Perfect kit **(15)**, liquid and sheet membranes, and thinset mortars to install the drain and the tile, as well as optional components, such as the panels needed to create the sloped floor. Mapei offers a separate installation guide for installing the ShowerPerfect system using its 4 to 1 mortar mix to create a sloped mortar bed instead of using sloping panels. And I don't see why the ShowerPerfect system would not work for larger shower installations if you connected two or more drains using its drain extenders.

The ShowerPerfect system is designed to be installed directly over a plywood subflooring or a concrete slab using only components in the kit. The kit's drain support frame—which slopes to both the front and rear—allows the drain body to be installed 3 inches to 6 inches from the wall. Depending on which kit you purchase, the drain body can be joined to sheet or liquid-applied membranes.

Mapei offers separate instructions for installations with the sheet membrane and liquid-applied membrane systems that are clear and easy to understand. These instructions along with installation videos are also available online.

Find more information at *mapei.com.*

JLC contributing editor Michael Byrne is a veteran tilesetter and moderator of the ceramic tile forum at jlconline.com.

Photos: 13, Roe Osborn; 14&15, Michael Byrne

Concrete Additive
Designed to work with small batches of concrete as a strengthener, hardener, and waterproofing agent, Super-Krete's Concrete Boost reportedly reduces permeability, efflorescence, and freeze/thaw susceptibility. Use it with a ready-mix sack (up to 90 pounds) of any Portland cement–based material. A 12 pack costs $17.85. super-krete.com

Custom Range Hoods
RangeCraft will fabricate hoods with 600 cfm or 1,200 cfm blowers as either wall- or ceiling-mounted models in a range of materials and finishes. The Canterbury (shown) can be dressed with rivets and decorative banding. Halogen lights and patented Micro baffle filters come standard; dimmers and variable switches cost extra. Prices start at $4,000. rangecraft.com

Wood-Look Porcelain Tile
Detailed shading and pigmenting help achieve a natural wood look in the Season Wood collection of Colorbody Porcelain tile from Daltile. Available in five colorways, the large-format field tiles measure 48 inches long and 6, 8, 12, or 24 inches wide, and coordinate with matching bullnose and cove base trim profiles. Pricing starts at $12 per square foot. daltile.com

Bluetooth-Enabled Leverset
The Liscio Electronic Keypad Leverset from Emtek features Bluetooth programming for home security. Sleek, discreet buttons on the leverset open the door with a code programmed from your smartphone. The associated free app accommodates up to 20 user codes for the lock. A key cylinder on the exterior provides back-up access. Price: $240. emtek.com

Custom-Tinted Caulk

Using a proprietary caulk that blends with latex paint instead of repelling it, Red Devil's Create-A-Color Caulk can be tinted to match walls, tile, countertops, or exterior trim and siding. A $30 kit includes two cartridges of the specialized caulk, a reusable heavy-duty mixer, and a syringe to inject the paint. reddevil.com

Low-Profile Dryer Vent

The Dryer Wall Vent's galvanized, powder-coated steel damper is lightweight and, maker In-O-Vate claims, creates zero back-pressure. Two balanced magnets on the door deter birds and other pests. The vent works with stucco, brick, and most conventional sidings, and its collar is sized to fit standard 4-inch seamed pipe in new construction or retrofits. dryerwallvent.com

Nostalgic Light Fixtures

Glass beads inside clear shades give a glistening effect evoking the 19th century in Progress Lighting's Dazzle collection. Pricing ranges from $189 for delicate bath sconces up to $1,800 for a dramatic nine-light chandelier. The collection also includes mini-pendants, close-to-ceiling, and foyer fixtures. progresslighting.com.

Trackless Door Guides

Johnson Hardware's Trackless Door Guides eliminate the need for a threshold or bottom guide track for bypass doors. The 100MP, 111MP, 100BP, and 111BP models feature a top precision extruded aluminum "jump-proof" box track for doors up to 200 pounds in three thicknesses: 1 3/8, 1 3/4, or 2 1/4 inches. Pricing varies. The 100MP costs $199. johnsonhardware.com

De-Nailer Air Hammer Attachment

For deconstruction and recycling during demolition, the Mayhew Steel Products Nail Boss can help more safely and easily remove nails and staples up to 1/4 inch in diameter. The Nail Boss attaches to any standard air hammer to straighten, drive, and remove fasteners with less effort than working by hand, helping save time and preserve materials. Price: $40. mayhew.com

LED Nightlight

SnapPower's SnapRays Guidelight features built-in LEDs that pull power from electrical contacts built into the outlet cover. The reinvented nightlights replace standard duplex or décor-style wall outlet cover plates so both outlets are always available. Package prices vary. A pack of 10 guidelights costs $120. The maker says each Guidelight costs less than 10 cents per year to operate and lasts up to 25 years. snappower.com

Kitchen Organization

The Rev-A-Shelf 448-Oxo Organizer makes room in a 12-inch base cabinet for food storage containers so home cooks can reclaim counter space. The shelves are specifically designed to fit the included Oxo containers. Full-extension slides with Blumotion soft-close improve accessibility and durability; adjustable rub bushings prevent side-to-side movement and frame rubbing. Price: $640. rev-a-shelf.com

Pneumatic Flooring Stapler

At just 11 pounds, the Senco SHFS200 mallet-actuated pneumatic hardwood flooring stapler delivers 547 inch-pounds at 100 PSI. Its 21 1/2-inch height makes the tool more comfortable to use while providing increased control. Users can easily alternate between 1/2-inch and 3/4-inch flooring thicknesses. Other features include a safety trigger, automatic staple angle and direction, and a top-loading magazine. Priced at $299. senco.com

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EDITED BY BRUCE GREENLAW

Mobile DeWalt Jobsite Table Saws

BY JOSH DUNLAP

When *JLC* asked me to review DeWalt's new 10-inch model DWE7491RS jobsite table saw and rolling stand earlier this year, I quickly agreed. At the time, we were using a compact DeWalt DWE7480, a DeWalt DW744X with a scissor stand, and a Bosch 4000 mounted on Bosch's TS2000 rolling "Gravity-Rise" stand. We wanted to see if the new mobile DeWalt would be an upgrade.

After we had used the saw for several months, DeWalt rolled out the DWE7499GD, which has a "Guard Detect" warning switch but is otherwise identical to the DWE7491RS. So we also tried that model to see if the enhanced switch was worth the extra cost.

Out of the box, it took me roughly 20 minutes to assemble each stand and bolt down both saws. I quickly verified that the blades were square to the table tops at 90 degrees and were parallel to the rip fences and miter-gauge slots. After I aligned the throat plates flush with the table tops using four adjustment screws, the saws were ready for action.

QUICK TOUR

If you visit dewalt.com/portable-jobsite-table-saw, you can view several videos that clearly demonstrate the key features of these saws. Built on a tubular-steel roll cage, the saws use DeWalt's signature rack-and-pinion fence-adjustment system, but the maximum rip capacity has been stretched to a class-leading 32½ inches. Our other table saws can rip 4-foot-wide panels in half, so we can already rip them to any dimension, but the extra support to the right of the blade is occasionally helpful. A separate strip of extruded aluminum flips over the top of the fence from right to left to support the right-hand edge of your stock when you're making wide rips. With a quick adjustment, it can also serve as a low auxiliary fence to make narrow ripping safer and easier. A push stick is clipped to the back of the fence within easy reach.

The miter gauge is small and flimsy, with no positive stops. That matters to us because these table saws can crosscut and miter wider stock than our sliding-compound miter saws.

Like all of the latest jobsite table saws, the two DeWalts feature a modular tool-free safety system that is clearly not an afterthought. It includes a blade guard that's permanently attached to a splitter, separate anti-kickback pawls that quickly snap on, and a separate riving knife that can be used instead of the guard assembly. The guard assembly has a rear dust port that helps eject sawdust away from the table and can hook to a vacuum.

To install or remove the guard assembly or the riving knife, you simply raise the blade all the way up, pull the release lever at the left end of the saw table, and slip the splitter or riving knife in or out. We normally don't use blade guards with our jobsite table saws because they often get in the way, but this system is so well designed that we're all at least using the riving knives to prevent binding.

The unique Guard Detect on/off switch on the DWE7499GD works like a typical paddle switch when the blade guard is properly installed. If you try to switch on the saw without the guard installed, however, a flashing light warns that the blade is unguarded. You then have to turn the switch's bypass knob once to start the saw, and you have to repeat this two-stage actuation every time you turn on the unguarded saw. This procedure does remind us to work safely, but it currently adds $150 or more to the cost of the saw.

The included accessories all stow beneath the saw table for transport and

storage. Unfortunately, you can't carry spare blades on the saw like you can on a couple of our other saws. We regularly use several blades for different applications, and onboard storage saves trips to the truck.

ON THE JOB

Folded up, the 90-pound rigs are easy to load into and out of our vans and pickups, though they won't quite fit under a tonneau cover. They also roll easily around our jobsites on two firm wheels that offer a satisfactory amount of cushion.

Setup is simple. First, with the stand resting upright, you unfold all four legs toward you until they snap into the locked position. Foot pedals allow you to release and extend the two bottom legs without bending over. With the legs extended, you then pull the stand's top handle to tip the saw up onto them. Reversing the process is just as easy.

Equipped with the factory blade, the saw effortlessly ripped everything from 100-year-old reclaimed 1-by fir with rock-hard knots to 3-inch-thick Douglas fir. Working solo, I also ripped full siding and sheathing panels. The splayed legs gave the stands exceptional stability without creating a tripping hazard and held firm even while I fed the sagging panels from well behind the saw. Overall, we think these rock-solid stands are a more important safety feature than the modular blade guards.

The saws efficiently eject most of the sawdust out the back and away from the saw with or without the blade guard installed. Dust collection was about average when we hooked a vacuum to the main dust port, and improved a bit when we hooked a second vacuum to the blade guard, though we still weren't dust-free. Mysteriously, DeWalt doesn't sell a Y-connector that would allow you to hook one vacuum to both ports, though woodcraft.com reportedly carries accessories that can do the job.

THE BOTTOM LINE

If we needed a new jobsite table saw, I'd definitely consider buying the DeWalt DWE7491RS. It's mobile, easy to set up, precise, powerful, and stable. If DeWalt would add onboard blade storage and a better miter gauge, the saw would be even better. The Guard Detect safety switch on the otherwise identical DWE7499GD works as advertised but costs a pretty penny. That added expense wouldn't make sense for us.

1. The maximum rip capacity is a class-leading 32 1/2 inches to the right of the blade. **2.** A low auxiliary fence flips down next to the main rip fence to make narrow ripping safer and easier. **3.** To install the blade-guard assembly, simply pull the external release lever and slip the guard into position. **4.** The DWE7499GD adds a unique Guard Detect on/off paddle switch that warns you with a flashing light when the blade guard isn't properly installed. To work without the guard, you must turn the bypass knob each time you turn on the saw.

DWE7491RS/DWE7499GD Specs

Blade: 10 inches; 5/8-inch arbor
Amps: 15
RPM: 4,800
Cutting depth at 0 degrees: 3 1/8 inches
Cutting depth at 45 degrees: 2 1/4 inches
Maximum rip: 32 1/2 inches
Maximum dado width: 13/16 inch
Weight: 90 pounds
Price: $600/$750
Included with saw: blade, blade wrenches, blade-guard assembly, riving knife, rip fence, push stick, miter gauge, rolling stand
Warranty: 3 years, 90-day money-back guarantee

Josh Dunlap is production manager of Consolidated Design & Construction Group, a residential design/build remodeling contractor in St. Louis.

Photos: 4, Josh Dunlap

Industrial-Grade Tool Totes

BY DOUG MAHONEY

The Veto Cargo Tote is basically a souped-up industrial-grade beach bag. The inside is one giant compartment, so while it's unlikely you'll use it to lug your wrenches, pliers, and nail sets, it's ideal for larger, bulkier items.

The bottom of the tote is a durable polypropylene shell. This not only protects the bag and its contents, but the hard rectangular shape holds the walls of the bag stiff and upright. The walls won't cave inward while you're loading and unloading; there's never any awkward grasping for the handles.

The walls of the bag are made of 1800 denier fabric. Denier is a measurement of the weight of the fiber used in the fabric; the higher the number, the more rugged the fabric. In my experience, 1800 denier fabric is nearly impossible to cut, rip, scuff, or wear in any way.

What these formidable bags can hold is entirely up to you. For me, the totes are perfect for the gear I need that's too big and bulky for my regular Veto Pro Pack. This includes extension cords, duct tape, caulking guns, framing square, 2-foot level, worm drive, clamps, work lights, and a framing gun. Items like these usually end up on their own, bouncing around the back of the truck in a disorganized fashion. They're also the tools that create multiple awkward trips from the truck to the work area.

Another carpenter who saw the Veto Cargo Totes told me he would ditch his tool cases and use the totes to carry his cordless setup, saying the bag was perfect for a recip saw. I could also see it being good for tiling gear, plumbing equipment, or drywall tools—anything where containing the cargo is more important than keeping it organized.

The totes are available in two sizes; the CT-LC goes for $85 and the larger CT-XL runs $100. At first glance the pricing may seem high, but considering the bags' usefulness and probable longevity, it makes sense. For something that you're going to use every day that will likely last well past a decade, $100 is a sound investment. Besides, there are plenty of high-quality lineman's bags in a similar price range.

Doug Mahoney is a carpenter in Harvard, Mass., and a regular contributor to Tools of the Trade, *where this review originally appeared.*

Photos: top, Doug Mahoney; bottom, David Frane

MAX LEVERAGE PLIERS

Last week the FedEx guy showed up with an unexpected delivery: new Vise-Grip 8-inch Max Leverage Diagonal Cutting Pliers from Irwin and a locked technician's case. There was no combination for the cable lock; I was supposed to open the case using the diagonal cutting pliers, which use compound cutting action to reduce the force required for cutting. The pliers cut through the steel lock cable with no more effort than it takes to cut a 14-gauge copper ground wire with regular wire cutters.

I was impressed—until I tried to cut the same steel cable with regular diagonal cutting pliers and realized that the cable was not so tough. So I decided to try something harder and test the Irwin tool against other 8- and 7-inch cutters I had in the shop, none of which were compound cutters. First I cut 16d galvanized finish nails. The 8-inch tools cut them one-handed; the 7-inch tools required two hands. Next, I cut #8 gold drywall screws. Only the Vise-Grip Max Leverage Pliers cut them single-handed.

It was a simple but instructive test: compound cut pliers, such as Irwin's, are easier on your hand and muscles when making difficult cuts or making heavy cuts all day long.

David Frane is editor-in-chief of Tools of the Trade, *where a detailed review of these pliers originally appeared online.*

BY JON VARA

1. Postmen and other inhabitants of the Landes region in France routinely traveled on stilts, as in this posed photo from the 1920s.
2. Stilted English farm workers assemble a support structure for hop plantings that will be used to flavor beer.

Stilts Beyond Drywall

Drywall stilts are a staple tool for hanging and finishing drywall and plaster, painting, and installing suspended ceilings. But while working stilts are now pretty much limited to the construction industry, it wasn't long ago that workers in other fields relied on them, too.

Until the early 20th century, shepherds in the Landes region of southeastern France tended their flocks from 5-foot stilts, partly for an enhanced view and partly because their longer "legs" allowed them to move swiftly across the flat pastureland. When the Empress Josephine visited the area in 1808, she noted that stilt walkers easily kept up with her carriage even when the horses were moving at a full trot.

English farmers traditionally used even taller stilts for tying twine to overhead wires to support growing hop vines. Similar stilts were also once used in California fruit and nut orchards at pruning and harvest time. But modern safety rules have pretty much put a stop to that—and have sharply limited the use of drywall stilts in the Golden State. (California OSHA prohibits their use, even though federal OSHA rules permit them.)

While stilts have lost ground in the working world, they're gaining in the world of entertainment: Because they're available commercially and are comfortable enough to wear for hours at a time, drywall stilts have become standard equipment at theme parks, where they're used to elevate costumed performers for dramatic effect.

Stilt manufacturers are aware of that off-label use, and they're careful to point out that their products aren't designed for it. Still, they appear to view it with a certain pride. "I was in Orlando Disney during the STAFDA [Specialty Tools & Fasteners Distributors Association] conference a while ago," says Chris Lin, office manager at Sur-Stilt. "There were some performers on stilts at the opening party, and when I asked, it turned out that they were our stilts. That was pretty cool."

JLC contributing editor Jon Vara lives in Cabot, Vt.

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