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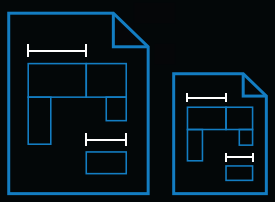

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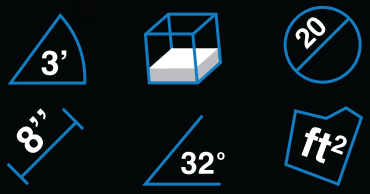

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On the cover: With increasingly stronger and unpredictable thunderstorms, flooding isn't just a coastal problem, as evidenced by this aerial view of a new home under construction in Minot, N.D. See the story on page 39. Photo by David Valdez/FEMA.

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DEPARTMENTS

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Reader Feedback
The following excerpts are taken from comments in response to the JLC articles referenced.

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Letters

"A BASEMENT FLOOR WITHOUT CONCRETE," BY STEVE DEMETRICK AND STEVE BACZEK (NOV/16)

dripfree (online, 11/6/16): Are there special site conditions, like a hill top, that make this installation possible? Even then, I wouldn't take the risk.

Steve Demetrick responds: The site conditions, specifically the soil and ground moisture, were taken into consideration. In my locale, a soil analysis needs to be completed as part of the permitting process. From that we knew that the soil was a sand and gravel mixture that had no history of an elevated water table. If this site had been a swamp with a high water table and had required mechanical drainage, like a sump pump, I would not have suggested this installation, nor would I have allowed a finished basement in those conditions.

Steve Baczek responds: If we inserted a 4-inch-thick concrete slab into the assembly and still finished the space above it with sleepers and sheathing and finishes (as is typically done), how is our risk lowered or eliminated? The slab's existence is not a variable in the "proper water management" equation. Proper surface collection and subsurface drainage conditions and basic water management are not linked to the slab in any way. Sometimes our fear of resisting common thought can overcome our ability to see with clarity.

ron.jlc@graburn.com (online, 11/13/16): Were you at all concerned about overdriven 1 1/4-inch screws puncturing the poly?

Steve Demetrick responds: We used the Simpson Quick-Drive auto-feed gun to install the screws. I had never used an auto-feed screw gun before and purchased one for this project—mainly because of the number of screws we were installing and, more importantly, because the gun has an automatic depth-stop adjustment on it, which ensured that we wouldn't puncture the vapor barrier. At the same time, I wasn't too worried about puncturing the vapor barrier in a few spots. Vapor pressure, unlike air pressure, across an assembly is so small that a few holes would have been absolutely insignificant.

Joatmon (online, 11/13/16): In my area, some foundations are allowed to be installed without footings because of light loads and high soil bearing capacity values. It's critical therefore that the basement slab act as a restraint against soil pressure sliding the base of the wall inward. A keyed wall to footing is therefore absolutely critical to resolving this lateral load. Of course, then you have to slightly worry about the soil friction necessary for the footing itself to resist sliding. As great as this idea is, I think I'd still rather place a basement slab than worry about a potential foundation displacement down the road.

Steve Demetrick responds: Our walls are locked into the footing with a key way in the footing as well as with rebar. Again, we also consider soil types, grades, and water management in our designs. Soil doesn't move by itself; there are a number of different forces that need to be considered that make the slab the last line of defense against your concrete basement walls caving in.

Steve Baczek responds: We go into numerous large homes in New England that have dirt floors in the basement with no slab. I grew up in such a house; the basement foundation walls did not creep in. I do understand your concern; I also believe that fear of change (especially in the case of a well-accepted standard such as a basement slab) can overwhelm our ability to see and act clearly.

BC Carter (online, 11/13/16): I have waited for years to see the unquestioned use of concrete challenged. The best justification ever offered for concrete is that it's an easy choice. Not necessarily the best, but the easiest. But it takes a lot of energy to manufacture and move, and it is, for practical purposes, permanent—not as great a thing as it might seem. Thanks for a look at something different.

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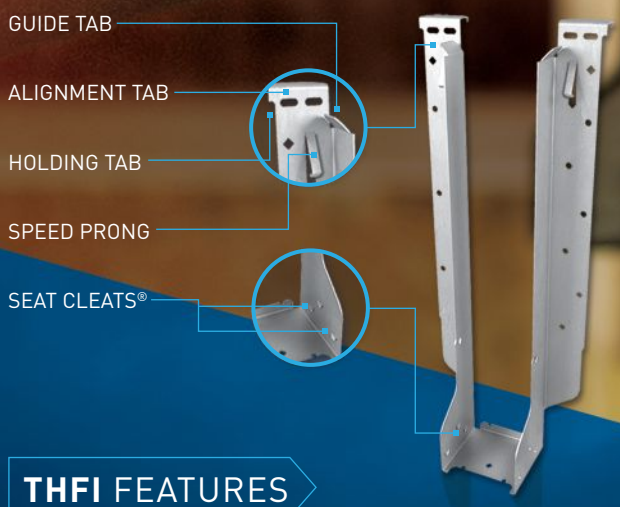

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Q A client has a sunroom with an uninsulated concrete slab that is 5 inches below the house floor. What is the best way to insulate and raise the floor to match the hardwood floor in the main house?

A Steven Baczek, a residential architect from Reading, Mass., who specializes in designing durable, low-energy homes, responds: With that 5-inch height difference, I assume that the walls are built on a stem wall, which is not uncommon. You will need to build up the sunroom floor in layers to seal and insulate the floor, while eliminating thermal bridging and creating a nail base for the wood floor.

The first thing to determine is whether the slab is relatively flat and consistent in height. A long level, a straightedge, or a couple of strings can help with this step, but the best tool for checking the floor is a laser level. If the concrete slab is in bad shape, it might be easier to take it out and start from scratch.

If you start with the 5-inch difference between the top of the slab and the finished floor of the house, and you subtract 3/4 inch for the strip floor and another 3/4 inch for the subfloor, you're left with 3 1/2 inches for a supporting frame. Because the slab is uninsulated, it is likely to transmit moisture from the ground below, so first I would cover the slab with 4-mil cross-linked poly (see Insulating a Sunroom Floor, below). Extend the poly up the walls a couple of inches and make sure that it is pressed tightly into the juncture between the slab and the sunroom walls. Tape the poly to the walls with waterproof flashing tape.

To build the supporting structure, start by installing treated 2x4 sleepers on the flat on top of the poly. Place the first sleeper 6 inches in from the edge of the walls and space the rest 24 inches on-center. Fill the spaces between the sleepers and around the perimeter of the room with 1 1/2-inch rigid EPS insulation.

For the next layer, cover the entire floor space with 2-inch-thick rigid insulation. That layer will take the height of the sunroom floor to 3 1/2 inches above the slab.

Next, install the 3/4-inch subfloor on top of the rigid insulation. Drive 3 1/2-inch screws through the 2-inch insulation and into the sleepers below; that screw length should anchor the subfloor without penetrating the poly barrier. With the subfloor installed, you should be able to continue the hardwood strip flooring from the main house directly into the sunroom, uninterrupted. Essentially, this is a floating floor system that is R-15+, sealed, and thermally broken. The insulated floor will make the sunroom warmer, drier, and less likely to cause problems with indoor air quality.

Insulating a Sunroom Floor

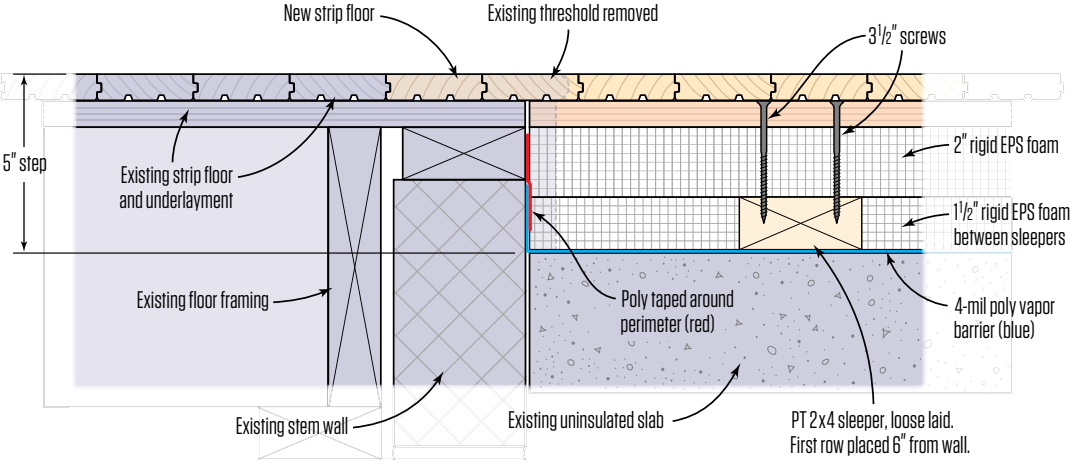


Illustration: Tim Healey

Q Are windows required in all basements?

A Victor Staley, a building official in the town of Brewster, Mass., responds: The IRC's definition of a basement is based on ceiling height, and the code regulates minimum ceiling heights, including those in basements. Section R305 states that the minimum ceiling height in habitable spaces (including habitable basements) shall not be less than 7 feet.

That same section goes on to state that basements that are not habitable shall not be less than 6 feet 8 inches in height. I take this to mean that if the overall below-grade ceiling height is less than 6 feet 8 inches, the space would not be considered a basement but rather a crawlspace. (I'll address crawlspaces later.) The situation can get a little nuanced and complicated when a builder is looking at building out a habitable space in an existing basement, but I'll leave that topic for another discussion.

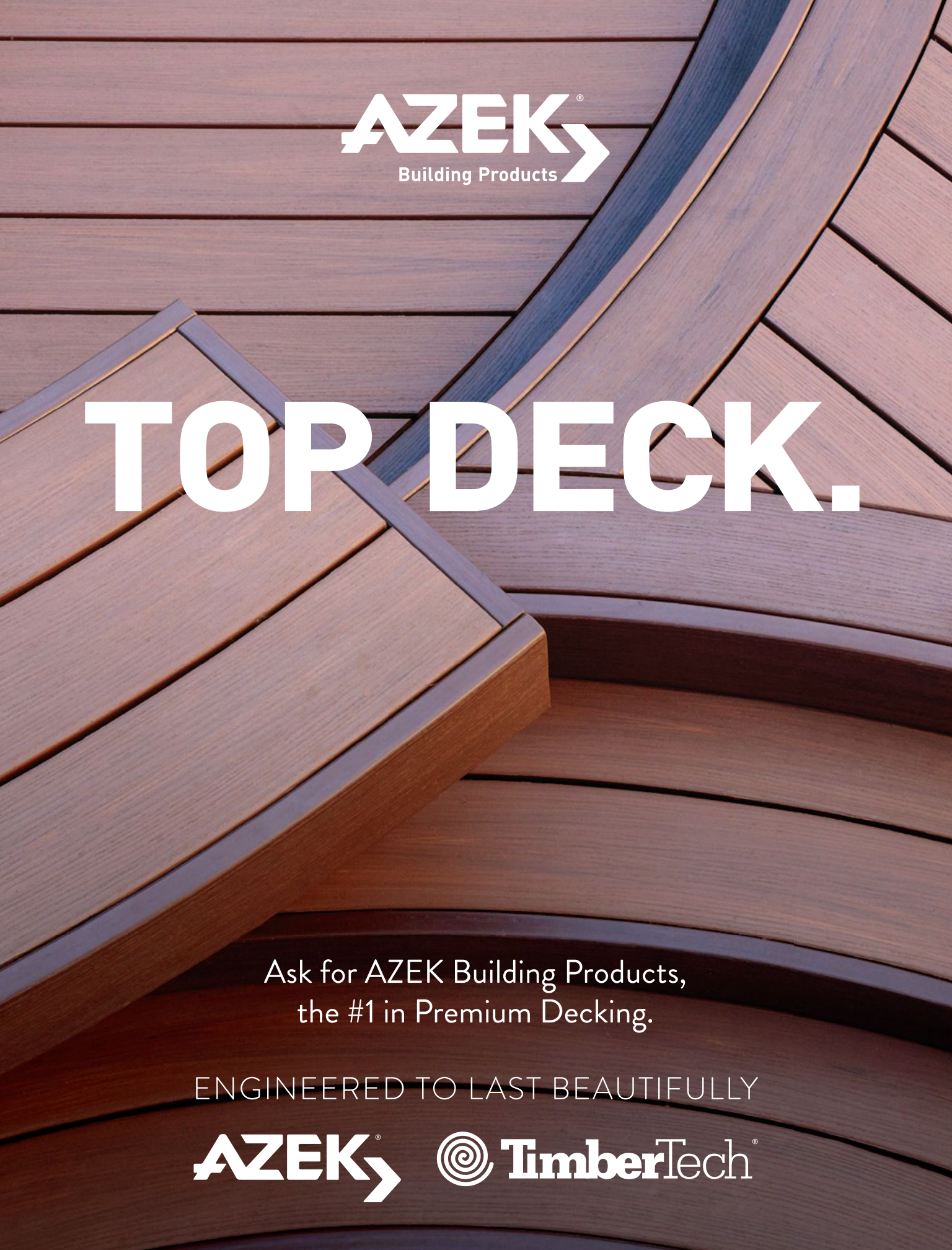
As to the window requirement, if the house is being built with a basement that meets the ceiling height requirement, the code does require egress that meets IRC Section R310.1, whether the basement will be habitable or not. This section requires that the egress from these areas go directly to the exterior of the building through either a walkout door, a window, or a bulkhead.

The interior stairway between the basement and the first floor does not meet the requirement for egress to the exterior because it does not lead directly to the exterior of the building. So oddly enough, you could build a house with a basement, and the typical interior stairs would not be required, but an egress from the basement directly to the exterior would always be required.

This type of egress in section R310.1 is referred to as an Emergency Escape and Rescue Opening, or EERO. The EERO can be located anywhere along the basement wall, even if the space is mixed-use with part habitable and part uninhabited areas of the basement. The exception to this rule is when a room is designated as a bedroom. In that case, an EERO has to be placed in that bedroom so people trying to flee the bedroom do not have to go through another room to access an EERO. This EERO provision is attached to all bedrooms regardless of the floor on which they are located.

For a below-grade EERO, the code sets forth a minimum net opening area of 5 square feet. If a below-grade window is being used to satisfy the EERO requirement, section R310.2 also requires a window well that projects at least 3 feet from the house. The horizontal area of the window well must be at least 9 square feet.

As mentioned before, a below-grade space with less than 6 feet 8 inches of height would be considered a crawlspace and would not require an EERO. However, the code does require ventilation openings in these spaces.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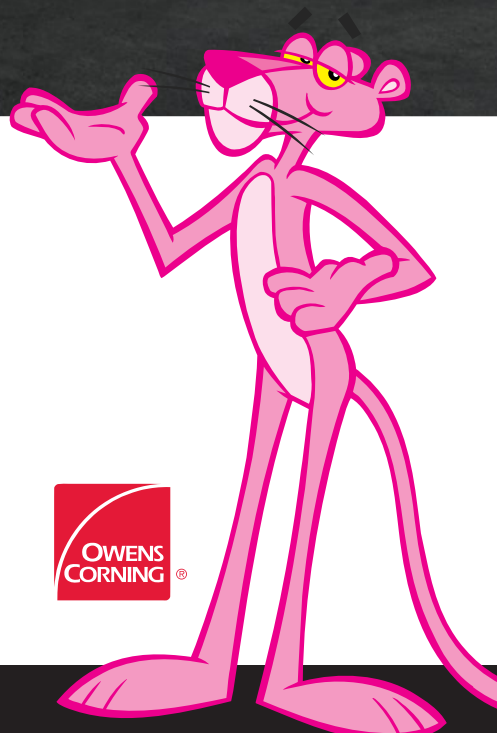

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BY TED CUSHMAN

Jesper Kruse and carpenter Alex Strugaskiy screwed a plywood mock-up of the stair landing to the house wall **(1)**. Kruse leveled, squared, and braced the landing template **(2)** before measuring and cutting the stringers.

Photos by Ted Cushman and Jesper Kruse

Templating a Steel Staircase

For a custom ski lodge in Maine, Jesper Kruse of Maine Passive House turned to a local ironworker to make a set of rugged and dramatic steel staircases. The trouble with using steel, though, is you get only one chance to fit the staircases to the building's frame. So Kruse decided to mock up full-size templates for the landings and stringers, a process we document in the photos here.

The main floor has an open plan with a kitchen and living room. Half of that space is open to the vaulted timber roof. The gable end, facing a mountain view, is mostly glass, and open stairs lead up to a loft looking down into the great room and sharing the views.

Kruse and carpenter Todd Conant began by building a plywood mock-up of the lower landing and fastening it to the wall, leveling and squaring the mock-up and supporting it with wood braces. Next, they suspended the top-landing mock-up from the loft. This allowed Kruse to accurately measure the rise and run for the lower and upper staircases and lay out and cut wood stair stringers to complete the full-scale template.

When the wood templates were finished, Kruse took them over to local steel fabricator Hanover Ironworks. Two weeks later, the steel installers came to the job to install the final product for a perfect fit.


3


4


5

Kruse measured the rise and run from the finish floor to the stair landing, laid out and cut a stair stringer template from a doubled sheet of plywood **(3)**, and checked the template in place against the floor and landing **(4)**. Supporting the upper landing mock-up was a little trickier **(5)**: Kruse and carpenter Todd Conant held the piece in place and suspended it from a piece of wood spanning the distance between two of the home's massive timber trusses.


6


7


8

With the landing mock-ups in position, Kruse and Conant laid up, cut, and test-fit the stair stringer template for the main run of stairs **(6)**. Once Kruse was satisfied with the mock-up measurements, he dismantled the model and brought the pieces to steel fabricator Richard Duka (Hanover Iron Works, Hanover, Maine). Two weeks later, Duka and son Matt Duka installed the steel landings, staircases, and railings **(7, 8)**, welding the assembly together on site.

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BY MARK LUZIO

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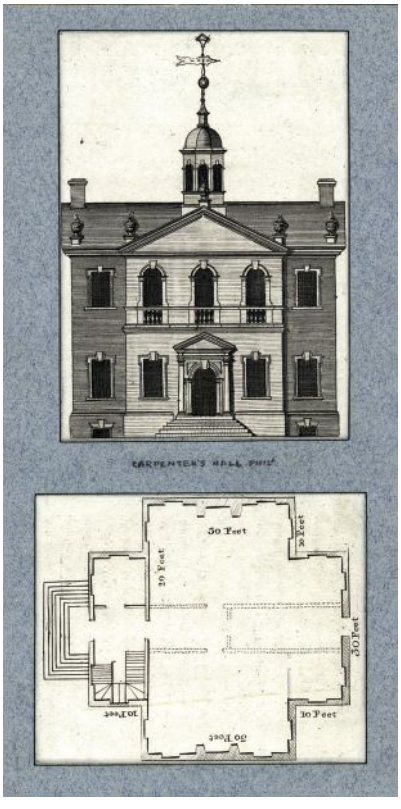

Delegates to the First Continental Congress decided Carpenter's Hall—home of The Carpenter's Company—was a better meeting spot than City Tavern. If not for that historic meeting, the building might have been demolished by the middle of the 19th century.

Two blocks from Independence Hall, in a small courtyard off Chestnut Street, is a beautifully preserved Georgian building known as Carpenter's Hall. This traditional meeting hall was built in 1774 by "The Carpenters' Company of the City and County of Philadelphia," the oldest trade guild—founded circa 1724—in the U.S. Its members were the master joiners who built Philadelphia, and the building itself holds great historical significance as the site of the First Continental Congress.

At the time our country was founded, a master joiner—the GC of the day—would have started out, like many GCs today, as a carpenter's helper and would work up to master. At that point, he would also serve as architect and engineer; the profession of an academically trained architect did not yet exist in the American colonies. A master joiner would draw—or oversee the drawing of—the plans and then build the structure with the help of subcontractors.

Of course, it was a different business climate in those days, but the way in which the early-American GCs conducted business makes for an interesting study in peer support and the regulation of industry standards that's worth examining today.

THE 1786 RULE BOOK

The basis for business among the members of The Carpenter's Company was a small book, copies of which were discovered in the early 1950s by Charles Peterson, an architect and a historian, while he was crawling through the attic of Carpenter's Hall. In early America, this rule book was reportedly a well-guarded secret. Widows of Company members were pledged to return their husband's copy, and even a former U.S. president, Thomas Jefferson, was unable to secure a copy when he requested one in 1817.

The "1786 Rulebook" contained "Articles" of association, much like union bylaws, and the "Rules for Measuring and Valuing House-Carpenters Work," which defined a specific process for setting prices and adhering to building standards. Included with the rules and prices were detail drawings of windows, doors, roof framing, and the like that demonstrated correct classical proportions.

Before building codes and a legal system under which written contracts could be upheld, GCs faced the same problem they do today: How do customers know that they are getting a good value, and how do you explain to customers why your price is so much higher than another guy's?

The final paragraph from the Articles of the 1786 rule book put it this way: "The real intent and meaning of what hath been done is, that every gentleman concerned in building may have the value of his money, and that every workman may have the worth of his labor."

MATCHING QUALITY WITH PRICING

As Philadelphia was growing from a colonial outpost to a world-class city, the problem of establishing quality grew acute: how to value and differentiate the work involved in building "plain simple houses erected in the early times of this state to serve the necessary purposes of life" from the richly adorned buildings in demand "as the inhabitants grew more opulent and strangers from time to time arrived from other countries, where many elegancies were in use."

This issue has not changed and is still very much a modern-day problem: Whether you are building a house, an addition, or a new kitchen or (as I usually do) making and installing custom millwork, it's up to you to explain to a client why your price is so much higher than the other guy's. Contractor licensing and job permitting provide meager assurance. They establish base-level standards—assurance only that a structure won't cause injury or death; that

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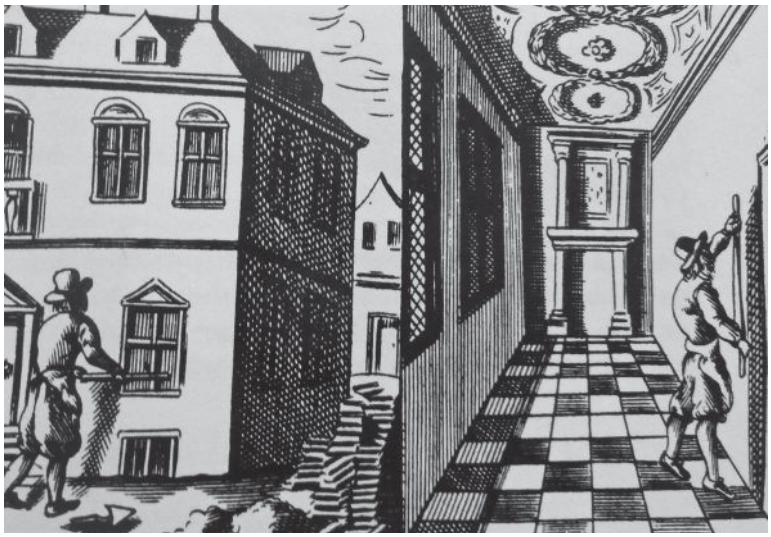
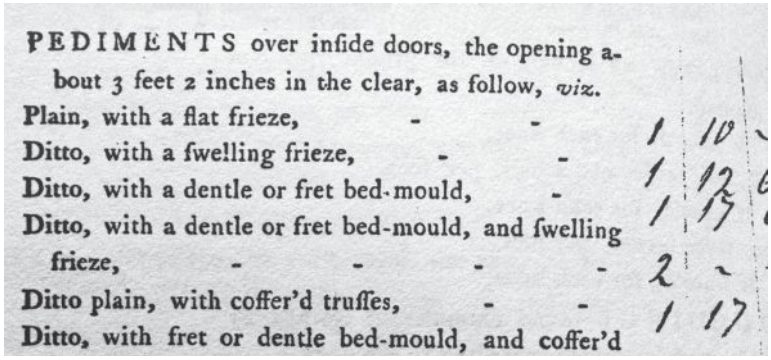




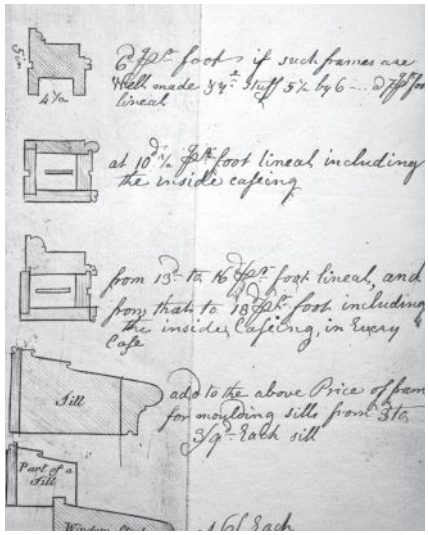
PEDIMENTS over infide doors, the opening a-
bout 3 feet 2 inches in the clear, as follow, *viz.*

Plain, with a flat frieze,	1	10
Ditto, with a fwelling frieze,	1	12
Ditto, with a dentle or fret bed-mould,	1	13
Ditto, with a dentle or fret bed-mould, and fwelling frieze,	2	
Ditto plain, with coffer'd truffes,	1	17
Ditto, with fret or dentle bed-mould, and coffer'd		

risk of fire is limited, and if a fire does break out, the occupants can escape; and that the foundation and septic won't harm the environment or make the neighbors sick. More recently, energy codes have been added that limit a building's energy use. But none of these standards say anything about the quality difference between "plain houses" and opulent or elegant ones.

The Carpenter's Company rulebook allowed for a carpenter's peers to help set prices for his area and also to confirm a level of quality beyond the life-safety baseline of today's building code. The "rules" established a common way that all jobs were to be measured, either by "square, yard or foot." For every job, two other carpenters—people "able to judge" and see details and materials choices that a client would surely miss—evaluated the work after it was built. In that way, valuation differed markedly from

In early America, carpenters didn't competitively bid on work. Instead, the price of a completed project was confirmed by "measurers" (top). Members of The Carpenter's Company acting as measurers evaluated the work of their peers, using "rule book" prices. The book listed "plain" details along with more elaborate versions (above).



In Colonial times, window "trim" spanned the entire wall thickness, serving as both rough-opening framing and finished woodwork.

the modern-day bid system. Presumably, the master joiner would talk to a client beforehand and give a reasonable estimate to match the quality and level of elegance desired. Anything like a contract price was determined afterwards. And much of early Philadelphia was built on a spec basis, as well, by master joiners acting as developers, and the system worked brilliantly for that.

Only carpenters at the upper levels of the profession, who commanded the respect of their fellows, were offered opportunities to act as "measurers" or "valuers"; their fundamental purpose was to arrive at a price that was fair to everyone. The measurers generally worked in teams of at least two, adding another checkpoint to the process. Their valuation was subject to scrutiny of both client and craftsman. In addition, as carpenter-builders, they would, in turn, have their work measured by others. As Charles Peterson explained, "It was the satisfactory combination of professional expertise, estimated cost, and independent valuation that made the system of 'mensuration' a popular form of deciding the final price."

Mark Luzio owns Post Pattern Woodworking, based in Brooklyn, Conn.

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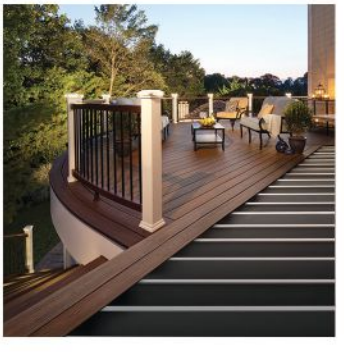

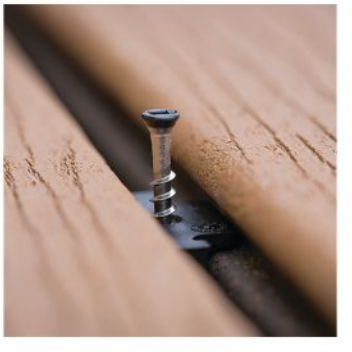

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BY SCOTT GUTHRIDGE

Photos by Scott Guthridge

Leaky Basement Windows

I was working on my parents' home, which I had built for them in 2009, finishing their basement off in stages as I had time between other projects, and I had one last window to trim out. The basement windows were hung on a treated-wood frame I used to surround the concrete opening in a Superior Wall foundation.

THE PROBLEM

As I looked from inside the home at the wooden framing around the window, I saw what looked like a water stain on the corner. I wondered what had caused it, so I looked outside around the perimeter of the window and found a slight crack in the gray caulk that my crew had originally applied to seal the window.

We had used a polyurethane sealant that the manufacturer of Superior Wall recommends to seal and adhere the precast fabricated foundation wall panels. I understood it to be durable enough to last the lifetime of the structure, and this is likely true for below-grade applications. But in this case, direct exposure to the elements seemed to have caused the sealant to pull away from the vinyl window and the concrete opening it was placed in.

In homes with these precast foundations, I build a rough opening that is 1/2 inch bigger than the vinyl replacement-style window. This provides an even, 1/4-inch space around the window, which I air-seal with non-expanding foam and seal on the exterior with caulking. I also set the window unit about 2 inches in from the face of the exterior wall to protect the head of the window from driving rain. This inset eliminates the need for head flashing, which can fail when adhered to the face of a concrete wall, and it saves time.

I cleaned off the dirt and debris from the existing sealant, as well as the mildew that had formed around the opening, and with some mild detergent,

Short of pulling all the basement windows and using a peel-and-stick to create a drainable sill pan, the expedient fix was to inject a high-quality polyurethane sealant into the gap below and on the sides of the window unit, creating a retrofit sealant pan before installing extension jambs.

I scrubbed, rinsed, and dried the opening.

I grabbed a new tube of caulk (Vulkem 116 polyurethane sealant, which is very similar to the Superior Wall caulk). While cracked, the existing caulk was still strongly adhered to the concrete. I applied the new sealant over the old and made sure it was bonding well to the concrete wall and the vinyl window.

Out of curiosity, the next day, when the sealant was thoroughly dry, I took a garden hose, set the nozzle to shower mode, and gently sprayed the window to replicate a rain shower. After spraying water for a couple of minutes, I went into the basement to check, assuming everything would be fine. But to my surprise, I saw water coming in around the corner of the window. "What in the world is going on here," I thought. I started to investigate. I looked outside and saw the caulk was tight, and the weep holes seemed open and clear in the window frame.

What had actually happened, to the best of my knowledge, was that the vinyl window itself had small cracks in the corners of the window frame. I took some photos and started documenting the process.

I dried up the water with some rags and went outside, set up the hose to spray the window, and left it running. Then I headed back into the basement to determine where the water was leaking through first. It appeared that the left side was leaking almost immediately, and eventually the right side started leaking as well.

THE SOLUTION

I was determined to find a solution for this leak before installing the extension jambs and trim.

I certainly did not want to tear out the window and start from scratch, although it crossed my mind. If I had removed the window, I would have been able to place a peel-and-stick membrane under the window, just as I do on all windows in a wood-frame wall. Short of this measure, I decided to create a pan by injecting the same polyurethane sealant that I had used on the outside to fill in the gap around the bottom and sides of the window.

I removed all the spray foam that I had used to air-seal the opening and cleaned it out as well as I could. I then took my caulk gun and shoved the tip as far into the 1/4-inch gap as it would go. I wanted to make sure the entire space was filled with sealant to prevent any water from entering the structure. As the sealant was squeezed into the opening and started oozing out in front, I troweled the sealant along the bottom and up the sides about 3 inches.

After letting the sealant dry for a day, I got out my hose. Again, I set it up to spray the window gently, and I went inside and hoped for the best. This time, there was no evidence of water inside. I let the hose run for five to 10 minutes, and still no water was leaking through. The amount of water that hit the window in that period of time was a deluge compared with the typical rainstorms we have in this area, and I was confident I had solved the problem of water leaking into the structure.

I had already trimmed two other basement windows on the house without testing them. The thought crossed my mind to tear out the trim and use the same procedure. For a paying customer, I might have been more motivated, if only to avoid the potential liability. But I decided against it, since one window was already finish painted. I rationalized that the actual rainfall on these windows is minimal, and the opening's frames are treated lumber and concrete. If there were a slight leak, it would take many years before any damage materialized.

I have built many homes with my original basement window detail and thought I was doing it well. Lesson learned. There are hidden cracks in many windows that usually go unseen. I do not know if the failure at the corners of this unit occurred at the time of original installation or in the ensuing years. All I know is that I am going to be water-testing more openings before finishing them off in the future.

Scott Guthridge is the principal of Guthridge Construction Services, based in Lancaster, Pa.

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BY MATT BOWERS

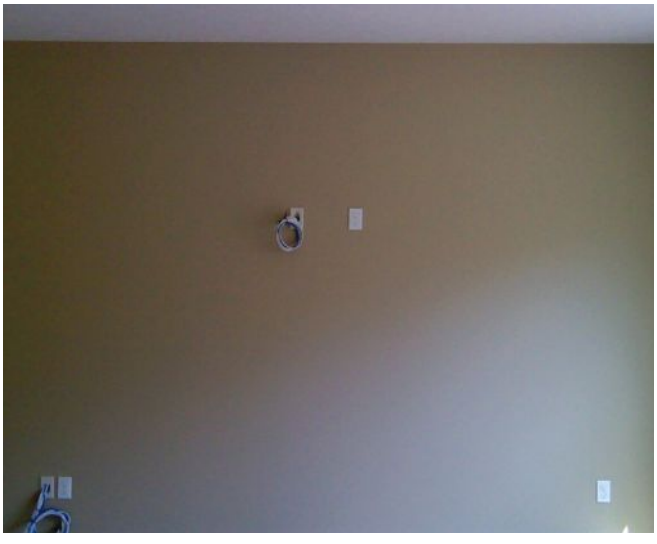
Thermal Imaging: A Detective's Casebook

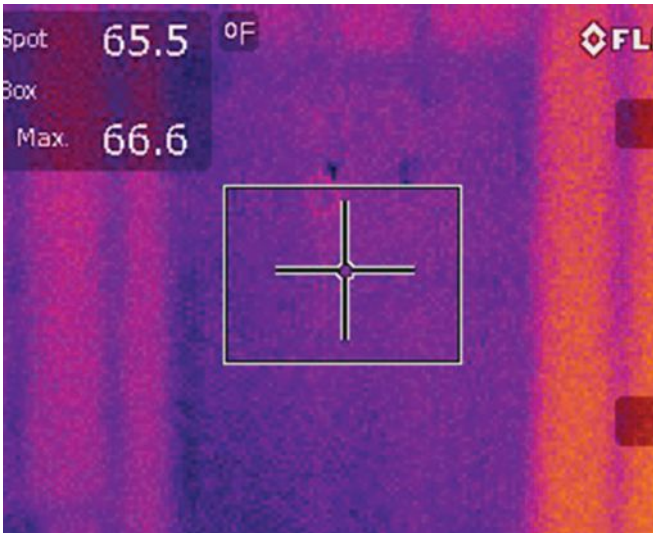
An infrared camera is not much use in a new house under construction, until the house is insulated. Once the house is being heated or cooled, the camera becomes a helpful troubleshooting tool. The temperature difference between the indoor space and outside needs to be about 20°F or more, so the camera has something to look at. In a completed house in our upstate New York market, the device is useful in summer or winter (about eight months of the year). In mild spring or fall weather, we leave the infrared camera at the office.

In this column, I'll present a few odd cases that I've collected during home performance audits. Each example includes one visible-light snapshot and one infrared image. In most of the examples, I'm using the infrared camera in combination with a blower door during cold weather—putting the house under a negative pressure to draw cold outdoor air in through any leaks and identifying cold spots (blue and purple areas) with the camera.

A COLD SWITCH BOX

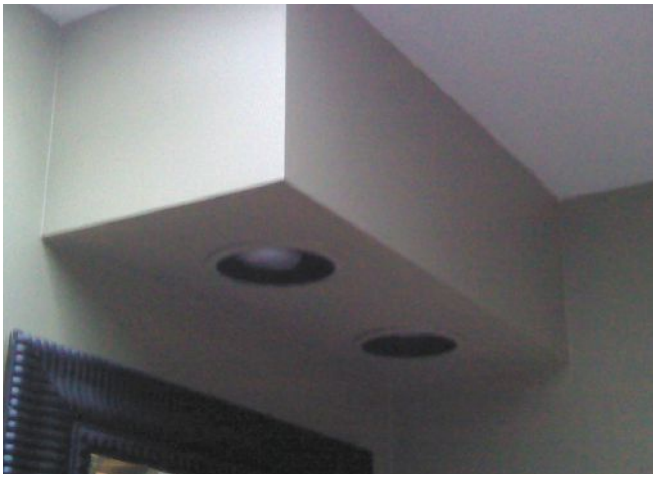
In the first example, the visible-light image (below left) shows what looks like just a blank wall. But behind the wall is the bump-out for what we call a "doghouse fireplace." The owner elected not to install the actual fireplace until later. A purple ghost image (below right) reveals the cold box where the fireplace would otherwise be. The wall is probably insulated to code, but there's no air barrier on the other side. A small vented shed roof on the doghouse is letting in the wind, and cold air is blowing through the fiberglass onto the drywall (and into the room through TV-cable and power receptacles). This flaw is difficult to fix as a retrofit, but during construction, the wall could easily have been sheathed to protect the insulation on all sides.

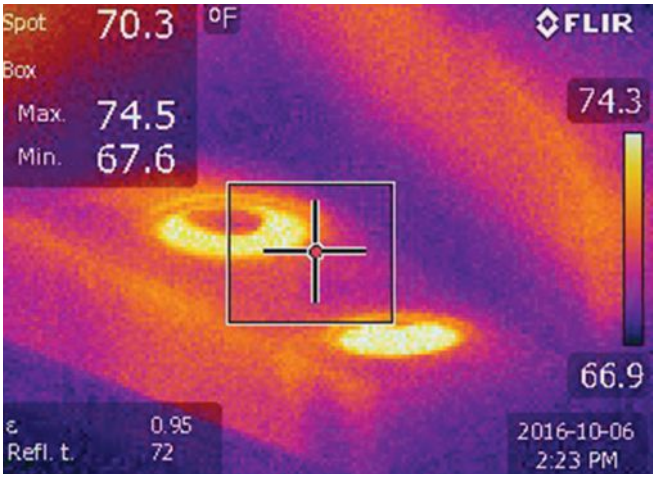




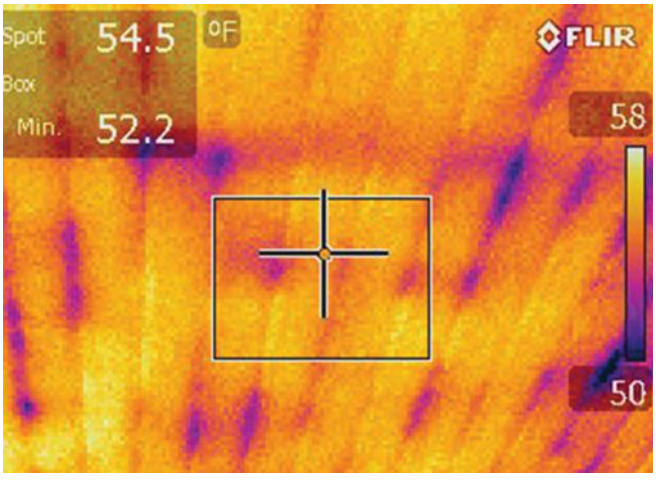
Photos by Matt Bowers

Behind the finished wall shown above is a cold bump-out where an optional gas fireplace has been left uninstalled. The insulation in the wall is not performing, because it's not protected from air infiltration on the other, cold side, which is exposed to outdoor air by vents in the bump-out roof. Continuous wall sheathing and housewrap would have blocked this thermal pathway.





This built-down soffit is another example of insulation failing to perform when installed without an effective air barrier. The soffit communicates with the cold attic above, even though insulation covers the hole in the ceiling.



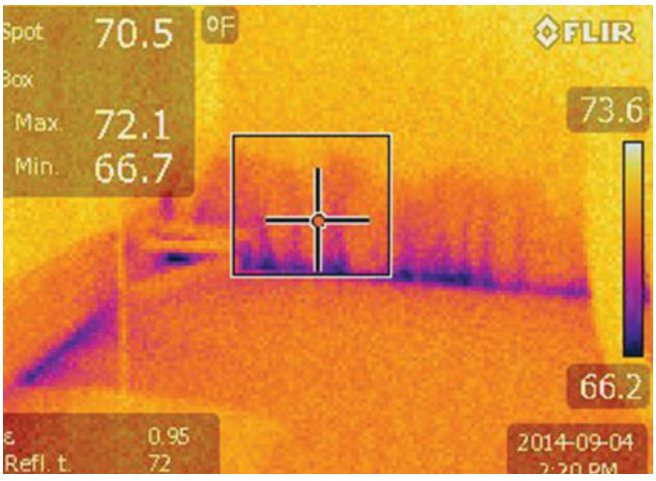
Beadboard as in the ceiling shown above does not function as an effective air barrier. Under negative pressure, cold air leaks in through the cracks between the boards.

A COLD SOFFIT

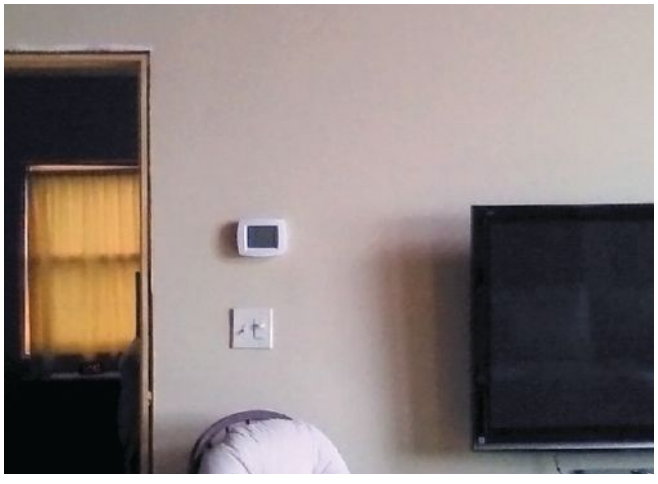
The images at the top of this page show a dropped soffit with two recessed light fixtures in it. In the infrared image, the lights are glowing with heat because they had just been turned off. The blower door is sucking in cold air (purple), because the top of the soffit is open to the cold attic above. A visual inspection of the attic wouldn't reveal this flaw, because there's insulation covering the hole. But the camera sees the cold air leak. To fix it, we went into the attic, pulled back the insulation, and air-sealed the opening with rigid foam and caulk. In new construction, drywalling the ceiling before framing down is a good way to maintain the air barrier.

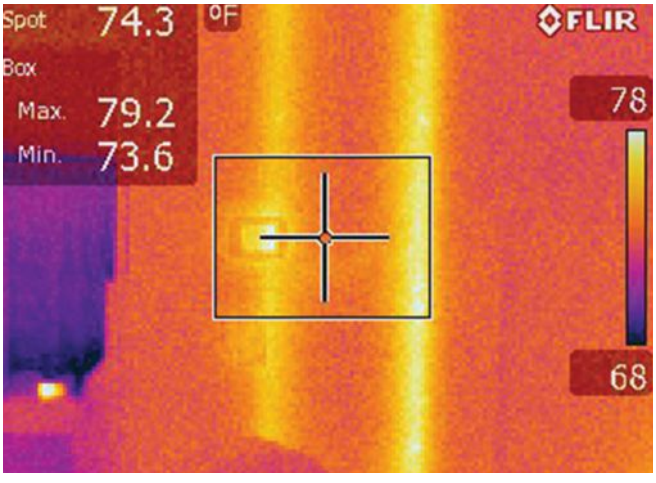
A LEAKY CEILING

A ceiling makes a good air barrier, but only if it's airtight. Drywall works well but other materials may not. The lower example above shows a ship-lap beadboard ceiling on an old porch that has been enclosed and conditioned. In the infrared image, the blower door is pulling in cold air through the cracks between the boards. The leaks show up as purple. In this case, we had to climb into that attic, vacuum out all the insulation that was in there, and then put a flash coat of spray foam down. Then we blew in more insulation on top of the foam, keeping the insulation blanket in contact with the air barrier.



Air-sealing between a concrete footing and a concrete wall can be surprisingly important. In the infrared image, it's clear that cold air is seeping in beneath the ICF wall, drawn in through exterior footing drain tile that drains to daylight.





In the example above, a thermostat was fooled by the hydronic heating line that ran in the wall directly behind it, supplying an upstairs zone. The author has seen similar problems when a thermostat just happened to be placed in a sunny spot.

A LEAKY ICF BASEMENT

In one house, we discovered air infiltration at the bottom of a concrete basement wall (see images, top). This is a high-performance house under construction, built with insulating concrete forms (ICFs); the images were taken in the walkout basement. You can see the Zehnder energy recovery ventilator (ERV) at left in the visible-light photo. With the blower door on, the infrared camera detected cold air seeping in at the base of the ICF wall—coming in through the footing joint (via perforated foundation drain tile set in gravel and draining to daylight). To fix the leak, we had to seal this perimeter joint with 6-inch-wide Tescon Vana tape.

A CONTROL SHORT-CIRCUIT

Here's an odd case: This thermostat (see photo, above left) controls in-floor radiant heat for the room; the story above also has radiant heat. The homeowners complained that this room was always cold, but after several callbacks, the HVAC contractor couldn't find anything wrong. The thermal image reveals that the tubes supplying an upstairs loop run right behind the lower room's thermostat. If the upstairs heat is on, this thermostat never calls for heat!

Certified HERS Rater and Passive House Consultant Matt Bowers works for Airtight Services, in Marion, N.Y.

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From Spec to Spectacular

Seven ways to sell spec houses faster and for more money

BY CAROLYN ANDERSON AND CHELSEA MULLEN

At one point or another in their careers, most builders and remodelers are tempted by the prospect of building a spec house. But there's more to being a successful spec-house builder than just having a background in construction.

To be a worthwhile venture, a spec house needs to sell in a timely fashion, which means it needs to create a great first impression that elicits a positive gut feeling in a prospective buyer. Key to making that happen are certain value-added features that don't add a lot to the cost of building the house, but that do turn lookers into buyers and minimize or eliminate negotiations over price. As a bonus, satisfied buyers are likely to tell other people how great the house is and how impressed they are by your attention to detail, your thoughtful design, and your excellent implementation—thereby boosting your reputation and ensuring an enduring enthusiasm for your brand.

1. PLAN THE SITING

Never underestimate the importance of building the right house for a specific lot. Spec-house builders commonly use "tried and true" stock plans, believing them to be a safe investment. However, if using those plans results in an unintentional view of the neighbor's HVAC unit from the family room, the money you saved by using "safe" plans goes out the window—literally.

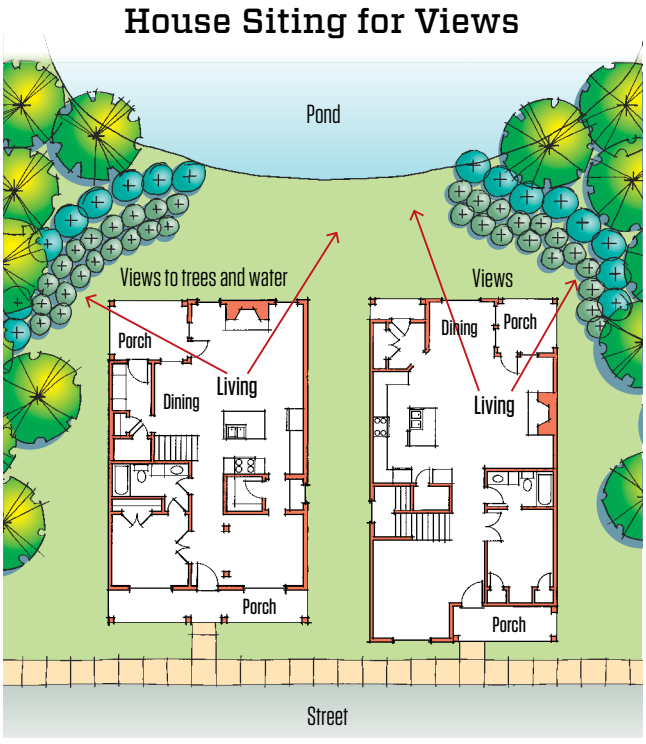
Site orientation. Investing a small amount of time to consider both sight lines and orientation can increase the appeal of the house and add thousands of dollars to the selling price, while cutting the time that the house spends on the market (see House Siting for Views, page 32). Even the smallest consideration, such as using a mirror image of the plan on a particular lot, can make a tremendous difference to potential buyers when they walk into the house.

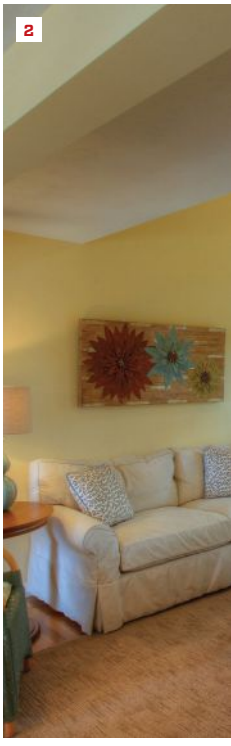
Room views. Ask yourself what the views will be from the living spaces. The two best answers are trees and water **(1)**. Invest in plantings that enhance the views from inside the house or make the most of that retention pond behind the property.

Select house plans that can be oriented on the site for the most advantageous views. That might mean rearranging plans to put the living spaces in the front of the house or facing the side. As you review the plans, be sure to check the views from the master bedroom and bath. If those areas look into private areas of the neighboring house, you might want to rethink the plan. The bottom line in most

Lead photo by Chelsea Mullen; all others by Roe Osborn

To create the best impression for prospective spec-house buyers, site the houses and arrange the floor plans so that public spaces inside the houses look out on natural settings instead of looking at adjacent houses. Ideally, the views from the living room and dining room should be of water or trees, as in photo **(1)**, above.





cases is that open vistas are far more desirable than views of adjacent houses.

2. PUT THOUGHT INTO FLOOR PLANS

Elegant plans don't necessarily cost more to build, so choose and arrange a plan that is comfortable to live in.

Daylight. Room orientation is part of choosing the right plan for the lot. Be mindful of daylight for specific rooms. Offer plans with master bedrooms facing east or south (ideally both) to capture morning light, and place the secondary bedrooms with north- or west-facing windows wherever possible, so kids don't wake up at dawn and show up in mom and dad's room before the alarm goes off.

Furniture. Regardless of region, price point, or demographic, furniture should be a major consideration when sizing and laying out rooms. Some rooms—like bedrooms—are even named for the furniture that goes in them. If a bed doesn't work in a bedroom, change the plan or lose it. It's not uncommon to see bedroom plans that don't provide adequate wall space for a bed or that don't allow enough space for closet doors to open properly with a bed in the room. Similarly, most dining room furniture includes a hutch or sideboard. Always make sure, and never assume, that there will be ample space for the furniture that is likely to be in a given room.

Closets. People need closets. Too-small or misplaced closets are a quick turn-off to buyers and can be a reputation buster for the builder. Coat closets are fairly common but might not be a value-added feature if the closet is near a formal entry door while the most-used entry is at the opposite end of the house. In that case, consider replacing the traditional coat closet with a drop zone outfitted with a bench and coat hooks near the entry door that is most likely to be used. The additional cost of trim work will be offset by eliminating the closet door and hardware. Make sure there is a broom closet for a vacuum and mop and a linen closet near the laundry room, with shelves at least 15 inches deep.

Wall space. Artwork is not just for upscale homes. Most folks want to decorate their walls—whether it is with an heirloom tapestry or with their kid's hand-print turkey. Nothing is more troublesome than a thermostat that's placed in the middle of the wall or an HVAC vent that interferes with hanging art symmetrically. Always be sure there is room on the plan for wall decorations and that functional features such as switches and controls are placed with forethought.

3. ENTICE WITH COLOR

Color drives emotional responses and, as a result, has a huge effect on sales. After the architecture itself, color is the most noticeable element of any building, so it always has a major impact on perceived value. Get it right, and the house will sell quickly and for more money. Get it wrong, and you may sit on it for a long time.

Illustration: Tim Healey

And while painting is one of the fixed costs of building a spec house, *re*painting a house to sell it can be expensive.

Regional preferences. Each region in the country has its own preferred palette that reflects the local environment of that region. Coastal, temperate areas tend to feature blue, aqua, tan, and white prominently in their landscape. So cooler, lighter colors are usually preferred in these markets. Conversely, in colder, mountainous areas, the topography and expanses of mature trees inspire the use of grays, greens, and browns balanced by warmer, richer colors such as red, orange, and yellow. These palettes should apply throughout the house, both inside and out.

Color combination. Consider how the colors of interior elements, such as countertops, floors, and cabinets, will blend and complement one another. Don't just select the least expensive cabinets and granite slabs and "pallet specials" of tile and then lump them together in a boring sea of beige and brown. Houses that have striking colors and a particular design sense sell faster than those with a generic, "lowest-price-tag" appearance **(2)**. If you still have doubts, leaf through a recent copy of a design magazine targeted to your area of the country. The buyer preferences for colors in your market for both exterior and interior surfaces should come across loud and clear in the photos.

Professional assistance. If you are not confident working with colors, a color consultant could be a wise investment. You already hire specialists for many of the other phases of building, so it makes sense to add someone who knows color to your team. Don't automatically expect your painting subcontractor to be this person (although some painters might be). If you don't have access to a color consultant, visit several homes that are for sale in your area and that are priced at three (or more) times your target asking price. If you mimic the colors you see there (adding value without cost), your homes will likely have immediate increased appeal.

4. PROVIDE LOTS OF NATURAL AND ARTIFICIAL LIGHT

Most people thrive on natural light, and well-placed windows can sell a house almost as quickly as a gourmet kitchen. Buyers will feel alive and uplifted as they walk through a house with lots of natural light. The size and placement of the windows are key factors for first impressions, and, like color, these factors are driven by the natural environment of your region. Again, look at images in local design magazines for ideas for the size and placement of windows.

Natural light. Window arrangement should be compatible with the furniture placement that's typical for any given room. In the master bedroom, allow for enough space between windows for a king-size bed. In the dining area, install small higher windows flanked by larger ones that provide ample daylight and privacy, while leaving a space below for a sideboard. Windows in children's bedrooms should be 30 inches or more off the floor to prevent accidental falls and to allow for bookcases or desks under them.

Artificial light. Well-thought-out artificial lighting is also important in a house. Resist the temptation to install fluorescent fixtures even if the price seems too good to pass up. Fluorescent lighting is no longer considered the best option for energy efficiency, and fluorescent fixtures in a kitchen will detract from the value and design of your house. LED bulbs are more efficient, last longer, and have less negative impact on the environment. But just as important, the color of LED bulbs can enhance your design. Invest in warm white (2,800K to 3,000K) LED bulbs everywhere in the house, and include information about them in your sales pitch. It will be an investment your buyers will thank you for when their electric bills come in.

Fixtures. Potential buyers are most likely to walk through a spec home in the daylight hours, so the fixtures themselves will be what they notice first **(3)**. Light fixtures that are on trend and also provide pleasing light don't add much cost; many big box stores and online suppliers have excellent choices with good pricing. Because lighting trends are always in a state of flux, this is one area to monitor carefully, updating your selections year to year. One place to monitor the trends is a specialty-lighting store that caters to high-end clients. Often, trend-setting fixtures trickle down to larger outlets.

Flush-mount fixtures in common areas say "Builder Grade" loud and clear. Use strategically placed recessed cans on flat ceilings, specifically-designed ones on angled walls and cathedral ceilings, and pendants in entryways. Finally, install dimmers wherever there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is overhead lighting, especially in the dining room. This simple, relatively inexpensive upgrade is a value-added feature that your buyers, for as long as they live in the house, will thank you for.

5. MAKE THE KITCHEN A FOCAL POINT

The kitchen is the biggest emotional button likely to change a home browser into a home buyer. Kitchen location, size (a kitchen should occupy at least 15% to 20% of the first-floor living space), color, appliances, plumbing fixtures, and finishes should be at the top of your priority list. And keep in mind that good color costs no more than bad color.

The kitchen must be commensurate with the style of the house and the demographic of your buyers. Don't be tempted to use "builder-grade" materials for any part of the kitchen. That doesn't mean you need to spend 20% of the budget in this room; it simply means that if you skimp, this is where it will be most obvious.

Appliances. Most important in a kitchen is that the appliances are the best quality and most up-to-date relative to the price of the house **(4)**. If gas is a sought-after feature in your market, include it. Next, use finishes that are striking, on-trend, and in keeping with the style of the house.

Counter space. Another sought-after kitchen amenity is ample counter space. Currently, the trend is for large islands with flush countertops and space for seating, rather than small islands meant just for cooking. Potential buyers also look for smart work areas. While symmetry might look great, it makes for awkward cooking. Don't place a sink directly across from a cooking surface, or two people will find themselves back-to-back while working in the kitchen.

Traffic flow. Establish an easy traffic flow from the entry door to the kitchen, and provide a landing space for groceries near the refrigerator and pantry.

Lighting. Finally, pay close attention to the lighting. You've already been warned not to use fluorescent lighting in a kitchen. If your budget allows for pendants over an island, make them memorable **(5)**. The difference between a $50 fixture and a $100 fixture could mean thousands in the perceived value of the home. The same is true for hard-wired under-cabinet lighting. It can cost as little as $50 per line, so add it. Your competitors likely won't.

6. ADD IRRESISTIBLE BATHS

Bathrooms—especially the master bath—are also elements that can trigger the sale of a house. Set your priorities in this order: master bath, powder room, any other bathrooms.

Master bath. The layout for the master bath needs to allow two people to use it comfortably at the same time. A whirlpool bath is no longer a priority, while a large shower has become more important **(6)**. Re-allocate the cost of the tub to the shower stall,

increasing its size and tiling its walls all the way to the ceiling. Make the shower the focal point of the room. If the house is in a middle- to higher-price bracket, include a frameless glass shower surround to let in plenty of natural light and offer natural views of the outside.

With a spec home in a higher-price bracket, place a freestanding soaking tub near a large window that looks out at a private natural setting, to create the feeling of an intimate oasis. Windows in any bathroom should never face a window in an adjacent house. The ideal location for the master bath is on the side of the house that is the most private and offers a view from the shower. A toilet room is desirable in a higher-priced spec home and is best placed close to the bathroom door for easy access.

The master-bath vanity should have two sinks if space allows and at least one bank of drawers for storage. For the look of a more expensive house while actually saving money, install two framed mirrors—centered over the sinks with single sconces flanking them—rather than a slab mirror that extends over the entire counter **(7)**. Plumbing fixtures should be on-trend and reflect the style of the house. And the color of all finishes should coordinate with each other and harmonize with the colors in the master bedroom.

Overhead lighting and vanity lighting in the master bath should be dimmable. Quiet and efficient ventilation equipped with an automatic timer also adds perceived value to a house, at very little additional cost.

Powder room. Don't underestimate the positive effect that an attractive powder room can have on potential buyers. It might be the first room they ask to see after walking around all day looking at houses. Make sure it's not placed in or adjacent to a room where people gather. A better option is an out-of-the-way place where sound won't be transmitted and where people feel less exposed while using it. Don't be afraid to dress up the powder room with high-quality finishes, dramatic color, and a unique sink to set it apart from a standard bathroom. The room is usually small enough that the cost to create a dramatic effect is minimal **(8)**. In fact, a piece of finished reclaimed wood on brackets with a vessel sink on top makes an impressive statement for less than a vanity would cost.

A window in a powder room is a value-added feature, but remember the rules about sight lines through that window. If it is an interior room, pay close attention to ventilation. Install an exhaust fan that is quiet yet powerful enough to eliminate odors quickly. The powder room is another place where lighting can have a positive effect. If space allows, sconces are a better and often less-expensive alternative to an overhead vanity light.

7. GET SMART WITH TECHNOLOGY

We live in an increasingly connected world, and homes that include "smart" features will be perceived as being cutting-edge. But this industry changes quickly, so in three years any features


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noted here will probably be out of date. Streaming and Wi-Fi have already rendered cable TV jacks obsolete for most rooms. Instead, re-allocate those dollars to more future-forward features so that you can market yourself as a "smart-home" builder. Instead of relying on your electrical contractor, partner with a low-voltage provider to keep pace with what's coming down the pike for cheaper and more-efficient connectivity.

Charging ports. Some currently available features are simple to install and don't require a significant investment. If there is a particular space in the home where it makes sense to mount a TV on the wall, add a conduit behind the drywall for wires that connect the TV to other devices, so the homeowner won't ever see wires dangling down from the TV. Duplex outlets with USB charging ports cost less than $30 and should be placed in convenient locations around the home, such as in the kitchen, in the drop zone at the main entrance, or in an office or study.

Wireless devices. Placing routers and modems in a structured wiring box can significantly diminish signal strength and will frustrate homeowners in their daily wireless use. Instead, invest $200 or less in a good wireless access point that helps to eliminate wireless "dead spots" in the home.

Wi-Fi-enabled "smart" thermostats add a lot of tech for the dollar. For less than $600, you can equip an entire house with smart, zoned, and energy-saving temperature control. Add a keypad for the garage door or a phone-enabled digital lock system at the main access door for the homeowner. All these items immediately increase the home's value and are features your sales agent can include in the MLS listing and talk up during house tours.

BUILD YOUR REPUTATION

You've implemented many or all of the tactics outlined here, so your house will likely sell quickly, and you'll be on to the next project. Now, how do you keep new clients beating a path to your door? The answer is simple: Develop a stellar reputation as the builder of houses that remain comfortable and easy to live in long after the punch list is cleared.

Don't let up on your attention to detail, and don't balk at investing a little more in the spec houses you build. The trick is to implement these ideas boldly and strategically to make your houses stand out in your market. As your turnover improves, you will elevate your reputation to "Builder of Choice" status. Your homes can command higher prices, and your bottom line will increase.

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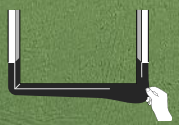
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Photo: Andrea Booher/FEMA

Building Tough

Nature's not getting any gentler—but builders are getting smarter

BY TED CUSHMAN

The main purpose of a house, it's fair to say, is to protect people from nature. We count on the exterior walls and the roof to keep us comfortable in a natural world—no matter how harsh the conditions outside.

It's a tough job in the best of times. But when nature does its worst, standing up to the elements can be a defining test of a home's performance. In any given year, we know that wind, flood, or fire will strike with fury somewhere in the nation—and that some houses won't survive.

2016 was no exception. Fires burned more than 500,000 acres in drought-stricken California last year, after hoped-for rains from a Pacific Ocean El Niño event proved lighter than promised. One blaze in Kern County destroyed 285 homes in June. In August, fires burned 48 structures in San Luis Obispo County, 189 homes in Lake County, and 105 homes in San Bernardino County.

Then the fire season moved East, and flames punished the parched hill country of Kentucky, Tennessee, Georgia, the Carolinas, and Virginia. Just after Thanksgiving, a raging forest fire damaged or destroyed more than 700 buildings in the Tennessee towns of Gatlinburg and Pigeon Forge. By December, fire had scorched more than 155,000 acres in the South.

In North Carolina, the fall wildfires were the state's second bout with disaster: Flooding associated with Hurricane Matthew inundated parts of the state in early October, when 7 inches fell in a single hour in some locations. Thousands were made homeless as the floods damaged or destroyed houses and washed out roads.

Flooding, unrelated to hurricanes, had already plagued other parts of the South earlier in 2016: Hundreds of homes in Houston were flooded in April, and major floods hit Oklahoma and Texas again at the end of May, damaging more dwellings. But those spring

floods paled in significance next to the disaster that befell Louisiana in August, when a stalled weather system brought more than 2 feet of rain to the state. More than 140,000 homes were damaged by the ensuing floods—and only a small fraction of those dwellings were covered by flood insurance. With damage to private and public property pegged at more than $15 billion, Gov. John Bel Edwards asked Congress for $4 billion worth of help.

Flooding can be made even worse with hurricane-level winds, and the U.S. has been fortunate that a major hurricane hasn't made landfall since October 2005, when Hurricane Wilma struck southeast Florida. Hurricane Matthew in late 2016 threatened to break that streak: As the storm approached last fall, governors warned of a dangerous storm. But Florida dodged a bullet: Matthew's top winds missed the state with a few miles to spare, and the storm touched South Carolina only briefly, as a Category 1 storm, before curving back out to sea. Wind damage was significant but far less severe than would have been the case had the storm tracked 10 or 20 miles inland up the Florida peninsula.

2016 was still a year of hard lessons. Matthew's near miss was a reminder that only good luck stands between U.S. coastal communities and a killer hurricane. Spring's and summer's deadly floods made it clear that rain is a risk in any low-lying location. And the fall wildfires in the Smoky Mountains were a wake-up call that fire isn't just a Western problem.

Here's the good news: Builders are learning. Every year, we get better at resilient construction. And when it comes to these three major hazards—wind, flood, and fire—a homeowner may be far better off in a new home than in an existing older one. New high-performance materials and components and improved construction methods offer much greater resistance to the forces of natural disasters. Builders who adopt the best technology can help the housing stock of the future stand up far better to nature's fury—and by so doing, can help protect their clients, as well .

This month kicks off *JLC*'s new "Climate and Construction" coverage category. In the coming year, stay tuned for a continuing series of technical reports about best-practice disaster-resistant and resilient construction methods.

WIND

No place in this nation is free from wind. Atlantic and Gulf Coast locations are exposed to hurricane winds, Tornado Alley in the South and the Midwest sees tornado risk, and any region can see dangerous straight-line winds from thunderstorms. Codes across the country vary from place to place, in response to the estimated odds of encountering these various degrees of wind hazard.

South Florida is the heart of hurricane country and the place where many wind-resistant structural solutions have been introduced, developed, and proven in the field. After Hurricane Andrew landed in 1992, Florida codes were the first in the nation to toughen up. And in the heavy hurricane years of 2004 and 2005, Florida's tougher building practices paid off: Newer homes in the state

Photos: Ted Cushman (top) and Twister Safe (bottom)

Saving lives. A family sheltered in the basement of this shattered building during the 2011 Joplin, Mo., tornado (left). Another Joplin resident survived in a "Twister Safe" shelter (below left).

In theory, you could build a house to withstand an EF-5 tornado's 300-mph winds; but it wouldn't really be a house. It would be a bomb shelter.

suffered noticeably less damage from storm winds than older houses did.

A few basic structural upgrades account for the improved performance: a continuous load path to resist wind uplift; strong lateral bracing (or engineered shear walls) to resist the sideways pressure of wind; hardened or protected windows and doors to resist penetration by wind-borne debris; and improved watertight and water-shedding details to resist rain penetration in storms.

As technologies have improved and spread through the market, these methods have become more cost-effective to implement. Then as modern methods are studied and publicized, proven techniques are becoming easier to learn.

Hurricanes. In regions at risk of hurricanes, these practices can make the difference between a house that works and one that fails:

At the foundation stage, place anchors in the concrete footing, stem wall, or basement wall to hold the wood-framed or masonry first story to the foundation.

Next, at the framing stage, design and build walls to resist both uplift and shear forces by using structural panel sheathing and closely spaced nailing. Metal straps nailed to framing members are used to connect upper and lower stories. To complete the continuous load path, metal connectors are also specified to tie roof framing to walls and, in stick-framed roofs, to connect opposing rafters together across the ridge.

Finally, at the roofing and siding stage, rain resistance is upgraded using advanced weatherproof tapes or fluid-applied sealant at sheathing or housewrap joints (a method that also improves house airtightness).

Applying weatherproof tape at the sheathing joints on the roof is a quick, simple step that can significantly boost a home's resilience in a hurricane: If wind blows away the shingle roof and underlayment, the taped sheathing will still keep most rainwater out of the attic, preventing the home's insulation and ceiling from becoming saturated (which can cause a collapse of the interior ceiling drywall). In extreme situations, this step could actually save the whole house: Sometimes, the bracing effect of gypsum board on a house ceiling can be an important structural factor in the building's resistance to wind pressure on the walls, and preventing roof leaks can keep that moisture-sensitive material intact. Depending on the situation, keeping the ceiling stiff could be key to preventing collapse.

And keeping the rain out does more than protect the structure

itself. If a house stands up, but the attic is saturated and the ceilings fail, the home becomes unlivable. That's also true if windows are blown out and the interior floors and furniture are soaked by wind-blown rain. Major repairs can be avoided—and the family can return to their home after the storm—if the house stays dry.

Tornadoes. In tornado country, the rules are a little different. Tornado winds can be much more severe than the worst wind any hurricane can dish out. An "EF-5" tornado (measured on the 0-to-5 Enhanced Fujita Scale) packs winds of 261 mph to 318 mph—about double the wind speed of a top-end Category 5 hurricane and more than twice as destructive.

Winds like that can't practically be measured in the field; instead, scientists classify tornadoes by assessing the damage after the storm has passed. The official verbal description of an EF-5 tornado is "incredible damage." You have to get down to EF-2 on the scale before you see winds as low as hurricane force (113 mph to 157 mph); in that case, the tornado's effects are termed "considerable damage." In theory, you could build a house to withstand an EF-5 tornado's 300-mph winds, but it wouldn't really be a house. It would be a bomb shelter.

Still, there's good news. Most tornadoes aren't EF-5 storms; 90% or 95% of them are weaker than EF-3, and three quarters are EF-0, EF-1, or EF-2. The same qualities that a house needs in hurricane country can also stand up to most tornadoes. And while those methods and materials are not typically required in tornado country—because a tornado is such an unlikely event—they're not necessarily prohibitively expensive.

For a production builder who's shaving costs on every house, the bottom-line focus may not accommodate hurricane-resistant construction for an inland house. But for custom builders, the budget might stretch to pay for the few details and design changes it would take to make a house tough enough to withstand a weak tornado or a near miss by a strong one. Either way, you'll want to be careful how you market the upgrade. Given the severity of a tornado, it's not something to make part of your warranty.

FLOOD

In the U.S., there's one provider of flood insurance for homes—the National Flood Insurance Program (NFIP) administered by the Federal Emergency Management Agency (FEMA) and the U.S. Army Corps of Engineers (USACE). Just one flood insurance program for the whole country—but the country has more than one kind of flood. As with wind, there's the coastal version (hurricane storm surge flooding), and there's the inland version (rising water from rain). Their physical causes are very different and, to some extent, so are their damaging effects.

Having one flood insurance program for two very different types of natural disaster weather events complicates the risk calculation in the flood insurance program and contributes to the many problems that the NFIP faces. But that's outside our topic here. More to the point, there are measures that builders can take to manage the risk of flood when they build a house—and the ones a builder chooses to implement should reflect the type of flood event the building could face.

Whether the concern is coastal surge or a rainstorm, elevation is the key to avoiding the risk of flood.

One smart move, obviously, would be to build the house someplace where there won't be a flood. But that's not as easy as it sounds. FEMA provides floodplain maps, created by the USACE, that define the boundaries of what's called the "hundred-year flood plain." The term is a little misleading: A house in a 100-year flood plain might easily flood more than once every 100 years. More accurately, the flood plain is defined as the location where the risk of flood in any given year is at least 1%.

But that "at least" hides a lot of variability. Some places in the flood plain are likely to flood more often. And the boundaries of the flood plain are based on complicated assessments that involve many uncertainties. Suppose your house is outside the flood plain but only a short distance away from the line and a few inches above it? How much safer are you than your neighbor, really? It's an impossible question to answer.

The flood map suggests discrete zones, but flood risk is a moving target. Natural changes in rivers and bottom lands, development upstream, soil subsidence, erosion, and other factors all can upset the odds. So even if you're not officially inside the flood plain, that doesn't mean you shouldn't build as if you were.

In practice, whether you're concerned about storm surge or rising water from rain, elevation of a home is the root strategy for avoiding risk. The higher you build a home's occupied space, the less likely it is to flood. And the way you elevate varies, depending on the type of flood you expect.

Elevation works. Above, a concrete house on pilings survives amid bare slabs in Pass Christian, Miss., after Hurricane Katrina. Right, "Fortified" wood houses on pilings stand alone on the beach in Gilchrist, Texas, after Hurricane Ike.

Photos: Marty Bahamonde/FEMA (top); Patsy Lynch/FEMA (bottom)

In the coastal velocity zone ("V zone"), where hurricane storm surge is the risk and wave action is the driving force, you need an "open foundation" on pilings, which allows waves to pass harmlessly below the home's occupied space. Waves pack an enormous punch—measured in thousands of pounds per square foot compared with tens of pounds per square foot for wind. Because water is so much more massive than air, a 2-foot or 3-foot wave is far more destructive than any hurricane wind pushing against a structure. That's why a 30-foot surge with high battering waves, like Hurricane Katrina brought in 2005, was able to scrape entire shorelines clean of buildings, including a total of 7,500 homes around Pass Christian, Miss.

River lowlands, where waves aren't expected, are in the "A zone." There, a foundation doesn't have to be open; an enclosed concrete or block foundation is OK, as long as it has flood vents to let water in and out, equalizing pressure on the foundation wall.

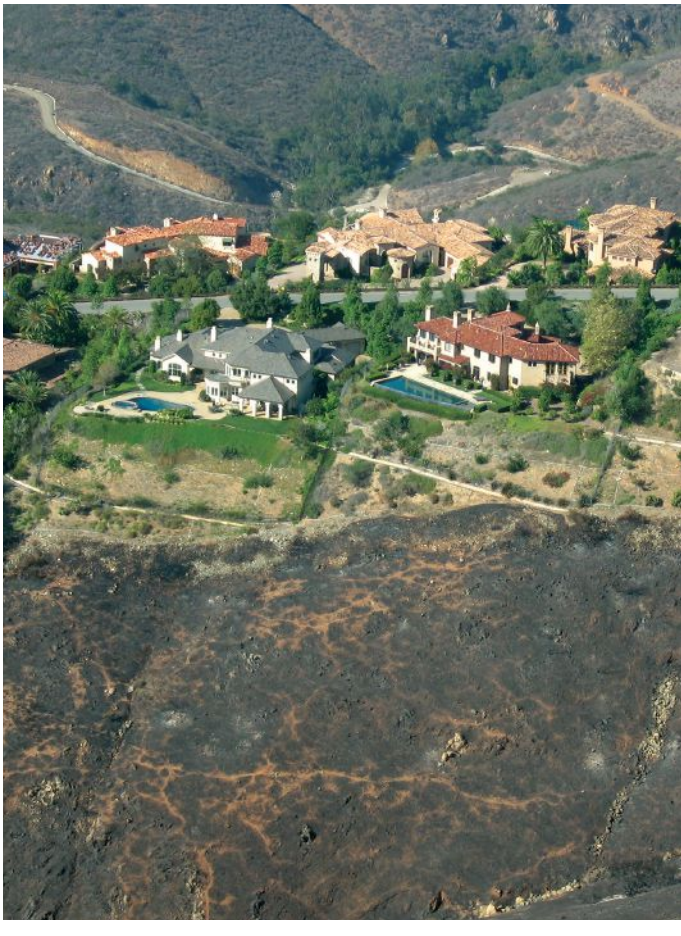
In either kind of flood plain, official maps will supply a "base flood elevation," or BFE. That's the elevation that the 100-year flood is predicted to reach, if it happens. Depending on your local code, you may have to build above the BFE level by a foot, 2 feet, or even 3 feet—a safety factor known as "freeboard." If the property has to carry NFIP coverage (which typically is required only if the house is mortgaged), freeboard can reduce the insurance premiums. The opposite, of course, is also true—homes that are below the BFE get smacked with steeper premiums.

In Louisiana's historic August floods, barely 21% of flooded homes were insured against flood. Some homes weren't mortgaged, so insurance wasn't required. But many were outside the official flood plain—proof, if any were needed, that no line on the map can guarantee safety in the real world.

Elevating houses is expensive and is hard to justify if the flood risk is uncertain. For low-lying inland locations, where destructive ocean waves aren't the big risk, there's another option—called "wet floodproofing." The idea is to design and build the lowest parts of the structure to be drainable and dryable, so they can withstand an occasional soaking. Usually, wet floodproofing doesn't meet code for construction within the official flood plain. But for homes near the flood plain, it can be a wise precaution. And for homes that have already been flooded, it may be the most sensible way to repair them.

Wet floodproofing involves constructing the lower parts of a first-floor wall using water-tolerant materials, so that if the wall is soaked by a foot or two of water, it can be quickly drained, dried, and repaired before damaging mold can get a foothold. Well-known building scientist Joseph Lstiburek and his colleagues at Building Science Corp. developed guidance for water-tolerant wall assemblies suitable for Louisiana and Mississippi following the disaster caused by Hurricane Katrina. The Louisiana State University extension program has also issued wet floodproofing guidance, which has found its way into FEMA construction manuals as well.

In brief, the idea is to frame and sheathe, if possible, with treated wood (already required in some Southern jurisdictions because



Keeping fire at bay. Fire spread from house to house after entering the California neighborhood above. But the development at left, designed with resilient landscaping and construction features, survived a similar type of fire with no homes lost.

Photos: U.S. Navy/Michael J. Pusnik, Jr. (top); Rancho Santa Fe Fire Protection District (bottom)

of termites) and insulate with waterproof exterior foam instead of cavity fiber insulation. Then on the lower portion of the wall, use cement board or an equivalent water-tolerant material instead of drywall. In the event of a flood, the baseboard and a strip of wallboard can be removed at the base of the wall, the water can drain out, and fans can quickly dry the open wall cavity. After that, only the base of the wall will need repair. (Wiring, by the way, is run high up on the wall, and outlets are located feet up instead of at the usual 16-inch height.)

FIRE

The risk of wildfire waxes and wanes with the weather. Prolonged droughts create extreme risks, and in recent years, Alaska and western Canada have seen unprecedented incidence of major wildland fire. This past fall's catastrophic Smoky Mountain wildfires followed many months of deep drought in the Southeast, and winter rainfall was a welcome relief for the region.

But human activity is a complementary risk factor. As residential development pushes deeper and deeper into formerly wild areas, more and more homes are placed in locations where wildfire is a common natural occurrence, though one that, just like the cold, the snow, and the rain, we humans would prefer not to experience.

Preventing or extinguishing major wildfires isn't something builders can do. That requires a major community effort, involving governments at all levels. But wildfire's danger to homes can be controlled, or at least limited, house by house and neighborhood by neighborhood—and here, builders have an important role. The design and construction of developments and homes can make the difference between survival and destruction.

The basic principles of wildfire resilience are built into several flavors of Wildland Urban Interface (WUI) code. The National Fire Protection Association (NFPA) and the International Code Council (ICC) each publish a model WUI code, which states and localities can adopt. The state of California, where the risk is extreme, has its own WUI code and has led the nation in the application of the code to neighborhoods and homes.

All the codes take the same fundamental approach. Fire protection starts with the landscape, and the mantra "lean, clean, and green" applies: Vegetation should be kept away from the house and be kept trimmed, pruned, and watered.

Then there's the house itself: There are ways to harden homes against being ignited by wildfires. Research has shown that the most intense phase of a high-intensity wildfire, the "crown fire," passes through an area in a matter of just a few minutes. Keeping the surrounding area well-groomed will prevent the intense fires from approaching the house. The crown fire itself applies intense radiant heat to a house, but only briefly, as it passes through. So if a house exterior can resist a few minutes of intense heat, it won't catch fire. The state of California maintains a database that includes products that have been tested for ignition resistance, as well as fire-resistive assemblies.

But the heat of a crown fire isn't the only risk. Windblown embers, which can travel for a mile or more on a windy day, are a major source of ignition. They pile against the house, land on roofs, or blow into the home through open windows. So fire resistance on the lower edge of the house is key; fire-rated roofing is vital; and windows that won't shatter from heat during the brief high-intensity crown-fire exposure can be a home-saver.

Ironically, other houses, not the dry wildland, can be the biggest source of fuel for an out-of-control wildfire. In an ordinary house fire, firefighters can concentrate on putting out one house so it won't ignite its neighbors. But once embers blow into a development and set several homes on fire—while the woods nearby are also burning—firefighting resources can be overwhelmed. Houses on fire send large volumes of hot embers up into the wind, which carries them into the surrounding wildlands and onto nearby homes. That's why fire resistance is a community concern. Carefully detailing every house to resist ignition is the key to preserving a whole community from a runaway wildfire.

Ted Cushman is a senior editor at JLC.

Framing Skills
A Test for Gauging Basic Knowledge

When it comes to acquiring skills in the building trades, there is no substitute for jobsite experience. An exam, at best, serves as a complement to on-site training. Certainly, no written test can adequately gauge a person's ability to perform physical tasks. Nor can it assess how well a worker will fit in with a crew, pick up efficient work practices or stay mindful at all times of safety hazards, all of which are essential jobsite skills. But the outcome of this exam can give contractors an idea of a worker's knowledge of certain building fundamentals.

This exam is designed to assess workers with a range of skills, from basic to moderately knowledgeable and is intended to bring attention to key issues, regardless of a worker's skill level. Getting a perfect score is not necessarily the goal for every employee, and even "failing" an exam can advance an employee's understanding if the employer keeps an open mind and uses the outcome as an opportunity to focus on job training.

This exam—the first in a series of skills competency exams for the *JLC* audience—can be copied and administered to current employees and prospective hires. A pencil to circle the correct answer and scrap paper or a calculator for solving a few math problems are the only tools needed when taking this test. Answers are shown on page 49. For listing of resources related to this exam, visit JLConline.com.

LUMBER PACKAGE

1. _____ boards are more likely to cup than _____ boards?
a. Long, short
b. Wide, narrow
c. Short, long
d. Narrow, wide

2. "_____" is a term used to describe bark (or missing wood at a corner where bark used to be) on the edge of a board.
a. Shake *b. Crook*
c. Shelling *d. Wane*

3. True or False: "Construction Grade" lumber is considered "better" than "Standard Grade" and "Utility Grade" lumber? *True / False*

4. The easiest and most accurate way to check if a stick of lumber is bowed or twisted is to _____.
a. pull a string along one corner
b. sight down the edge of the board
c. use a framing square
d. check the grade stamp

5. When breaking down a lumber package, it's good practice to _____.
a. cull out all unsuitable boards, including those with extreme bows, twists,crooks, end checks, splits, and wane
b. stack materials off the ground on stickers spaced 4 feet apart
c. check the delivery against the ticket to confirm that all the material that was ordered got delivered
d. all of the above

FLOOR FRAMING

6. When installing joist hangers, _____.
a. use a nail in every hole
b. use every other nail hole, avoiding knots and end checks where possible
c. use at least six nails per joist; too many nails will damage the joist ends
d. it is not necessary to nail into the joists; only nail-off the flanges on the rim joist

7. True or False: A floor framed with continuous 30-foot I-joists crossing a midspan girder is stiffer than a floor framed with 15-foot I joists that break at the girder. *True / False*

8. If you're using a rim joist cut from solid lumber with wood I-joists, the rim joist must be _____.
a. no more than 1 inch taller than the I-joists
b. no less than 1/2 inch shorter than the I-joists
c. the same depth as the I-joists
d. none of the above. Dimensional lumber should never be mixed with I-joists.

9. The nominal size of a 2x10 measures _____ inches deep
a. 10 *b. 9-1/2*
c. 9-1/4 *d. 9*

10. _____ along a girder is required to support the load from a bearing wall above the girder.
a. An extra I-joist
b. Full-depth blocking between joists
c. Diagonal bridging every 4 feet on-center
d. Web backing on I-joists

11. When framing a cantilever with wood I-joists, _____ must be added where the joists cross the exterior wall (the shear point).
a. an extra I-joist
b. full-depth blocking between joists
c. diagonal bridging every 4 feet on-center
d. web backing

12. True or False: When using dimensional lumber for joists, make sure the crown is down to avoid creating a hump in the floor?
True / False

13. When you're installing floor sheathing, the long side of plywood and OSB panels should run _____ to the floor joists.
a. parallel
b. perpendicular
c. doesn't matter

14. When installing the first sheet of T&G floor sheathing, place the first sheet on the corner of the framed deck with the _____ along the rim joist (facing the outside of the building).
a. tongue b. groove
c. doesn't matter, as long as you are consistent with the way you install the rest of the sheets.

15. When you're installing a plywood or OSB subfloor, the space between panels should be_____.
a. 1/16 inch on all sides
b. 1/8 inch on the 4-foot edges and lightly butted on the T&G edges
c. the width of a 16d nail head at the 4-foot edges, tight on the T&G edges
d. zero. Panels should be as tight as possible to eliminate floor squeaks.

WALL FRAMING

16. The nominal size of a 2x6 measures _____.
a. 1-1/4 in. x 5-1/4 in.
b. 1-1/4 in. x 5-1/4 in.
c. 1-1/2 in. x 5-1/2 in.
d. 1-1/2 in. x 5-3/4 in.

17. Precut studs for a 10-foot-tall wall typically measure out at _____.
a. 121-1/2 inches
b. 120 inches
c. 116-5/8 inches
d. 115-3/8 inches

18. In a window or door opening, the full-height framing members that make up the rough opening are called _____.
a. Aces
b. Kings
c. Queens
d. Jacks

19. In a window or door opening, the framing members in the rough opening that extend from the bottom plate to the header are called _____.
a. Aces
b. Kings
c. Queens
d. Jacks

20. True or False: Exterior load-bearing walls have double top plates, which are needed for increased strength, but interior partition walls typically have only a single top plate? *True / False*

21. Which nails should be used for toenailing studs to top and bottom plates?
a. Two 16d commons (3 in. x .128 in.)
b. Two 10d commons (3 in. x .148 in.)
c. Two 8d commons (2-1/2 in. x .131 in.)
d. Three 8d box nails (2-1/2 in. x .113 in.)

22. Which nails should be used for nailing through the top and bottom plates into studs (end nailing)?
a. Two 16d commons (3 in. x .128 in.)
b. Two 10d commons (3 in. x .148 in.)
c. Two 8d commons (2-1/2 in. x .131 in.)
d. Three 8d box nails (2-1/2 in. x .113 in.)

23. Which nails should be used for nailing together double top plates?
a. 16d commons (3-1/2 in. x .148 in.)
b. 10d box nails (3 in. x .128 in.)
c. 8d commons (2-1/2 in. x .131 in.)
d. 8d box nails (2-1/2 in. x .113 in.)

24. For a 9-foot wall, precut studs are typically _____ long.
a. 108 inches
b. 106-1/2 inches
c. 105 inches
d. 104-5/8 inches

ROOF FRAMING

25. What type of cut butts the ridge at the end of a common rafter?
a. Plumb cut
b. Seat cut
c. Birdsmouth
d. Bevel cut

26. Which nails must be used to secure rafters or roof trusses to wall plates?
a. Two 16d commons (3-1/2 in. x .148 in.)
b. Two 10d commons (3 in. x .148 in.) or two 16d box nails (3-1/2 in x .135 in.)
c. Three 16d box nails (3-1/2 in. x .135 in.) or three 10d commons (3in. x .148 in.)
d. Three 16d commons (3-1/2 x .148)

27. When you're installing trusses on a 24-in. o.c. layout, the first truss (after the gable-end truss) should be placed _____ from the gable end.
a. 12 inches
b. 22-1/2 inches
c. 24 inches
d. 48 inches

Figure 1. Rafter Framing

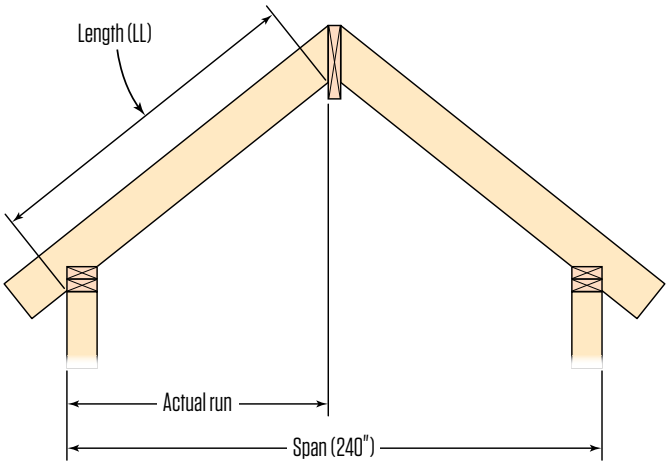
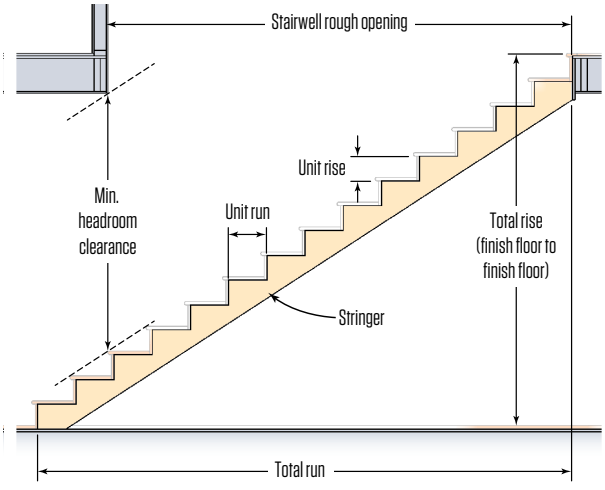


Figure 2. Stair Layout



28. True or False: When nailing trusses to the wall plate, never nail through a truss plate?
True / False

29. In Figure 1 (above) the ridge board is a 2x and the building span is 240 inches. What is the actual run of the common rafters?
a. *118 inches*
b. *119-1/4 inches*
c. *120 inches*
d. *123-1/2 inches*

30. If the roof in Figure 1 (above) was framed at a 6:12 pitch, what is the line length (LL) of the common rafter?
a. *120 inches*
b. *131-7/8 inches*
c. *133-3/8 inches*
d. *143-3/8 inches*

STAIR FRAMING

In Figure 2 (above):
- Wall studs are 8-foot precuts
- First- and second-floor joists are 9.5-in. I-joists
- Second-floor subfloor is 23/32-inch T&G plywood or premium OSB
- First-floor subfloor is 1-1/8-inch T&G plywood or premium OSB
- Finish flooring on the first floor is tile over a cementitious backerboard (total thickness = 1-inch, including 3/8-inch tile, tile mastic, 1/2-inch backerboard and adhesive)
- Finish flooring material on second floor is hardwood strip flooring (3/4-inch-thick)

31. Working from Figure 2, what "Total rise" would you expect?
a. *107-1/8 inches*
b. *108-1/4 inches*
c. *112 inches*
d. *119-1/8 inches*

32. In Figure 2, what is the unit rise?
a. *6-3/4 inches*
b. *7-1/8 inches*
c. *7-1/2 inches*
d. *7-3/4 inches*

33. What is the minimum headroom at any point along a stair?
a. *6 feet*
b. *6 feet 6 inches*
c. *6 feet 8 inches*
d. *7 feet*

Illustrations by Tim Healey

ANSWERS

LUMBER PACKAGE

1) b. Wide boards are more likely to cup than narrow boards.
2) d. Bark along the edge of a board, or a missing edge where bark used to be, is called "wane."
3) True. Typical lumber grades used for framing include: "#1 Structural" = at least 75% clear wood; "#2 Structural" = at least 66% clear wood; "#3 Structural" ("stud" grade) = at least 50% clear wood; "Construction Grade" = at least 57% clear wood; "Standard Grade" = at least 43% clear wood; "Utility Grade" = at least 29% clear wood
4) b. The easiest and most accurate way to check if a stick of lumber is bowed or twisted is to sight down the edge of the board.
5) d. All of the above. Breaking down a lumber package is more than just sorting the lumber and stacking it piles off the ground in locations near where it will be used. It also involves culling out lumber with gross defects and checking as you go against the ticket to confirm that all the material that was ordered got delivered.

FLOOR FRAMING

6) a. Every nail hole in a joist hanger must be filled with a fastener of the appropriate length and diameter, as specified by the hanger manufacturer.
7) True. The break at the girder acts like a hinge and can move.
8) d. Dimensional lumber should never be mixed with wood I-joists.
9) c. A 2x10 nominally measures 1-1/2 inches x 9-1/4 inches.
10) b. Where a bearing wall is framed above a girder, full-depth blocking between joists is needed over the girder to transfer the wall load onto the beam.
11) d. Web backing must be added to I-joists at the shear point of a cantilevered floor.
12) False. The crown of a joist should always face up.
13) b. In a framed floor, plywood and OSB panels are installed with the long side perpendicular to the joists.
14) a. When installing T&G plywood or OSB floor decking, the first sheet on the corner gets installed with the tongue facing the rim joist. This allows you to insert the tongue of the next adjacent sheet into a fixed groove, and use a block on the grooved side of that sheet to persuade the sheet into place.
15) b. Install 4x8 plywood and OSB floor panels with a 1/8-inch gap (the width of a 10d nail shaft) between the ends. This will help eliminate swelling between joints if the deck gets wet. T&G joints should be snug but not super tight.

WALL FRAMING

16) c. A 2x6 nominally measures 1-1/2 in. x 5-1/2 in.
17) c. Precuts for a 10-foot wall measure out at 116-5/8 inches.
18) b. King studs are the full-height framing members at the edge of a window or door rough opening.
19) d. Jack studs extend from floor plate to support the header.
20) False. Typically, both interior partitions and exterior walls have double top plates. This allows you to overlap plates and stagger joints between the plates to help strengthen the wall.
21) a. and d. To meet the requirements of the 2009 and 2012 International Residential Codes (IRC), three 8d box nails (2-1/2 in. x .113 in.) or two 16d nails (3-1/2 in. x .135 in.) are required to toenail each stud to the wall plates.
22) a. When framing walls to stand up (that is, nailing through the top and bottom plates into the ends of the studs), two 16d nails are required at each end of each stud.
23) b. The IRC fastener schedule requires 10d box nails (3 in. x .128 in.) for nailing wall plates together.
24) d. Precuts for a 109-foot wall measure out at 104-5/8 inches.

ROOF FRAMING

25) a. At the top of a common rafter, a plumb cut butts the ridge.
26) c. Three 16d box nails (3-1/2 in. x .135in.) or three 10d commons (3in. x .148 in.) are required to secure each roof truss to the top plates of framed walls.
27) b. The first truss should be placed 22-1/2 in. from the gable-end truss so the roof sheathing breaks on the middle of the next truss.
28) False. Often it's necessary to nail through the truss plate when securing trusses to walls.
29) b. The actual run for the roof illustrated is 119-1/4 inches. The formula is: Span minus Ridge Thickness divided by 2, or (240 – 1-1/2) / 2.
30) c. The line length for this rafter is 133-3/8 inches. You can solve this easily with a construction calculator or by multiplying the line length ratio for a 6:12 roof (1.118) by the actual run (119-1/4 inches).

FRAMING STAIRS

31) a. The total rise is 107-1/8 inches. To calculate this You need to add the height of wall framing (1-1/2 in. + 92-5/8 in. + 3 in.) to the depth of floor framing (9.5 in + 3/4 in.) and the finish floor thickness on the second floor (3/4 in.). Then subtract the thickness of the finish floor on the first floor (1 in.), since the stair stringers sit on the subfloor.
32) b. Unit Rise = Total Rise ÷ Number of Risers, or 107-1/8 inches – 15 = 7.142 (rounded to 7-1/8 in.)
33) The answer depends on the local code. Under the 2012 IRC, the minimum allowed headroom along all parts of the stairs is 6 feet 8 inches. In some jurisdictions, operating under earlier versions of the IRC, 6 feet 6 inches may be correct.

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2016 Index

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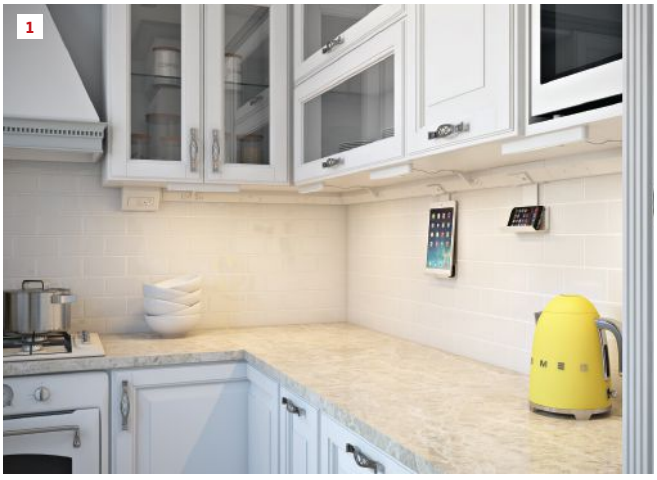

1. A Discreet, Modular Lighting System

The adorne Under-Cabinet Lighting & Power system from Legrand combines the aesthetic value of subtle lighting with the growing consumer demand for more technology. The modular track features an LED lighting strip with power outlets, USB ports, a Bluetooth music system, and mobile charging cradles that can be customized in a variety of configurations and updated at any time. The system can be installed with in-wall wiring or be plugged into an existing outlet. Pricing starts at $80 to $100 per linear foot. legrand.us/adorne

2. The Power of Commercial Technology at Home

LG Electronics has introduced the first single-phase variable refrigerant flow 5-ton heat recovery unit for residential applications. The Multi V S system includes 2-ton heat-pump and 5-ton heat-recovery models for simultaneous heating and cooling at a more energy efficient rate. The 5-ton system closely matches compressor speed with demand and can control individual room temperatures for up to 12 zones. Price varies by dealer. lghvac.com

3. Decorative Outdoor Hardware

Simpson Strong-Tie's new Outdoor Accents line of decorative hardware includes connectors and fasteners for outdoor structures. Made of galvanized steel with a black powder-coat finish for corrosion protection, the connectors are load rated for 4-by and 6-by lumber sizes. The line features an innovative hex-head washer that is used with a wood screw and requires no predrilling for an easier and faster installation compared with through-bolting. Pricing varies from $1.70 for small angles to up to $38 for large post bases. strongtie.com/outdooraccents

4. Perfect Drywall Corners

CertainTeed's Levelline Outside 90 laminated drywall corner beads are an alternative to traditional metal and paper-metal drywall corners. The laminated corners are less than half the weight of traditional beads, don't have sharp edges, and won't rust, and they deliver clean lines without ridges. According to the maker, the material's high bond can withstand shifting caused by drying or settling lumber, humidity, and temperature differences. Levelline corners come in 8-, 9-, and 10-foot lengths. Check with dealer for pricing. certainteed.com

5. A Strong Tension Tie for Decking

MiTek's new Adjustable Deck Tension Tie makes decks safer by resisting the lateral and horizontal loads that pull a deck away from the house or structure. The tension tie, which is made of 14-gauge steel, can be installed with a USP WS8-HDG or 3/8-inch HDG lag screw adjacent to or up to 4 3/8 inches below a deck joist in either a "full extension installation" or a "flush installation" configuration, avoiding the need for blocking. One deck tension tie costs $5.35 online. www.mitek-us.com

5

6. Increased Hand Tool Comfort

DeWalt aims to reduce muscle fatigue with the introduction of its DWHT75900 Carbon Fiber Composite Hammer Tacker. Prolonged exposure to vibrations on the jobsite can cause discomfort, and traditional tackers are often made of die-cast aluminum, which is bulky, heavy, and tiring to use. DeWalt's carbon fiber composite material weighs 45% less than other industry-leading hammer tackers and reduces vibration levels by 45% and muscle effort by 25%, allowing users to work longer. It drives 5/16-, 3/8-, and 1/2-inch heavy-duty staples. Online price is about $40. dewalt.com

6

7. High-Performance Garage Doors

The new Ambient line of Safe-Way Steel Garage Doors are insulated with a high-density, 2-inch polyurethane foam core, which has an R-value of 17.68 for increased thermal performance. The outer layer of galvanized steel combined with the insulated core creates a durable, sound-resistant, and dent-resistant material, says the company. The doors are available in seven color and two wood-grain options and six panel styles, and they can be customized with a variety of window configurations. Pricing varies. safewaydoor.com

7

8. Thermal Insulation With Spray Foam

Knauf Insulation's new JetSpray Thermal Insulation System is a spray-on glass mineral wool that fills any net-less, side-wall cavity for acoustic and thermal insulation. The foam installs easily around wiring and other obstructions; provides R-values of R-15 when installed in a 2x4 wall cavity and R-23 in a 2x6 cavity; and reduces sound transmission up to 5 STC points. The spray's glass fibers are mold-resistant and do not support microbial growth, says the company. JetSpray typically dries within 24 hours, so drywall can be installed the next day. Check with installer for pricing. jetspray.knaufinsulation.us

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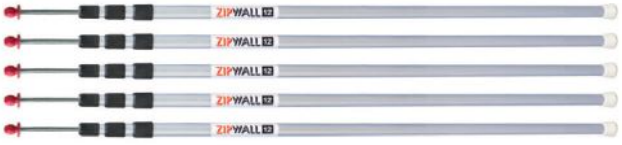

12

9. A More Accurate Laser Level

The GLL 100 G self-leveling cross-line laser is the first green laser level from Bosch. Green light lasers are up to four times brighter than traditional red beams, according to the company, so they provide more visibility in bright ambient light conditions. Green lasers are optimal for jobs requiring a greater distance—the laser on this tool is visible up to 100 feet. The cross-line laser includes conventional vertical, horizontal, and cross-line modes, which can be used independently or together. The laser can be purchased for $270. bosch.com

10. Seamless Flush Baseboards

Builders can create flush baseboards for drywall abutting wood or other materials with the Architectural L Bead from Trim-Tex. The L bead is installed by applying an adhesive coating to the bead, attaching it to drywall, and then stapling every 4 to 6 inches with 1/2-inch staples before installing the baseboard. The clean, sharp lines add a modern element to spaces while minimizing the maintenance costs that often arise from debris settling on traditional baseboards. Pricing ranges from $0.14-$0.18 per foot. trim-tex.com

11. A Quick Pop-Up Dust Barrier

ZipWall's Dust Barrier Toolkit allows contractors to create a 16-foot-wide, sealed dust barrier in minutes. The kit is easily set up on site, requires no ladders or tape, works with all ceiling types, and doesn't damage walls and ceilings. Each toolkit includes five ZipWall 12-foot spring-loaded poles, six FoamRail Span adjustable tapeless seals, one FoamRail tapeless seal 2-pack, four wall mounts, five heads and non-skid plates, five GripDisk non-slip pads, two floor adapters, one ZipWall heavy-duty zipper 2-pack, one ZipDoor standard door kit, two Edge heads and non-skid plates, one ZipFast reusable barrier panel multi-pack, and carry bags. The kit costs about $1,300. zipwall.com

12. Advanced Kitchen Ventilation

Broan's new under-cabinet range hoods feature an advanced three-speed blower/wheel design with a centric inlet to remove smoke and odors faster, the firm says. A "Heat Sentry" feature detects excessive heat and adjusts the blower speed to provide proper ventilation and prolong the life of the unit. The vents are available in two styles, Glacier and Spire, in a variety of widths and colors. The range hood will range in price from $140 to $600. broan-nutone.com

January Advertising Index

BY TIM UHLER

Festool Reinvents the Circular Saw

I am a framer, concrete former, and sider by trade, but since I was a little kid watching the New Yankee Workshop, I've always dreamed of being a finish carpenter. For whatever reason, finish carpentry didn't become my vocation. Maybe it's out of nostalgia for my childhood, but for the last few years, I've read a lot of reviews and forum posts about Festool products that were geared towards finish work. Most of the technical info goes over my head because working outside and to rougher tolerances, I don't need these products. I especially don't have much use for the dust collection for which Festool has become well-known.

A few months ago, *JLC*'s sister magazine *Tools of the Trade* asked me to review the new (to the U.S.) Festool HKC 55 cordless circular saw and crosscut guide. I agreed to do it, without really understanding what this saw was or how I might find a use for a Festool product.

THE SAW

This saw is cordless with a brushless motor that spins a 6 1/4-inch blade and is available as a bare tool ($375) and in two kits. Both kits come with two 5.2-Ah Li-ion batteries, an 18-tooth blade, and a SYS 4 Systainer and charger; one kit comes with the rail ($690) and one without ($570). The kits are also available as a corded saw (HK 55), which has all of the same features as the HKC except that it is also equipped with a speed adjustment knob. With more control over the motor, you have more options for cutting various materials like metal, PVC, or laminates; material-specific blades are available as well. I used an 18-tooth framing blade.

This is a blade-left saw that bevels up to 50 degrees. The depth adjustment differs depending on whether you're using it with the track or without and is very accurate with clear markings. The tool can also be turned into a plunge saw and used with other Festool guide rails. The dust port, which can be hooked to either a bag or a vacuum, features a new design that works with a new locking hose and fits on all Festool dust extractor connections.

FSK GUIDE RAILS

The FSK guide rails are different from the FS rails for Festool's TS track saws that you may be familiar with. They hook to the saw to become a unit, and they are self-retracting. Even better, they can be

set to an angle up to 60 degrees, making it easy to achieve shop-quality repetitive miters. These rails come in three lengths: 9.84 inches (FSK 250), 16.53 inches (FSK 420), and 26.38 inches (FSK 670). All guide rails include an integral splinter guard.

On the underside of the guide rail are a plastic pivot and an adjustable "stop" (see photo, bottom right). You simply put the track on the piece of lumber and rotate the saw and rail until both the pivot and stop are up against the material to set the cut angle. You can adjust the angle to register to either the left or right relative to the material.

HOW WELL DOES IT WORK?

Let's take the dust collection first. I didn't use this saw with a vacuum or bag. I angled the port down and to my right because that keeps the dust off the track and off the material I'm cutting. I was inclined to cut right-handed with my left hand on the track. Whichever hand you use, you will likely want to have your free hand holding the track down in front—particularly with larger material. While Festool doesn't claim that this saw collects all dust, I found that I had basically no dust on the surface I was cutting. I used this HKC 55 saw to cut three stair stringers, all of my 2x8 riser material, and 1-inch OSB tread material. I then took the saw off the crosscut rail and used it with one of the FS rails to rip the treads. During all of this, my workstation stayed clean.

The saw had plenty of power for cutting through dry 2x12 Doug fir. I kept a steady speed and didn't force the saw. I don't have any complaints about power. The depth was easy to set, and the guard was easy to retract using a convenient lever just to the left of the blade. You can set this saw into a plunge mode that retracts the blade completely up; when you're cutting in this mode, it is nice to be able to raise the guard with the lever. Once we framed the house and papered the roof, we could use this saw to do pick-up work inside. When ripping sheathing, I found that using the saw and long rail was as fast as snapping a line and cutting freehand.

The FSK rail works very well. The splinter guard aligns precisely on the cutline just as with the FS rail. I didn't set the angle to cut the riser and tread lines on my stringers; I could have, but I found that it was easy enough and fast to set the track on the line and cut. Like the FS rail, the FSK rail has rubber strips along the bottom, which help it to stay on the material without slipping.

We got this saw in time to frame a roof that had I-joist rafters. In addition to the rafters, I had nearly 100 10-inch web stiffeners to cut. I had planned to bring our sliding compound miter saw and stand to cut them but forgot the stand. So instead, I used the HKC and guide rail. I set the angle to 30 degrees and quickly cut 100 5/4x8 10-inch web stiffeners with 30-degree miters on each end. I went through one-and-a-half batteries.

I noticed that every 20 cuts or so, the rail was failing to retract, so I took the saw off the rail to shake out the dust. This was OK with me because even while I was using a guide, my shoulder was getting a workout, so the quick break was helpful.

Another task I used the saw and FSK rail for was cutting I-joist blocking. We had a lot of 13 7/16-inch and 9 7/16-inch I-joists to cut down. The lumberyard sends us lineal footage of I-joist to cut into

When mounted to the FSK guide rail, the HKC 55 (shown) and the corded HK 55 saws can follow the cutline by aligning the guide rail's splinter guard along the mark. Before making your first cut, you'll need to trim the splinter guard to align it with the blade.

This view of the underside of the FSK guide rail shows the pivot point (black plastic, top) and angle adjustment point (green thumb screw, below), as well as the foam anti-slip tape. The green thumb screw moves to set the angle; the black pivot point stays fixed.

blocking. Normally, I use a beam saw for this, which is hard on my arm and not too accurate.

This time, I made all the cuts with the Festool; I finished with a cordless recip since the flanges were 2 1/2 inches deep and the Festool cuts about 2 inches deep with the rail. I found that we had perfectly cut blocks, and it was actually faster than using the beam saw—I didn't have to scribe any lines, and I left my framing square in my pouch. All I had to do was align the guide rail to my mark, and it squared the cut for me. And it was much easier on my arm.

IS IT REALLY WORTH BUYING?

I have been grappling with this question for the last month. I absolutely loved using this saw for cutting stair stringers. The set of stairs I built with it look very clean. Using it to cut repetitive blocks without pulling out my square was also clean and fast. And we had a number of walls to frame up to rafters on the house we are working on, and they all had either 30- or 40-degree miters. I liked not pulling out a square to mark the angles.

As a rough framer, I initially thought: I really don't need this saw, and most framers don't need it either. However, after using the saw, the rail it came with, and a 118-inch FS track, it occurred to me that I will never need my table saw and stand or my 12-inch sliding compound miter saw and stand on site again. I also tend to rip faster using this saw and guide, because I'm not watching the line.

We have a Rosseau table set up with outfeed tables for our table saw and a 12-inch sliding compound miter saw with a Saw Helper stand (no longer available). Now, they stay tucked away in our shop. The cost of those tools and stands add up to between $1,500 and $2,000. I can buy the HKC 55 Cordless kit plus the 420 FSK guide rail (16 1/2 inches long) for $690 plus the FS 118-inch guide rail for $355 and still save money.

When I add the convenience of taking my saw to the material instead of the material to the saw and consider the fact that I get shop-quality cuts on a rough jobsite, then I absolutely recommend this tool. Another advantage is that everything but the track fits in the Systainer box, which is easy to roll out and put away and doesn't clutter the van. I would suggest that you invest in one or two more batteries, though, or consider the corded version. Even with a good blade, cutting through 2x6 up to 2x12 wears out the batteries faster than they recharge.

This is a tool I think we'll continue to find uses for in the coming months. I know we'll have it out most days we are siding and installing exterior trim. If you're a carpenter or a remodeling contractor who has been waiting to take the plunge into buying a Festool, I think this is the place to start.

Tim Uhler is a lead carpenter for Pioneer Builders in Port Orchard, Wash. He is a regular contributor to JLC *and* Tools of the Trade.

BY ROE OSBORN

No Chance of Showers

As I write this, an icy northwest gale sweeps off of Cape Cod Bay, finding its way through every open nail hole and crevice in this tiny cottage built before anyone ever even dreamed of air-sealing. I shiver under many layers of clothing, but it's not the warm summers or the sunny beaches of the Cape that I long for on this winter day—it's my outdoor shower.

While outdoor showers are common in many locales around the country, Cape Cod is the only place I know where residents bravely—and maybe insanely—use them as their primary shower for much, if not all, of the year. My own humble stockade-fence shower is plumbed with garden hose connected to the least expensive shower apparatus available. I commission it each year on the first day of baseball season—my way of underscoring the hope of spring. Then I use it consistently until the first hard freeze in the fall. This year, that sad day fell on the Monday before Thanksgiving.

I won't try to describe the blissful exhilaration I feel under the warm shower surrounded by whatever air Mother Nature happens to bestow on the day, but I understand and live the obsession that so many Cape Codders feel about showering outdoors. To satisfy that obsession, Cape Codders have taken the design and building of outdoor showers to an art form, both in new construction and remodeling. And I've found that if the home is more elaborate, the outdoor shower usually follows suit.

In my 11-year tenure on the Cape, I've been lucky enough to photograph scores of homes and dozens of outdoor showers. Decorative shapes carved into the boards are common, and waves are a familiar theme **(1)**. The showers themselves can assume many different sizes and shapes including trapezoids, triangles, and even the occasional cylinder **(2)**.

The actual water delivery system can vary quite a bit. I've seen a garden nozzle used as a showerhead, but I've also seen incredibly elaborate full-body shower systems with rainfall showerheads **(3)**.

Materials in outdoor showers can also differ from one shower to the next. Besides the typical vertical wood boards, fencing made from PVC is becoming more and more common, and I've seen every type of material from corrugated metal to glass block **(4)**. Never underestimate a Cape Codder's ingenuity when it comes to building a unique outdoor shower.

So I wait here impatiently in the snug confines of this cottage as the days lengthen and sun's light melts the snow and warms the earth. Fenway Park opens on April 3 this year, but for now I can only dream of venturing out on that day to officially kick off another season.

Roe Osborn is a senior editor at JLC.

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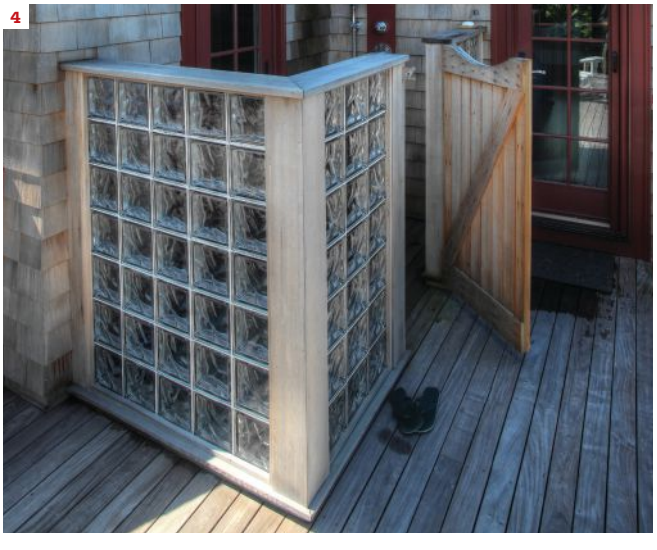

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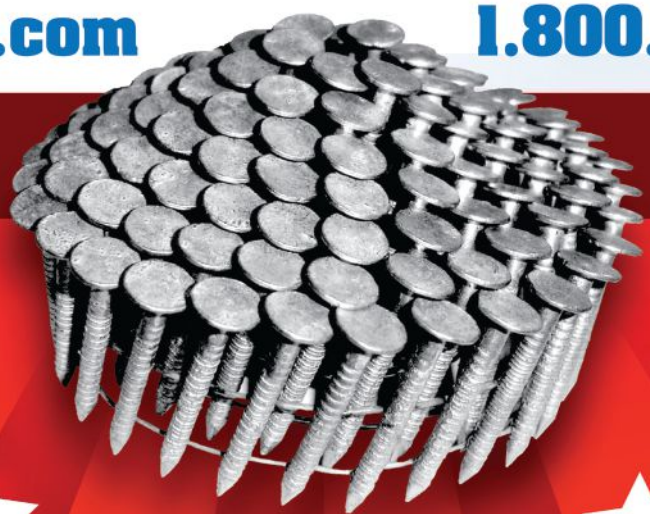

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