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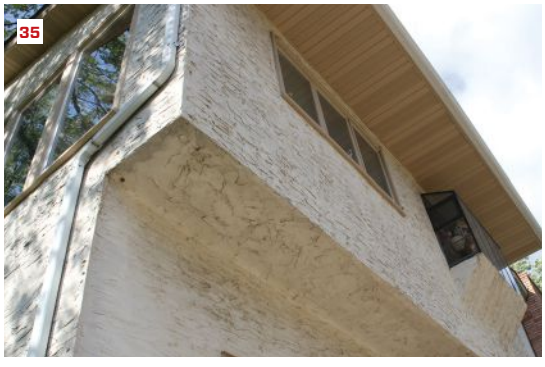

On the cover: Expert plasterer Ron Bisson, of Bisson Plastering, in Craftsbury, Vt., joins a new floral-relief replacement piece to an existing ornamental plaster ceiling. Photo by Tim Healey. See the story on page 16.

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DEPARTMENTS

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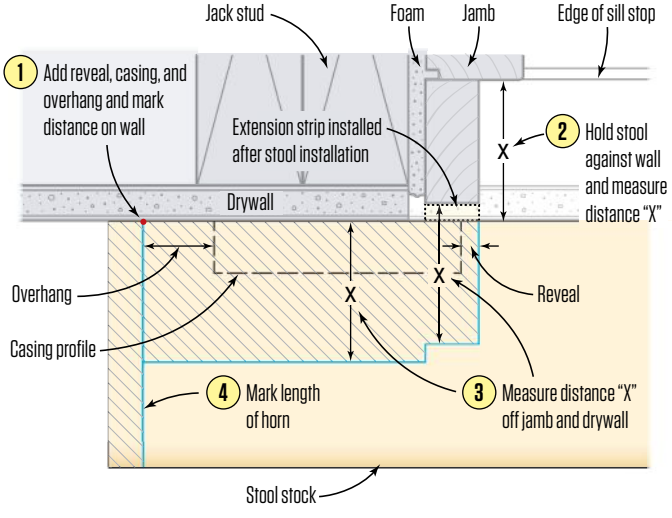
BY ROE OSBORN

Fitting a Window Stool

Stool Layout Sequence



Add the reveal, casing width, and overhang, and mark the end of the horn on the wall. Hold a rough length of stock against the wall and measure in how deep the stool needs to be to meet the window. Measure out that distance to plot the cut lines. In this example, a small strip will be added to the factory jamb extensions to make them flush with the drywall.

Photos by Roe Osborn; illustrations by Tim Healey

Interior window trim always begins with the stool, or the flat, horizontal part of the trim. I like to think of it as the place where folks typically set a plant. This piece usually involves the most fitting work. A stool has to fit against the wall on both sides of the window, as well as against the window itself or the sill stop in front of the window **(1)**.

The stool is a landing place for the jamb casings above, and the apron casing fits against the underside of the stool. The stool should always be installed level. It can sit directly on the sill part of the window frame or it can be padded up from the sill of the rough opening. Either way, the finished stool should fit tight against the window stop at a height that looks appropriate with the rest of the window assembly. The stool can be installed before or after the extension jambs.

Stock for the stool can take a variety of forms in a variety of materials. For this article, the stool is made of one-inch-thick paint-grade poplar with a simple bull-nose or half-round edge. As with many stock profiles, a dado on the inner part of the stock allows it to sit on the factory sill at the bottom of the window frame.

After the opening is checked for level, the first step is marking the width of the horns, or the parts of the stool that extend out along the wall on both sides. Starting at the inside edge of the side jamb, add the width of the reveal (typically 1/4 to 3/8 inch), the width of the casing, and finally, the amount that you want the horn to extend beyond the outside edge of the casing.

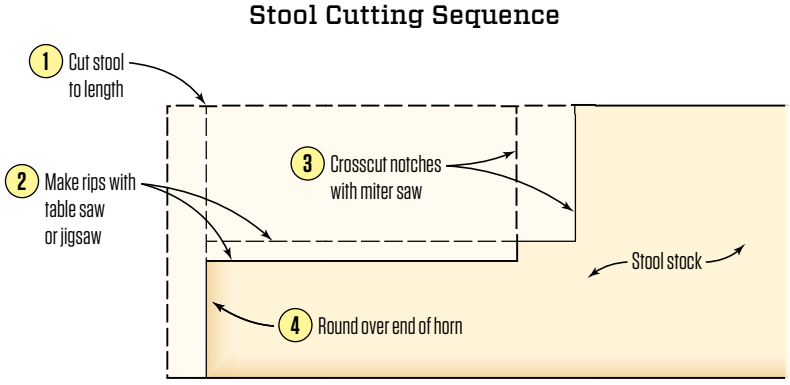
Mark this measurement on both sides of the window and measure between the marks for the overall length of the stool. Rough-cut a piece of stock an inch or two longer than the measurement, for a working length of stock. Now you're ready to scribe and fit the stool.

Roe Osborn is a senior editor at JLC *and the author of* Finishing a House *(Taunton Press, 2012).*

Start by adding the widths of the reveal, casing, and desired overhang. On both sides of the window, measure out from the inside of the jamb and mark that distance on the wall. Those two marks give you the overall length of the stool. Next, hold a length of stock against the wall and measure in to the window **(2)**. Using that measurement, draw a line on the stock to represent the inside edge of the jamb **(3)**. Measure the same distance from the jamb if it is not flush with the drywall, and mark the stock.

Measuring from the wall, mark that same distance near the end of the horn **(4)**. Draw lines to connect the measurement marks **(5)**. Note that this carpenter stepped the stool to fit tight against the factory jamb, and he drew in that additional line. After installing the stool, he added narrow strips to bring the jambs flush with the drywall for installing the casing.

The lines drawn will guide the saw to remove the waste from each end of the stock. Before releasing the stock from the wall, transfer the mark that you'd made earlier on the wall (to indicate the overall length of the stool) to the stock **(6)**. At the opposite side of the window, repeat the entire layout and marking process for the other end of the stool.



For the sake of safety, make the cuts for the stool horn in the proper sequence. First, cut the stool to length. Next, make the rip cuts to fit against the wall and, if necessary, the jamb. Then cut across the grain over to meet the saw kerfs from the rips. Finally, round over the end of the horn.

Start creating the horn profile by cutting the stool to its finished length at both ends. The rips along the lines parallel to the front of the stool come next. The best tool for ripping is either a jigsaw or a table saw. Then, using a miter saw or jigsaw, make the crosscuts for the inside edges of the window jambs **(7)**. Finish cuts with a handsaw, if necessary. Clamp the stock firmly to a work surface, and create the bullnose profile on the ends of the stool with a round-over bit mounted in a router **(8)**. (For stain-grade trim, miter the ends of the horn).

After cutting out the horn profile, dryfit the stool to confirm that it fits tight against the window, the jambs, and the wall. Scribe and cut any micro-adjustments that are necessary. When satisfied, apply construction adhesive to both the sill jamb and the backs of the horns **(9)**. Slide the stool into place and fasten with finish nails through the top of the stool and into the sill jamb **(10)**. Drive additional nails horizontally through the horn and into the framing on both sides of the window.

For a more detailed discussion of fitting a window stool, go to **www.jlconline.com/training-the-trades/fitting-a-window-stool**.

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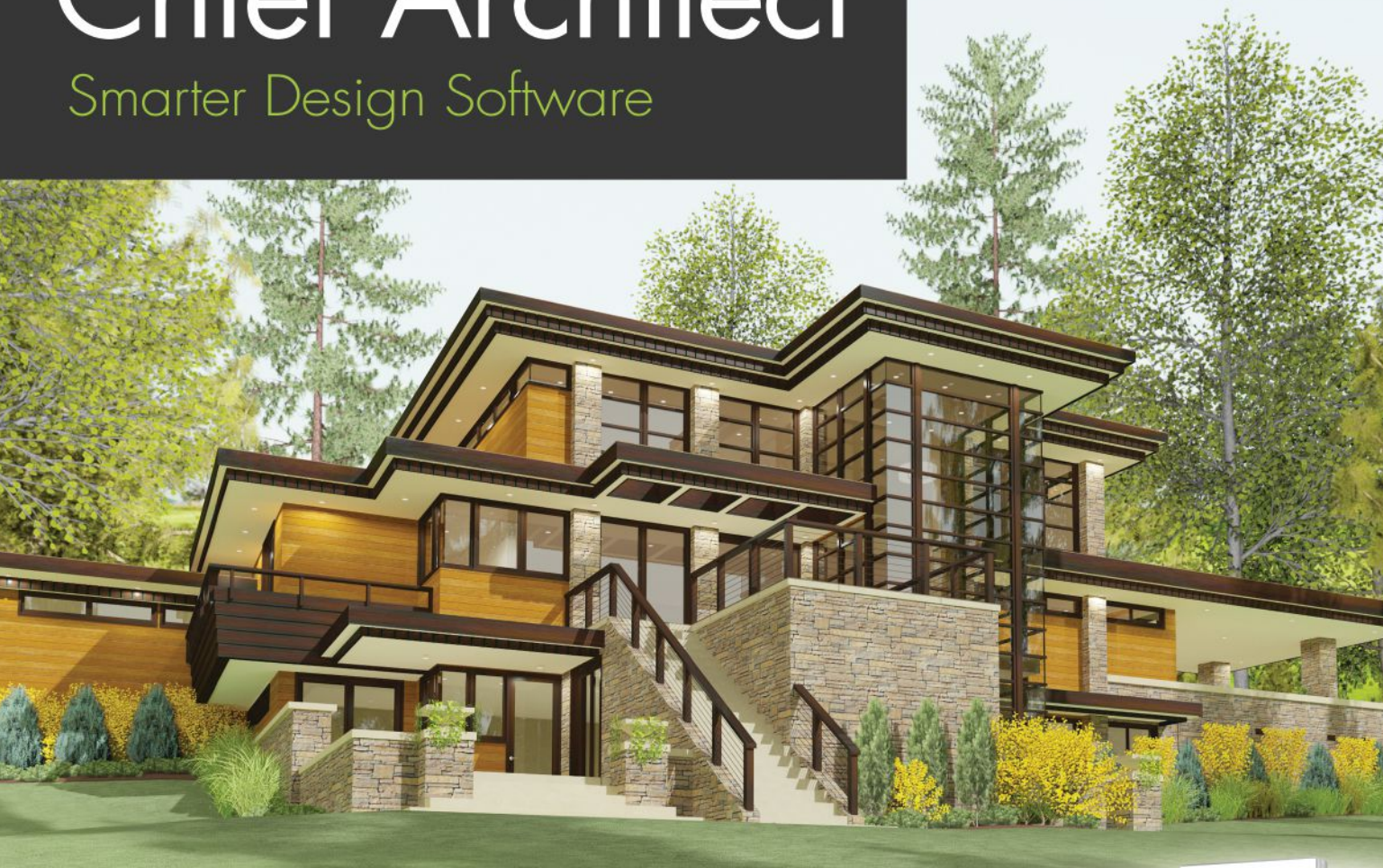

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Q A client asked me to install copper gutters on a house with aluminum-clad fascia trim. Will there be a problem between the dissimilar metals reacting?

A Harrison McCampbell, a forensic architect from Brentwood, Tenn., responds: When different types of metal come into direct contact with one another, you're setting the table for possible corrosion between the two. The speed at which that occurs, along with the amount of corrosion (both visually and structurally), depends on the metals involved. In this example, if you install copper gutters on a house that had been built with aluminum gutters, trim, and fascia, the less-reactive copper may cause damage to the more-reactive aluminum.

A technical explanation of the process is that metals contain atoms and ions that may provide negatively-charged anodes (known as anodic) or positively-charged cathodes (known as cathodic). When two different metals come in contact in the presence of an electrolyte—in this case, water—a small electric path moves from anodic (more-reactive metal) to cathodic (less-reactive metal). Over time, this electron transfer leads to degradation or corrosion of the anodic metal while the cathodic metal stays relatively unaffected. Looking at the chart below (based on a chart at solarprofessional.com), you can get an idea of how different metals used in construction compare to one another in regards to their level of galvanic activity.

As a general rule, it is probably good to physically separate different metals, just to be safe. That separation, or isolation, can be done with paint (although metals rubbing together over the years might cause paint to wear off), with some sort of plastic film (which might become brittle and deteriorate over time), or with a self-adhering rubber or asphalt-based membrane (such as Protecto Wrap flashing tape; protectowrap.com). These self-adhering membranes can be found in most residential construction supply houses. Also keep in mind that even if one of the metals involved has factory-applied paint, the ends and edges of the metal can be difficult places to maintain any protection.

I often see buildings with prepainted vertical metal siding in direct contact with galvanized counterflashing, and rust forming on the counterflashing. That is because the galvanizing itself is metal and it's reacting negatively with the siding, which is a different metal. Most likely, cyclical and differential movement have rubbed the finish off the siding at those places where adjacent panels meet. The newly-exposed metal in the siding consequently attacks the galvanized finish of the counterflashing at each of these locations.

Time and water are always the culprits with galvanic reactions. Adding a protective coating like paint to metal can forestall corrosion, but in your case, installing aluminum rather than copper gutters might better reduce the risk of corrosion.

Galvanic Series Chart

	Active	Magnesium
Anode (-)	(most susceptible to	Zinc
	corrosive attack)	Galvanized Steel
Electrical current/movement of ions	Direction of attack	Aluminum
		Mild Steel
		Cast Iron
		Lead
		Brass
		Copper
		Bronze
		Monel
		Nickel
		Stainless Steel 304
		Stainless Steel 316
		Silver
		Titanium
	Noble	Gold
Cathode (+)	(least susceptible to	Graphite
	corrosive attack)	Platinum

This chart lists common metals in order of how reactive they are with other metals. The greater the distance between two metals on the chart, the greater the potential for corrosion when they're in contact.

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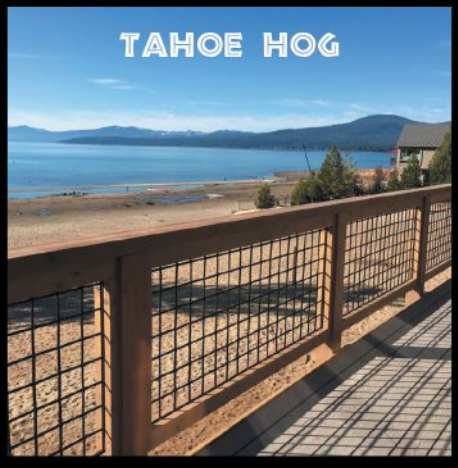
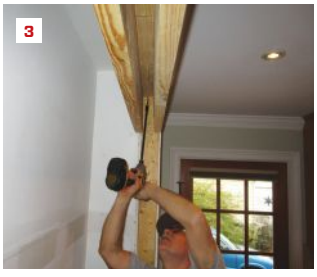




This pantry had three inconvenient outswing doors. Here, the doors and an intermediate post have been removed **(1)**. Having taken out the existing headers **(2)**, the author screws a single 9-by-5 1/4-inch U-shaped header to the top plate **(3)**. To accommodate the three bypass doors, the new 5 3/4-inch-wide finish jambs are wider than the existing 2x4 walls, and they are flush with the drywall on the outside of the pantry **(4)**.

Photos by John Carroll

Retrofitting Bypass Doors

BY JOHN CARROLL

Pantries are great storage options in kitchens, but they have a downside: Most pantry doors swing out. In high-traffic areas, those doors can disrupt work flow and cause mishaps, which was certainly the case in a project that I worked on recently.

The client's pantry had three doors—a double and a single. When open, the doors blocked routes to both the living room and dining room. After seeing a magazine article featuring bypass doors, which slide past each other on parallel tracks, the homeowners called me to replace the outswing doors on their pantry.

Lay out and frame the opening. As with any type of door, I needed to build the finished opening for the bypass doors to precise dimensions. The combined opening of the existing outswing doors was 96 inches, so I made the new finished opening 94 inches wide. This dimension worked perfectly for three 34-inch-wide door panels with the stiles overlapping fully.

I started by removing the three existing doors, the intermediate post separating the single door from the double door **(1)**, and the existing headers **(2)**. Then I installed a new, U-shaped single header to span the entire 8-foot opening **(3)**. This header needed to be very stout and straight because the header portion of the jamb would be attached directly to it, without shims. (Later, I would attach the three upper tracks to the jamb material with screws that were long enough to run through the jamb and into the header framing). And even though the walls were 2x4 framing, the header had to be at least 5 1/4 inches wide to accommodate the three bypass doors (more on that below) **(4)**.

The header also had to be sized correctly to accommodate the height of the door panels, which was determined in part by my treatment of the bottom track. To make it easier to slide items in and out of the pantry at floor level, I wanted to recess the bottom track flush with the floor (the recessed tracks would also look better). This would set the bottom face of the header jamb 82 1/2 inches above the finished floor. To achieve that height with the header attached directly to the underside of the top wall plate, I had to make the header 9 inches high.

The new 15-lite doors were heavy and they would hang from above, so I firmly anchored the center horizontal part of the upside-down U-shaped header to the double top plate of the wall with structural screws, using a long extension bit on an impact driver. After filling the space inside the "U" with solid lumber and plywood, I fit double 2x6 jacks under both ends of the header.

Jambs wide enough for three doors. Like pocket doors, bypass doors are suspended from overhead tracks. Three-wheeled ball-bearing hangers (two wheels on one side and one wheel on the other) fit inside the track and attach to brackets near both ends of each door panel. The track and the rollers look similar to those that I use for pocket doors, and the bypass-door hardware is actually made by the same company, L.E. Johnson Products (johnsonhardware.com).

But there are important differences between pocket and bypass doors. First, bypass doors require a separate overhead track for each door. This configuration allows the door panels to move past each other independently. The panels can all slide to one side of the opening and each door panel can operate without having to move the other doors.

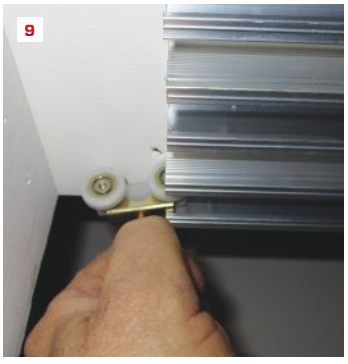
To allow enough room for the doors to slide past each other, the jambs had to be wider than 4 1/2 inches, the width of the existing 2x4 wall. The hardware installation instructions called for jambs at least 5 1/4 inches wide to accommodate the tracks for three standard 1 3/8-inch-thick doors (hence the 5 1/4-inch-deep header). I made the finished jambs a bit wider (5 3/4 inches) so they would be flush with the drywall on the outside of the wall. The frame and jambs project into the pantry 1 1/4 inches, which isn't visible from outside the pantry when the doors are closed.

Guide tracks on the floor. Another important difference between pocket doors and bypass doors is that without the wall pocket to hold the doors in line, bypass doors must be held in plane with Teflon pins that ride inside simple, U-shaped guide tracks attached to the floor.

To recess the aluminum tracks flush with the surface of the finished floor, I first had to make two straight cuts to remove a 6-inch-wide strip of the existing oak floor across the entire opening. For the bulk of the straight cuts, I used an EZSmart track saw system (eurekazone.com) that I've used since the 1990s **(5)**. The track saw and guide gave me a very straight cut, but I couldn't cut all the way to the end of the door opening. To finish the ends of the cuts, I used a multi-tool, working carefully by eye **(6)**. Then I screwed the aluminum guide tracks to the subfloor, filling in the spaces on both sides of the strip and between the three tracks with strips of oak flooring **(7)**.

Overhead track installation. The installation instructions recommended that the edge of the front overhead track be installed 11/32 inch in from the face of the drywall—tolerances usually reserved for more exacting tasks than hanging doors. I took a chance and added 1/32 inch to that dimension, installing the track 3/8 inch in from the face of the wall. Next, the instructions recommended a space of 17/32 inch between the front and the middle tracks. Again, I added 1/32 inch and made that space 9/16 inch. I did the same thing with the space between the last two tracks **(8)**.

The author uses a track saw to remove a 6-inch-wide section of flooring for the guide tracks **(5)**, finishing up near the jambs with a multi-tool **(6)**. Strips of flooring fill the gaps between the tracks, which are screwed to the subfloor **(7)**. The author screwed the overhead tracks through the jambs and into the header in positions dictated by manufacturer's instructions **(8)**.



A gap between the ends of the overhead tracks and the side jamb allows the rollers to slide into place **(9)**. Metal brackets screwed to the door-panel tops accept pins that hang down from the rollers **(10)**. Plastic guides screwed to the panel bottoms ride in guide tracks on the floor **(11)**. To hang a door panel, the author slipped the plastic guides into the floor track, and then lifted the panel one side at a time to engage the roller pins in the brackets. A nut below the rollers allows for adjustment. The head casing covers the upper tracks and the tops of the doors **(12)**. Each door slides independently to either side of the opening with very little effort **(13)**.

Before screwing the tracks to the header jamb, I cut them 1 3/4 inches shorter than the width of the finished opening. The resulting gap at the end of the track allows the rollers to be inserted into the tracks when it is time to install the doors **(9)**.

Hanging the doors. Similar to the pocket-door system, the three-wheeled part of the bypass-door hardware has a pin that extends down from the assembly. A bracket that attaches to the top of the door has a plate with a slot and a locking clip. After slipping the wheeled part into the track, the pin slips into the slot in the door plate and the locking clip keeps the pin in place **(10)**.

To hang the doors, I first inserted a pair of the wheel assemblies into the end of each track. Per the instructions, I alternated the side that had two wheels to help balance the load of the door in the track. Next, I installed the door plates on the top edge of each door panel, keeping the assemblies 2 1/4 inches from the side edges of the doors. On the bottom edges of the door panels, I installed the guide pins 2 inches from the side edges **(11)**.

After attaching the hardware to the tops and bottoms of the door panels, I set each panel in place with its guide pins in the bottom track. Next, I rolled the two hangers for each door into position, then lifted one end of the door at a time until the roller pin lined up and slipped into the plate on the top of the door. When the roller hardware was properly engaged with the door hardware, I rotated the clip to lock the two parts together. A nut on the roller hardware allows the doors to be adjusted so that they meet the side jambs perfectly. I could push the doors open with just a finger.

The final step was casing the opening. I set the side casings at the standard reveal on the jambs, but the header casing received slightly different treatment. I kept the lower edge of the head casing down far enough to just cover the tops of the door panels, concealing the upper track at the same time **(12, 13)**.

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

Repairing Ornamental Plaster

BY RON AND WILLIAM BISSON

I've been a plasterer for about 40 years. Along with my son, William, I run our business, Bisson Plastering, out of Craftsbury, Vt. We do new and restorative plaster work for both residential and commercial properties around New England and have had the great fortune of working on dozens of buildings on the National Register of Historic Places. Our work varies from large jobs, which entail making large decorative moldings (such as ceiling medallions and cornices), to repairing plaster ceilings and walls for small, rural farmhouses. In this story, we'll offer a glimpse into our fairly specialized niche of repairing historic plaster.

Last spring, we began plaster restoration work at the Fairbanks Mansion in St. Johnsbury, Vt. The mansion is part of the St. Johnsbury Academy (a private high school) and it serves as function space on the main floor and student housing on the upper floors. Built in 1884, the structure—the crown jewel of the academy's campus—has been under extensive renovations for the last couple of years. Most of the plaster cracking throughout the building was a result of normal wear and tear, but extensive foundation and structural repairs contributed to more-pronounced plaster damage localized to the first-floor rooms.

In terms of complexity, the ornamental plaster ceiling in the building's main entry hall **(1, 2)** was the project's most challenging restoration work for us. The ceiling's thin decorative patterns were done in what we refer to as flat reliefs. It had suffered from water damage and extensive cracking. Complicating matters, it had a rustic sponge finish. Though this rough, stippled finish looked like it had been added in intervening years, it was original and added a degree of difficulty to our work.

MAKING AN IMPRESSION

On our initial walkthrough, we verified that the entry hall's walls were a mix between gypsum- and lime-base-coat walls. We tested the walls by pushing a putty knife into them (if the knife goes through to the lath, it's lime base coat; if it doesn't, it's gypsum base coat—gypsum is much harder than lime). A few of the home's original lime-base-coat walls remained, while most had been redone with gypsum (lime walls typically last about a hundred years). The walls were on the thick side, 7/8 inch thick (conventional plaster typically finishes off at 3/4 inch). Inspecting the ceiling,

Master plasterer Ron Bisson inspects his replacement plaster flatwork **(1)**, which will be used to repair the main entry hall ceiling of the Fairbanks Mansion in Vermont **(2)**. Prior to making a mold, his son, William, brushes on one of seven coats of flex wax over an intact motif **(3)**. Then the wax impression is removed from the ceiling and prepped for mold making **(4)**.

Photos by Tim Healey

we discovered it was lime base by chipping on some of the cracks and noticing its softness. We also found that the ceiling was on the thin side, about 1/4 inch thick, which was a little unexpected given the robust nature of the mansion's overall construction.

Starting out, we needed to make replacement pieces for some of the damaged decorative motifs. We chose intact candidates on the ceiling, masked them off with painter's tape, and applied petroleum jelly to the existing painted plaster surface to help release our impression molds. Then we applied flex wax in seven coats to a minimum thickness of 3/32 inch **(3)** to the shapes we needed. Once hardened, we removed them from the ceiling and prepped them for making molds **(4)**—we removed the painter's tape and trimmed the wax "negative" mold **(5)**.

Of all the molds we use, wax molds are the easiest to make. There isn't a lot of handwork or complex ingredients involved, but they have short lifespans. For this ceiling, we needed to replicate only three decorative shapes (a sun motif and two floral patterns), creating a few of each, so we were able to get by using wax molds rather than the standard rubber ones we usually make.

MOLD MAKING

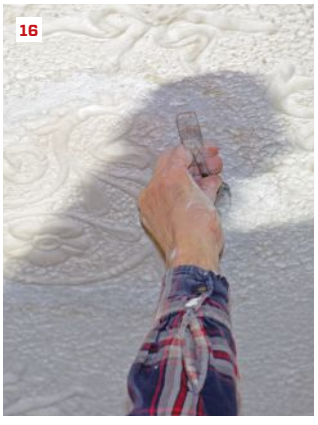
Next, we mixed fast-drying, highly refined gypsum, or gauging, to make what would be the flat bottoms, or saddles, of our molds **(6)**. Gauging is an ingredient used to make plaster, which hardens it (the more gauging added, the harder the plaster). We sprayed the bottom of the wax with cooking oil, then poured the gauging over the wax **(7)** and flattened the saddles out with putty knives **(8)**. After 20 minutes, the molds were ready to flip over.

The replacement flat-work pieces were made with straight Hydrocal white gypsum cement by USG (no lime added). Hydrocal is a super-hard, highly-refined molding plaster, which we use for making thin, ornamental work that needs to be strong. We sprayed the wax molds with cooking spray and poured the Hydrocal into the top of the molds. After five minutes or so, the mold was ready to be disassembled—first the saddle **(9)**, then the finish replacement piece **(10)**.

APPLYING THE PATCH

First, we carefully removed the damaged decorative molding and some of the adjacent plaster down to wooden lath. We scored the existing plaster with a putty knife, cutting slowly through the finish and base coats. While removing the plaster, we pressed on the edge of the remaining plaster at the same time, so we didn't hurt the ceiling **(11)**. We cleaned out all the gaps in the lath, allowing us to key our new plaster into the lath. We precisely lined up the replacement pattern

Ron trims the wax negative **(5)**, while William and apprentice Derek Dawson mix fast-drying gauging (gypsum) to make the bottom, or saddle, of the mold **(6)**. After the wax has been sprayed with oil, the gauging plaster is poured over the wax **(7)**, flattened **(8)**, then later flipped over (Hydrocal is used to make the new pieces). First, the mold's saddle is removed **(9)**, then the paper-thin, Hydrocal replacement piece **(10)**.



After the damaged piece has been removed **(11)**, Ron applies a bonding agent over the old, dusty lath **(12)**, then spreads a thin coat of plaster (heavy on the gauging, light on the lime) to the repair area **(13)**. Squeeze-out from the replacement piece is tooled around the edge **(14)**. Finally, touch-up lime putty is feathered to the existing painted surface, with the excess wiped **(15)** and tooled **(16)** off the existing paint.

to its desired location, then scribed and trimmed our replacement piece to the opening. With our new piece dry-fit to our liking, we wet down the existing wood lath using a pump sprayer and applied a bonding agent **(12)**. We use USG's Plaster Bonder to help adhere new plaster to old, dusty lath. The bonder takes about an hour to become dry and tacky.

With the bonding agent ready, we prepared the plaster that would hold our replacement piece in place. We mixed the plaster with a lot of gauging and just a small amount of lime in order for it to set quickly and adhere the decorative piece to the ceiling. We applied it to both the bonding agent **(13)** and the back of the replacement piece (at this stage, you have to work fairly fast and know precisely where the new piece is located). Also, to add to the degree of difficulty, you have to apply the right amount of plaster fill to flush up the new piece with the existing ceiling—this takes a lot of practice.

While the replacement piece was being held in place, we pushed excess plaster squeeze-out into any voids and tooled the edges **(14)**.

FEATHERING NEW TO OLD

For the finish touch-up work, we mixed some lime putty. We typically use autoclaved lime, which we soak for a few days (a process known as slacking the lime). Slacked lime is more pliable and it blends into itself better. We store the wet lime in buckets and use it as needed. Working in small batches, we made small rings of lime and added a retarder in a little bit of water to the ring. Also made by USG, gypsum plaster retarder is used to control how long you want a batch to last (or as we refer to it, timing the batch). Once the retarder was mixed in the water, we added gauging to the lime—if a retarder weren't added to the mix, the gauging would cause the lime putty to set up almost immediately after mixing it.

Because the existing ceiling was painted and lime putty cannot adhere to paint, we had to feather our new touch-up work right up to the edge of the painted surface. While texturing to match the existing ceiling, we wiped the plaster off the paint while we worked **(15)**, using a rodding spatula to help texture the ceiling and scrape back the new plaster **(16)**. Perfectly feathering in a new replacement piece with lime putty is a quick process that happens in a matter of minutes; a lot must be done before the finish sets up. After the lime putty dried, we applied parging (spackle) over the hairline seam between the new plaster and the existing painted surface and sanded it smooth to cover the seam.

Ron and William Bisson own and operate Bisson Plastering, in Craftsbury, Vt.

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Integrity from MARVIN

BY DAVID GERSTEL

Transparency: An Idea Whose Time Has Gone? Or Come?

Note: David Gerstel is the author of the construction industry classic, Running a Successful Construction Company. *The following article is in part adapted from his new book,* Nail Your Numbers: A Path to Skilled Construction Estimating and Bidding.

Recently, I ran across a website for a construction service that is a bit different from any I have encountered before. "CS," as I will call the service here, recruits homeowners and builders, pairs them up with one another, and then supports their projects with its web-based management platform.

CS describes its service as "new" and "revolutionary" and "transparent." It may be somewhat new. It may even have real value. But here's what CS calls "transparent": It charges a fee of 3% to 8% of construction cost for its service. It collects the fee by routing all payments from an owner to a builder through its management platform and taking its percentage before sending the balance on to the builder. Meanwhile, CS is at pains to avoid disclosing its take to homeowners. You can call that practice what you like. But transparent? Hardly.

While there are a number of definitions for "transparent," for the sake of this article, a straightforward one will do: "Candid disclosure of the charges for a construction project."

That's simple enough. Even so, builders have strong opinions about the issue when it comes to their own charges. I have heard builders refer to one another as idiots, traitors, and un-American as they butt heads over just how much transparency they are obligated to provide with respect to their charges for labor, for material, for trade partners—and especially for overhead and profit.

Transparency is a subject I have given a lot of thought to over the years, and I have arrived at strong opinions about it myself. But let me hold off on my own views and first attempt a fair-minded presentation of the diverse views of other builders. They fall into two groups: those who resist the idea of candid disclosure in the form of detailed and undisguised breakdown of the charges in a bid, and those who think it is an ethical obligation, an effective business strategy, or both.

Let's hear from the anti-transparency camp first. Their opinions range from matter-of-fact opposition to horror registered with true-believer intensity. At the matter-of-fact end of the spectrum is the opinion offered by veteran remodeler and construction business consultant Jerrald Hayes of ParadigmProjects.com. Jerrald suggests that transparency is not much of an issue simply because it matters very little to clients. In support of his view, he cites a survey in which homeowners did not bring it up even as they noted a couple of dozen other concerns.

A legendary builder who has been my lifelong mentor once made a related point to me. Clients are buying "value, not price," he said, and they are not concerned with the way in which charges are broken down in a bid. Other builders claim that transparency on costs and charges is unnecessary because it does clients no good—that spreadsheets filled with rows and columns of numbers just bewilder them.

Still other builders fear client abuse of transparency. A remodeler who operates in Alaska says he did for a time provide detailed breakdowns when he submitted bids to clients. But he gave up on transparency after clients repeatedly pointed to lower charges for similar items in competing bids to try and bargain down his charges on those items, while accepting his charges for the items on which he was low. He then switched to providing only one number in his bids, namely his total price to do the job.

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A now retired remodeler, much admired for building a thriving company with unusually high gross profit margins, amplifies the Alaskan remodeler's concerns. At a JLC Live conference, while proudly reporting that close to half of every dollar collected from clients went to their salary, other overhead, and profit, this remodeler warned the audience to never practice transparency. "Don't give a client a breakdown of your charges," they said. "That's like giving them a 2x4 to beat you with." If clients ask for more than a single number, maybe give them a minimal breakdown, but never show your overhead and profit markups. And if they insist on more

breakdown, tell them further information is "proprietary" and that you won't share it.

Michael Stone, the widely read construction business consultant, responds to the very idea of financial transparency with disdain and dismay. Builders who claim to be practicing transparency are "just playing a numbers game," he says. He considers even advocacy of the idea to be a betrayal of builders. It disturbed him, he reports, to discover an article in a magazine widely read by builders that encouraged transparency as the best thing for consumers, rather than "looking out for contractors."

The objections to transparency are united around one primary concern: that by exposing their numbers for overhead and profit, builders risk erosion of their earnings. It is for that reason that one builder limits transparency and protects his markups by providing clients strictly with "retail" numbers. That is, for each item in his bid, he provides a single figure that includes both his direct costs and his markups. For example, if he figured wall framing was going to cost him $1,000 and he wanted to mark up his costs by 30%, then in the breakdown he offered clients, he would charge wall framing at $1,300. The builder uses such a presentation because it emphasizes that to reduce cost, clients must change scope by eliminating or changing an item of work, but that overhead and profit are not negotiable apart from scope reduction.

Another builder prefers to just fake transparency. In an interview I did with him for *Nail Your Numbers*, he explained his tactics: He pretends to offer transparency by breaking out overhead and profit because that, he has learned, wins a client's trust. But his figures, he says, are purposefully "bullshit." He shows clients what "they want to see." If they want to see 10% for overhead and 10% for profit, that's the figure he displays in his bid while concealing his substantial additional markup within labor, material or sub charges. If you want "to make a lot of money," he says, "that's what you have to do." He contends there is "no way" you can make a lot of money in construction while "honestly expressing" your full markups.

Paul Winans' view: Among the builders who have come down on the side of transparency is Paul Winans, formerly head of NARI and a long-time columnist for *Remodeling*. While Winans does not make a big issue out of it, he told a group of other remodelers that he had no problem fully expressing his charges for overhead and profit. He let clients see his gross profit margin of around 40%, explaining to them that's what is required to run a full-service remodeling company that produced reliable work. Winans attracted plenty of projects and built such a strong company that he was eventually able to sell it in an all-cash deal and retire.

Michael Anschel's view: Michael Anschel, owner of Design+Build in Minneapolis, has given an unusual degree of thought to the benefits and necessity of transparency. If you want to get his full take, check out "The Big Reveal" (the article that Michael Stone experienced as a betrayal of contractors) in the April 2018 edition of *Pro Remodeler*. In brief summary, Anschel concludes:

- Transparency is increasingly the way of the world. It is not a fad, but a requirement for doing business at a global and local level. Builders have to get with it, too.
- Real transparency by builders includes full and honest disclosure of all charges for a project, including project management costs, overhead, and profit.
- Transparency is a sound business strategy. It inspires client trust.
- Transparency makes closing a deal easier. It allows price adjustment for value engineering and cuts in scope to be made in full view of the client. Complicated and awkward attempts to "hide the ball" (as one construction attorney describes attempts to deceive clients about markups) are not required.

My views: At a glance, my take on transparency may seem contradictory. I am opposed to it in some circumstances, while in others, especially around markup for overhead and profit, I am so strongly in favor of transparency that I consider it to be an ethical obligation, and the failure to practice it an act of willful fraud.

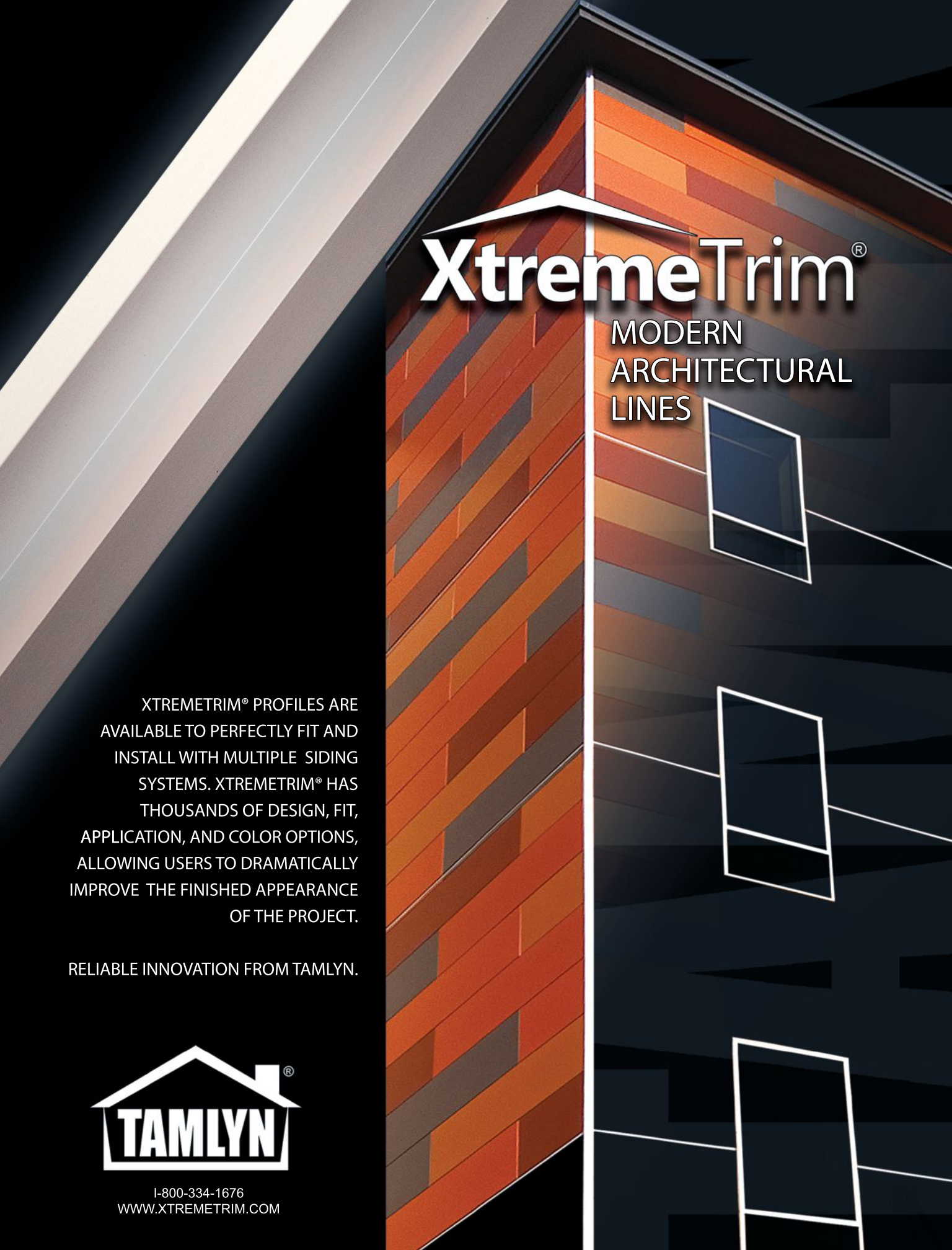
A single theme unites the objections to transparency: The naysayers argue that by fully exposing their numbers, especially their charges for overhead and profit, builders put themselves at risk for erosion of their earnings.

In other words, as I see things, both the obligation to practice and the value of practicing transparency depends on context. It all depends upon the relationship between builder and client during the preconstruction process.

If you operate in the world of competitive bidding, if you create estimates and submit bids for projects at no charge, then in my view you should feel no obligation to practice transparency. Repeat: none.

As I have written in *Nail Your Numbers*, when you submit a bid for free, you have provided a valuable service without compensation. You have no obligation to give all the details of the bid to the client. Present your numbers in any way that you wish. Provide a single lump-sum figure for the whole job. Combine markup and direct costs into "retail" numbers. Play your cards close to your chest or put them on the table. Any demand for a highly detailed and transparent breakdown in a bid that you have spent many hours building and are not getting paid for is, in my view, out of line. You should feel free (to the extent the law allows) to present your numbers in whatever format you think is strategically advantageous.

I will be surprised if many readers disagree with that. But some will disagree with my opinion that in other circumstances—namely when they are charging for estimates rather than bidding



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for free—builders do have an obligation to provide transparent, open, honest figures. I think that is the case when you are being paid for what I call "Cost Planning Services" (aka "preconstruction services"), of which the estimate is an important component, and you are working in a collaborative relationship with an owner and an independent designer. Likewise, I believe it to be an obligation if you are offering a design/build service. D/b necessarily includes estimating. Clients are paying for the estimates along with the design and other preconstruction guidance you are providing. They have a right to honest and complete disclosure in the product they are paying for.

Briefly, here are the specific items that I feel we owe clients when we charge for estimating:

- A complete line-item estimate of your direct costs for labor and material.
- Disclosure of any margins of safety, like the lines for "completion" for unforeseen minor items of labor and material such as I include in my estimates.
- So called "naked" costs; that is, the actual quotes to you from your trade partners and suppliers.
- All overhead charges and all profit charges called out on separate lines.
- Very importantly, no additional overhead and profit hidden in any of your figures for labor, material or trade partner costs. That would amount to purposeful deception.
- Copies of your quotes from your suppliers and subs and a spreadsheet displaying your burdened costs for labor at various skill levels so that clients can verify your transparency.

Why do I ask for that level of transparency? When clients contract with your company for preconstruction services they are placing enormous faith in you. As part of their gesture of trust, they are

At a glance, my own views on transparency may seem contradictory. I am opposed to it in some circumstances, while in others, especially around markup for overhead and profit, I am so strongly in favor of transparency that I consider it to be an ethical obligation, and the failure to practice it an act of willful fraud.

paying you to produce estimates that they can use to evaluate and shape their project. You owe them honest numbers. If you doctor or conceal charges, you are limiting the usefulness of the numbers that they are paying you for and relying upon. Responding with figures designed to serve yourself and deceive or limit them even as you take their money ... well, that is betrayal.

I do know that other builders will take issue with my view. In fact, I can almost hear certain objections likely to be voiced by remodelers and owners of design/build firms. Their objections are often (not exclusively) built around comparisons to other kinds of businesses. Thus, the remodelers will exclaim that restaurants don't show their markups, so why should we have to do it?

The answer is that restaurants aren't charging you to provide numbers. They are offering what amounts to a free competitive bid for, say, a hamburger or a pizza. You can readily compare their bids to other such free bids posted on menus at the burger or pizza places down the street and then choose a bidder. Ditto for lawyers, automotive shops, and toothpaste vendors. And if they want to charge you for their bids, well, then next time you bump into a Sushi joint that wants you to pay for telling you the price of its California roll, demand in return a candid breakdown of its direct costs and margins. You would be entitled to it.

As for the argument that clients are concerned about value not price: The two are joined at the hip. When was the last time you went out to buy something of value and ignored price? You want to get your money's worth, right? Price is considered in any value calculation.

Now, it may be that some clients are not much interested in delving deeply into transparent numbers. Some may even feel they are not capable of comprehending detailed spreadsheets and will choose to ignore them. But I think that's their decision to make, not mine to make for them.

During my own career, I have almost entirely stayed clear of bidding for free, of so-called "competitive bidding," and have instead won contracts for construction via my Cost Planning service (described in detail in *Nail Your Numbers*). Using it, I get paid for all preconstruction as well as construction work. And, as part and parcel of the service, I do provide full disclosure of my numbers as suggested in the bulleted list above. But, I practice transparency not only because it feels like the right thing to do. I do so because, like Paul Winans and Michael Anschel, I have found it practicable and even financially advantageous. I have the strong sense that full transparency that is verifiable by clients creates trust. It persuades clients that they are working with a reliable builder. And in construction, the creation of such trust not only helps to close deals but, as I am sure every reader of this article knows, is a vital ingredient to the successful delivery of any project.

David Gerstel has been a licensed builder for four decades. His new book, Nail Your Numbers: A Path to Skilled Construction Estimating and Bidding*, is available from independent local and online booksellers.*

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Fire Sprinklers: A Closer Look

Sprinkler rules can help you or hurt you

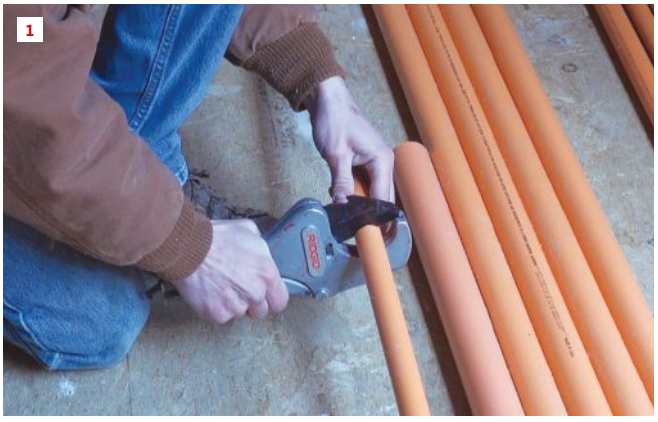
BY TED CUSHMAN

When the International Residential Code (IRC) was updated in 2009, it was the first time a major model code had ever required fire sprinklers for one-family and two-family buildings. Press coverage of the new rules at the time, including in *JLC* (see "Residential Fire Sprinklers," Aug/09), followed something of a pattern: "You're going to have to do this thing, so you better learn what's involved."

When push came to shove, however, the future didn't turn out quite that way. State by state, responding to political pressure from home builders, policymakers chose not to implement the fire-sprinkler provisions in the residential building code. As of today, only one state (California) enforces the part of the IRC that requires sprinklers in every single-family or duplex house (although some cities and towns in other states do enforce that part of the code).

Even if you don't live in any of those places, though, that doesn't mean you'll never need to know about sprinklers. Almost everywhere, as soon as you get into larger projects, you're in the game. Most states and municipalities require sprinklers in townhouse or apartment buildings with three or more dwelling units.

Authorities may also require sprinklers in special situations—for example, where access to a home site is restricted, setbacks from adjacent buildings are tight, or other conditions exist that would make it hard for a fire department to respond to a fire in a residential occupancy.



The CPVC piping shown on these pages is only one of a half-dozen or more permitted materials, but it's widespread because of its versatility, affordability, and ease of use. Above, an installer cuts the tubing with hand shears **(1)**. He applies a thick coat of solvent cement to the inside of a fitting **(2)**, then jams the end of a pipe into a prepared fitting **(3)**.

Fire officials prefer to describe the trade-offs involved in those special situations not as a cost but as an opportunity. And that makes sense. In many situations, installing fire sprinklers in a project allows builders or developers to do things they couldn't otherwise do. Gerry Leach, a public safety inspector at the Maine State Fire Marshal's Office who handles fire-sprinkler plan review for the entire state, says: "Fire sprinklers buy the contractor a lot of benefits. If you tell your local fire officials or building department that you're going to sprinkle all the houses in a development, maybe you can have a longer dead-end road. Maybe you can avoid the need for a fire pond or a cistern. Now you have a buildable lot instead." In addition, sprinklers may reduce the requirements for fire-truck access or turnarounds or reduce the required space between buildings—factors that can help make a project profitable.

MATERIALS AND METHODS

There's a lot of choice in the world of fire sprinklers. Industry standards require piping and sprinkler heads to meet certain test conditions, but the list of materials that can pass those tests continues to grow. The old standby, steel pipe (commonly called "black iron"), is still popular among sprinkler contractors, but the less-costly CPVC (chlorinated polyvinyl chloride) pipe, recognizable by its bright orange color, is widespread. Another plastic piping option, cross-linked polyethylene (known as PEX), has also made inroads in the market. Copper tubing is permitted too—although it's expensive, copper is sometimes preferred for exposed conditions where some people find it more visually pleasing than other choices.

Black-iron pipe has the advantage of familiarity for old-school sprinkler contractors, and it has a high bursting strength that suits it for situations where a high-pressure fire-department connection on the exterior of the building is required. It's also very rigid, which helps where you need a stiff, strong connection to the building. But it's relatively hard to cut compared with plastic tubing, and it requires the ability to tool threaded connections onto lengths of pipe.

CPVC, by contrast, is easier to cut and join. But there's a significant caveat: The plastic material is sensitive to chemical interactions with other materials—a vulnerability that the industry has learned the hard way, through failures in the field.

To make a CPVC pipe joint, both of the pieces to be attached need to be smeared with the solvent adhesive. Above, the installer applies a medium-thick coat of adhesive to the inside of the fitting **(4)**, then applies a heavy coat to the pipe end **(5)**. He jams the pipe into the fitting until the pipe bottoms out against the fitting **(6)**, then checks the pipe drop for plumb **(7)**. Adjustments to pipes should be made immediately, before the adhesive sets. At left, the installer secures the pipe to the framing with a connector **(8)**. Pipes need to be restrained against uplift from water pressure in the event that a sprinkler head activates.

An installer wraps a sprinkler head's threads with thread tape **(9)**, levels the head in its fitting with a wrench **(10)**, and applies a cover to protect the head during drywalling and painting **(11)**. A paint touch-up pen can be used to repair any small scratches in the head's paint caused by the wrench.

Nowadays, suppliers warn about a range of potentially damaging interactions. On the website of Lubrizol, the maker of Blazemaster CPVC pipe and fittings, you can find a long list of incompatible products that includes antimicrobial coatings for steel pipe, 11 different kinds of caulk, 14 different firestopping products, five leak detector fluids, six mold cleaners, two mold inhibitors, a vinyl-coated pipe hanger, four kinds of pipe tape, 20 different thread sealants, and one brand of waterproofing. Putting any of these products in contact with the sprinkler pipes could lead to degradation and leaks. So, too, could exposing the pipe to the UV radiation in sunlight.

When it comes to sprinkler heads, there's also a lot of choice. Sprinkler heads are designed to actuate one by one when temperature at the head reaches around 200°F, suppressing heat and flame in the area directly under the head with a fine water dispersion. You can get sidewall-mounted as well as ceiling-mounted sprinklers. You can also get recessed sprinkler heads with flush covers that will drop off in the heat of a fire but that allow sprinklers to visually blend with the ceiling.

Whether you use flush covers or exposed sprinkler heads, you need to protect both from paint. Manufacturers supply temporary covers for use during construction.

It's also important to be aware of obstructions. Sprinkler heads need to be located so that the spray from a head that activates won't be impeded by soffits, dropped beams, lighting fixtures, and so on. That's an issue that should be addressed early in the design process.

NAVIGATING THE RULES

The trickiest part of working with fire sprinklers is not the technology; it's the rules. If you do choose to put sprinklers in a building, or if you are required to put them in, you've entered a world of code books and standards—and there is plenty in that world that can trip you up. When it comes to sprinklers, the main reference standards are NFPA 13, NFPA 13R, and NFPA 13D, which are published by the National Fire Protection Association. It's not always obvious which book (or which edition of that book) will apply to your situation, and that alone can make a big difference.

NFPA 13 is the main sprinkler standard. It's the National Fire Protection Association's oldest standard, with origins dating back to 1896, and it has grown in size and complexity over the years. NFPA 13 is a fat book, and it's hard to navigate—so hard, in fact, that the 2019 edition of the standard, which has just been released, basically amounts to a complete reorganization whose purpose was simply to make the standard readable and usable.

Steve Leyton is a nationally known fire-sprinkler consultant who runs an 11-person sprinkler design firm (protectiondesign.com) and has served on the standards

Here, a fire-department side-by-side demonstration in Brunswick, Maine, shows the effectiveness of residential fire sprinklers in suppressing a fire in a pair of simulated rooms. A fire in the right-hand room (with no sprinklers) reached deadly flashover in a little over two minutes **(12)**. A sprinkler head in the left-hand room ceiling activated in about one and a half minutes after ignition, effectively suppressing the fire **(13)**. Damage to contents in the unprotected room was far more severe than in the protected room. More importantly, in an actual fire, the sprinkler would have given building occupants precious moments to escape.

committees for NFPA 13R and NFPA 13D. Jokingly, Leyton remarks, "We work very hard to keep the standards as complicated as possible so that the general public has to hire guys like us." More seriously, Leyton says about the NFPA 13 rewrite, "I'm fully on board with what they've decided to do." Organizationally, the revised standard starts at the street with water supply—a logical format, Leyton says. "I always tell young designers when they're starting out, 'Follow the water.'"

Reformatting NFPA 13 required a 6,000-line spreadsheet, and even the new, improved version is still a behemoth. Fortunately for residential builders, most projects won't require you to delve into the full Standard 13. One-family and two-family homes (and some townhouses) fall under the much, much shorter NFPA 13D standard; and most other residential occupancies less than four stories in height—including apartment buildings, condominiums, group homes, hotels, and motels—typically fall under NFPA 13R, which is also mercifully short.

Conceptually, NFPA 13 is intended to save buildings. NFPA 13R and 13D are intended only to save lives and prevent injury. "The residential system is designed to get the people out," says Gerry Leach. In practical terms, the differences between NFPA 13, NFPA 13R, and NFPA 13D can be substantial.

To comply with the full NFPA 13, for example, the sprinkler system has to include sprinkler heads in closets, small bathrooms, balconies, attics, and dead spaces—all locations that don't need to be protected under NFPA 13R or 13D. Also unlike a full NFPA 13 system, or even an NFPA 13R system, NFPA 13D systems don't require a separate water supply for the building—you can make a "combined system" that uses the domestic water supply as its water source.

SPECIAL CASES

All that simplification is great if you're doing a simple, straightforward project. However, there are traps for the unwary if you get involved in a complicated situation—as Heather Thompson, a custom builder (and *JLC* contributor) who runs Thompson Johnson Woodworking in Portland, Maine, learned the hard way this year.

Thompson is in the middle of an investment project on Peaks Island, in the Portland harbor. The job is a major makeover of an old building that used to be the island's bowling alley and for years has been a two-family dwelling. Thompson is revamping the old

Sprinkler heads are available in ceiling-mounted as well as wall-mounted versions, able to cover an area of about 15 by 15 feet. Here, the installer screws a ceiling head into its fitting **(14)**, tightens the head with a wrench **(15)**, and applies a temporary protective cover **(16)**.

structure, adding two apartments and a business occupancy (her own company offices and some storage space).

The city of Portland requires all new homes and this kind of major remodel to have sprinklers. But the city building department told Thompson that she could sprinkler the residential part of the building according to NFPA 13D. Only later, when she got to the level of plan review by the state Fire Marshal's office, did she find out that according to NFPA rules, she would need to comply with the full NFPA standard, even for the apartments.

The reason, state official Gerry Leach told *JLC*, is that the fire separation assemblies between the apartments and the commercial occupancy didn't meet a two-hour separation standard—which Thompson hadn't known she would have to meet. By the time she got the bad news, the firewalls were already built as a one-hour fire separation, the apartments were fully framed in, and it was too late to make a change.

Interestingly, under NFPA 101, the NFPA's "Life Safety Code," the total footprint of Thompson's project might have been small enough that the remodel would not have triggered any sprinkler requirement at all, according to Gerry Leach. The sprinkler was needed only because of the city of Portland rule that required it. But Leach says, "Even if the state doesn't require sprinklers, once the city requires the builder to have sprinklers, the state reviews the design according to the NFPA rules—and in this case, if a sprinkler was installed, it needed to comply with the full NFPA 13."

As a result, Thompson had to find money in the budget for significant upgrades, including sprinkler heads in all the closets in the rental apartments, through-the-wall freeze-protected dry sprinkler heads for the outdoor balconies, and a separate freeze-protected dry sprinkler system for an unheated attic space.

This sort of problem with sprinklers late in the job is common, says expert Steve Leyton—but preventable. "It goes to the whole reason why I went into business," says Leyton. "You know, you have to coordinate the work. When you start adding up all the things like ductwork, beams, or ceiling fixtures that can get in the way of a fire sprinkler, especially on a commercial job, there is a certain amount of coordination work. It requires some focus. When builders defer the sprinklers, they also defer a lot of the decision-making that should go into the design not just of the sprinklers, but of the building itself."

Ted Cushman is a senior editor at JLC.

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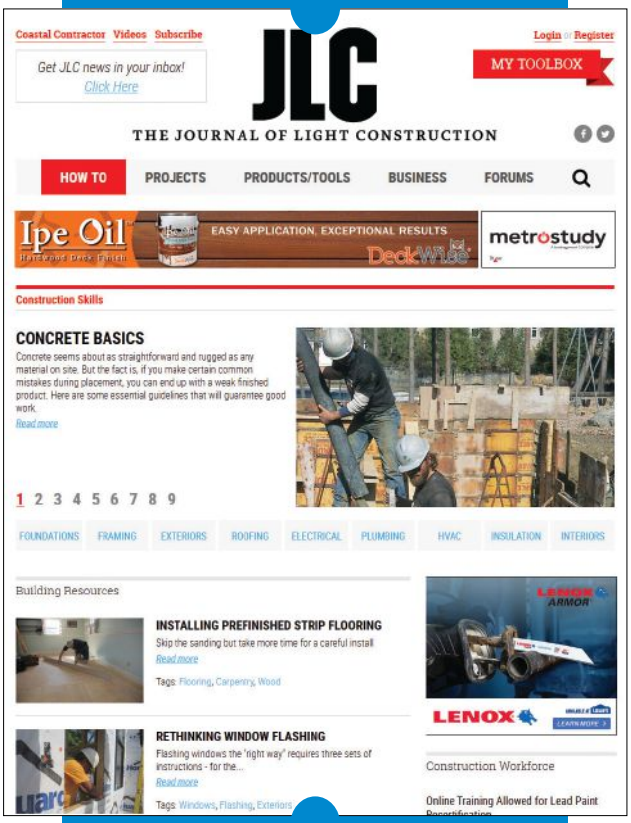

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Avoiding Stucco Buckets

Changes of plane and intersections present common moisture-management challenges

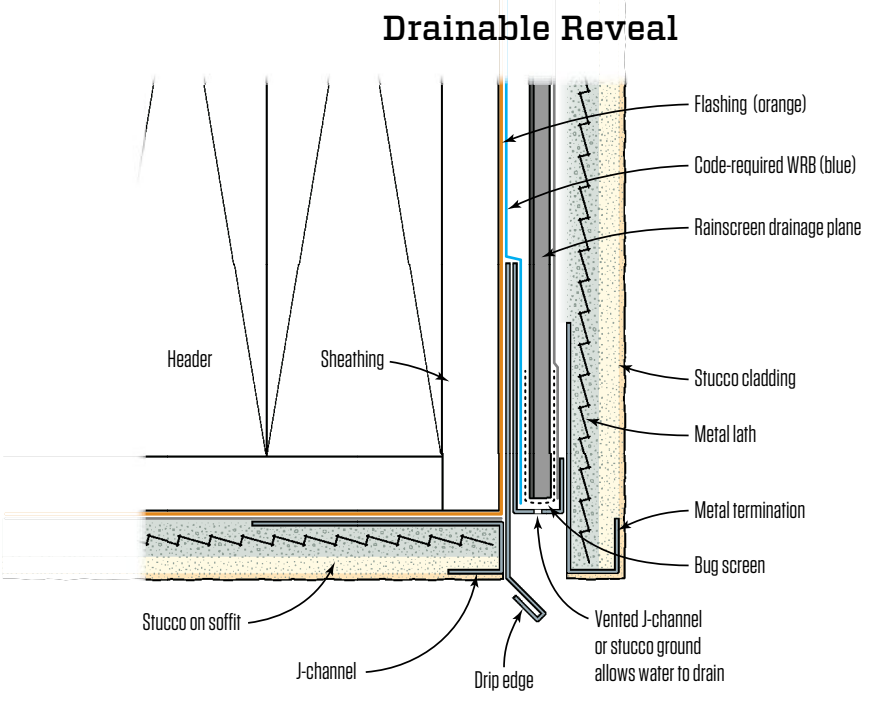
BY JOHN H. KOESTER AND TYLER LECLEAR VACHTA

Detailing an exterior sure would be easy if all houses were simple boxes with only four corners. It would be a lot easier if they didn't have all of those windows, too. Of course, those are not realistic options. In the real world, we always need to rely on deflection, drainage, drying, and durable materials to prevent moisture problems.

In this article, I'm going to zero in on basic drainage requirements for stucco and stucco-type exteriors and examine one all-important question we need to focus on when detailing any exterior cladding system: "Where does the water drain?"

The rainscreen principle uses an air gap over a water-resistive barrier (WRB) to create a capillary break. That break allows gravity to drain liquid water; when detailed properly, it also provides ventilation to dry out materials.

We need to rely on the rainscreen principle more than ever in high-performance buildings to help out the drying side of the equation. As increased levels of insulation and air-sealing have reduced energy flow through walls, they have reduced the drying potential of building assemblies as well. But the rainscreen principle involves a system, not a single component, and as we detail the



A "stucco bucket" on this stuccoed cantilever (photo, top) resulted in the wall kicking the bucket, so to speak. Water had nowhere to drain and eventually overwhelmed the WRB, rotting the framing beneath.

One solution that works on cantilevered areas is to build a drainable reveal, as shown in the illustration above.

numerous components of that system, we need an exit strategy for the water.

These days, providing an exit for water behind stucco is often straightforward and installers are familiar with what to do. While we still see some cases where weeps and weep screeds are left out at the base of the wall, the most common problem areas for moisture intrusion are windows and what have been termed "stucco buckets" by Jeff Bowlsby of Simpson Gumperts & Heger and stuccometrics.com.

A stucco bucket is an overhang where the stucco wraps from the vertical wall to the horizontal surface underneath, without anywhere for liquid water to drain out. Like a bucket, stucco-wrapped soffits hold water and let your wall components marinate until the lawyers say you need to do something. These problems aren't limited to stucco, which has been dragged through the mud more than its fair share for poor detailing and execution. Thin-brick, adhered-stone, and even fiber-cement-siding walls suffer the same fate from the wrapped detail. Any time the drainage plane is interrupted, we need a plan for the moisture to exit.

STANDARD SOLUTIONS

To misquote an old children's song, "Put a hole in the bucket, dear Henry, dear Henry." The most straightforward approach to avoiding stucco buckets is to include a reveal that drains and ventilates the rainscreen air gap (see Drainable Reveal, left). Just let the water out. Where do we need these reveals? Wherever the water control layer changes plane, whether it's a full 90-degree corner or a smaller angle.

To identify those changes of plane, use the pen test, which is a simple and important process for verifying control-layer continuity on building plans. Use different color pens to trace the water, air, and thermal (insulation) control layers on the wall section details. If you need to pick up the pen at any point, there is a discontinuity with the control layer.

In terms of drainage, any time your pen turns while tracing the water control layer, you need to flash or drain. Flash and

Illustrations by Tim Healey based on drawings supplied by MTI

slope when the pen turns outward; let the wall drain to the exterior when the pen turns inward.

A stucco bucket is an overhang where the stucco wraps from the vertical wall to the horizontal surface underneath, without anywhere for liquid water to drain out.

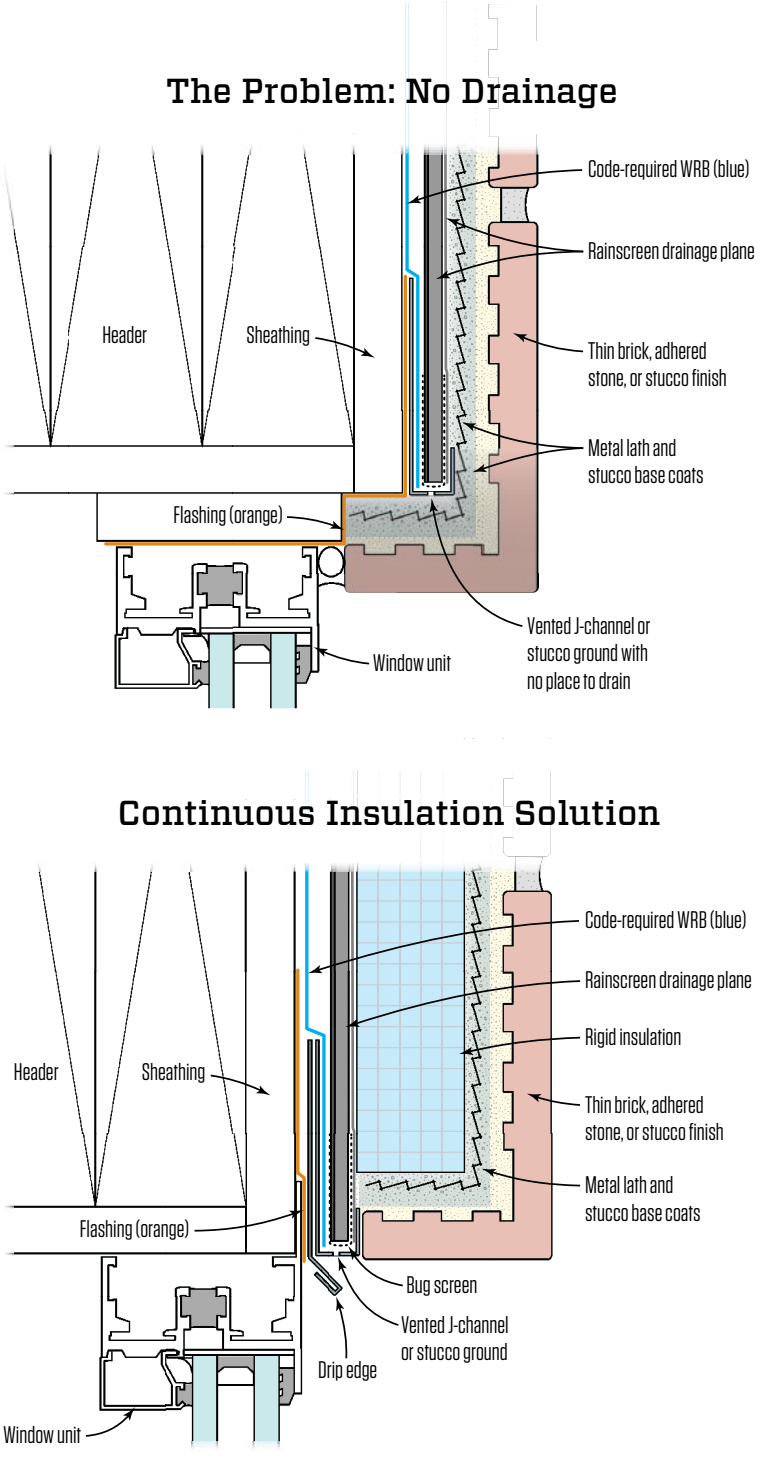
THIN-BRICK AND STONE

The extremely practical reveals shown in the "Drainable Reveal" illustration on the previous page might not always offer the desired aesthetic, but gravity doesn't care about aesthetics, and we may need to alter our approach. We do always have to play by gravity's rules, but in some cases, it is possible to divert the drainage to a concealed outlet.

One common place this is often required is with "innie," or recessed, windows. These are currently popular with many designers, but creating a drainage reveal over every opening is not compatible with thin stone and thin brick. This cladding uses corner pieces at the header to deceive the eye into believing the wall has a full-wythe veneer. Using a drainage reveal, in this case, would preclude the use of the corner pieces and reveal the thin veneer's secrets.

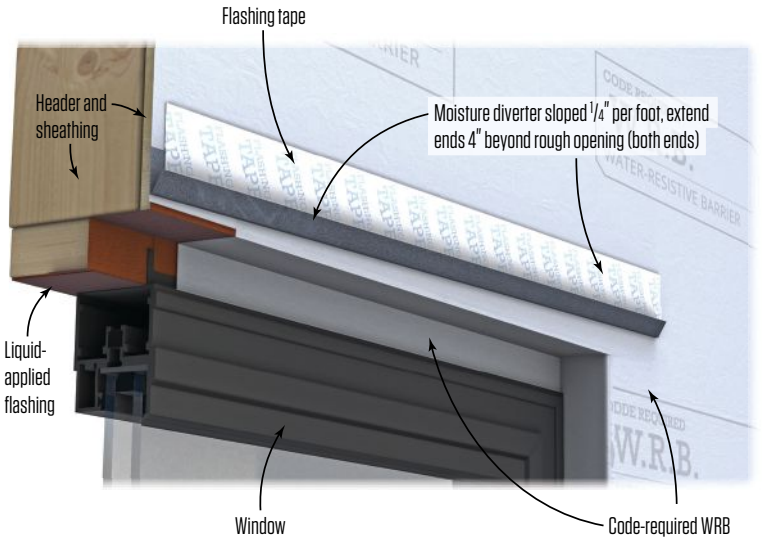
One solution is to borrow an idea from the EIFS folks: Use rigid foam to create the inset aesthetic with the drainage plane between the foam and the sheathing (see illustrations, right). This resembles an inset window in an EIFS wall—just limit the air gap to 1/8-inch drainage gap to maintain 95% of the insulation's R-value.

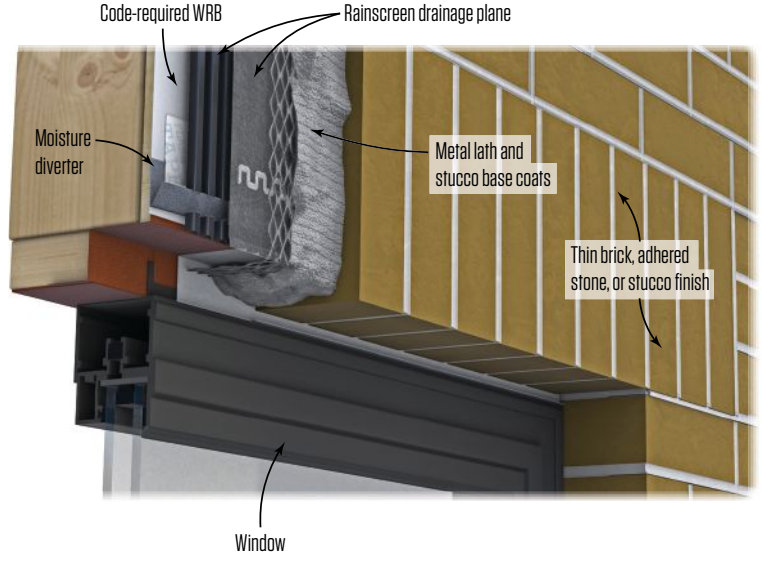
Not using exterior rigid foam? Then we'll have to create a diversion. No, we are not trying to confuse the water—let's just



This is the problem: A drainable assembly has nowhere to drain (top). When you are using continuous exterior insulation with thin brick (above), the insulation can kick the assembly outwards far enough to create a drain reveal with thin-brick corner pieces.

Diversion Strategy





Without continuous exterior insulation, a moisture-diverter channel works like an umbrella over the stucco bucket. This channel should slope at 1/4 inch per foot above the rough opening and be integrated with the WRB. It should also extend at least 4 inches beyond each side of the opening to kick the water from the drainage space to the sides of the window opening, where it can drain at the base of the wall.

hope we don't confuse the designers or installers too much. The illustrations at left show how it's done.

This diversion strategy still relies on gravity. Over a rough opening, we flash the water-control layer to a small moisture-diverter channel that is installed at a 1/4-inch-per-foot slope and extends 4 inches past the opening on both sides. This moisture diverter must be integrated with the WRB and the rainscreen air gap. Any liquid water draining through the air gap is safely diverted away from the rough opening and put back on course to drain to the bottom of the wall. Remember, at the bottom of that wall, there must be weeps, or a rainscreen-compatible weep screed, to let the water out.

This moisture-diverter approach is entirely concealed when the exterior is completed. Even when dealing with "outie" and "tweenie" windows that drain above the rough opening, diverting moisture away from this high-risk zone is a good example of belt-and-suspenders moisture management. We need this redundancy at windows.

Consider fluid-applied flashing for the recessed windows to simplify the origami that is otherwise required with peel-and-stick. Fluid-applied reduces the cumulative thicknesses of flashing with tapes. Also, put some slope on those sills when framing the openings. Sealants around the window will not last forever, so sloping the sill to drain prevents moisture from accumulating and causing problems.

Also, keep in mind that the window frame and any masonry will expand and contract at different rates. If you run stucco or masonry right up to the window frame, you will get accelerated cracking and exposure to moisture. Keep a more flexible seal around the windows, using backer rod and sealant between the window frame and the cladding. The goal is to build a predictable system. Use sealant to reduce cracking and rely on the rainscreen drainage plane behind the veneer to drain the water.

John H. Koester is the founder and CEO of Masonry Technology Inc. Tyler LeClear Vachta is the marketing and education manager (mtidry.com).

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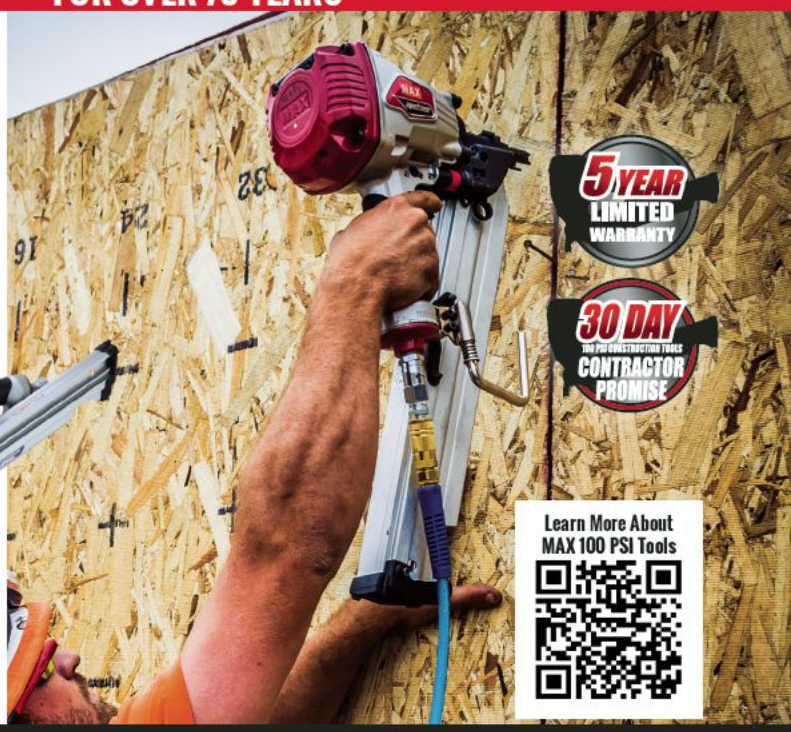

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BUILDING TOUGH

Rebuilding a Flooded House

Post-Harvey, a builder sets his new home on a tall crawlspace

BY DAVE YELOVICH

When Hurricane Harvey brought 5 feet of floodwater to my neighborhood in Friendswood, Texas, my family and I faced a choice. Like all of our neighbors' houses, our 1970s-era ranch house was badly damaged. What should we do? Should we repair the house sitting at grade where it stood? Should we elevate the existing house on a new foundation? Or should we tear the whole place down and start over?

But those decisions would have to wait, because after any flood, the first thing they tell you to do is clean up. Partly that's for health reasons: There's going to be a parade of insurance folks and government folks marching through to evaluate things, and the house can't be full of rotted junk. And for insurance reasons, you need to clear out everything that's damaged, make lists, and take plenty of photos to document your losses.

If you let everything sit there waiting for someone to make a decision, insurance policies typically won't cover the increased damage that will result if mold takes over the entire house. Flood insurance coverage usually applies only to the immediate effects of the water, not to things that happen later.

So as soon as the water went down and we could go back to the house, we gutted the walls and put all the debris out at the curb. And then sure enough, along came the insurance people, FEMA, the Small Business Administration (SBA), and all the other federal and local agencies to see what was going on.

IS THE HOUSE WORTH SAVING?

This wasn't our first rodeo. Our house backs up against a creek, and it had flooded 18 inches deep during Tropical Storm Allison in 2001. That time around, flood damages penciled out to about 46% of assessed value, just barely below the 50% threshold that would

Photos by Dave Yelovich

Up to the eyebrows. The author's house, which backs onto a creek in Friendswood, Texas, flooded 5 feet deep in Hurricane Harvey **(1)**. All the interior materials and finishes were ruined, including the wood flooring shown here **(2)**.

have required us to elevate the building when we rebuilt.

This time, I knew the damage was much worse. But because of some policy maneuvers by the city, we might theoretically still have the option of repairing the house where it stood. With help from the estimators at my company, we worked up a schedule and got some pricing on that work. I figured the cost of that option at about $150,000.

What if we were to elevate the existing structure, slab and all? That idea was all over the news, so I got a couple of bids. To be sure of being high and dry, we wanted to go up 8 feet, because we had gotten 5 feet of water in the flood. Depending on the company, raising our existing house that high would cost somewhere between $200,000 and $250,000; and then we'd still be facing $150,000 in repair work, plus incidental site work, plus a premium for the fact that the work would be higher up in the air. So bottom line, we'd be looking at $400,000 to $450,000—an awful lot of money for us to come up with, for saving a house that would never be worth that much. The idea seemed like a non-starter.

One of the guys from work said, "Hey Dave, no offense, but you're not getting younger. If you rebuild this house at grade now, can you do this again in five or ten years? Why don't you tear it down and rebuild higher? Because otherwise, you know it will flood again."

It wasn't what we wanted to hear, but he was right. We live on a creek, and creeks go up and down. If we left the house sitting there, we were going to have to gut it out again someday. Preserving and elevating it was too expensive, especially for an outmoded 1970s house. When we took the emotion out of the equation, and just looked at the situation as if we were accountants trying to get the best deal for a client, the answer was clear: Knock it down, rebuild it up in the air, and do the whole thing right.

Cleanup. The first priority in any flood is to clean up, in order to minimize health risks and prevent ongoing damage from mold and rot. The author's family and friends gutted out all the walls **(3)**, revealing existing outdated structural details such as gypsum sheathing and diagonal bracing **(4)**. All the debris was dumped at the curb **(5)**.

WHETHER TO SAVE THE SLAB

The existing house was built in 1975 on a monolithic slab-and-grade-beam foundation. Almost 14 years ago, however, I had installed concrete piers to help support the slab. I knew there were elevation readings taken at that time, so I called the slab company and asked them to re-check the slab's elevation to see if it had moved. After adjusting for the half-inch flooring we had stripped off, they found that the slab hadn't moved even 1/8 inch in 14 years. So that was good.

Then I asked a colleague from work to inspect the slab and assess it. He concluded that there was nothing wrong with the existing slab, and he pointed out that even though our new home would be one story taller than the original house, we were using HardiePlank siding instead of brick veneer—so our new house, although it was larger, would weigh less than the house we were replacing.

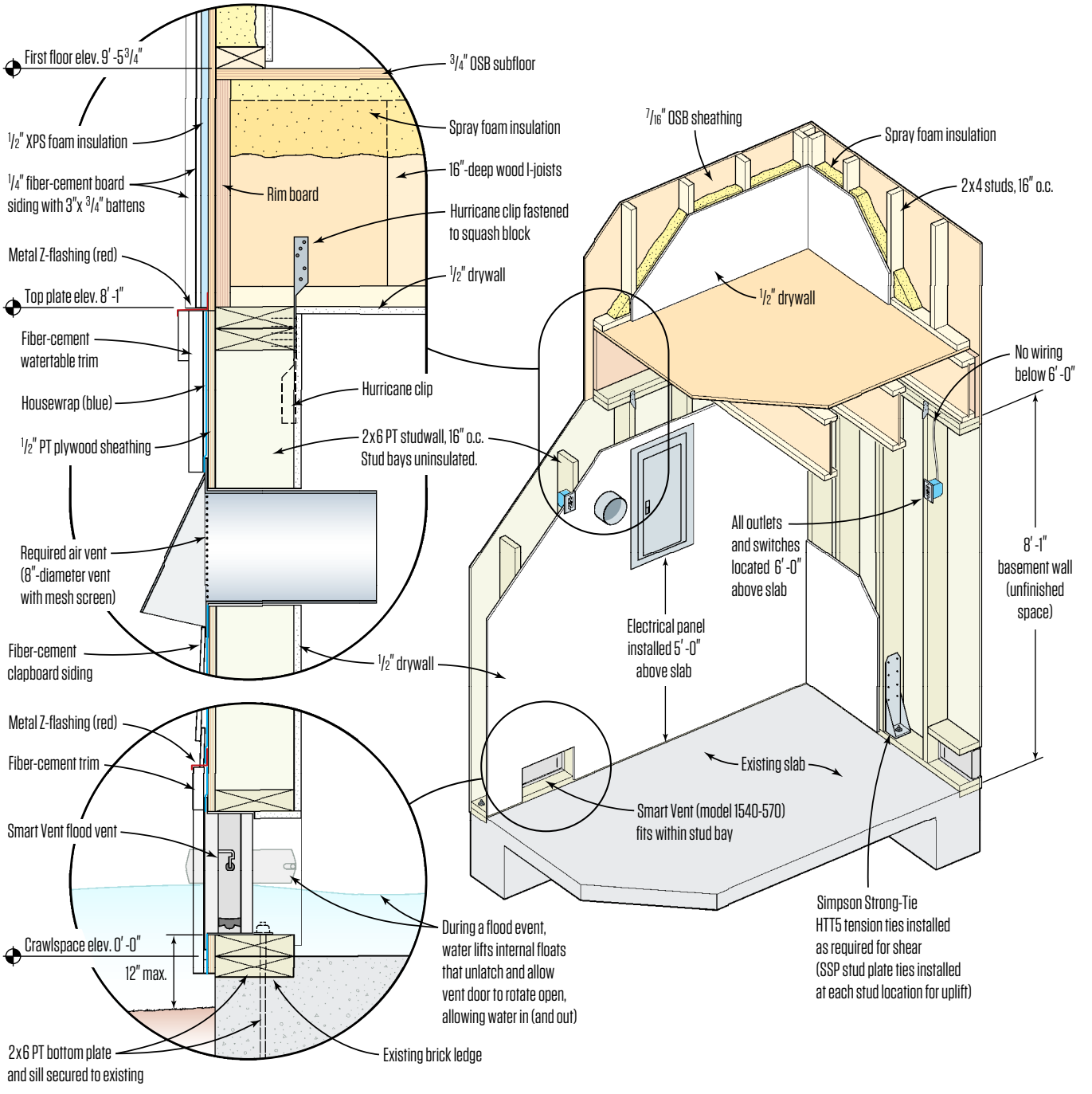
After considering all that, we decided to re-use the existing slab—which saved us about $50,000 compared with the cost of demolishing the slab and building a new foundation to replace it.

HOW HIGH SHOULD WE GO?

When I started to ask questions at the building department, I learned that a new house at this location would need to have the lowest framing member for its first occupied floor situated 2 feet above base flood elevation (BFE). When I had our existing slab surveyed, we found out that the slab sits 6 inches below the BFE. So if I built our new house on a crawlspace, that crawlspace would need to be at least 2 1/2 feet high.

I said to the flood-plain manager, "Well, we flooded 5 feet deep in Harvey. If we duplicate Harvey, and I've built 2 1/2 feet high, we'll just flood again."

Vented Crawlspace for a Flood Plain



The author coined the term “Texas basement” for this 8-foot-tall space, with room for storage, that is detailed like a crawlspace with flood vents at the wall base, ventilation openings near the ceiling, and shear-wall details engineered to handle the uplift and lateral forces of 120-mph hurricane-force winds.

Anchors and vents. The author secured the crawlspace wall sole plates to the existing foundation using Titen HD structural bolts from Simpson Strong-Tie **(6, 7)**. The space's 8-foot walls are detailed as shear walls for windstorm resistance **(8)**, including 4-inch-o.c. nailing and beefy hold-downs. Flood vents operate automatically to relieve water pressure in case of a flood **(9)**.

Besides that, I'm 6 feet tall, and I wanted to be able to use my crawlspace for storage and such, not crawl around it on my stomach. The flood-plain manager told me that I could build higher than 2 1/2 feet if I wanted to; but he could only require me to build 2 1/2 feet high.

Well, studs are 8 feet long, and so is plywood. And considering that we had already experienced 5 feet of floodwater, I decided that if I had to go up anyway, I would go up 8 full feet and have a full one-story space that I could stand up in and use. Technically, it's still a crawlspace, and it would still have to be detailed as a crawlspace: unoccupied, with flood vents and air vents. But I began to call it my "Texas basement."

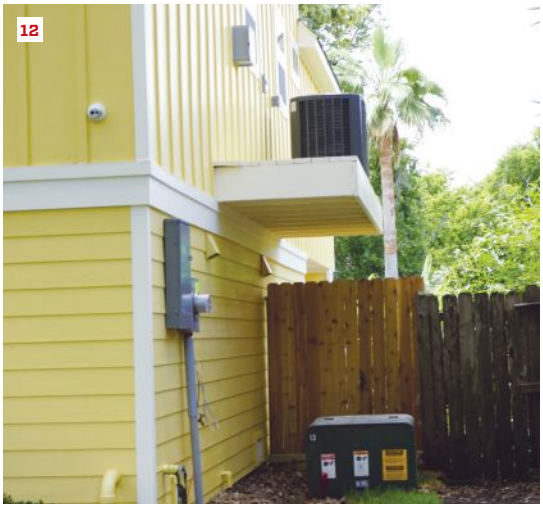
THE TEXAS BASEMENT

The demo company used Bobcats to scrape the slab, and in the process, they either cut off or bent over all the existing anchor bolts. So we had to replace all of those, using Titen HD bolts from Simpson Strong-Tie. The engineer called for 1/2-inch bolts 6 inches long, set at 32 inches on-center, but all my supplier had were 5/8-inch bolts 8 inches long. My engineer was fine with that change—and at the same price for a much beefier connection, so was I. Our guys did wear out a few drill bits putting those bolts in, though—40-year-old concrete is hard.

Besides being in a flood plain, we're also in a hurricane exposure area with a 120-mph design wind speed. So the anchor bolts are just the lowest element in a wind-resisting load path that goes all the way up to the ridge. All the exterior walls, as well as some of the interior partitions in the crawlspace, are detailed as shear walls, with 1/2-inch treated plywood on the treated studs, nailed with galvanized nails at 4 inches on-center in every stud. Some of the interior shear walls go right up through the upper-story partitions all the way up to the ridge. We used Simpson HTT5 hold-downs at the ends of the shear-wall panels, and Simpson SSP stud plate ties to tie studs to the sole plate at the foundation, and Simpson H-2.5A hurricane ties at the top of the wall to tie the studs to the wall plates.

We used treated wood (UC3B, which is rated for above-ground use, but not rated for ground contact) for the entire crawlspace wall system. All the plates are treated, all the studs are treated, and all the posts are treated. The lowest untreated piece of wood is the top plate of the 8-foot lower wall.

Technically, I could have used treated wood for just the part of the structure that lies at or below the BFE. I've seen some buildings on which they've done just that: used an 18-inch-wide strip of treated plywood at the bottom of the wall. But treated plywood is only a few bucks more a sheet, so we framed and sheathed all the way up the "crawlspace" wall with treated studs and plywood. To make sure the framers didn't accidentally mix in any



Resilient details. Hurricane clips at the top of the crawlspace wall form part of the uplift and shear load path **(10)**. Closed-cell spray foam defines the thermal boundary of the first occupied floor **(11)**. Power and mechanicals are elevated above the level of the Harvey floodwaters **(12)**. Screened vents provide cross-ventilation **(13)**, required by code for an uninsulated crawlspace.

untreated wood, we didn't have anything but treated wood shipped to the site until our Texas basement walls were all framed.

We installed about a dozen Smart Vent flood vents, strategically placed around the base of the walls. For aesthetic reasons, we placed them all on the side and back walls; but then again, the back of the house is where the creek is. Smart Vent provided engineering services to spec out the vents. They were easy to install because they're sized to fit neatly between two studs at 16 inches on-center. We just blocked in for them and installed the siding right over the opening. Then we cut the siding out with a recip saw and popped in the vents, adding a little trim for looks.

At the top of the wall, 8-inch round ducts provide the required ventilation. These are also spread around the walls to allow cross-ventilation and are screened to keep the bugs out. On a hot day, the space under the house seems to stay about 10°F cooler than the outdoors.

The "Texas basement" has ceiling lights and wall switches and outlets, but the electrical panel for the space is located 5 feet above the floor, and the outlets and switches are 6 feet up. I've installed shelving at 5 or 6 feet high as well, to keep our belongings dry if it floods. We also lifted the air-conditioning equipment up almost 10 feet, to be above any future floodwaters.

The inside walls of the space are drywalled to comply with the local fire code. The next time our creek floods the house, we'll have to strip that material out and replace it. Otherwise, our 8-foot-tall crawlspace is ready for another Harvey. And we rebuilt our entire house, using modern energy and building-science details, for less than what it would have cost us to elevate the existing one as it stood, not counting repairs.

Dave Yelovich is a compliance officer with Tilson Homes.

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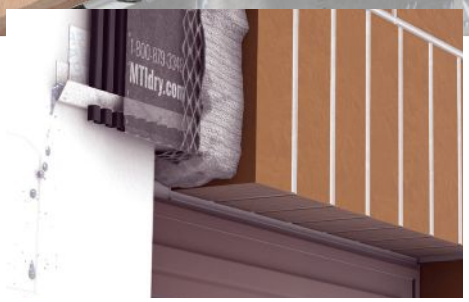

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1. Modern Vanities
Linear and modular styling define the Stratos Vanity Collection from Hastings Tile & Bath. The Stratos-Linear vanity (shown) consists of a solid-surface countertop that appears to float over lower and side cabinets, which may be offset to the left or right. Drawers come in 35 matte or glossy finishes and three wood-laminate finishes, and countertops come in three matte or six glossy finishes, including yellows, mandarins, and reds. Prices range from $2,980 to $4,250. hastingstilebath.com

2. Mediterranean Tile
The Medina tile is the newest addition to the StoneImpressions Artisan Collection. Inspired by Mediterranean architecture, the pattern features gold latticework with a choice of onyx or turquoise accents. Available in limestone or marble, tiles are sealed with a three-part acrylic topcoat to provide durability in wet spaces, backsplashes, and light flooring applications. The tile can be ordered as a quick-ship product in 6x6 or 12x12 sizes, or special-ordered with custom features. Pricing ranges from $18 to $75 per piece. stoneimpressions.com

3. Bacteria-Killing Light
The ellumi LED bacteria-killing light, first launched as an undercabinet luminaire, is now available as a shower-safe recessed retrofit light. Evolution Lighting and healthcare-solutions-provider Vital Vio combined their respective lighting and bacteria-killing technologies to create the light. Instead of using UV to combat mold, fungi, and bacteria, Vital Vio's proprietary process uses LEDs. The shower light fits standard 5- and 6-inch recessed cans and has both a lighting mode and a disinfection mode. It costs $90. ellumilighting.com

4. Compact Gas Furnace
The new Bosch 80% AFUE Gas Furnace, BGS80 Series is the first-ever non-condensing gas furnace in Bosch Thermotechnology's lineup. The system is designed to deliver up to 80% AFUE heating efficiency. The cabinet's compact, 33.75-inch height and four-way multipoise design help it fit in tight places. Other contractor conveniences include a natural-gas-to-LP fuel conversion kit, left- or right-hand connection for gas and electric service, and a removable bottom closure panel. Contact a local distributor for pricing. bosch-climate.us

BY SYMONE GARVETT

5. New Take on Vintage Kitchen Hardware

Atlas Homewares' new Bradbury collection mixes vintage hardware features with modern design. The pulls have rounded edges and fine details on either side of a straight center bar, while the knobs' rounded tops and flared bottoms frame a straight-edged central ring. This transitional stance complements both traditional and modern aesthetics, according to the manufacturer. All knobs and pulls are available in brass, polished-nickel, brushed-nickel, polished-chrome, and matte-black finishes. Prices range from $7.45 to $40.45. atlastothetrade.com

6. Labor-Saving PEX Valve

Plumbing solutions provider Keeney Manufacturing Co. has unveiled its No Crimp PEX valve. The maker says that the push-on, quarter-turn valve with a compression sleeve creates an installation identical to compression valves, without the need for special tools, by compressing the sleeve around the pipe as the nut is tightened. While the sleeve compresses, a split ring and internal barb keep the pipe round, and a double O-ring seal helps prevent leaks. Valves retail for about $18. keeneymfg.com

7. Smart Control Panel

The Brilliant smart-home control is now available for consumer purchase. Designed to replace any existing light switch, Brilliant provides a wall-mounted control hub for dozens of compatible smart devices, with simple touch, voice, and motion controls. Other features include a microphone and camera with a privacy shutter; storage space to display photos, art, or seasonal themes; and the ability to program custom "scenes" around a single touch or verbal command. The hub is available in one-, two-, three-, and four-switch configurations, starting at $300 for the one-switch hub. brilliant.tech

8. Exterior Door Installation

Dap has introduced its QuickKit for installing an entry door. Available in a range of configurations and styles with jamb-size options, kits include all necessary installation materials, from sealants and shims to sill pans and hardware, according to the manufacturer. The system accommodates single doors with rough openings up to 40 inches wide, double doors with openings up to 80 inches wide, and sliding doors with openings up to 72 inches wide. Pricing starts at $90. dapquickkit.com

9. Curbless Shower Trays

Schluter-Systems has introduced three reduced-thickness shower trays. The Kerdi-Shower-TT trays feature perimeter heights of one inch or less to simplify construction of curbless shower entries, according the company. Besides the addition of the thin line, all Schluter trays now feature an integrated waterproof membrane on the top of the tray. The pre-installed waterproofing can be incorporated with Schluter's Kerdi drain lines to construct a watertight system in one less step. Pricing varies based on tray size and shape, from $87 to $325. schluter.com


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10. Solar Roof Shingles

Solar manufacturer Sunflare debuted a series of solar residential shingles at the Solar Power International Show this year. Designed to cover the entire roof, the thin-film shingles install with standard methods and snap-together electrical connectors. The manufacturer says that the lightweight, waterproof shingles are encapsulated in durable, lightweight polymer solar sheets and have a temperature coefficient of -.31% per 1°C (for each degree the shingle warms, its output decreases .31%). Each cell has a by-pass diode, so only shaded cells become inactive if in shadow, according to the maker. Pricing will be available soon. sunflaresolar.com


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11. Smart Ventilation

Home-technology company Alea has launched an air-management platform called Alea Air. The new HVAC system replaces standard registers with smart vents that the manufacturer says can track and adjust temperature and monitor air quality. The vents have 11 sensors and robotic louvers and are enabled by a cloud-learning system that analyzes data and sends instructions to vents based on room-by-room preferences, weather forecasts, occupancy, and room size and orientation. Available in January 2019, a starter kit with three vents and the connectivity Airhub can be preordered for $380. Additional vents cost $120 each. alealabs.com


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12. Sleek Bath Faucets

California Faucets has added a new handle option to its Rincon Bay collection of mid-century-modern bath faucets and shower and tub fixtures. According to the manufacturer, the new cross handles are available on all Rincon Bay fixtures, including an 8-inch widespread faucet, a wall-mount vessel faucet, a Roman tub faucet, a tub/shower faucet, and a shower handle. Pricing starts at $650. calfaucets.com


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c. Total Requested Copy Distribution (Line 15F) + Requested/Paid Electronic Copies	65,892	66,520
d. Percent Paid and/or Requested Circulation (Both Print and Electronic Copies)	91.9%	90.0%

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18. I certify that all information furnished on this form is true and complete. Signature and title of Editor, Publisher, Business Manager, or Owner–Rick Strachan, Publisher, 9/27/18

Weigh In!
Want to test a new tool or share a tool-related testimonial, gripe, or technique? Contact us at JLCTools@hanleywood.com

New Tools From Hilti

BY CHRIS ERMIDES

In September, Hilti sponsored its annual Innovation Day, for which the company flew in a large group of editors and influencers to check out its latest tool offerings. The 2018 event started out with a high-level overview from near Hilti headquarters in Irving, Texas, during which we got a sneak peek at a couple of tools that I can't mention here (though we will be reviewing them once they're officially announced next year).

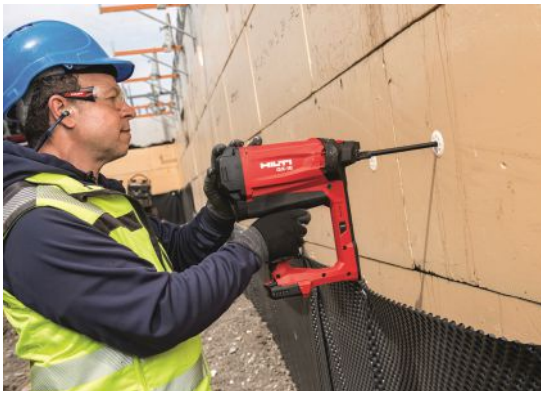
We did get our hands on a variety of new products—including a rotary laser level that rises and lowers to meet the receiver height, a new cordless reciprocating saw, and new cutoff wheels for grinders and saws that are both affordable as well as long-lasting. I couldn't fit all of the tool announcements in this single page, but here are three—a cordless jigsaw, a cordless vacuum, and a gas-powered nailer—that I thought would be of particular interest to *JLC* readers.

Cordless D-grip jigsaw. Hilti's model SJD 6-A22 jigsaw, which runs on the company's 22V battery platform, can bevel up to 52 degrees and includes LED lighting for better visibility. It has a removable dust window and dust shroud for vac hookup, quick-release blade change, three orbital settings (plus no orbital), and variable speed in the trigger and via a speed dial. A no-mar base is included, but the saw doesn't have onboard tool storage as of yet—which is disappointing considering you need a hex key to change the bevel angle. I found it to be well-balanced, lightweight, and smooth-running in the few minutes I had to try it out. Cost is not available yet.

Cordless vacuum. The VC 75-1-A22 is the company's first cordless vacuum, and—according to Hilti—the industry's first OSHA Silica Table 1 compliant cordless vacuum. It has manual filter-cleaning capability, which complies with the silica standard for drilling holes in concrete or masonry when paired with an available DRS-D shroud or TE-C(X) hole-drilling hollow-core bits. The dry-only vac features a HEPA filter and has 75 cfm of max suction. It runs on a single 22V battery and has an Eco mode that provides extended runtime at half the max cfm. The hose extends 8 feet, the body has onboard accessory storage for jobsite cleanup, and the unit can be used as a blower. Cost: $200 tool only; $400 with two 5.2-Ah batteries and a charger.

Cordless fastening system. Hilti's GX-IE cordless gas-powered nailer can be used to attach rigid foam to concrete. Plastic anchors specifically sized for the thickness of the rigid foam you're attaching (from 1 inch to 8 inches thick) are loaded manually one at a time onto the tool's driver shaft. When you pull the trigger, the tool's driver pin sets a masonry fastener embedded within the plastic anchor into the concrete. Though currently available only for concrete, options for steel and wood are either in development or under consideration. The nailer runs on a 12V battery that can reportedly fire up to 5,000 shots per charge. Replacement gas canisters come with the fasteners. Cost is not yet available.

Chris Ermides is the editor of Tools of the Trade. *Follow him on Instagram @toolmagazine.*



Hilti expands its cordless options. While a largely concrete-focused tool company, Hilti is bringing several new cordless carpentry products to market including a jigsaw (top), a silica rule–compliant HEPA vac (middle), and a gas-powered nailer for fastening rigid foam to concrete (bottom).

18V Cordless Finish Nailer

Makita has had an 18-volt cordless brad nailer on the market for some time. While our reviewers found the brad nailer to have substantial power and appreciated that it could be easily switched between sequential and bump modes, the design was unconventional and led to an unbalanced tool.

It seems that Makita went back to the drawing board with its newest 16-gauge straight finish nailer (model XNB02Z). The tool is lighter than its older pin nailer, at 7.5 pounds (with 5.0-Ah battery). It can drive nails from 1 inch to 2 1/2 inches from a magazine capacity of 110 nails. According to Makita, the tool will drive up to 1,000 nails on a single charge.

The nailer features dry-fire lockout—a much appreciated feature—as well as a selector switch to choose between bump and sequential modes. Additional features include an LED light, reversible belt clip, toolless jamb clearing, and two no-mar tips. In lieu of a power button found on some cordless tools, this model features a trigger lock. The nail magazine is notably open, making it easy to see how many nails are left, and it features nail length markings so you can easily identify what nails are inside.

The nailer costs $320 (tool only). Additional cordless finish nailer models include a 23-gauge headless pin nailer, available in 18V and 12V versions, as well as an 18V brad nailer. makitatools.com —*C.E.*

A Cordless Compressor That Delivers

BY ROBERT COURTNEY

Last year about this time, DeWalt released its FlexVolt cordless 2.5-gallon air compressor. It's a pancake-style unit that features a brushless motor and oil-free pump. The tool is powered by one FlexVolt 60V Max battery and weighs just under 24 pounds when equipped with a 6.0-Ah battery. It has a maximum tank pressure of 135 psi and delivers 1.2 scfm at 90 psi. According to the manufacturer, it can fire up to 1,220 brad nails per charge.

I've been using it for months now to power a variety of tools, including a flooring stapler, brad and 15-gauge finish nailers, and—on rare occasions—framing and siding nailers. While the compressor provides plenty of power to fire a framing or siding nailer, it obviously will not keep up with production work. We used it in that capacity only minimally, when we'd forgotten our cordless framer, but it did just fine. Mainly, we use it to install casing and baseboards, and this is where it really shines.

I like how lightweight the unit is, and I keep a coil hose attached to it, which allows me to carry it effortlessly as I work around a room or in and out of rooms.

Most recently, I've been using it to install 9-inch-wide white oak flooring over existing oak flooring. I've been amazed at how well it does in this capacity. When I'm running 1 7/8-inch-wide crown staples in a Spotnails flooring stapler at one shot every 6 inches, I get about 12 staples set before the unit kicks on. I can then continue to fire at a steady clip while the compressor cycles, which takes about 30 seconds.

Runtime has been impressive with the 6.0-Ah battery—I installed 600 square feet before having to recharge the battery. The noise level is reported to be 79 dBA. It runs fairly quietly; the nail-gun fire seems louder to me than the compressor itself.

The compressor, which is kitted with one 6.0-Ah battery and one fast charger, sells for $300. It is made in Jackson, Tenn., with global materials.

Robert Courtney is a custom-home builder living in Saratoga Springs, N.Y.

Classifieds

BY MIKE GELSOMINO

Cutting Baseboard in Old Houses

Cutting baseboard to length in old homes can be challenging. The floors are always off level, and, most of the time, the casement moldings around all the doors are out of plumb too. Rarely is the cut angle 90 degrees where the baseboard meets the casing.

This simple jig allows you to scribe the angle cut to the baseboard for a tight joint. It's easy to make on site by notching a piece of scrap. Line it up against the casing, as shown in the photos here. No angle finders. No math. Just fast and simple.

Mike Gelsomino is a second-generation carpenter, who works alongside his father, Fino, and his older brother, Joe in their company, Gelsomino Brothers Home Remodeling, based in New Rochelle, N.Y. For more good carpentry tricks and techniques, follow Mike on Instagram @mikebuildstuff.



Top four photos by Mike Gelsomino

Send us your tips: *JLC*, in partnership with our sister publication *Tools of the Trade* and Milwaukee Tools, is giving away a power tool each issue to the reader who sends us the best trade tip. (Next month, we'll give away a Milwaukee M18 Fuel 8 1/4-inch table saw, shown at right.) Send tips to JLC-Editorial@hanleywood.com with "Trade Tip" in the subject line. Any building trade qualifies. Don't sweat the grammar or writing; that's what *JLC* editors get paid for. But please send us high-quality photos, and, if needed, a rough sketch to explain your tip.

BY GLENN MATHEWSON

Keeper of the Codes

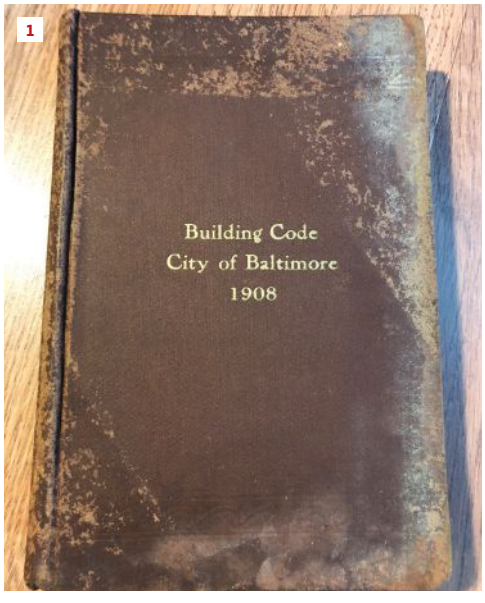
As a code professional, I find myself constantly researching old codes. And that research has led me to collect more than 200 different code books from more than a dozen organizations—and those are just my pre-2000 books, published before the International Code Council's code became universal. These books include plumbing, electrical, mechanical, building, fire, fuel-gas, and energy-conservation codes. I also have a solar-energy code book from 1979. The oldest book in my collection is the 1908 *Building Code City of Baltimore*, published in response to the Great Baltimore Fire of 1904 **(1)**.

Older code books are much smaller than those we use today **(2)**. The 1949 *Dwelling House Construction* is only 40 pages, and the 1976 edition of the *Southern Standard Building Code* is only 53 pages long—a pamphlet bound together with a couple of staples: "Here, read this and go build a house!" To be fair, that booklet doesn't include the mechanical, electrical, and plumbing provisions found in the current *IRC*, with its 962 pages.

Many vintage codes are from organizations that no longer exist or have merged with others. Some merged only to separate again, like ICBO and IAPMO. The tale of the turf wars over who would have the leading code for their trade reveals itself in decades of plumbing codes released every three years.

I started collecting code books more than 10 years ago, and they haven't been easy to find **(3)**. The books have no collector value—I've never met anyone else who shares my affinity for them. Because old code books are somewhat rare, I occasionally see them listed on eBay for $200 or more, but I try to cap purchases at $25, and often I pay less than that. A long-time mentor who retired recently gave me his collection, which he'd garnered over a long career as a code official. Merging our two collections left me with almost 100 duplicate code books, all pre-2000. I'd love to find another collector to trade them with. In the meantime, I'll keep buying codes as I find them, along with other inspector collectibles, such as pins, buckles, and badges. Got something I can add to my collection?

Glenn Mathewson is a code educator and consultant from Colorado (buildingcodecollege.com).



Code books were much smaller at the turn of the last century. This building code from Baltimore was a response to a fire that destroyed much of the city in 1904 **(1)**. Code pamphlets such as this one from 1925 could be carried in a shirt pocket **(2)**. Shown here are just two shelves of a collection of more than 200 code books from the 20th century **(3)**.

Photos by Glenn Mathewson

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