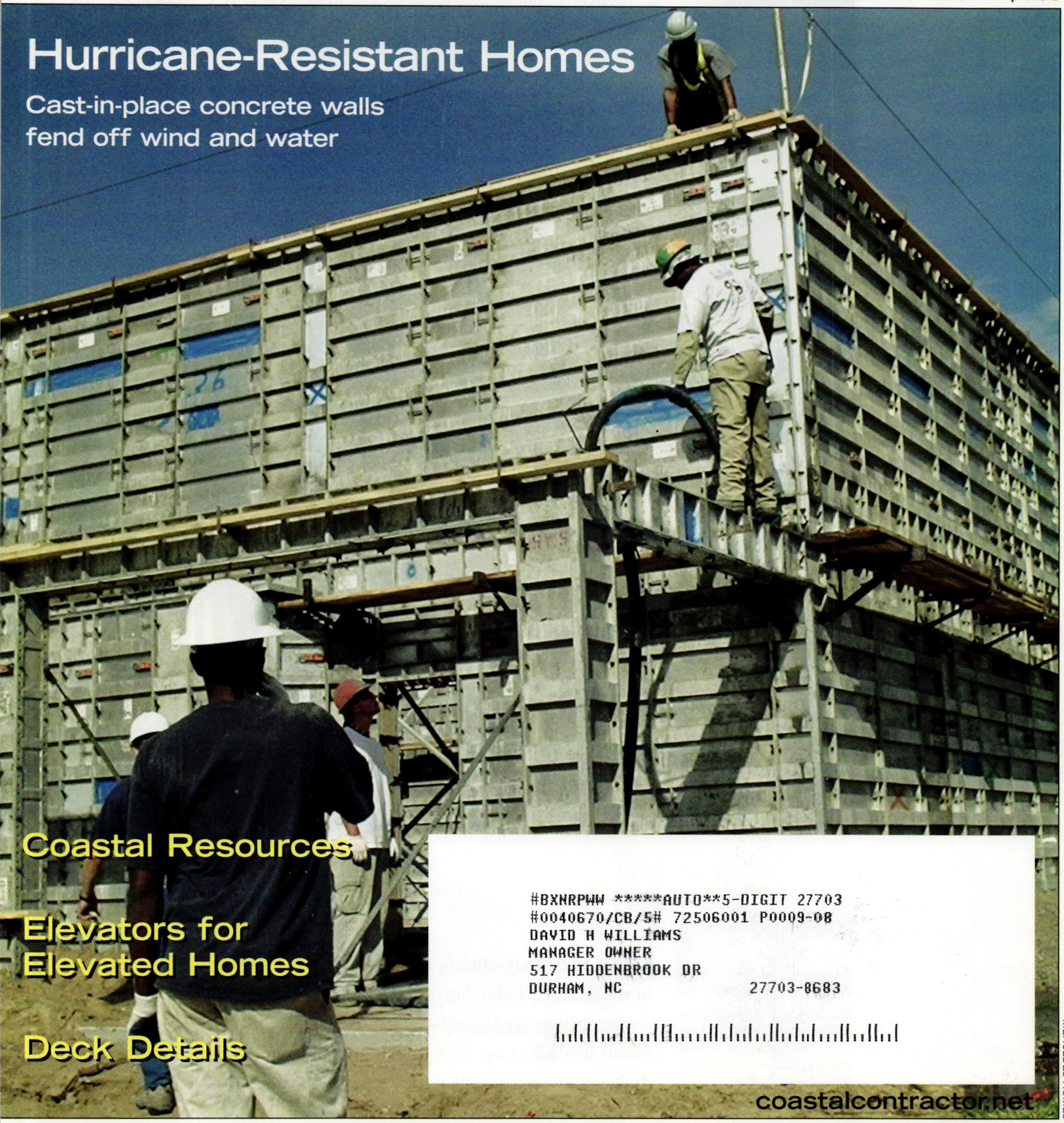
Coastal Contractor

hanley

November/December 2007 $4.95



Hurricane-Resistant Homes

Cast-in-place concrete walls fend off wind and water

Coastal Resources

Elevators for Elevated Homes

Deck Details

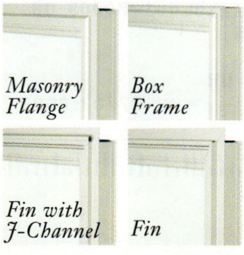
#BXNRPWW *****AUTO**5-DIGIT 27703
#0040670/CB/5# 72506001 P0009-08
DAVID H WILLIAMS
MANAGER OWNER
517 HIDDENBROOK DR
DURHAM, NC 27703-8683

coastalcontractor.net

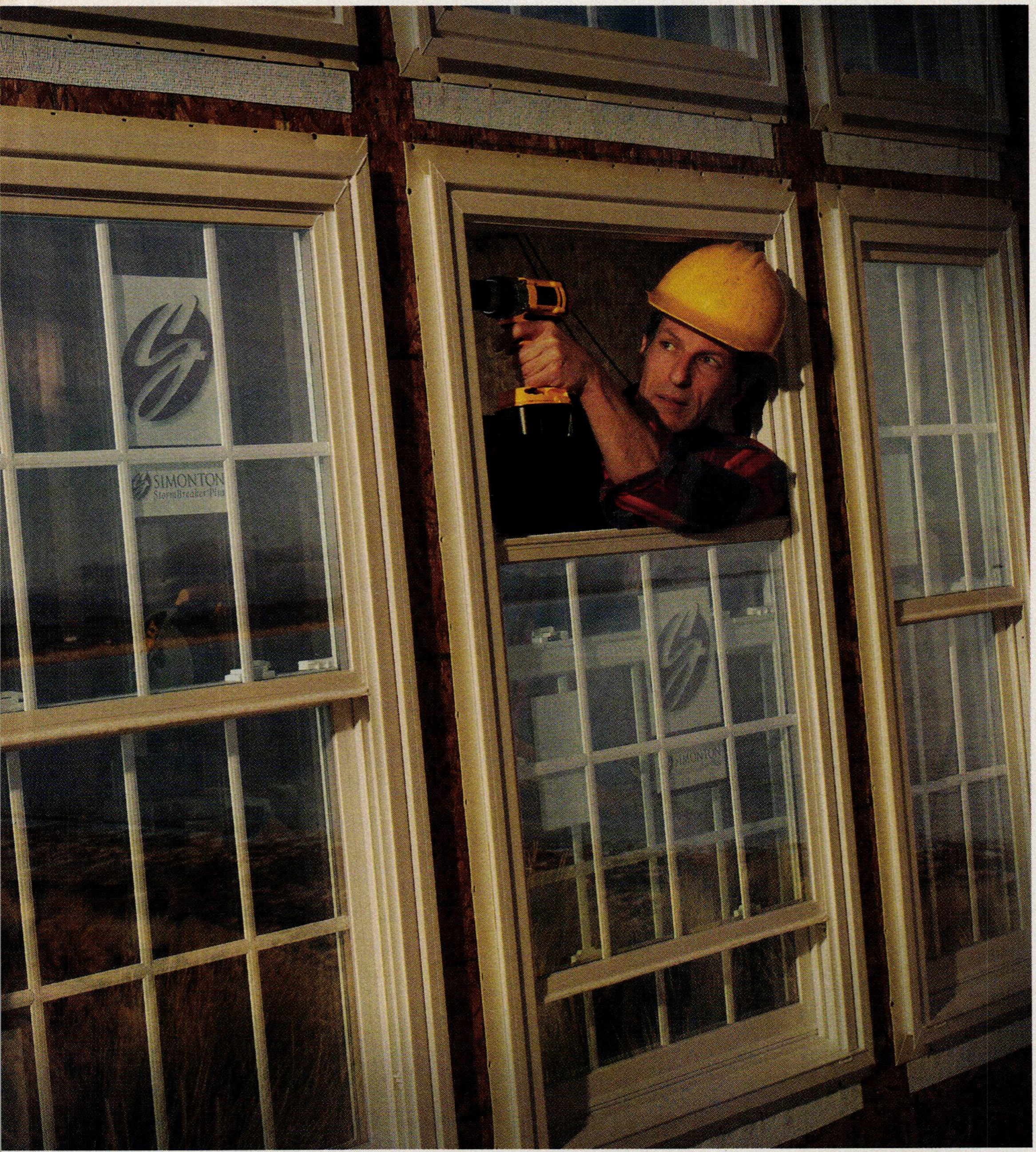
MERCEDES HOMES

3:31 PM

Hurricane Reggie moves through Charleston faster than predicted.



It used to be that window installer Reggie Neilson got very frustrated putting in those heavy, bulky hurricane windows. But now, thanks to new integral frame options on Simonton's StormBreaker Plus™ windows, it's quick. Which means less adjusting. Less hassle. And a whole lot less aggravation. And once the windows are installed, they're even more impressive. Because not only are



they stunningly beautiful, they meet the strictest hurricane codes. Simonton StormBreaker Plus™ windows are available with masonry flange for masonry construction, box frame for retrofit, fin for brick, and fin with J-channel for siding. So choose StormBreaker Plus.™ Not only will you improve productivity, you'll improve the disposition of workers, like Reggie. To learn more, call 1-800-SIMONTON or visit www.simonton.com.

SIMONTON® WINDOWS

We make lasting impressions®

Circle #34

TRADE TERMS CARD FROM AMERICAN EXPRESS OPEN.℠

the choice of up to 2% early pay discount or up to two months defer pay can change the way you do business, please call 877-OPEN-PLUM or visit PlumCard.com to apply. We can't wait to see what you do with it.

AMERICAN EXPRESS OPEN FOR BUSINESS

APPLICATION NOW AVAILABLE AT 877-OPEN-PLUM PLUMCARD.COM

Circle #1

Show your clients how great outdoor living can feel with Trex®

When your clients want the best outdoor living has to offer, let them know that they want Trex. No other product comes close.

THE CUSTOMER HAS SPOKEN

Trex offers a natural beauty and barefoot comfort that no composite product can match. It's why Trex is asked for by more people than any other name in the industry. We have developed a broad portfolio of decking and railing choices, with finishes from subtle to bold, in a wide variety of rich, inviting colors and options. So no matter what style your clients ask for, you can always deliver the quality that only comes with Trex.

DECKING

THE PROOF IS IN OUR RECORD

Hands down, Trex has the longest record of proven performance in the field. Trex never rots, warps or splinters, so it requires little maintenance. We're so confident in the durable beauty of Trex, we back it with our 25-Year Limited Warranty. You'll find Trex cuts, routs and fastens easily, for an outstanding workability. We've also made installing Trex railing a snap with our time-saving TrexExpress™ system. And you can even shape and bend Trex to create dramatic, sweeping curves.

RAILING

WE'VE GOT YOUR BACK

When you choose to build with Trex, we will provide all the tools you need to build your business too: a dedicated help-line, a powerful lead generation machine, effective marketing materials, a rewarding incentive program, along with comprehensive field support and training. It's the best trade partner support program in the business. For the best trade partners in the business: ours.

Trex®

How outdoor living should feel.

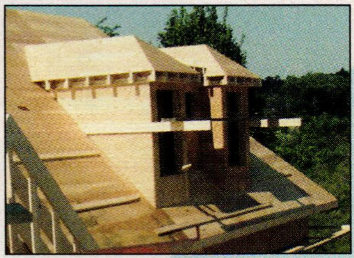
Learn how easy it is to build your business with Trex. Visit **trexpartners.com** today or call **1-800-BUY-TREX, ext. 6343.** Circle #29

November/December 2007

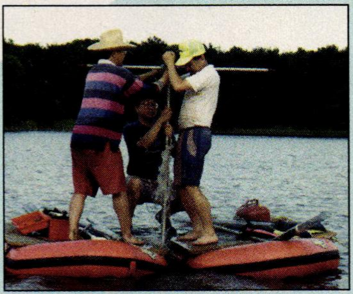
Features

p. 36

p. 11



p. 19



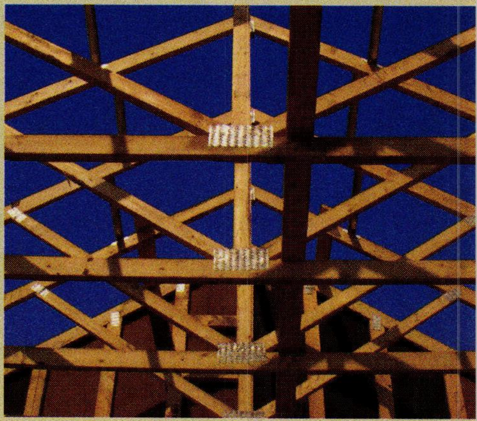
p. 64

Departments

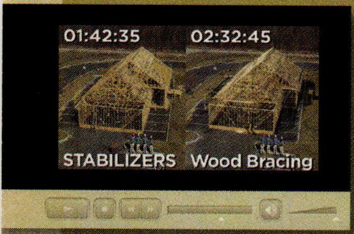
Volume 4, Number 6. *Coastal Contractor* (ISSN 1932-4235; USPS 000-169) is published six times per year (Jan/Feb, Mar/Apr, May/Jun, Jul/Aug, Sep/Oct, Nov/Dec). Annual rates for non-qualified subscriptions: US states and possessions, $19.95; Canada, $39.95 (US funds); all other countries, $49.95 (US funds). Publisher reserves the right to determine qualification. Single copy/back issue price: $8.00 per copy. For new or existing subscriptions please visit **www.omeda.com/coco** or call toll-free: 888/269-8410. Fax: 847/291-4816. E-mail: **coco@omeda.com**. Application to mail at Periodicals Postage Rates is pending at Washington, DC, and at additional mailing offices. Postmaster: Send address changes to: *Coastal Contractor*, PO Box 3570, Northbrook, IL 60065-3570.

STABILIZER® LATERAL BRACES FROM MITEK®

SEE HOW TO SAVE 45% IN LABOR COSTS.



STABILIZER® LATERAL BRACES FROM MITEK® ARE A SIMPLE INSTALLATION TOOL THAT MAKES SPACING AND BRACING ROOF TRUSSES EASIER, QUICKER, SAFER*, AND MORE ACCURATE.



Want proof? We set up a side-by-side comparison, with a single crew framing the roof system of a 2,600 square foot home – the first time using traditional truss installation techniques, the second time using STABILIZERS.

The results speak for themselves. The STABILIZER crew finished the job nearly *an hour faster* than the traditional install crew, representing a total labor savings of over 45%! See the actual time-lapse video at: **www.mii.com/unitedstates**

STABILIZERS are available from your local MiTek roof truss manufacturer. Or to learn more, and try STABILIZERS for yourself, **call 800.325.8075** or visit **www.mii.com/stabilizer**

STABILIZER Lateral Braces. Another way MiTek brings you the Power to Perform.™

MiTek®
POWER TO PERFORM

*WHEN USED WITH DIAGONAL BRACING, STABILIZER PROVIDES EFFECTIVE TOP CHORD STABILITY DURING INSTALLATION.
BE SURE TO PROMOTE EFFECTIVE INSTALLATION PRACTICES IN ACCORDANCE WITH BCSI.

Circle #17

Coastal Contractor

www.coastalcontractor.net

Editorial & Advertising Offices:
186 Allen Brook Lane
Williston, VT 05495
(802) 879-3335 Fax: (802) 879-9384
Editorial submissions: coastal-editorial@hanleywood.com

Coastal Contractor

www.coastalcontractor.net

INFORMATION DIRECTORY

Contact

Coastal Contractor
186 Allen Brook Lane
Williston, VT 05495
coastal-editorial@hanleywood.com;
802/879-3335; fax 802/879-9384

Write to us

We welcome letters and article submissions from our readers at the e-mail and postal addresses above. Please keep copies of all original materials. Letters may be edited for length and clarity.

Subscriptions

For subscriber services, subscriptions, or renewals, call 888/269-8410 (toll-free) or 847/291-5221; fax 847/291-4816;
e-mail coco@omeda.com; or mail to
Coastal Contractor
PO Box 3570
Northbrook, IL 60065-3570

Annual subscription rates for non-qualified readers are: US and possessions, $19.95; Canada, $39.95 (US funds); all other countries, $49.95 (US funds).

Single copies and back issues are available for $8.00 each.

Privacy of mailing list

We rent our subscriber list to reputable companies. If you do not wish to receive promotional materials from other companies, please call us toll-free at 888/269-8410.

Custom reprints

Contact FosteReprints at 866/879-9144.

Media kits

Contact Helene Slavin at 202/736-3428 or hslavin@hanleywood.com.

Postmaster: Send address changes to *Coastal Contractor*, PO Box 3570, Northbrook, IL 60065-3570.

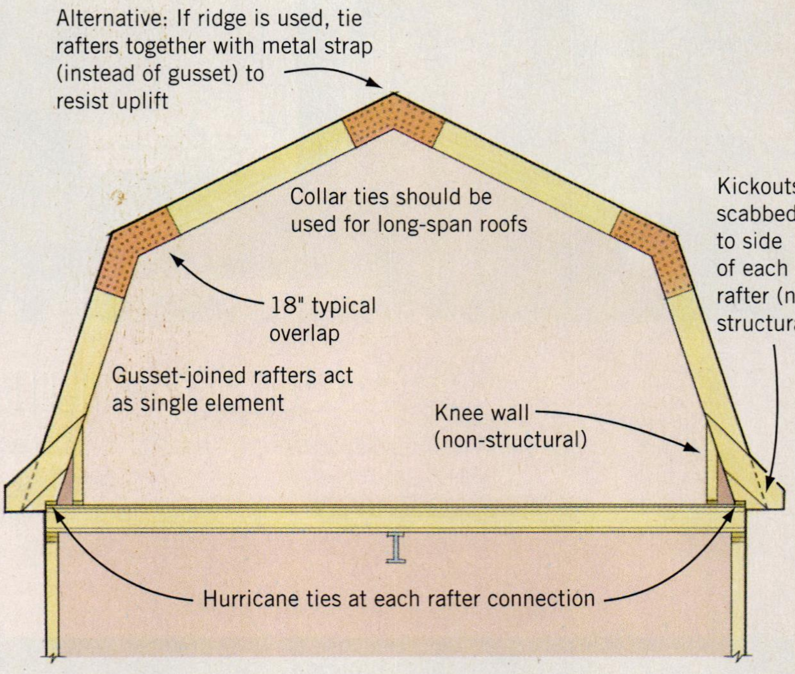
Resisting Uplift

Thanks for the excellent article by Andrew DiGiammo on a simplified method for framing a gambrel roof (September/October 2007). I am wondering whether the detail could be simplified even further by eliminating the steel strap across the ridge. It would seem that the double plywood gusset across the rafters that meet at the ridge acts to provide the same resistance to uplift as does the strap. If the gusset is inadequate by itself, why not just make it slightly larger, with enough fasteners to resist the uplift forces?

Carl Mezoff, PE
Stamford, Conn.

Clayton DeKorne responds: Thanks for the close read, and for paying attention to the critical details. The point you are drawing attention to reflects an oversight on my part. The label on the illustration indicating the need for a metal strap should have been suggested as an alternative uplift restraint for a gambrel frame with a conventional ridge *instead of* the uppermost gusset. You are correct that having both the strap and the gusset is redundant. The revised illustration below includes the label as it should have appeared initially.

Site-Built Gambrel Truss



Green Mandates

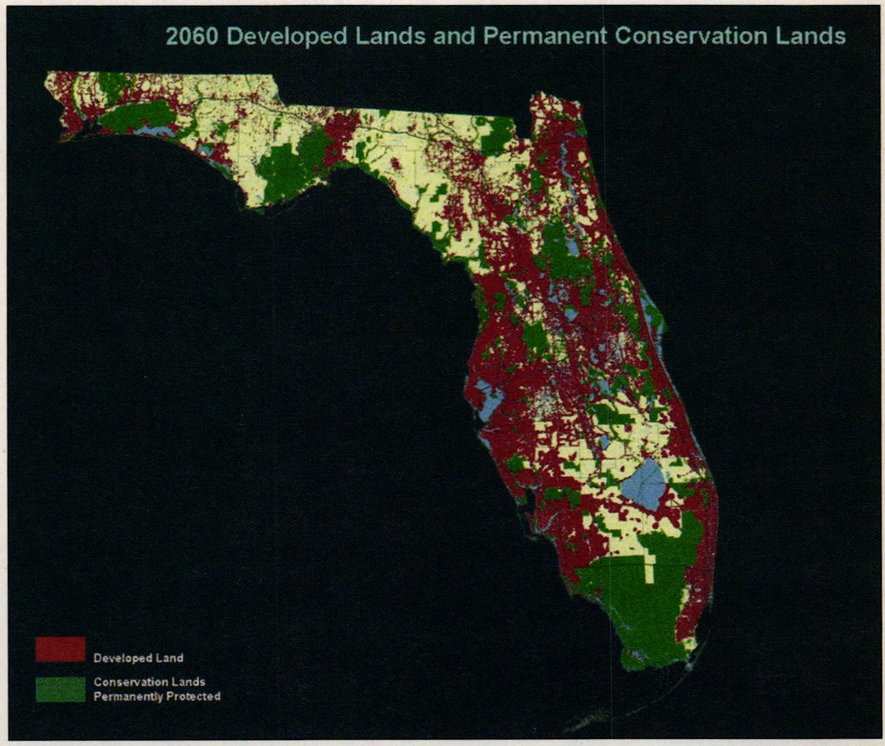
Sustainable building moves from concept to code

With governors and municipal leaders promoting green building from California to Florida to New York, some in the industry are worrying about added construction costs boosting home prices during an already pronounced slump.

"Right now, the one thing that we don't need and are very concerned about are significant spikes to our costs," says Douglas Buck, director of governmental affairs for the Florida Home Builders Association.

Green building, often defined as increasing energy efficiency while reducing negative impacts on the environment, has long been an option for environmentally minded home buyers and builders. But with California Governor Arnold Schwarzenegger, Florida Governor Charlie Crist, New York City Mayor Michael Bloomberg, and others publicly embracing the concept in recent months, policymakers are steadily writing important elements of the concept into state and municipal policies and building codes.

As of this fall, at least 24 states and 90 municipalities had green building initiatives in place, says Jason Hartke, manager for state and local advocacy with the U.S. Green Building Council. Those numbers will likely grow: more than 500 U.S. cities have signed on to the U.S. Conference of Mayors Climate Protection Agreement, which encourages green building. Meanwhile, Minnesota Governor Tim Pawlenty announced in July that he would make "securing a clean energy future" his top priority for his term as chairman of the National Governors Association — a move met with wide support from his peers.



UNIVERSITY OF FLORIDA SCHOOL OF NATURAL RESOURCES AND ENVIRONMENT

Developed land vs. conservation land. The future is at stake, says Florida Governor Crist, New York City Mayor Bloomberg, and other policymakers who have passed environmental initiatives aimed at balancing the impact of developed lands on natural lands and waterways.

"There are a lot of really interesting policies being put in place whether you are in Seattle or Florida," Hartke notes.

Today, buildings account for 71% of electricity use and 40% of carbon emissions nationwide. Stemming largely from coal- and gas-burning power plants, emissions tied to buildings eclipse even the 33% from transportation, Hartke explains.

Policymakers clearly hope to reduce those numbers. Today's most common green building initiative among states and municipalities requires new publicly owned buildings to be green, often as dictated by the Green Building Council's Leadership in Energy and Environmental Design (LEED) certification program, Hartke says. These policies are hardly confined to government office buildings: New Jersey, for example, requires developers of affordable housing units to meet minimum green building standards.

Offering builders incentives to adopt green building techniques is almost as common as mandating public green buildings, Hartke adds. Cities and states have extended the majority of incentives, from tax relief, expedited permit review, and density rule exceptions or exemptions to commercial projects. But they are rapidly expanding into residential construction. New Mexico, for example, recently passed a tax credit for residential structures, with the credit amount pegged to the efficiency level of the home, notes Hartke.

Less common but also on the increase are new or strengthened state or municipal green building codes. Some new codes are tied to incentives. Maryland's Howard County, for instance, recently coupled stepped-up green building codes with property tax abatements. Other codes stand alone. This spring in Florida, for example, Governor Crist issued an executive order seeking to require all newly constructed homes and buildings to be at least 15% more efficient by 2009. The order, which is now being considered by the Florida Building Commission, got a tepid reception from the industry and some builders.

The main objection: that the added cost of efficiency improvements would turn away already scarce home buyers unless they result in clear and rapid energy savings — savings that could be directly marketed to home buyers. "Unless the homeowner sees a payback period of time — hopefully it's not 55 years, it's seven years, which is the length of time I might own a home — the homes are at a price disadvantage to existing construction," explains Buck, of the Florida Home Builders Association.

Energy-efficiency advocates insist builders can achieve the 15% reduction easily and cheaply. Danny Parker, principal research scientist for buildings at the Florida Solar Energy Center, says doing so would likely require only three steps: using compact fluorescent bulbs, sealing ductwork, and choosing light colors for roofing and exterior walls. "No problem; easy to do," he says of the 2009 deadline outlined in Crist's order.

Buck isn't so sure. Home construction codes and standards have become so numerous that each new one increases potential conflicts, he explains. One cheap way to make homes more efficient is to use fewer windows, for example, but that may violate fire codes. "We are so finely tuned in our homes that you can't have a ying without a yang," he comments.

Hartke says it's key to involve builders and other stakeholders in discussions leading up to new green building codes or rules. Nevertheless, it seems likely more objections will flare up as green building transitions from concept to code nationwide. — *Aaron Hoover*


You need to build houses that last.
Weather, or not.
SIMPSON Strong-Tie
High Wind Framing Connection Guide
WFCM
SIMPSON
Strong-Tie

Mapping Disaster

Ongoing research

George Fernandez remembers sitting beside his father, a soldier in the U.S. Army Reserve, as he drove around South Florida handing out food and bottled water in the days following Hurricane Andrew.

He was just a young boy in 1992. But 15 years later, Fernandez has returned to hurricane recovery, this time as undergraduate civil engineering student and member of a team of University of Florida wind researchers.

"I think our research is vital to helping people survive the aftermath of a hurricane," he says. "Considering we can't stop hurricanes, we might as well learn how to prevent the most damage that we can."

Fernandez was among over a half-dozen students and two faculty members at the ready this hurricane season to travel anyplace where a hurricane landfall was expected, to gather data on its wind speeds and forces.

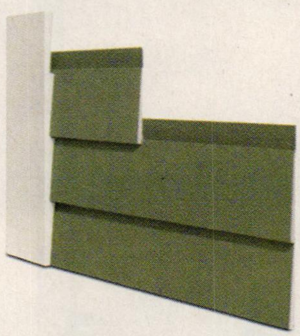
The team planned to make the trips as part of the Florida Coastal Monitoring Program, a nine-year-old UF-led effort to learn more about low-altitude hurricane winds and the forces they impart on homes and businesses.

Heading out from Gainesville in a small fleet of white Ford F250 trucks, researchers tow four trailer-based towers equipped with devices that measure wind speeds, barometric pressure, and rainfall to projected landfall locations. They also keep tabs on 30 homes around coastal Florida modified to include roof-mounted pressure monitors and other devices aimed at monitoring their performance during storms.

The goal: to correlate the low-altitude wind speeds measured by the towers with wind forces on the homes, establishing relationships needed to understand, predict and — with luck — help prevent onshore hurricane damage.

"When you define Category 1, 2, or 3


Cedar
Designed for the forest



hurricanes, that's based on what's happening over water," says Kurt Gurley, a UF associate professor of civil and coastal engineering and the lead researcher on the project. "The missing piece is, how do you take that and translate it into what's happening over the land?"

With partner Clemson University, UF has collected data from the towers, modified houses, or both during least 18 tropical storms hurricanes dating as far back Hurricane Georges in 1998. While that sounds like a lot, the amount and variety of data is only now reaching the level required to draw potentially new conclusions about low-altitude hurricane winds and determine precisely how they stress homes.

"The important thing," Gurley explains, "is to get a critical mass of different storms hitting different parts of the state at different intensities."

The goal: to correlate the low-altitude wind speeds measured by the towers with wind forces on the homes, establishing relationships needed to understand, predict and — with luck — help prevent onshore hurricane damage.

He and several students are currently working on analyzing the data bank, a project that could lead to reexamining the American Society of Civil Engineers Wind Load Provisions — guidelines used by engineers nationwide in assessing potential wind loading on homes and other structures. It's unclear at this point whether the research will suggest that the provisions should be revised, but it will have value even if it serves only to confirm the accuracy of existing provisions, Gurley says.

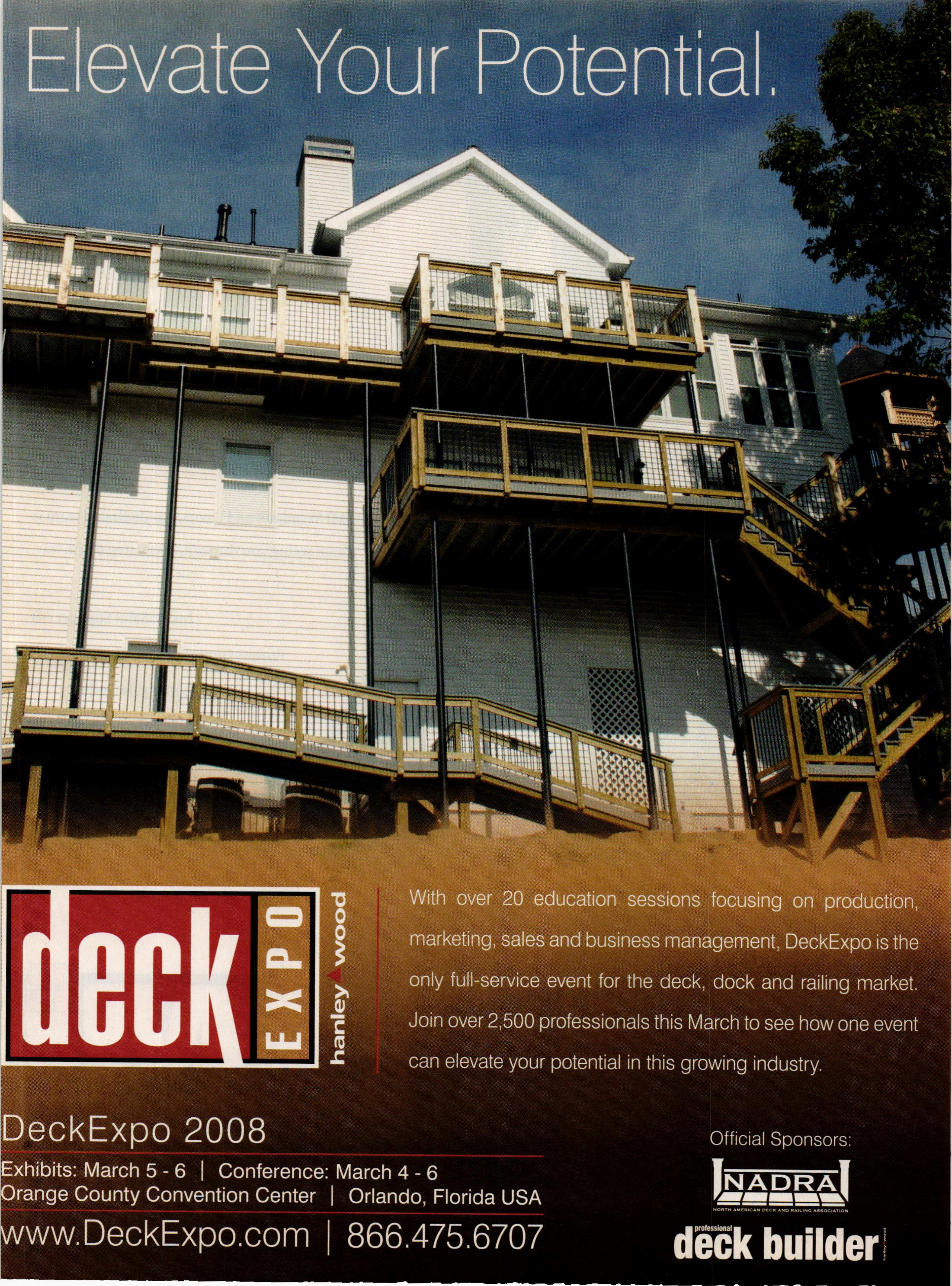
More immediately, the towers since 2003 have provided real-time wind data, via cell phone and now a satellite connection, to the National Oceanic and Atmospheric Administration. NOAA plugs the data — the only such information gathered from low altitudes over land — into a computer model of hurricane wind speeds called HWIND.

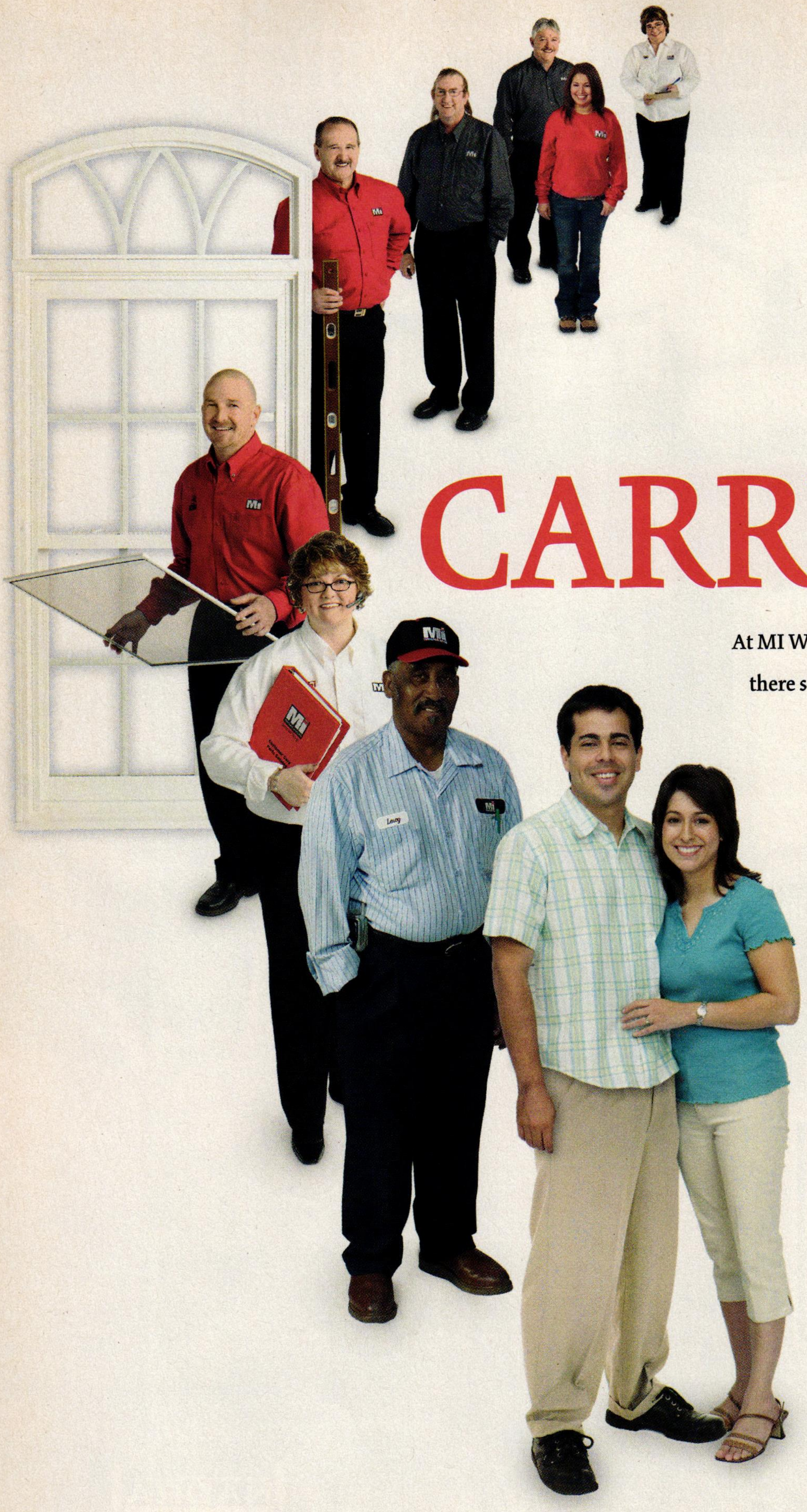
The Federal Emergency Management Agency uses a portion of HWIND in another model, HAZUS, that projects anticipated hurricane damage. That model in turn helps FEMA decide where to prioritize its response and recovery activities, notes Gurley.

The UF researchers are also working with utility companies seeking to find ways to reduce hurricane-caused outages and repair jobs. "They are investigating a number of different options," he says, "and they want to work with the scientists to make sure their approach is going to be cost effective." — *A.H.*

UNIVERSITY OF FLORIDA CIVIL AND COASTAL ENGINEERING

Down-to-earth data. The Florida Coastal Monitoring Program erects towers as close to the path of Hurricane Wilma as possible. Wind-speed data from the towers, along with wind-pressure data from houses wired with instruments, is part of a growing body of real-world data used to establish hurricane-resistant building techniques. Most of the data prior to this has been from buoys that measure hurricane winds over open water or from airplanes gathering it high above the sites where the damage actually takes place.


Elevate Your Potential.
deck EXPO
hanley wood
With over 20 education sessions focusing on production, marketing, sales and business management, DeckExpo is the only full-service event for the deck, dock and railing market. Join over 2,500 professionals this March to see how one event can elevate your potential in this growing industry.
DeckExpo 2008
Exhibits: March 5 - 6 | Conference: March 4 - 6
Orange County Convention Center | Orlando, Florida USA
www.DeckExpo.com | 866.475.6707
Official Sponsors:
NADRA
NORTH AMERICAN DECK AND RAILING ASSOCIATION
professional deck builder



Double Doghouse Dormer

Doghouse dormers merge with a shed dormer for extra space and added visual interest

by Andrew P. DiGiammo

As an architect and builder on the New England coastline, I work a lot in my own interpretation of the shingle style. The tradition employs a lot of low rooflines, where the roof springs from the first-floor wall, and consequently, I often wind up using various kinds of dormers to create usable space under those low roofs.

FIGURE 1. A Nantucket dormer provides the headroom of a shed dormer with visual appeal of two doghouse dormers. Here, it is used to define one side of an entire house, where a plain shed dormer would have been too boxy.

UTILITY WITH FLAIR

One dormer I frequently use is the "Nantucket dormer" — a sort of hybrid between a shed dormer and a doghouse dormer. We call it a Nantucket dormer because it's rumored to have been developed on Nantucket Island, where it's a common roof feature on many homes. But you can also find this dormer style used throughout New England on old houses.

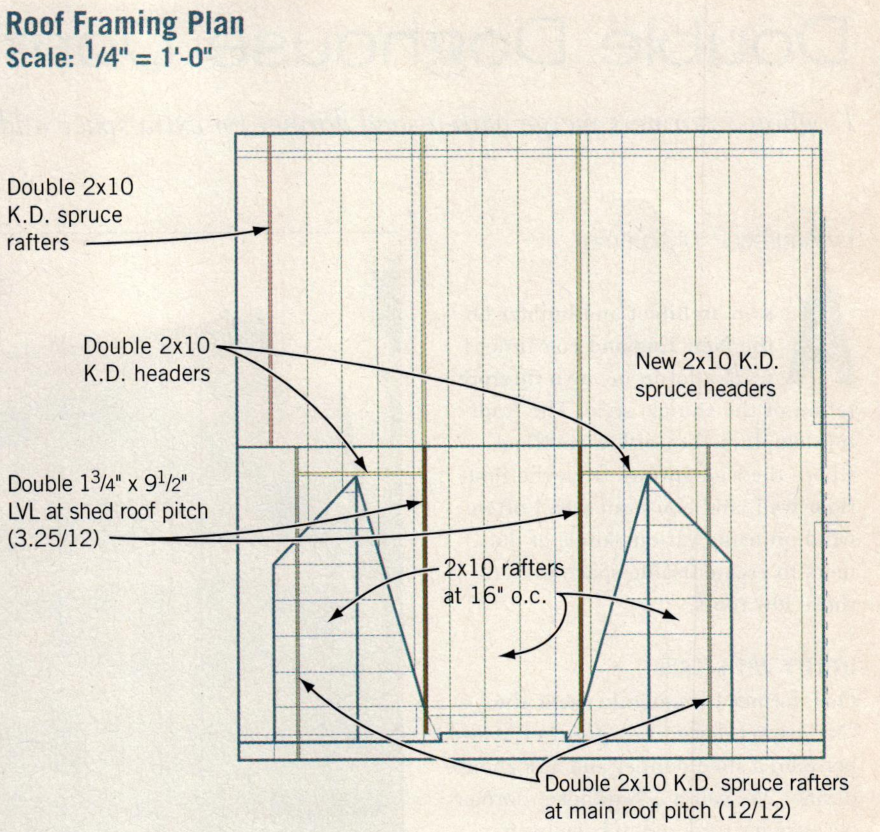
I like this style because it allows me to get the practical utility of a shed dormer, for enclosing space, along with the visual interest and traditional look of doghouse dormers. From the exterior, it looks pretty much like two closely spaced doghouse dormers. However, the Nantucket dormer creates a larger clear space on the inside, defined by the area under the two doghouse roofs combined with the shed roof that connects them.

A typical use for this method is to open out a piece of usable space in a room over a garage. It's useful wherever you want to build a large dormer into a roof but would rather not have a big, clunky-looking shed dormer. I've even used this element on a grander scale, as shown in **Figure 1**, in which one whole side of the second story of the home is framed out as a double set of hip-roofed dormers joined by a center shed roof.

SIMPLE FRAMING

The framing for these dormers can be a challenge for my field crews. But in principle, it's fairly simple: We frame the dormer opening in the roof by doubling up the rafters of the main roof system (**Figure 2**). The outside walls of the doghouse dormers rest on those doubled rafters. We frame up the front wall and side walls of the dormer, then we install the center, shed part, of the dormer roof, running the shed rafters back to tie into some kind of support — either all the way across the main roof to mate with the main roof rafters for the other side of the house, or else to some interior supporting structure like a bearing beam or wall. Again, we double the shed rafters on the ends of the center shed roof.

At the elevation where the lines of the main, steep-pitched house rafters and the lower-pitched dormer shed rafters cross, we run headers across from each doubled shed rafter to its counterpart doubled main house rafter. Those headers are intended to catch the ends of the doghouse dormer ridge boards, which we install next. With the locations of those ridges defined, we can then place valley rafters for the intersection points where the doghouse roofs meet the main roof, as well as where the doghouse roofs join the center shed roof.



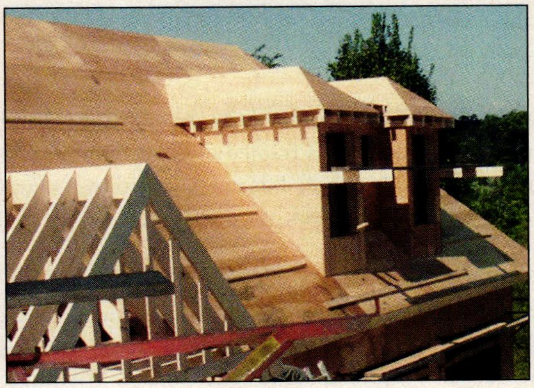
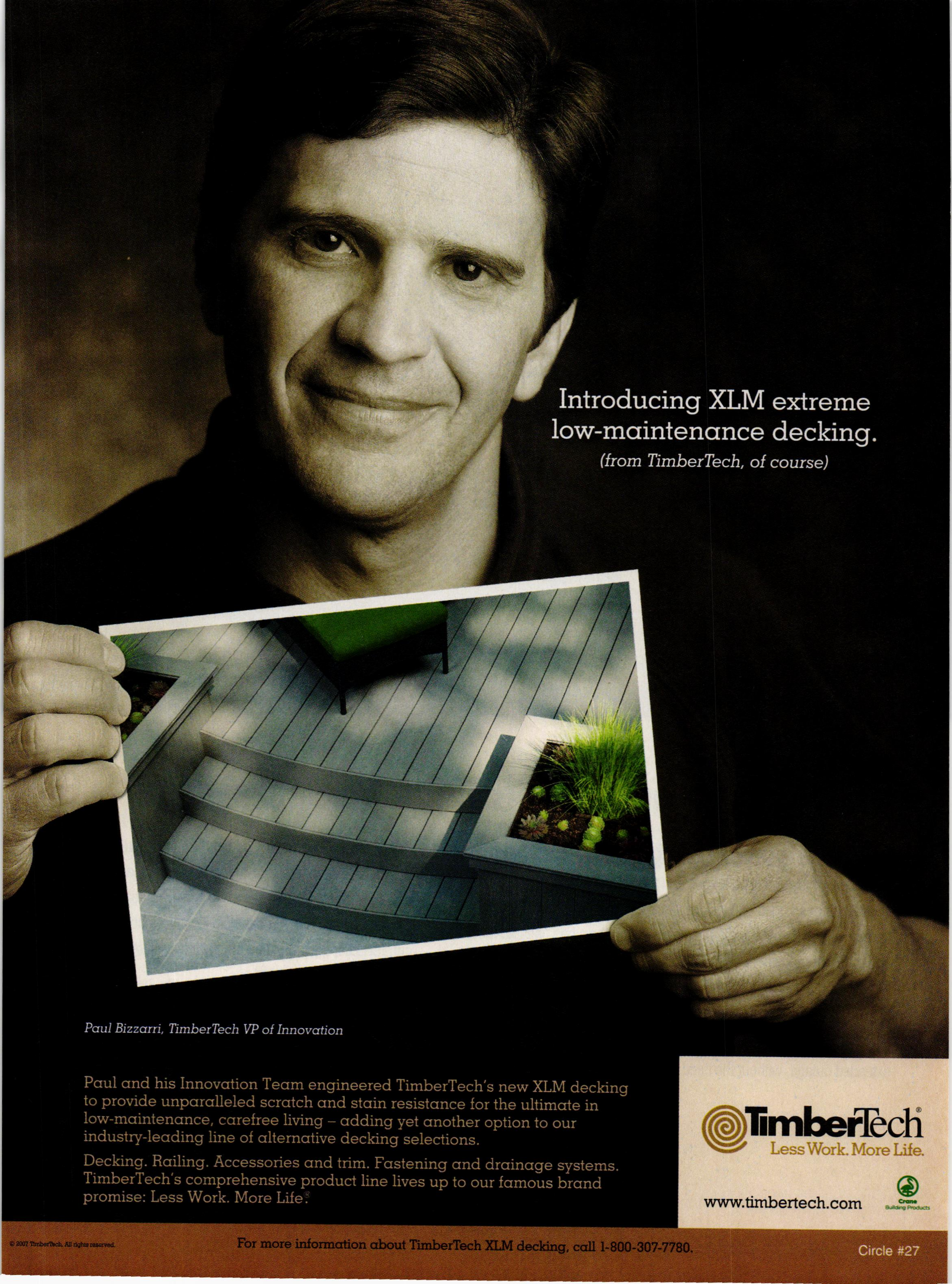


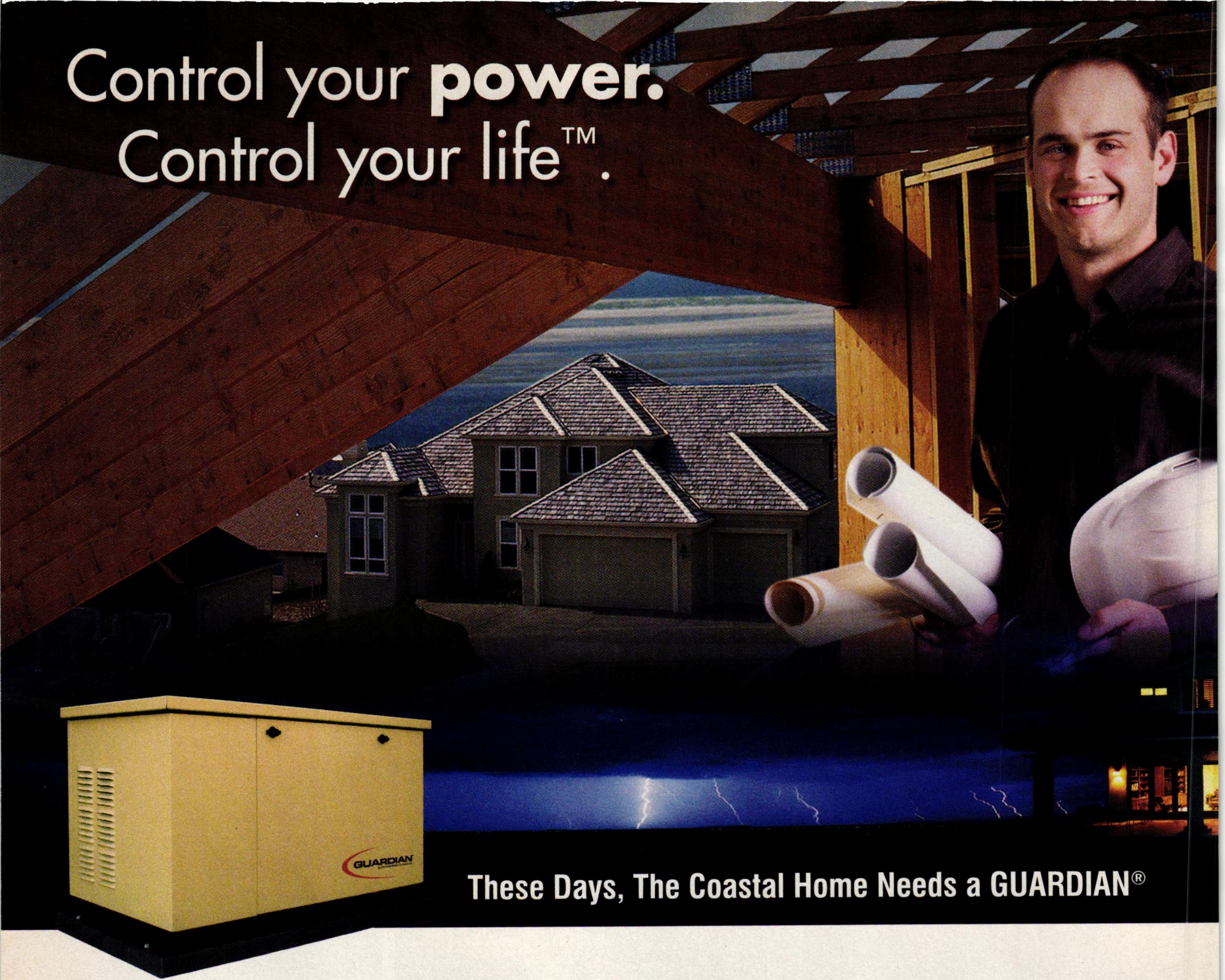
FIGURE 2. The trick to framing a Nantucket dormer is establishing the valleys for the two doghouse dormers (plan illustration above). The outside valleys meet the main roof, while the inside valleys meet the lower-pitched shed roof that joins the two doghouse dormers. While essentially a shed dormer in plan, the visual effect is closer to a pair of doghouse dormers (left).

Usually I keep the dormer walls short, to accommodate the various pitches and to keep the dormers from visually dominating the roof. To gain sufficient ceiling height in the indoor room, I let the ceiling follow the plane of the rafters. So inside the house, the cut-up shed-and-doghouse roof planes are revealed, making for some interesting interior spaces.

I didn't invent this form of dormer — it has been around for a long time. It's an interesting and useful roof form that I can add to my bag of tricks, just to keep things lively.

Architect and builder Andrew P. DiGiammo owns and operates a custom design/build firm based in Assonet, Mass. Photos by the author.


Introducing XLM extreme low-maintenance decking.
(from TimberTech, of course)
Paul Bizzarri, TimberTech VP of Innovation
Paul and his Innovation Team engineered TimberTech's new XLM decking to provide unparalleled scratch and stain resistance for the ultimate in low-maintenance, carefree living – adding yet another option to our industry-leading line of alternative decking selections.
Decking. Railing. Accessories and trim. Fastening and drainage systems. TimberTech's comprehensive product line lives up to our famous brand promise: Less Work. More Life.®
TimberTech®
Less Work. More Life.
www.timbertech.com
Crane Building Products
© 2007 TimberTech. All rights reserved.
For more information about TimberTech XLM decking, call 1-800-307-7780.
Circle #27



Why Should You Install GUARDIAN Generators?

Because power outages are happening more often, they're lasting longer, and they're becoming more costly. When the power goes out, lack of air conditioning threatens coastal homes with moisture damage, even after the storm has passed. More and more, homeowners are requiring uninterrupted power, so the market for standby generators is huge…and it's growing.

Fueled by clean-burning natural gas or LP, GUARDIAN standby generators start up automatically and operate worry free during an extended outage, without the need for refueling.

As the top-selling standby generator on the market today, GUARDIAN offers the right model for every coastal home… plus they're easy to install and maintain. You can't prevent power outages, but you can help keep your customers safe, comfortable, and confident that their largest investments, their homes, are well protected.

For more information about selling and installing GUARDIAN generators, call us at 1-888-GENERAC or visit us online at www.guardiangenerators.com.

GUARDIAN®
by Generac Power Systems, Inc.

Automatic Standby Generators

Circle #10

Cupping Callback

Q. I added an ipe deck onto a house located on the Ashley River in Charleston, S.C., using 3/4- x 6-inch ipe decking with a continuous groove to accommodate Eb-Ty fasteners. Our crew did not finish the deck; however, the homeowner did apply a deck sealant within a few months. At the one-year walk-through, the homeowners pointed out some gaps and cupping on the deck (see lower photo below). Most of the cupping and gaps are toward the center of the deck, where the boards receive the most sunlight. The areas of decking where the deck is partially shaded are essentially perfect. Do you have any idea why this deck would have gapped and cupped so badly, and what might be done to remedy the situation?

A. *Clayton DeKorne responds:* The gaps are caused by shrinkage of the deck boards, as the wood has dried in the sun to a lower moisture content (MC) than it had when the deck was installed. Wood tends to shrink most across the grain (tangential to the circular growth rings in wood, as shown in the illustration, page 24), so flat-sawn boards always shrink more in width than in length or thickness. The cupping occurred because the top side shrank while the bottom side very likely absorbed moisture from the damp earth beneath. Because the deck is low, there is little air circulation underneath it to dissipate moisture, so the relative humidity there is much higher than on the top side. As the boards take on moisture from this damp environment, the bottom face expands, while the top surface, which is baking in the sun, dries and shrinks. The result is the cupping you now see.

In the shaded areas of the deck, the difference in moisture content across the board is not as extreme, so the boards remain flat.

If you can gain any access to the underdeck, spread poly there to prevent the ground moisture from rising. Punch holes in the poly so the water doesn't pond in it. In addition, the sides of the deck should have some type of latticework to increase the air-

Got a question?

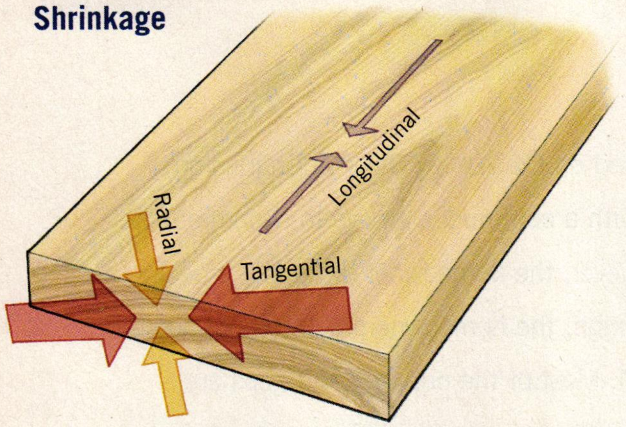
We want to hear from you!

E-MAIL
coastal-editorial@hanleywood.com

MAIL
Coastal Contractor Magazine
Attn: Soundings
186 Allen Brook Lane
Williston, VT 05495

TREY STROCK

With little air circulation below a low deck, the ipe on this South Carolina deck absorbed significant moisture from the ground, while the sunny side dried. The uneven shrinkage caused the boards to cup within a year. The fix is to spread poly below the deck to prevent moisture from rising and to add lattice along the sides of the deck and louver vents in the stair risers to promote air circulation.

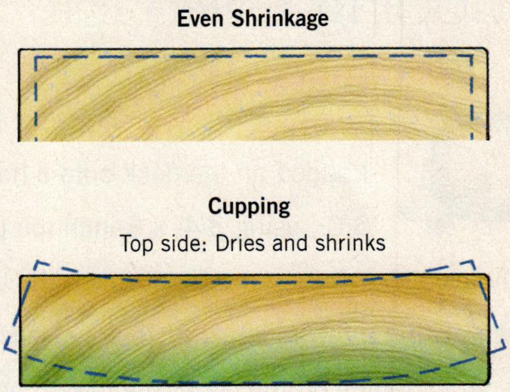


Wood shrinkage (and swelling) occurs in three directions:

Longitudinal shrinkage. The least change takes place longitudinally (parallel to the grain).

Radial shrinkage. Moderate change will occur perpendicular to the growth rings (from the center of the tree outward). In a flat-sawn board this will usually be reflected as a slight change in thickness.

Tangential shrinkage. The most change takes place along the line of the growth rings. At any set point, the change occurs along the tangent to the curve of the growth ring; therefore, flat-sawn boards tend to shrink most in width.



When the moisture content is relatively equal on all sides, shrinkage or swelling typically occurs at an even rate (top). However, when a flat-sawn board dries out on the top but absorbs water on the bottom, cupping occurs (above).

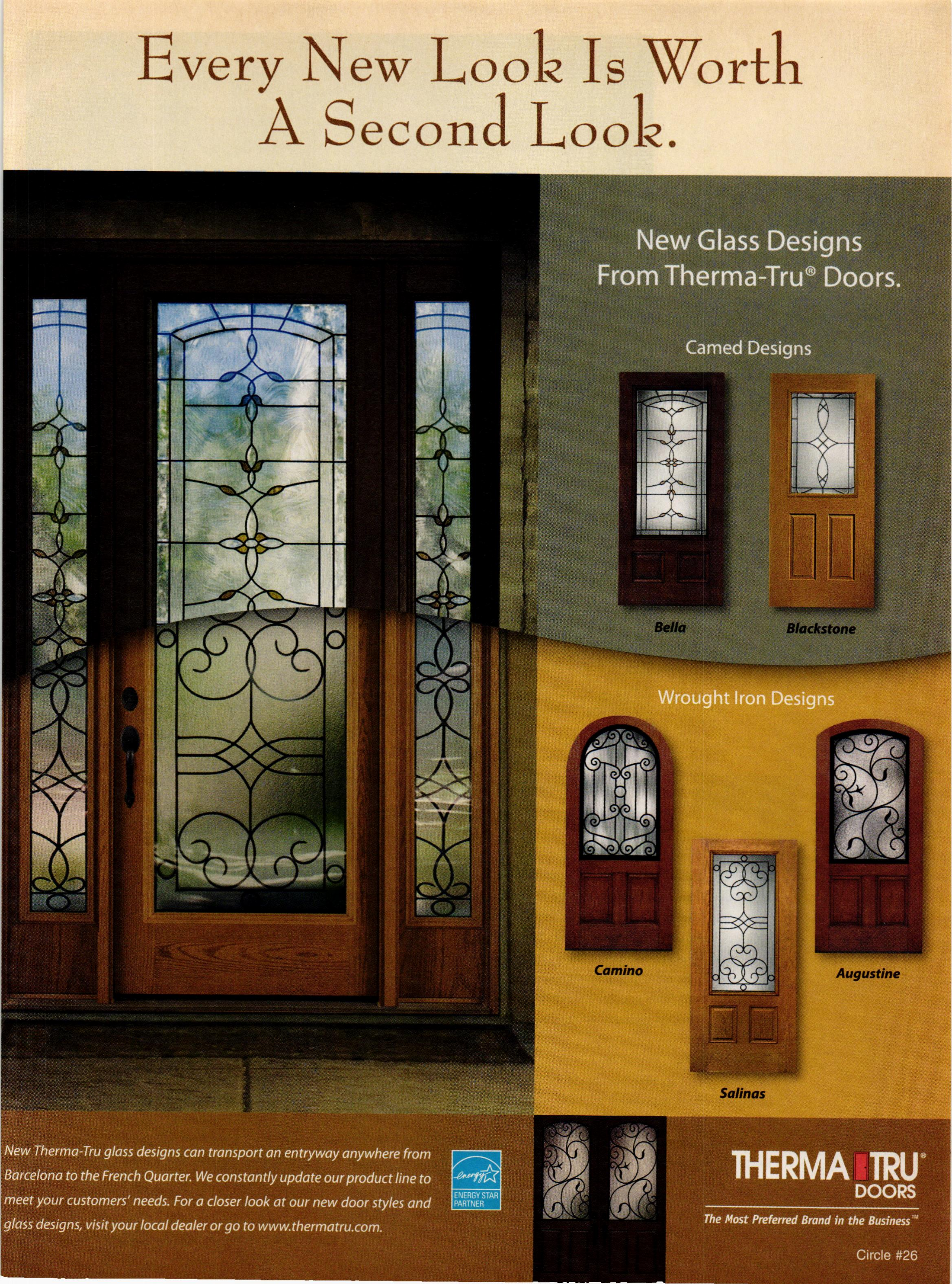
CHUCK LOCKHART

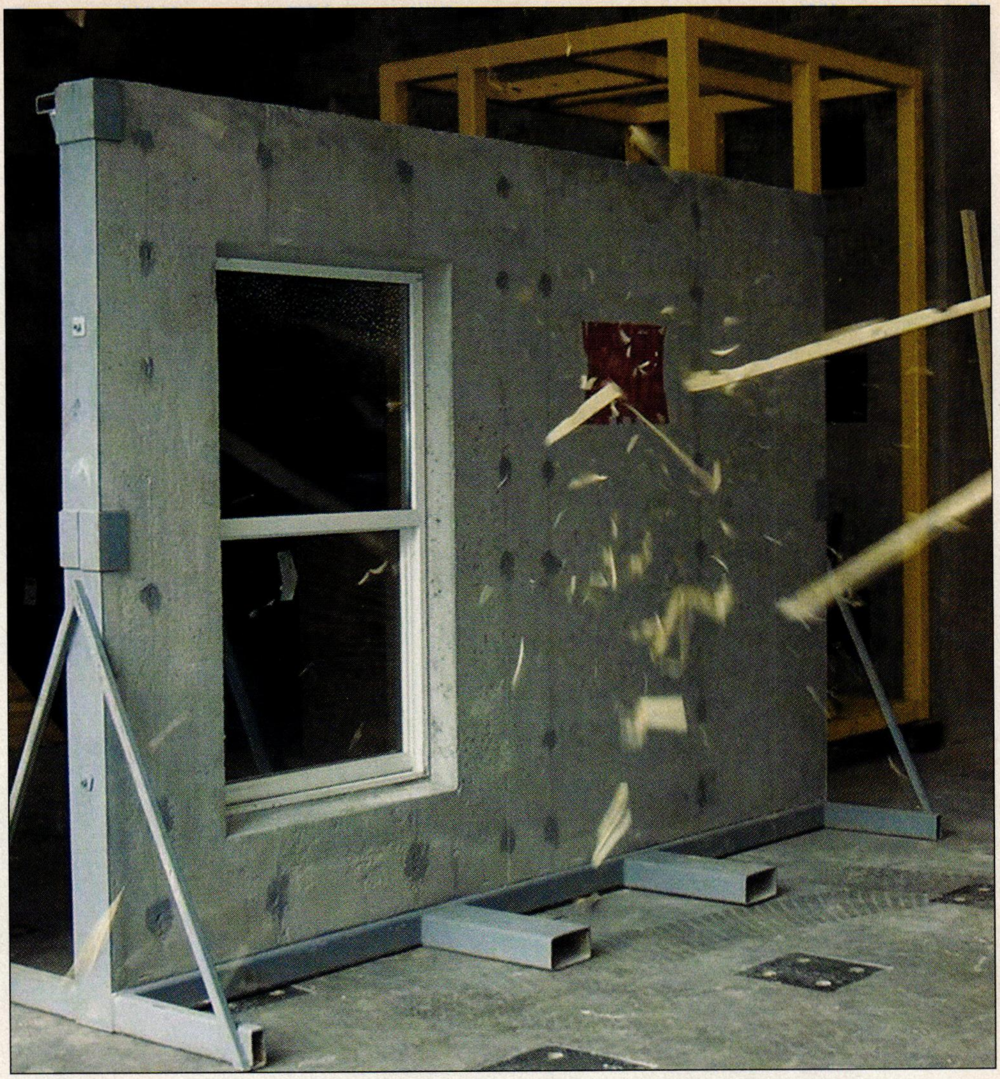
flow and to vent the moisture. If possible, add some venting louvers in the stair risers as well.

Ipe is somewhat notorious for shrinkage, because a lot of it gets shipped with a fairly high moisture content. It's not unusual to get boards with 20% MC or higher from a hardwood distributor. For any future ipe decks you build, be sure to rip off any shrink-wrap that the boards might be bundled in, and sticker the boards on sawhorses or blocks to get them up off a slab or floor for several days before fastening them down. Avoid stacking the ipe over bare earth. Ipe is one of those woods you really should not install without being certain of the MC. Around 12% MC (to a maximum of 15% MC in humid climates) is what you'd like to see for exterior trim and deck applications in most areas of the United States.

It's worth noting that I do not think the Eb-Tys had anything to do with the problem. While Eb-Tys do force you to gap the boards initially (and therefore you cannot lay them down tight when the MC is higher than the usual 12% equilibrium MC), I think it makes more sense to acclimate any wood decking prior to fastening. The idea that you can lay up wet boards and let them shrink to the correct gap (as some wood technologists propose) does not make sense to me. This would stress whatever type of fastener you have, and I don't think it's prudent to build that kind of stress into a deck by design. Some carpenters have written to us, arguing that the continuous groove along the boards (intended to speed up the installation of Eb-Tys) can trap blowing dirt and sand that will hold moisture and speed up the process of deterioration and rot. While this might be a long-term problem in some locations, not enough debris is likely to have accumulated in the few years to be of concern in this case.

Also, I don't think the finish the homeowner put on either helped or hurt the situation. True, ipe is one of the few woods that can go unfinished without the wood significantly deteriorating over time. Instead, it weathers over a few years (depending on exposure to the sun) to a silver-gray. Not everyone likes this color, however. Many homeowners love the rich tone of new ipe, and as long as they are willing to maintain the finish every year or two to preserve that look, it's not a bad way to go. It's theoretically possible the finish might have trapped some of the rising moisture in the board, making the bottom side swell more, possibly increasing the distortion. However, I don't think that would be significant if you address the root cause — the moisture below the deck — in the first place. What you absolutely do *not* want to do, however, is to seal the bottom surface of the decking in an effort to fend off the absorption of moisture from below. This could create a trough out of the board that would trap rainwater, leading to reverse cupping or accelerated deterioration of the wood.


Every New Look Is Worth
A Second Look.
New Glass Designs
From Therma-Tru® Doors.
Camed Designs
Bella
Blackstone
Wrought Iron Designs
Camino
Augustine
Salinas
New Therma-Tru glass designs can transport an entryway anywhere from Barcelona to the French Quarter. We constantly update our product line to meet your customers' needs. For a closer look at our new door styles and glass designs, visit your local dealer or go to www.thermatru.com.
ENERGY STAR PARTNER
THERMA TRU® DOORS
The Most Preferred Brand in the Business™
Circle #26



The 2x4 used in the "large missile test," which has become the standard measure for impact resistance, completely shatters upon impact with solid concrete, causing no damage whatsoever to the advanced wall system developed by Mercedes Homes and the Department of Energy's Building America program.

A builder's search for a new wall system leads to a more hurricane-resistant home

Following the 2004 hurricane season, Florida-based Mercedes Homes set out to design and build a truly hurricane-resistant home. But as researchers and builders have come to understand only too well, a home that provides complete protection from an intense tropical storm must offer not just superior structural strength but also afford both greater resistance to wind-driven rain and improved post-storm recovery.

EARLY EFFORTS

The prototype to this hurricane-resistant home began in 2000, when Mercedes Homes started working with Building America research teams to develop an advanced wall system to replace the concrete masonry unit (CMU) construction typically used in Florida. After experimenting with a variety of test systems, including two different types of precast concrete wall systems, Mercedes Homes selected a cast-in-place concrete wall system, which it dubbed the Solid Wall System (SWS), and began providing it as a standard offering on its homes in Central Florida.

Beginning in 2001, with funding provided by the Federal Emergency Management Agency (FEMA), the Mercedes concrete wall system was rigorously examined and engineered for hurricane resistance by researchers from University of Florida's Program for Resource Efficient Communities and Steven Winter Associates, Inc. Engineering analysis of this initial wall system showed a potential for marked improvements in structural integrity over a CMU wall.

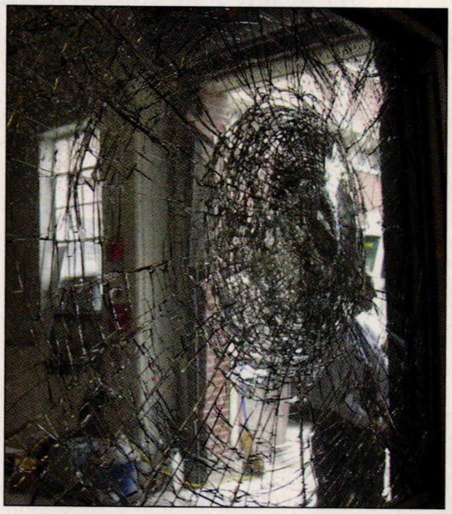
Hurricane-Resistant Concrete Homes

by William Zoeller

However, the 2004 hurricane season provided a different lesson about hurricane protection: after a record number of tropical storms pounded Florida and the Southeast, the majority of damage to buildings was not so much structural failure but damage from wind-driven rain intrusion. In order to be truly hurricane resistant, the new wall system would have to provide not only enhanced wind-load protection but also significantly reduced incidence of water intrusion.

STRUCTURAL PROTECTION

In much of Florida, the typical single-family home is built with CMU walls. Although stronger and more durable than standard frame construction when subjected to a tropical storm, these homes are still susceptible to lateral and uplift wind-load failures as well as to penetration damage caused by wind-blown debris ("missiles"). The Mercedes SWS cast-in-place concrete wall developed with the help of the Building America program performs better than a CMU wall (and monumentally better than a wood-framed wall) at resisting these forces (**Figure 1**).



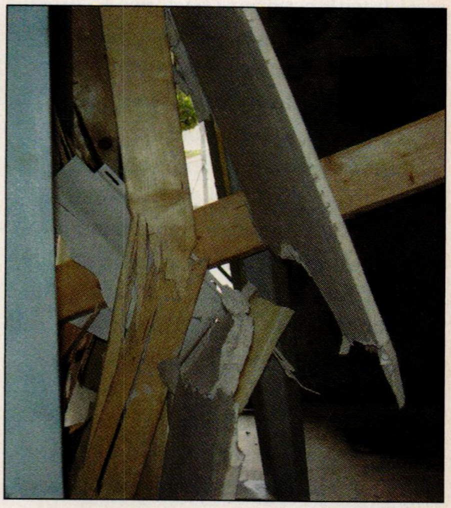


FIGURE 1. Windows that meet the ASTM E 1886 and ASTM E 1996 impact standards shatter but do not present an opening that will either pressurize the interior or allow undue amounts of water into the home (above). However, most conventional wall systems do not fare as well under the same test. A typical vinyl-sided wood-frame wall is obliterated by the large missile test (right). A concrete block wall performs a bit better but still allows a sizable hole for wind and water to penetrate (top right).

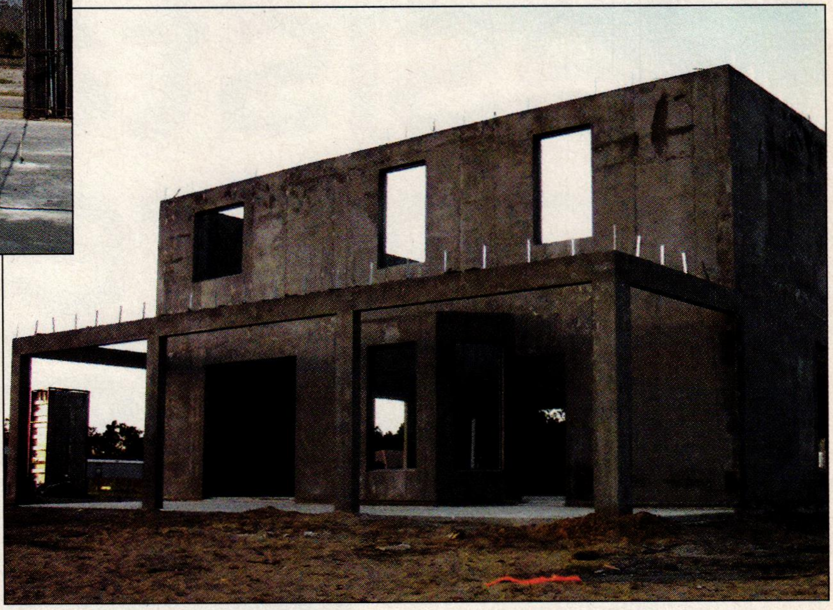


FIGURE 2. The heart of the Solid Wall System (SWS) is a steel reinforcing cage of 6x6x1/8-inch "road mesh" combined with vertical 5/8-inch reinforcing bars placed at 4-foot intervals (above). The cage is specifically designed to evenly distribute lateral wind loads and minimize point stresses imposed by missile impacts, which can lead to failure. The steel cage also connects to steel in the footings. Wet-set tiedowns (hurricane straps) are embedded every 2 feet in the concrete as the walls are poured, providing a continuous path to resist uplift.

The science of SWS. The SWS system uses 3,500-psi concrete placed in modular aluminum forms to create its 6-inch walls. The concrete encloses a steel reinforcing cage of 6x6x1/8-inch "road mesh" combined with vertical 5/8-inch reinforcing bars placed at 4-foot intervals (**Figure 2**).

This steel-reinforced concrete wall assembly acts as a monolithic composite system with superior resistance to hurricane-induced forces. When a point impact load or a sustained lateral load is imposed against the wall surface, the composite system acts to spread the forces through the system, thereby reducing the "stress" — and the potential for failure. The concrete (strong in compression, but not in tension) and the steel mesh (strong in tension, but not in compression) work in tandem, creating a wall assembly that is strong in both tension *and* compression.

Typical wind speeds for a Category 5 tropical storm range up to 155 mph, with wind-borne debris traveling well upward of 100 mph. Engineering analysis shows that the cast-in-place system can withstand missiles fired up to 200 mph. Uplift forces are also more efficiently resolved with SWS walls. In typical CMU construction, the upper course of block masonry is usually a grout-filled "bond beam" into which the roof truss tiedowns are set. Failure of this system can occur when the uplift wind forces exceed the limits of the bond-beam structural connections, which are most often solid-grouted CMU cores with rebars at every 4 feet on-center. Because the uplift load is resistant on a CMU wall at concentrated points, the potential for failure is greater than for the SWS walls. As with the impact-load resistance, the SWS walls effectively "spread" the applied forces, reducing opportunities for failure.

Other performance improvements. Structural strength is not the only benefit of the cast-in-place system. Concrete walls have high thermal mass, reducing energy transfer between interior and exterior surfaces and reducing homeowners' energy bills. The continuously poured system minimizes interior temperature fluctuations and drafts, and it also reduces noise transmission. Concrete inherently resists mold, termites, and rot because it contains no organic mater. The moisture that can enter CMU walls at joints, especially when deformed by structural loads, is eliminated in the monolithic system, as is the potential for flood water storage within the hollow CMU cavities. Additionally, the houses are safe from more than just hurricane disasters: the SWS structure, with its 6-inch solid concrete walls, offers up to a three-hour Class-A fire rating, making the home safer from wildfires.

WIND-DRIVEN RAIN PROTECTION

In addition to some structural vulnerability, the CMU walls typically found in much of Florida are also susceptible to water intrusion when subjected to a tropical storm. The Building America team

Decking, Evolved

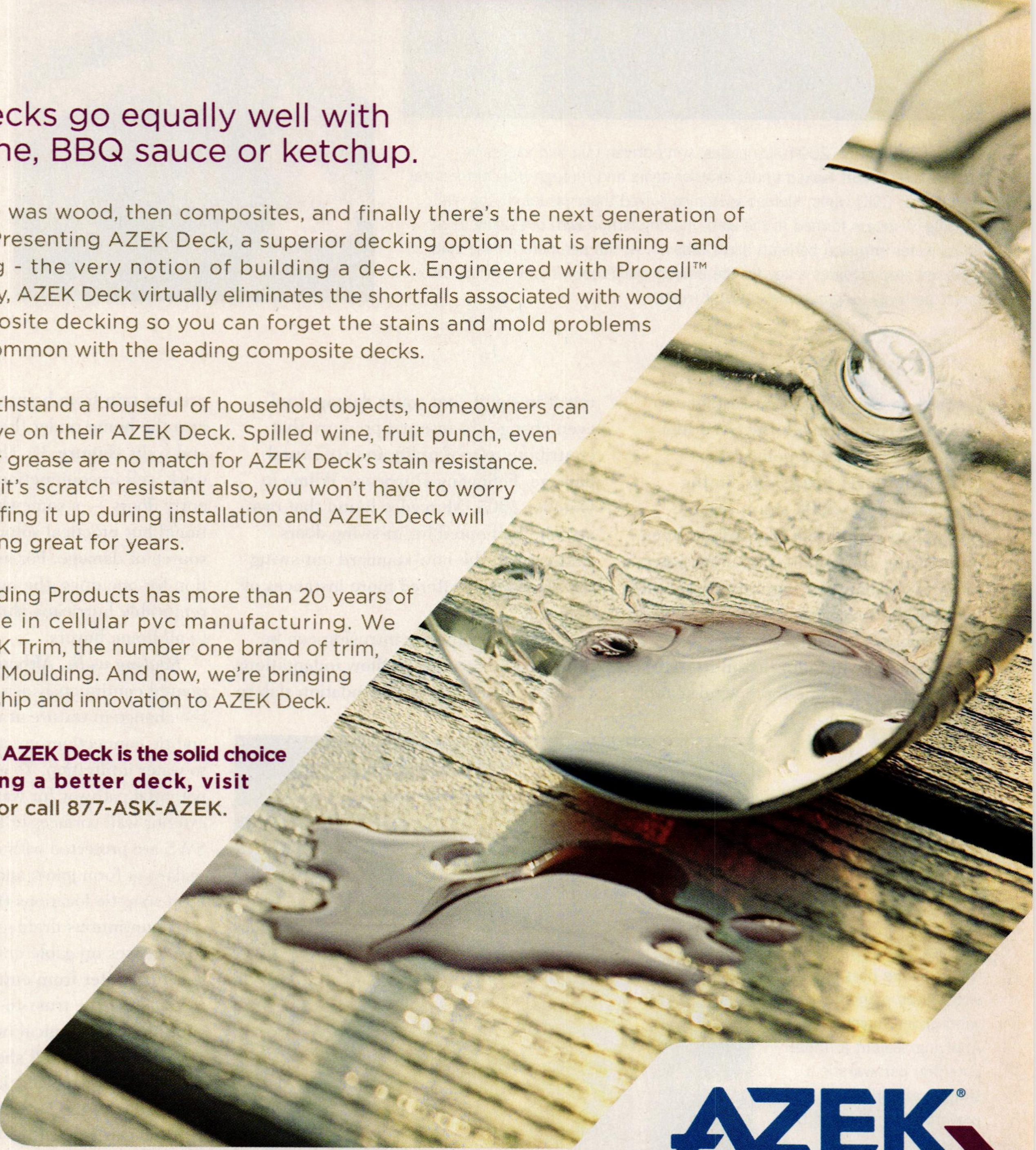
Our decks go equally well with red wine, BBQ sauce or ketchup.

First there was wood, then composites, and finally there's the next generation of decking. Presenting AZEK Deck, a superior decking option that is refining - and redefining - the very notion of building a deck. Engineered with Procell™ Technology, AZEK Deck virtually eliminates the shortfalls associated with wood and composite decking so you can forget the stains and mold problems that are common with the leading composite decks.

Built to withstand a houseful of household objects, homeowners can actually live on their AZEK Deck. Spilled wine, fruit punch, even hamburger grease are no match for AZEK Deck's stain resistance. And since it's scratch resistant also, you won't have to worry about scuffing it up during installation and AZEK Deck will keep looking great for years.

AZEK Building Products has more than 20 years of experience in cellular pvc manufacturing. We make AZEK Trim, the number one brand of trim, and AZEK Moulding. And now, we're bringing our leadership and innovation to AZEK Deck.

To see why AZEK Deck is the solid choice for building a better deck, visit azek.com or call **877-ASK-AZEK.**



AZEK® Deck

AZEK Building Products | AZEK Trim | AZEK Deck | AZEK Moulding

Circle #3

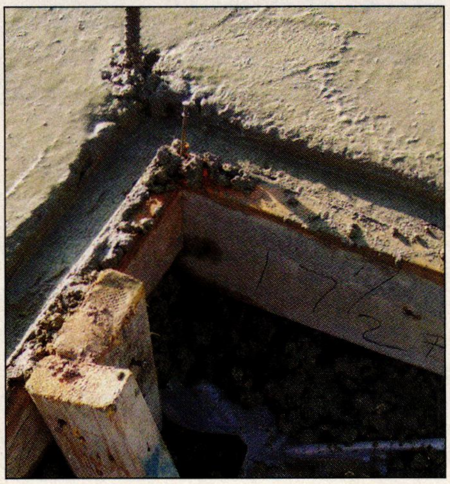


FIGURE 3. During the 2004 hurricanes, wind-driven rain and excessive ground-level runoff leaked under exterior doors and through the cold joint at the base of CMU walls. Mercedes Homes solved these issues during slab forming: A recess formed in the slab, in conjunction with out-swing doors, limits water intrusion beneath doors (above). At the perimeter of the slab, a recessed step provides a key for the poured walls that effectively cuts off a direct pathway for ground-level water (right).

focused on improving the resistance to water intrusion through the SWS in a number of vulnerable points.

Ground-level intrusions. In the aftermath of the 2004 storm season, researchers found that high-wind forces on in-swing entry doors can allow water to enter the home in significant quantities because the weather-stripping gaskets rely on pressure in the opposite direction. Complete blow-in failure of an in-swing door during hurricane-force winds can result in significant water damage and even changes in internal pressure that contribute to roof uplift and structural damage. Following Hurricane Wilma in October 2005, Mercedes found that owners who had opted for in-swing doors (rather than the now-standard out-swing configuration) suffered more instances of damage.

Ground-level water intrusion can be mitigated by creating shallow indentations or recessed seats in the foundation slab to prevent rain from being driven or sucked into the home under the exterior doors and walls (**Figure 3**). The recessed seats work well in conjunction with out-swing entry doors — a somewhat unconventional but practical solution to a common source of damage. For additional protection for openings, the builder also offers removable hurricane shutters as an option to all home buyers.

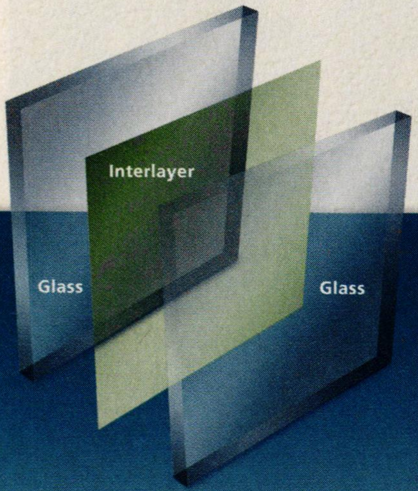
FIGURE 4. Form joints and snap ties are possible water entry points for wind-driven moisture. Applying sealant to these potential pathways is a simple, effective way to prevent water damage to the interior.

Sealing walls. Although concrete is poured continuously across multiple forms, the change in texture at vertical form joints and tie connections creates a vulnerability to water infiltration. To eliminate this potential pathway for water intrusion, the exterior wall surfaces of the Mercedes SWS are protected with elastomeric sealant at form joints and at the concrete form snap-tie locations (**Figure 4**).

A continuous drainage plane covers roof trusses on gable ends to prevent sheeting water from entering the building assembly at the truss-to-wall transition. In addition to the typical housewrap layer over the vertical wall sheathing, a separate building-paper-backed wire mesh is installed over the housewrap prior to the synthetic stucco finish. Without this

continued on page 34


When Your Customer Demands the Finest,
Look for the Signature that Endures
Signature lifetime®
Duron's highest quality, 100 percent acrylic exterior finish. This ultra-premium product features advanced technologies that provide long-term security throughout your customer's home.
Exterior House Paint
Lifetime Warranty
Self-priming on sound surfaces
Superior gloss and color retention
Exceptional performance on virtually any exterior, vertical surface
DURON
Signature lifetime
Our Highest Quality Finish
Flat
Satin
Gloss
100% ACRYLIC EXTERIOR FINISH
WHITE BASE
126 FL. OZ. 3.72 LITERS
DPR™ technology
DOUBLE-PLY RESIN
1
DPR™ Cross-section
Moisture
Hard resin layer
Soft portion of resin separates and penetrates pores of surface
SIGNATURE LIFETIME'S DPR™ TECHNOLOGY
IMPROVES THE COATING'S PERFORMANCE AT A MOLECULAR LEVEL. HARD- AND SOFT-SHELL POLYMERS BLEND TO FORM A VIRTUALLY IMPENETRABLE PAINT FILM ON THE HOME'S EXTERIOR.
HELPS RESIST THE EFFECTS OF HARSH WEATHER CONDITIONS, SUCH AS CRACKING AND FADING.
2
DPR™ TECHNOLOGY
ALSO PROTECTS AGAINST PEELING AND BLISTERING, ALLOWING INDOOR MOISTURE VAPOR TO PASS THROUGH AND DISSIPATE RATHER THAN BUILDING UP UNDER THE COATING.
Signature Lifetime — for the Ultimate in Exterior Living
DURON®
PAINTS & WALLCOVERINGS
Circle #9
10406 Tucker Street • Beltsville, MD 20705
Call 1.800.72DURON for the location nearest you.
www.duron.com
13076 2/06



ImpactGard™ protection features laminated glass with a plastic interlayer placed between two panels of heat-strengthened or tempered glass. The interlayer is 100 times more rigid than the industry standard and delivers five times its tear strength.

JELD-WEN windows. Now with invisible shutters.

10 YEAR LIMITED WARRANTY

JELD-WEN® windows and patio doors with ImpactGard™ protection deliver superior impact-resistance. In addition to protecting homes from wind-borne debris, these products provide forced-entry resistance and increased UV protection. To learn more, request our free ImpactGard brochure by calling 1.800.877.9482, ext. 5005, or visit **www.jeldwen.com/5005**.

RELIABILITY *for* real life®

JELD-WEN WINDOWS & DOORS

FIGURE 5. The perforations in Alcoa Hidden Vent are recessed in the panel grooves. The manufacturer claims this design provides plenty of ventilation airflow, but when combined with a fascia that extends a full inch below the soffit, the potential for water sheeting off the roof and getting driven by wind or surface tension into the vent openings is greatly reduced as well.

continued from page 30
added layer, moisture penetrating the stucco can seep right through a single layer of housewrap. The extra layer provides a foolproof drainage plane and allows for proper stucco adhesion.

Finally, SWS wall surfaces are finished with a high-performance acrylic coating capable of flexure and bridging small gaps to prevent the exterior walls from absorbing water during sustained heavy rainstorms.

Roof protection. At the roof level, researchers recommended several strategies to protect against water intrusion. In Mercedes houses, a peel-and-stick underlayment product adhers directly to the roof decking beneath the shingles to create a secondary roof drainage plane. This provides backup protection in the case of lost or damaged shingles — a common casualty of tropical storms.

In another frequent envelope failure, water sheeting off the roof spills down the fascia board and is driven by wind or surface tension into the soffit vent openings. To alleviate this mode of water entry, a redesigned fascia extends an inch below the soffit to form a drip edge, directing water down and away. A perforated soffit panel by Alcoa (www.alcoa.com), with recessed rather than surface openings, limits water intrusion while encouraging greater air circulation and faster drying within the eaves assembly (**Figure 5**). A simple change to baffled ridge and roof vents is also used to mitigate a common, and often significant, water-entry mechanism.

POST-STORM RECOVERY

Most of the losses from the 2004 hurricane season resulted from water intrusion, and mold played a significant role. Mold can grow undetected within the home for long periods of time, compromising indoor air quality and causing significant long-term damage to the home. When power outages prevent homeowners from drying out their homes quickly following a storm, water damage and mold growth become severe.

Backup power as a means of mold mitigation. To aid in post-storm recovery, Mercedes Homes offers a natural gas-fueled generator as an option to home buyers throughout the Florida market. The unit allows homeowners to use shop-vacs, fans, and dryers during post-storm recovery, when power outages are common, thereby greatly reducing the risk of mold growth and long-term damage.

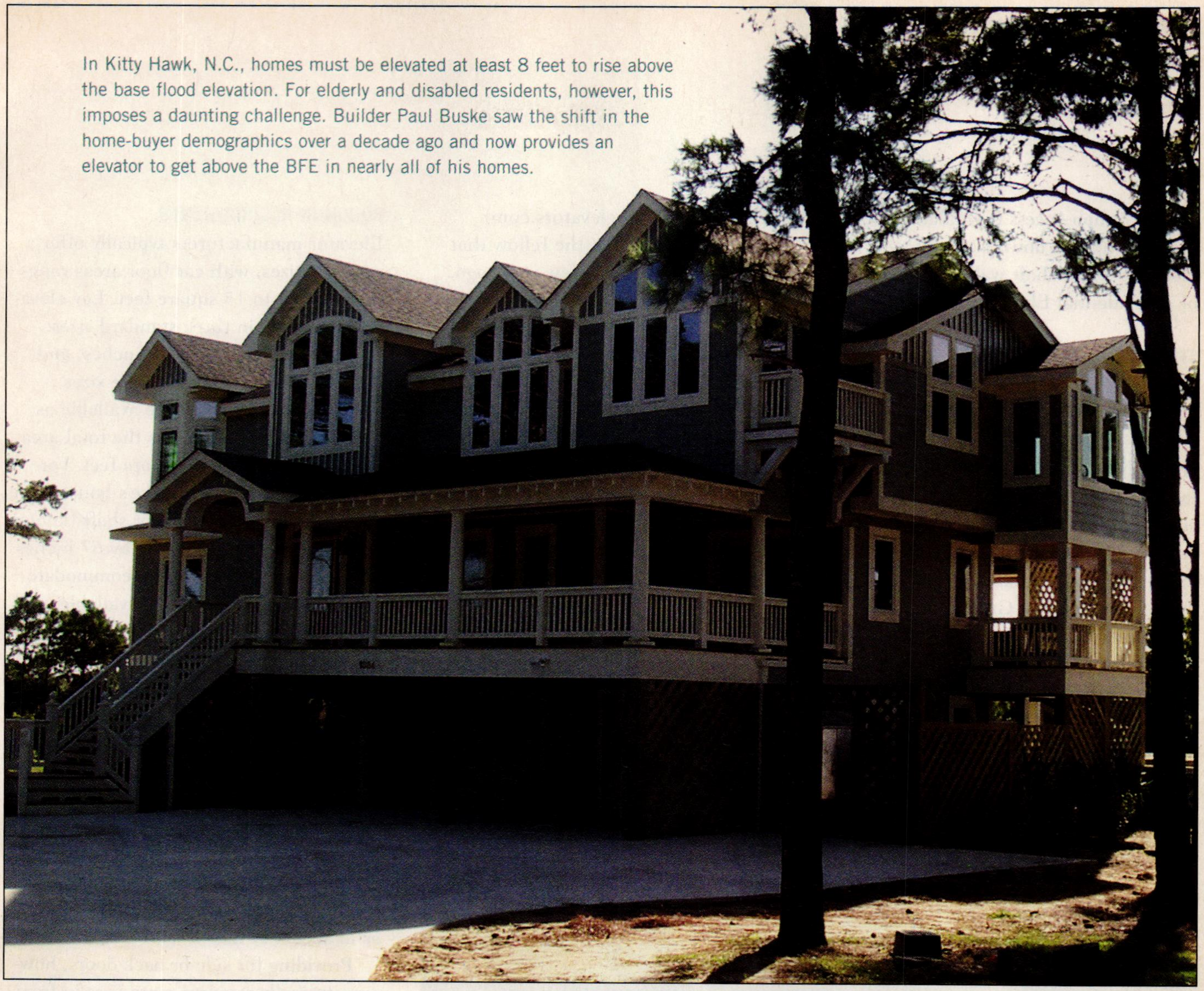
Mercedes Homes also offers a generator-ready electrical service panel that can be easily connected to a portable generator. Even if a homeowner is initially unable to afford the upfront cost of a natural gas generator, each home will be prewired and equipped for a generator to be installed at a later date, or as needed (see "Blackout Power Solutions," September/October 2007; available at www.coastalcontractor.net).

Companion strategy. Removing damaged drywall, and the mold it supports, was one of the most common storm-related repairs faced by homeowners following the 2004 hurricanes. To help remove the risk of mold, which grows particularly quickly on paper, adhesives, and other organic matter, Mercedes Homes uses non-organic finish materials. These storm-resistant homes use a new paperless drywall product offered by Georgia Pacific that has a glass reinforcing mat facing over a gypsum core, which resists mold growth better than traditional paper-faced products.

CONCRETE RESULTS

The concrete SWS homes are now a standard product for several Mercedes Homes divisions in Central Florida. Although incrementally more expensive than the CMU construction it replaces, the benefits of the concrete construction to homeowners and to the builder (production time for the walls are reduced to two days from five) easily outweigh the costs. The now-standard water-intrusion and storm-recovery measures add about $2,200 to the cost of the homes, and the upgrade options (generator and shutters) add another $8,000. Of the 343 new homes built using the improved specifications between June and October 2005, only 16 reported any damage (all minor) following a near direct-hit from Hurricane Wilma in October 2005 (the last significant hurricane to hit the region, as of this writing). With ongoing improvements, Mercedes expects to see even less damage, and many more happy homeowners, in the future.

William Zoeller is an architect and senior associate with Steven Winter Associates, Inc., of Norwalk, Conn. Photos courtesy of Steven Winter Associates.



In Kitty Hawk, N.C., homes must be elevated at least 8 feet to rise above the base flood elevation. For elderly and disabled residents, however, this imposes a daunting challenge. Builder Paul Buske saw the shift in the home-buyer demographics over a decade ago and now provides an elevator to get above the BFE in nearly all of his homes.

handicapped-accessible house," Buske explains. As long as your bathrooms and everything else are ADA-compliant, the landlord can advertise the house as accessible."

Landlords have learned that a home with an elevator can earn a rental premium, even from people with no special disabilities. As the U.S. population ages, more and more seniors are joining their families at the beach. An elevator equips the house to host a true family vacation that includes every generation, and even younger family members appreciate being able to bring in a full load of groceries without making a half-dozen trips up the stairs.

EQUIPMENT CHOICES

There are three basic types of residential elevators:

- hydraulic-drive units that use a hydraulic ram to lift the cab
- cable-and-drum units that lift the cab using cables that wrap around a motor-driven drum
- electric chain-drive units that use an electric motor geared to a large, counter-weighted chain

Buske prefers the nonhydraulic solutions. "There's nothing wrong with hydraulic elevators," he says. "But with a hydraulic elevator, you need a dedicated space for the equipment: The hydraulic reservoir, the hydraulic pumps, and all of your electronics and electrical control panels have to be housed in a separate room. Then you just pipe your hydraulic fluid over to the hydraulic ram that lifts the elevator."

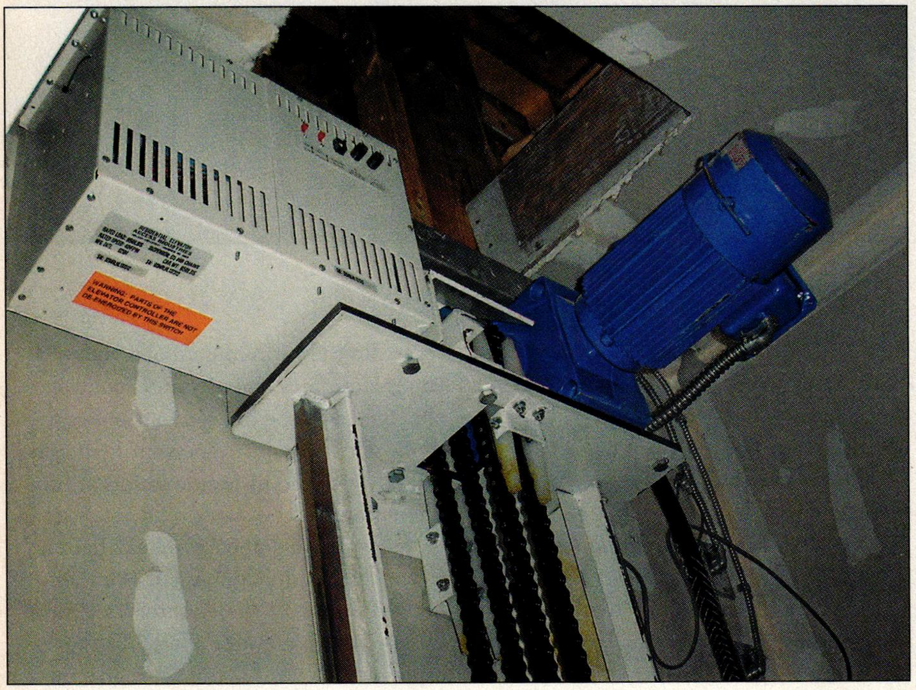
Electric units don't need all that space. "All of the equipment is either housed on top of the elevator itself or at the top of the elevator shaft," Buske explains. "So we don't have to give up 25 to 35 square feet to equipment, and we can use that floor space for something else that serves a better purpose for the homeowner." The elevators Buske currently provides are Lev brand units (www.thelev.com), manufactured by

ThyssenKrupp Access (www.tkaccess.com), that ride up and down a pair of steel rails fastened to the shaft wall (see "Anatomy of a Residential Elevator").

TRADE RELATIONS

Surprisingly, even a relatively small market like the North Carolina barrier islands is served by more than one specialty elevator contractor. Buske has two local contractors to choose from, one supplying hydraulic elevators and one supplying the electric Lev brand. Should either of these be unavailable, elevator companies based in Greenville and Raleigh, N.C., also install and service elevators on the Outer Banks.

Currently, Buske's preferred elevator vendor is Atlantic Elevators in Manteo, N.C. (www.atlanticelevators.com). "It just happened that the fellow that started this company a few years ago, Kenny Pekrun, was already a personal friend of mine. I knew about him, I knew his work ethics; it was just a perfect fit," comments Buske. The electric Lev elevator brand has also proved itself reliable, claims Buske: "The installers need to find a company they can depend on to make a good product. They need to know that they can get their product in a timely manner and they can get parts when they need parts — just as I have to know that if I'm putting a product in my house, my trade contractor can service it, so that my homeowners aren't sitting waiting for weeks or months for something to get fixed."



Even in a large home, floor space is always at a premium, which is the primary reason Buske prefers electric elevators: The equipment to operate them simply takes up less space. All of the equipment can be housed at the top of the elevator shaft just below an access hatch that leads from the attic to the top of the "hoistway." (By contrast, a hydraulic elevator requires an equipment room for the pump unit and electrical controller, which must be at least 30 by 36 inches to provide the necessary clearances required by the NEC.)

ROUGH-IN REQUIREMENTS

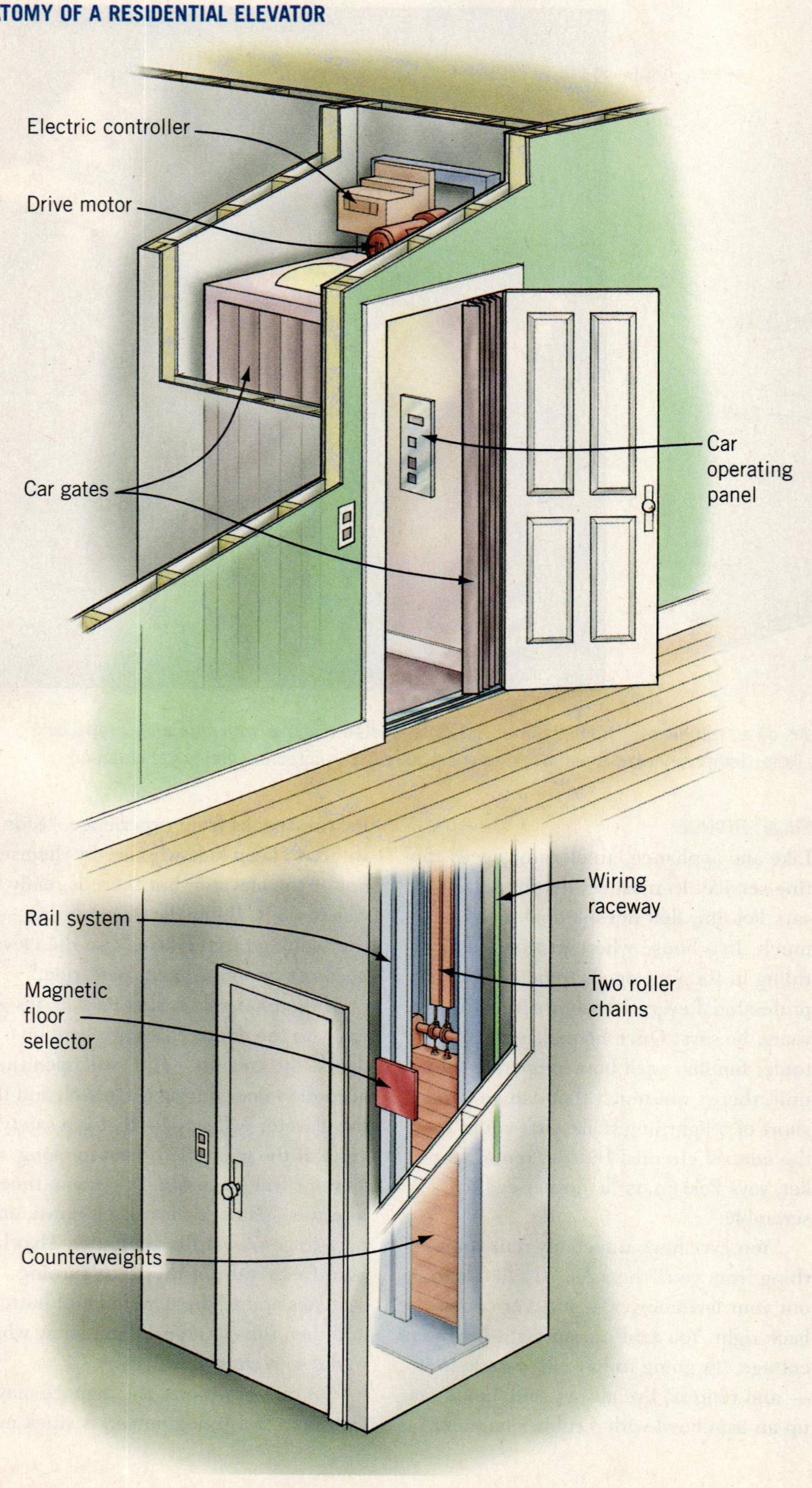
Elevator manufacturers typically offer a range of sizes, with car floor areas ranging from 12 to 15 square feet. Lev elevator cars come in three standard sizes: 36 by 60 inches, 36 by 48 inches, and 40 by 54 inches. Intermediate sizes (in 2-inch increments) are available as a custom order, as long as the total area is between 12 and 15 square feet. For the sake of flexibility, Buske's house plans always allow for an elevator shaft (known as the "hoistway") that's 67 by 67 inches square. That way, he can accommodate the longest elevator model available, and the space gives him complete flexibility for locating any size elevator on any side of the shaft — as long as the cab has only one door.

Besides the main door, Lev elevators can be fitted with an additional door on either side or on the back, so that passengers can enter through one door on one level and exit the car in another direction on the next floor. This allows for greater choice in room or hallway layout, as well as in access to the elevator.

Providing for side or back doors, however, typically requires more care in framing the shaft and laying out the door locations. The code specifies certain tolerances for elevator doors, explains Kenny Pekrun. When the elevator's accordion door is closed, and the home's shaft door is closed, there can be no more than 5 inches of air space between them. This guideline is designed to prevent small children from being injured if they get caught between the doors. By the same token, the code allows only a small gap between the elevator floor and the main house floor when the elevator comes to a stop.

"With a single-door application, all that is pretty simple," says Pekrun. "We can easily position the rail so that it brings the car close enough to the door. But with the two-door application, the

ANATOMY OF A RESIDENTIAL ELEVATOR



CHUCK LOCKHART

shaft must be sized precisely to the [stock] size elevator." Pekrun likes to meet with the framing crew to make sure they have all the measurements they need. It's often unfamiliar territory, but he can ease things considerably by drawing the rail centers and the door centers right on the plates for them.

The shaft or hoistway (which must be sheathed with fire-code gypsum drywall) is framed like any other wall system, with studs 16 inches on-center and ordinary door framing. However, the rail system does require its own beefed-up backer in one wall: a post made of doubled 2x12s, glued and nailed, flanked by 2x4s on each side, also glued and nailed. This post, which Pekrun calls a "rail header," serves as an attachment point for the elevator's steel T-rails. Four-inch lag screws at specified intervals anchor the rails to the framing (see "Rail Header Detail," page 40).

At the top of the shaft, the elevator needs at least 9 inches of headroom for the lift equipment. And at the bottom, it needs a 6-inch-deep "pit" in the foundation slab, reinforced according to specs provided by the elevator manufacturer — one more reason for Pekrun to stay in close communication.

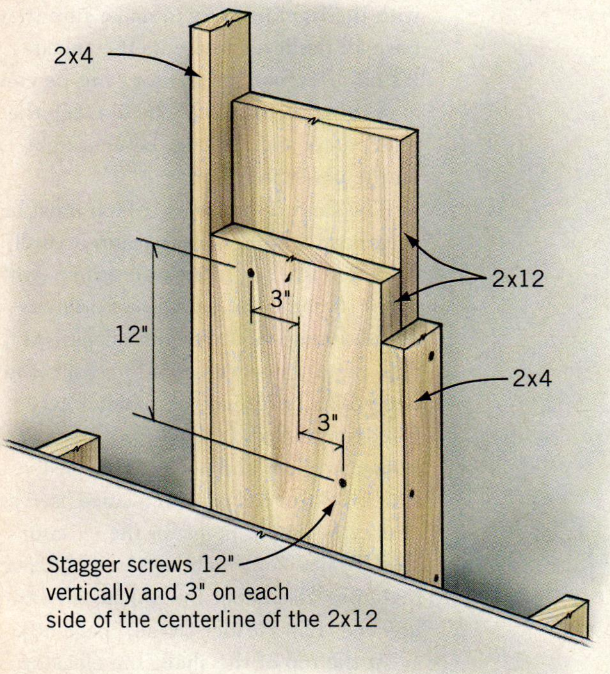
KEEPING DRY

Elevators come in especially handy for tall houses built on piling foundations. But at the same time, elevators can be vulnerable to flood damage. As Pekrun explains, the industry has taken that problem into account.

"FEMA has come through and redrawn all the flood hazard maps in our area," says Pekrun. "We have all the various flood elevations and flood zone types to deal with. But FEMA also says that your elevator can land below base flood elevation — no problem — provided that your elevator has an automatic means to return out of the flood plain."

Like most elevator companies,

RAIL HEADER DETAIL



The elevator's steel rail rides on a "rail header" framed out of 2x12s laminated together with glue and screws, and banded by a pair of 2x4s. Note: Temporary planks and decking are required fall protection during construction.

ThyssenKrupp Access now provides control circuitry designed to automatically return a Lev elevator to its "home floor" after use. "I can set it to return to any floor that I choose," explains Pekrun. "Of course, here in the flood plain, we use the second or third floor. It has a timer, so once you get out of the elevator, 300 seconds later it will return to that automatic home floor, and stay there until it is called again."

In some cases, says Pekrun, elevators may stop shy of the ground. "Occasionally, we locate the elevator at the top of a short access ramp to get it above the flood elevation. We make it a two-and-a-half or three-and-a-half-stop elevator. You can still access it from the driveway or ground level, but it doesn't travel all the way down. In that case, we also like to set it to automatically return to an upper floor after use."

MAINTENANCE

Like any appliance, an elevator needs routine service. In most residential settings, says Pekrun, that doesn't amount to much. In a house where just one family is riding it, the unit needs to be seen by a professional every 18 months to two years, he says. Once he makes the customer familiar with how to operate the unit, there's not much that can go wrong, short of a lightning strike that could fry the control circuits. But the rental market, says Pekrun, is "a 'nother egg to scramble."

"You ever have somebody rent something from you?" he asks. "It's like loaning out your lawnmower — it never comes back right. You rent out an eight-bedroom cottage, it's going to have 20 people in it — and renters, I've always said, could tear up an iron bowl with a rubber hammer."

Pekrun speaks from experience. "Kids — we try to keep kids who are by themselves out of the elevator, but there is really no way to do it. Rainy days are terrible — they can't go to the beach, so the elevator becomes an amusement park ride."

If there's damage, says Pekrun, it's generally to the doors. "Kids are hard on doors," he laments. "They will open the accordion door during the travel, and then the elevator will stop — that is a safety circuit." If the gate is left open too long, the elevator will try to run three more times at intervals. "Then it shuts itself down, and I have to go reboot the computer. That happens frequently; or they start turning switches and pushing a bunch of buttons and then the elevator doesn't know what to do, so it shuts down again."

On rare occasions, the damage may be extreme. "If a young person is stuck in

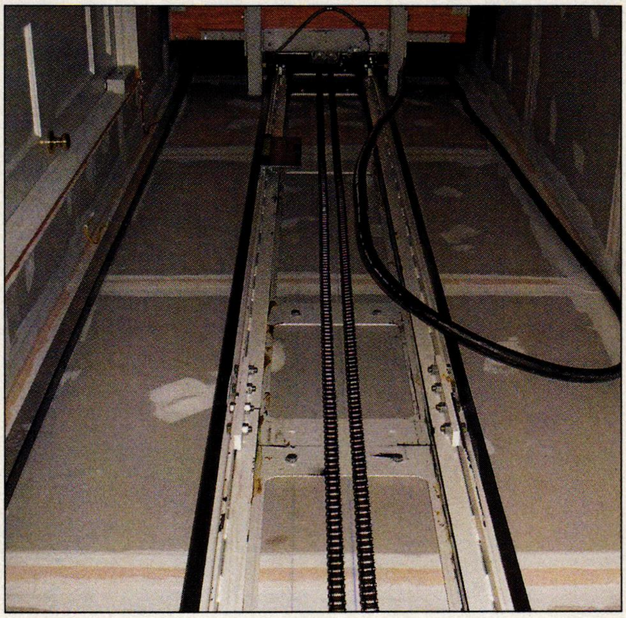
The cab rests on a pair of sliding "sling brackets" that cantilever off the rails. The balancing counterweight, sliding down or up between the rails, lightens the load for the 230-volt electric motor (positioned at the top of the shaft) that hoists the load. Note at right that the bottom of the hoistway — the pit — is below the lower landing and is framed in with pressure-treated lumber to stave off moisture damage to the drywall at the lower reaches of the home. The slab on the pit floor must withstand a 3,200-pound impact load.

there screaming and shouting, someone may take a crowbar or axe or something, or take the main door off the hinges and start prying. Then we have to replace stuff. That is the worst thing." Short of that kind of abuse, however, residential elevators are quite robust, says Pekrun, and should run for many years with minimal amounts of care.

Aging in Place?

Pekrun hopes to see elevators make headway in mainstream home construction, as an upgraded version of the accessibility products like stair lifts and wheelchair lifts that he also sells. "People are getting older, and doctors are making people live longer," he points out. "Building lots are more and more expensive, too, so people are building multistory homes. We are really trying to market our product with the idea that the aging population can stay in their homes. I tell them, 'Buy the view that you want forever, and let me make it accessible for you now, while you can afford it.' "

A former frame and finish carpenter, writer Ted Cushman has been covering construction business and technology since 1993. Photos by Paul Buske.



To meet fire code, the hoistway must be sheathed with drywall and taped, and be completely clear of any pipe, wires, or other obstructions. Typically, there's less that a 1/4-inch tolerance in the finished dimensions from top to bottom, which means the framing must be dead plumb. Note the box in the upper right-hand corner of the door: it's an automatic lock that secures the door when the cab is not in place. The magnetic plate on the rail opposite the door lock locates the floor, stopping the cab at the right elevation.

ATRIUM®
COMPANIES, INC

SafeHarbor® Vinyl Impact Windows & Doors The next generation of SafeHarbor Vinyl Impact Windows & Doors is available now for both new construction and replacement applications. SafeHarbor products are approved for hurricane debris test protocols, block 99% of UV rays, dramatically reduce sound transmissions and provide additional security against forced entry. Create a safe harbor for your homes now.

- **Single Hungs**
- **Double Hungs**
- **Horizontal Sliders**
- **Casements**
- **Special Shapes**
- **Sliding Patio Doors**

atrium.com

ATRIUM WINDOWS AND DOORS · HR Windows · DANVID Windows Doors · Thermal Industries, Inc. · SUPERIOR Windows & Doors · CHAMPION WINDOW · Darby Doors · NORTH STAR® VINYL WINDOWS AND DOORS

The Atrium Family of Brands

Circle #2

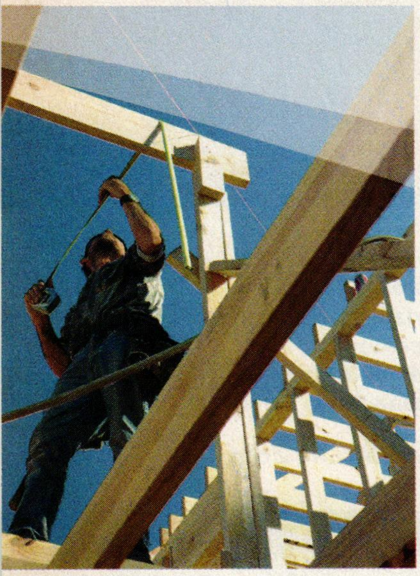
Standing Together

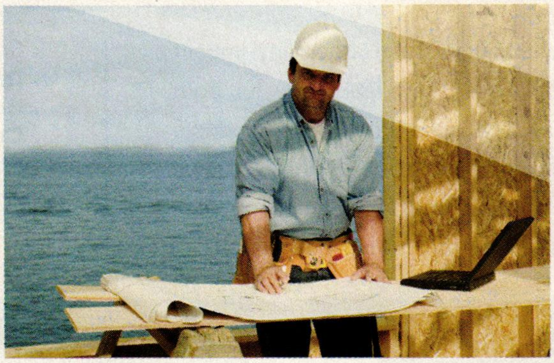
Best Practices for Coastal Construction

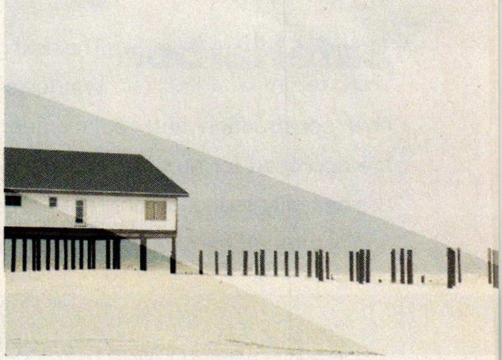
Attend the First Forum to Exchange Information and Share Best Practices

You're invited to attend the **Coastal Contractor Summit,** the premier forum for discussing and improving coastal building performance. Coastal builders, remodelers, architects, engineers, code officials and other professionals from all aspects of our industry will be standing together to share how we can make coastal construction safer and more lucrative.

- **LEARN** new building solutions based on current wind research
- **HEAR** successful strategies to overcome moisture intrusion
- **FIND** out about flood-resistant construction tactics
- **NETWORK** with coastal builders, remodelers, architects, engineers, and code officials







Brought to you by:

Coastal Contractor

Sponsored by:

ATRIUM COMPANIES, INC

MOLD-RESISTANT FrameGuard INDOOR WOOD

Wood Treated Right™

Plycem

Coastal Building Resources

A complete guide to safe and sustainable coastal homes

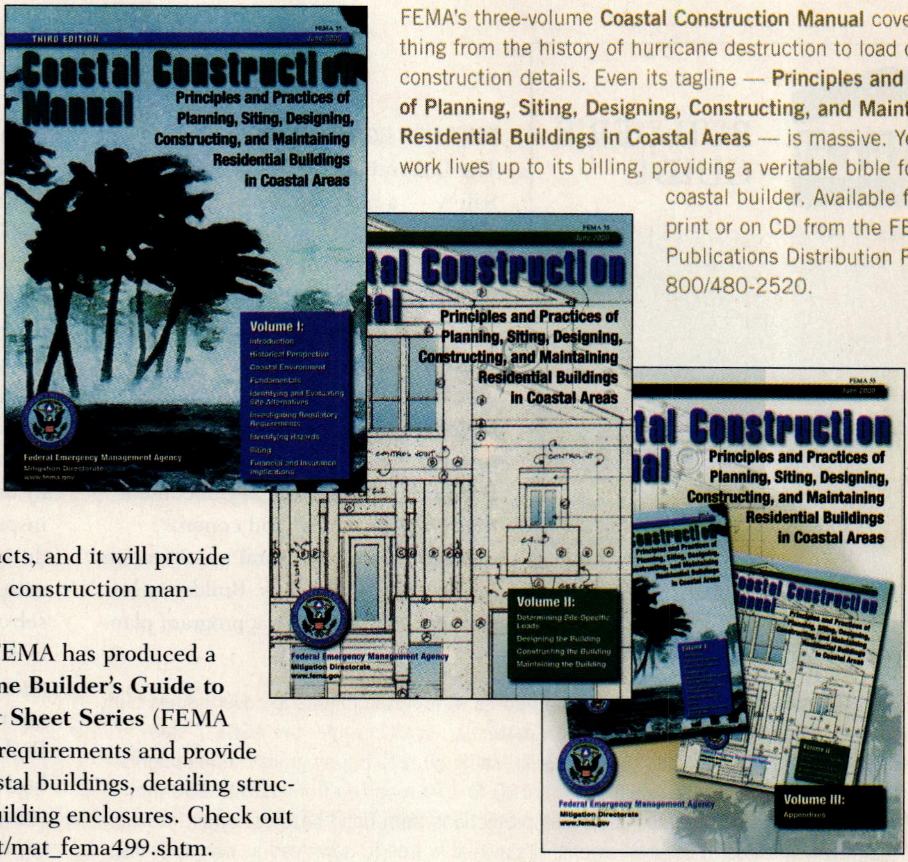
by Clayton DeKorne

As an industry, we know how to build a home suitable for coastal living. Daunting as the climate can be — with its hurricane-force winds, floods, home-crushing waves, incessant rain, high humidity, short drying cycles, scorching sun, and corrosive concentrations of salt — the home-building industry has the capacity to construct homes capable of withstanding these forces. Complete protection, however, requires the know-how from a number of different sources. The titles gathered here provide a good representation of this collective knowledge and even point the way toward overcoming new perils looming on the horizon.

COASTAL CONSTRUCTION MANUAL

FEMA's **Coastal Construction Manual**, known as FEMA 55, remains a staple for every coastal builder. Covering everything from the complete history of the hurricane damages unleashed on U.S. coastlines to the principles of designing and constructing residential buildings in coastal areas, this feast of information fills a 4-inch binder when printed. It's a bit lean on the sort of job-site savvy that leads to efficiency and elegance, but it's rich in basic building facts, and it will provide the essential savoir faire for designers, construction managers, and trade partners.

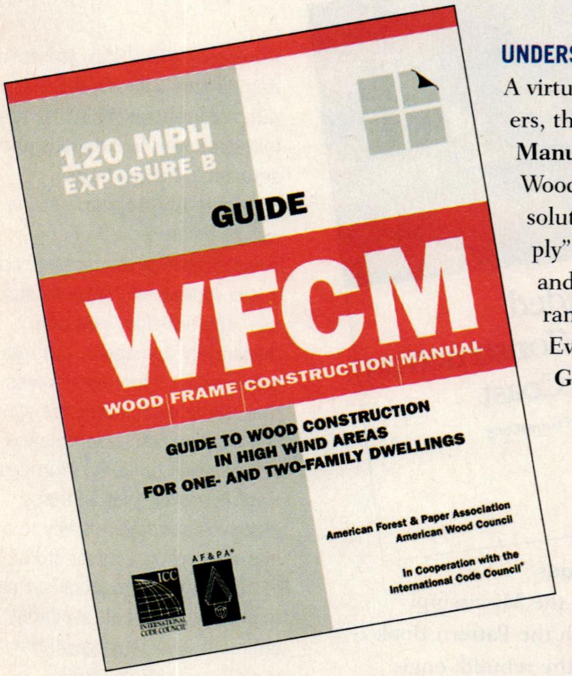
For those with a smaller appetite, FEMA has produced a series of 31 bite-sized fact sheets, **Home Builder's Guide to Coastal Construction Technical Fact Sheet Series** (FEMA 499), that summarize flood-insurance requirements and provide information about proper siting of coastal buildings, detailing structural connections, and weatherizing building enclosures. Check out the series at www.fema.gov/rebuild/mat/mat_fema499.shtm.



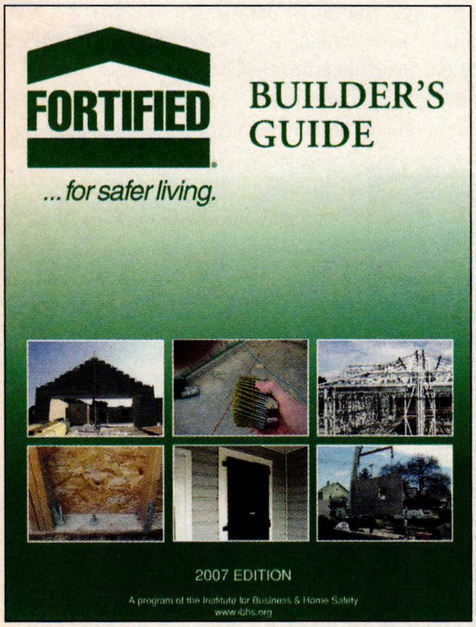
FEMA's three-volume **Coastal Construction Manual** covers everything from the history of hurricane destruction to load calcs and construction details. Even its tagline — **Principles and Practices of Planning, Siting, Designing, Constructing, and Maintaining Residential Buildings in Coastal Areas** — is massive. Yet this work lives up to its billing, providing a veritable bible for the coastal builder. Available free in print or on CD from the FEMA Publications Distribution Facility, 800/480-2520.

UNDERSTANDING WIND LOADS

A virtual engineer between book covers, the **Wood Frame Construction Manual** (WFCM) from the American Wood Council offers prescriptive solutions that are "deemed to comply" with ASCE 7 for seismic, wind, and gravity loads for a limited range of house sizes and shapes. Even easier to use are the new **Guides to Wood Construction in High Wind Areas** — five short handbooks geared to five different wind-speed zones (90 mph, 100 mph, 110 mph, 120 mph, and 130 mph). Each provides drawings and tables specifying the main structural elements of a wood-frame house in a high-wind area. Published in cooperation with the International Code Council, the guides provide a quick and simple path to coastal code compliance.



A new series of easy-to-use **Guides to Wood Construction in High Wind Areas** addresses wind design requirements in 90-, 100-, 110-, 120-, and 130-mph wind zones. The guides are based on provisions contained in the **Wood Frame Construction Manual for One- and Two-Family Dwellings**, 2001 Edition, the reference document for high-wind wood-frame construction in the International Residential Code (IRC). Available free to download at www.awc.org/Standards/wfcm.html.



The **Fortified ... for safer living** program has modified its wind requirements to cover homes built to resist winds 20 mph more than those set for a particular location under the ASCE 7 standards. This means that coastal homes from Texas to Maine built to the program's requirements will be protected from hurricane-force winds from 120 to 170 mph (up from 100 to 150 mph per ASCE 7). The revised program also addresses protections from flood hazards, water intrusion, and fires — all likely hazards in coastal regions. It's available free to download at www.ibhs.org.

FORTIFIED HOMES

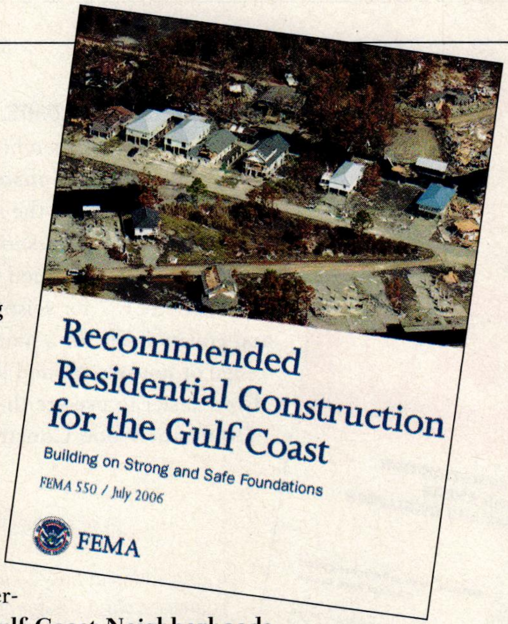
The Institute for Business & Home Safety — a nonprofit arm of the insurance industry — has been charged with reducing the risk of natural disasters by upgrading the built environment. Towards this goal, IBHS instituted the **Fortified ... for safer living** program, which presents a set of prescriptive building guidelines intended to exceed ASCE 7. The Fortified ... for safer living **Builder's Guide** is the key document that provides a clear and concise overview of the structural requirements for resisting high winds. Builders who submit their project to a program plan reviewer, follow the Fortified guidelines, and have the home inspected by a program inspector, can certify the project as a Fortified home.

Whether or not this wins the owner a break on insurance premiums (it could, depending on the provider), the program should lend real value to a coastal home. While the program requirements have been crafted with an eye toward practicality, it's got real teeth and it's not necessarily an easy certification to get. The inspector must visit the site four times during construction to verify compliance with the Fortified standards, which themselves have been painstakingly considered by some of the best wind and civil engineers in the business. The requirements are meant to exceed the International Building Codes, and thereby go beyond basic life and safety standards, to meet a standard of care that would mitigate expensive damage to homes.

GULF COAST GUIDEBOOKS

While critics have disparaged FEMA's response to Hurricane Katrina, it is heartening that the engineers charged by FEMA with mitigating future disasters mounted an impressive response to Katrina with the publication of **Recommended Residential Construction for the Gulf Coast: Building on Strong and Safe Foundations**. Dubbed FEMA 550, this groundbreaking guidebook provides engineers and builders with the essential information needed to build coastal foundations that can stand up to the huge wave forces of another hurricane on the scale of Katrina.

Developed as a guidebook to rebuilding the Gulf Coast, it includes pre-engineered foundation designs, some that match the traditional Gulf Coast vernacular home designs found in **A Pattern Book for Gulf Coast Neighborhoods** (www.mississippirenewal.com/documents/Rep_PatternBook.pdf) developed by the Mississippi Governor's Commission on Recovery, Rebuilding, and Renewal. Together, both the Pattern Book and FEMA 550 provide a rich resource for easing two of the biggest costs of the rebuild: engineering and architecture.



On August 29, 2005, Hurricane Katrina struck the Gulf Coast with record-breaking storm surge that destroyed foundations and devastated homes from Louisiana to Alabama. Katrina was so destructive that engineers assessing the carnage no longer looked for "success stories" (homes that were only moderately damaged), but rather searched for "survivor" homes that, while extensively damaged, still bore a slight resemblance to a residential building. Hurricane Katrina proved that a strong, elevated foundation is key to a home surviving a major storm. FEMA's latest guidebook set out to address just that (available online at www.fema.gov/library/viewRecord.do?id=1853).

Advertising Index

ADVERTISER	PAGE	RS#	WEB SITE	PHONE
American Express OPEN	2&3	1	PlumCard.com	877-OPEN-PLUM
Atrium Windows & Doors	43	2	atrium.com	
AZEK Deck	29	3	azek.com	877-ASK-AZEK
AZEK Trimboards	59	4	azek.com	877-ASK-AZEK
BOSCH	63	—	imgreat.org	888-52GREAT
Coastal Contractor Summit	44&45	—	coastalsummit.com	
Cox Industries	35	5	coxwood.com	800-849-0491
Custom Window Systems, Inc.	60	6	cws.cc	800-327-3086
DeckExpo 2008	17	—	DeckExpo.com	866-475-6707
DLH Nordisk, Inc.	54	7	dlhusa.com	800-688-2882
Duron Paints and Wallcoverings	31	9	duron.com	800-72DURON
Generac Power Systems, Inc.	22	10	guardiangenerators.com	888-GENERAC
Gerard and Allmet Roofing Products By Metals USA	41	8	allmet.com	
International Code Council	14	11	iccsafe.org/Contractor	888-ICC-SAFE x33806
JELD-WEN Windows & Doors	53	13	jeld-wen.com	800-877-9482 xadv600
JELD-WEN Windows & Doors	32&33	12	jeld-wen.com/5005	800-877-9482 x5005
Masisa USA, Inc.	IBC	14	plycemtrim.com	770-405-2628
Masonite International Corporation	10	15	masonite.com	800-663-DOOR
MI Windows & Doors	18	16	miwd.com	717-365-3300
MiTek Industries, Inc.	6	17	mii.com/stabilizer	800-325-8075
Muhler Company	58	18	muhler.com	800-899-5712
Norbord Industries, Inc.	8	19	Windstormosb.com/CC	
NuCedar Mills	15	32	nucedar.com	866-393-8883
Nudura Corporation	61	20	nudura.com	866-468-6299
Online Accounting	62	—	onlineaccounting.com	888-254-9252
Reward Wall System	7	21	rewardwalls.com	800-498-6344 x611
Simonton Windows	IFC+1	34	simonton.com	800-SIMONTON
Simonton Windows	OBC	33&35	simonton.com	800-SIMONTON
Simpson Strong-Tie	13	22	strongtie.com/hw	800-999-5099
Smart VENT	62	23	smartvent.com	877-441-8368
Snavely Forest Products	12	24	snavelyforest.com	800-348-1089
Strongwell	61	25	strongwell.com	276-645-8000
Therma-Tru	25	26	thermatru.com	
TimberTech	20	28		
TimberTech	21	27	timbertech.com	800-307-7780
Trex	4	29	trexpartners.com	800-BUY-TREX x6343
Trimline Building Products	7	30	trimline-products.com	800-438-2920
Windsor Window Company	57	31	windsorwindows.com	800-218-6186

Advertising Sales Offices

HEADQUARTERS

Rick Strachan
Group Publisher
(202) 736-3332 Fax: (202) 785-1974
rstrachan@hanleywood.com

Mark Taussig
Publisher
(202) 736-3406 Fax: (202) 785-1974
mtaussig@hanleywood.com

Paul Tourbaf
V.P., Sales & Editorial, e-Media
(202) 729-3629 Fax: (202) 785-1974
ptourbaf@hanleywood.com

Katina Billado
Ad Contracts Coordinator
(802) 879-3335 ext. 180 Fax: (802) 879-9384
kbillado@hanleywood.com

NORTHEAST

Louise Cupelli
Regional Sales Manager
(Including CT, DC, DE, MA, ME, NH, NJ, NY, PA, RI, VA, VT, WV)
(215) 413-0331 Fax (202) 785-1974
lcupelli@hanleywood.com

MIDWEST

Paul Gillen
Regional Sales Manager
(Including IA, IL, IN, KS, KY, MI, MN, MO, ND, OH, NE, OK, SD, TX, WI)
(773) 824-2404 Fax: (773) 824-2540
pgillen@hanleywood.com

SOUTHEAST

Fred Chandler
Regional Sales Manager
(Including AL, AR, FL, GA, LA, MD, MS, NC, SC, TN)
(202) 729-3544 Fax: (202) 785-1974
fchandler@hanleywood.com

WEST

Edward N. Klaner
Regional Sales Manager
(Including AK, AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA, WY)
(415) 441-8965 Fax: (415) 441-8966
eklaner@hanleywood.com

CANADA

D. John Magner
York Media Services
(416) 598-0101 Fax: (416) 598-9191
jmagner@yorkmedia.net

CLASSIFIED ADVERTISING

Janet Allen
Director - Inside Sales
(202) 736-3330 jallen@hanleywood.com

Radford Brogden
Account Executive - South
(202) 729-3537 rbrogden@hanleywood.com

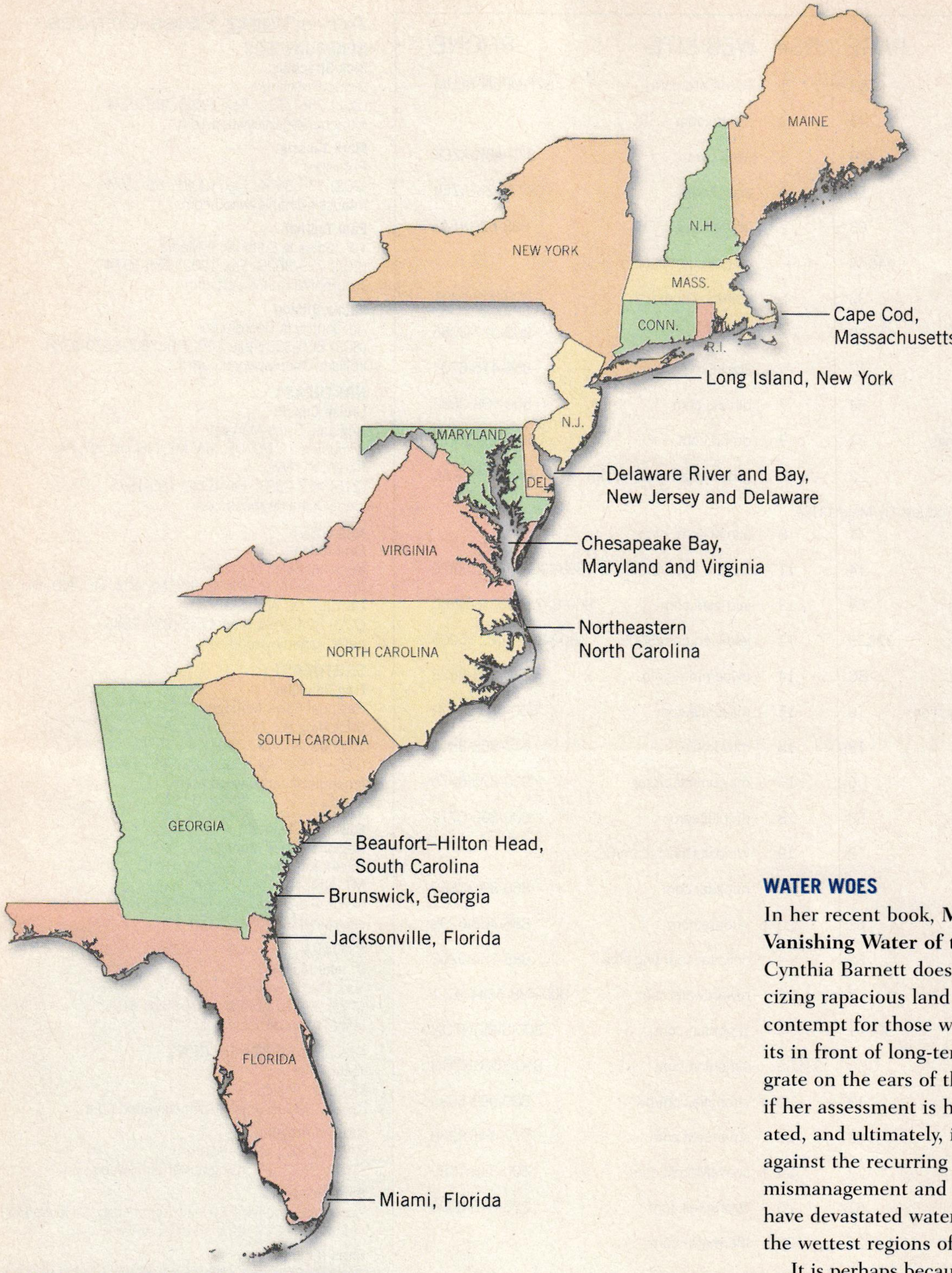
Barb Bukaty
Account Executive - Building Technology & House Plans
(913) 239-8877 bbukaty@hanleywood.com

Chris Nettune
Account Executive - West
(202) 736-3346 cnettune@hanleywood.com

Tim Smith
Account Executive - North
(202) 729-3585 tsmith@hanleywood.com

To Order Reprints: FosteReprints
Steve Hahn
(866) 879-9144 shahn@fostereprints.com

For a Media Kit:
Helene Slavin
(202) 736-3428 hslavin@hanleywood.com



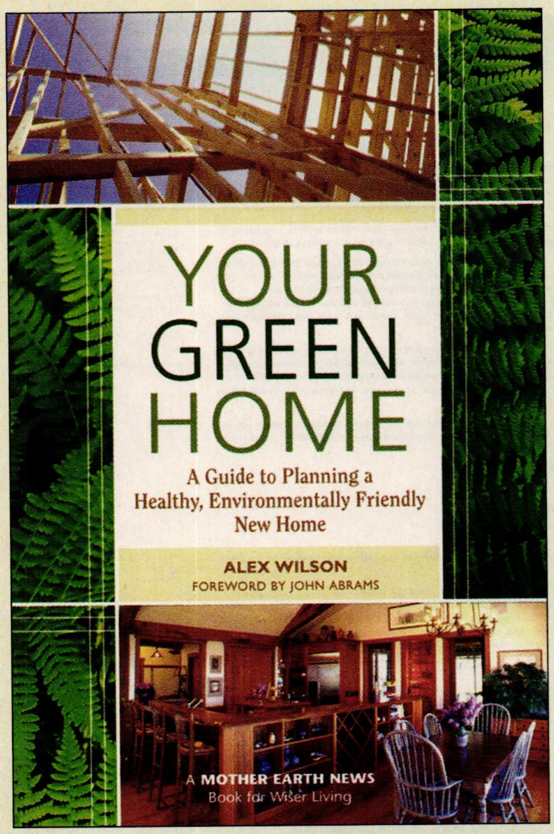
AN EXAMPLE OF THE EASTERN WATER CRISIS

Along the Atlantic coast, freshwater aquifers are bounded by saltwater on the seaward side. If the aquifers are allowed to flow unhindered, the outflow exerts pressure that keeps the saltwater at bay. But as more freshwater is pumped to meet rising demand, the pressure is reduced and saltwater encroaches on the freshwater supply. The U.S. Geological Survey has identified these sites where development of groundwater resources has caused significant saltwater intrusion.

WATER WOES

In her recent book, **Mirage: Florida and the Vanishing Water of the Eastern U.S.**, Cynthia Barnett does not mince words criticizing rapacious land developers, and her contempt for those who put short-term profits in front of long-term sustainability may grate on the ears of the biggest builders. But if her assessment is harsh, it's well substantiated, and ultimately, it's difficult to argue against the recurring historical patterns of mismanagement and political bumbling that have devastated water resources in some of the wettest regions of our country.

It is perhaps because these regions are so wet (Florida, for instance, averages more than 54 inches of rainfall per year) that regulators have been slow to curb the uptake of in-ground water resources. In the East, we don't bother to capture the vast rainfall in reservoirs much. Easterners want the land for develop-

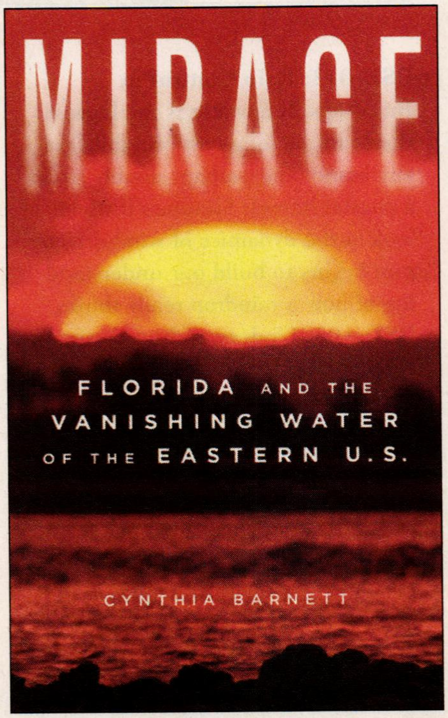


Alex Wilson has been at the business of "green building" long before it was a hot topic. He's the founding editor of **Environmental Building News** — a no-nonsense, tell-it-like-it-is, advertising-free monthly assessment of green-building practices — and president of BuildingGreen.com, an online portal for rational building know-how. Builders and remodelers entering the "green space" will want to consult Wilson's **Green Building Products** — a compendium of some 1,600 products that qualify as green — to sort out the confusing and sometimes misleading claims about material choices. But first you should pick up his most recent book, **Your Green Home: A Guide to Planning a Healthy, Environmentally Friendly New Home**, as a primer for prioritizing the issues and steering customers in the right direction.

The take-home messages in this book: Green is not about choosing pressed-granola flooring and whole-wheat cabinets. Material selection takes a backseat to the two most important steps to building a green home: (1) build a smaller house, so you use fewer materials in the first place, and (2) focus on making the home more energy efficient, so the continuous consumption of energy can be contained. After that, reliance on alternative-energy supplies and resource-efficient building materials makes sense.

Alex Wilson's book is intended for builders and consumers alike. More than just about any book out there, this guide deftly cuts through the current hype on the topic to prioritize the issues and focus our attention (and our wallets) on what really matters to the planet. (A Mother Earth News Book for Wiser Living; available from www.buildinggreen.com)

ment, not bodies of water, and we have the luxury of deep, ancient aquifers from which to pump the water we need. But as Barnett explains, slowly and surely, from the Florida Keys to the Great Lakes, municipalities have been overpumping groundwater to keep up with the rapid pace of development. These actions have successfully depleted water reserves, made deserts on land that used to be swampland, and even induced sink holes that swallow houses and trees whole. In Florida, regardless of how much rain might fall from the sky, the downpour cannot sustain the state's current 8.3-billion-gallon-per-day water habit in dry times, much less keep up with the projected 21% population increase that will drink up an additional billion gallons per day in the coming decade. Not just in Florida, but all along the eastern seaboard, increasingly scarce water supplies will do more to limit growth than any increase in mortgage rates ever can. In the interests of long-term sustainability of coastal building, everyone inhabiting the region ought to sit up and take notice. Water wars are no longer the drama only in the West. They have begun to dominate state politics on the East Coast, and Barnett provides strong evidence that they will only get worse.



Cynthia Barnett's recent book **Mirage: Florida and the Vanishing Water of the Eastern U.S.** provides a highly readable, even gripping, account of the water crisis now facing nearly every state in the nation. (University of Michigan Press; www.press.umich.edu)

building science.com

about this site

research a building science topic ...view list of available documents ...perform an advanced search

> search database

you are here: home → documents → digests → bsd-111: flood and hurricane resistant buildings

Building Physics

Thermal Control
Moisture Control
Air Flow Control
Climate
Acoustics
Light (ultraviolet radiation)

BSD-111: **Flood and Hurricane Resistant Buildings**

last updated 2006/10/27

print this page

collapse article

expand article

We learn our lessons from disaster. Hurricane Andrew taught us about wind. Hurricanes Charley, Frances and Jeanne taught us about rain. The Red River of the North Basin taught us about floods. Hurricane Katrina had it all: wind, rain and flood. That we will rebuild, and rebuild in the same place, is not in doubt. This is what we do - for better or worse. If we are to rebuild and if we are to rebuild in the same place how should we rebuild?

We actually do know how to address wind, rain and flood. However, we don't often address all three simultaneously. The lesson of Hurricane Katrina on this score is particularly harsh. Rebuilding will have to address all three.

To address wind and rain we should look to Florida. When you get hit by hurricanes on a regular basis you tend to learn a thing or two. The Florida Building Code underwent significant revision after Hurricane Andrew. The success of those changes was reflected during the four hurricanes that hit Florida during August and September 2004. No one died in any structure built under the new code changes. Furthermore, structural damage due to wind was minor in buildings built under the new code changes. And the code is being further revised as a result of the last hurricane season. Excellent guidance is readily available [1] and [2].

In an irony that is best appreciated by engineers and contractors the success of the code changes in Florida regarding wind resulted in significant unhappiness with rain entry in new buildings. When your building has blown away, when you are missing a roof and an entire facade you tend not to complain about rain leaking through walls, windows and doors. New Florida buildings did not blow away and roofs and facades stayed intact during the last hurricane season - they just leaked rainwater [3].

However, addressing rainwater entry is a rather straightforward matter [4] - but only if a decision is made to actually address it. As a result of the last hurricane season control of rainwater entry is now a Florida priority. It should be a priority everywhere it rains.

To address flood we should look to common sense:

- elevate structures
- build with materials that can get wet
- design assemblies to easily dry when they get wet

The Federal Emergency Management Agency (FEMA) has all of the basics correct and has had them correct for a long time [5], [6] and [7].

The obvious point is to build up - as high as possible and practical. In coastal regions such as Charleston, SC and Florida's panhandle the first level in new buildings is typically used for parking, storage and building access. Utilities, services and equipment are also elevated (Photograph 1 and Photograph 2). This should be the fundamental basis for construction in high flood risk areas. Farther inland, elevated crawlspaces and pier foundations can be constructed (Figure 1 and Figure 2). Slabs should be avoided. If and when slabs are constructed they should be constructed as raised slabs (Photograph 3 and Figure 3).

new documents

BSD-149: Unvented Roof Assemblies for All Climates 2007/06/27

BSD-114: Interior Insulation Retrofits of Load-Bearing Masonry Walls in Cold Climates 2007/06/27

RR-0603: Impact Resistance of Advanced Framed Wall Systems with Insulating Sheathing as the Primary Sheathing 2007/01/26

BSP-043: READ THIS: Before You Move In 2006/12/21

CS-BA02: EcoVillage Cleveland 2006/11/20

Every coastal builder to some degree needs to aspire to the building sciences. Joseph Lstiburek and John Straube take the drudgery out of that ambition, if not online (www.buildingscience.com) then in periodic seminars (www.buildingscienceseminars.com).

MOISTURE MITIGATION

Coastal builders require a strong working knowledge of building science. There's no shirking in this department: Understanding the physics of heat and moisture through the building enclosure is integral to keeping water out of walls, particularly along the humid coastlines saturated by wind-driven rains. Short drying cycles raise the ante for builders attempting to keep wall cavities dry and avoid moisture-related callbacks and litigation.

Unfortunately, there's a relative scarcity of building-science information that is both lucid and accurate. Some of the best material is that written and compiled by engineers John Straube and Joseph Lstiburek, much of it available at **BuildingScience.com.** Not all of the material you will find here is easy to read. Much of it requires a real diligence to get through, and if it seems opaque, one would be well served to participate in the duo's **Building Science Fundamentals** seminars listed at www.buildingscienceseminars.com. Indeed, Straube and Lstiburek shine in person in a way that is sometimes diminished by their writing.

Whether you're taking the seminars or not, several must-reads for coastal builders include the following titles:

- **BSD-013: Rain Control in Buildings**. Rainwater is the biggest threat to the long-term durability of any home (and perhaps doubly so for a coastal home). Straube's textbook look at the dynamics of wind-driven rain begins to build our understanding of how a raindrop really thinks.
- **BSD-105: Understanding Drainage Planes**. The first, best step to controlling rainwater is to install an effective drainage plane. Lstiburek clearly lays out what "effective" actually means and just what's required to get the job done right.
- **BSD-108: Investigating and Diagnosing Moisture Problems**. One of the documents that reads much like Lstiburek talks, this engaging overview of the "first principles" of moisture movement in buildings provides a solid basis for troubleshooting problems, with examples of some common yet often misunderstood problems.
- **BSD-111: Flood and Hurricane Resistant Buildings:** Following Hurricane Katrina, Lstiburek took a commonsense look at the threat of hurricane-driven winds, rain, and floods, arriving at practical advice for rebuilding the Gulf Coast that applies to all coastal construction.

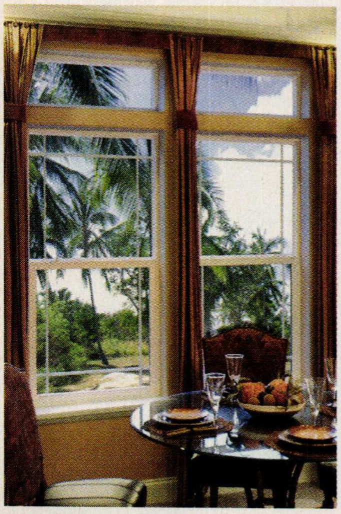
(To locate these articles online, use the search function at buildingscience.com/index to search by BSD article numbers.)

Clayton DeKorne is the editor of Coastal Contractor.

Protecting Homes from Mother Nature

JELD-WEN®
WINDOWS & DOORS

Hurricanes make headlines and builders and homeowners from east to west are focusing on storm preparedness this year. That's because homes nationwide are facing threats from heavy rain, wind and extreme temperature changes throughout the year.



In fact, weather-related disasters account for nearly $14 billion in damage throughout the country each year, according to the National Oceanic & Atmospheric Administration (NOAA).

"It's important to understand how severe weather can affect structural integrity," said Brian Hedlund, window product marketing manager of JELD-WEN, the world's leading manufacturer of reliable windows and doors. "Specifying the right exterior products can help decrease the risk of major damage."

ImpactGard protection delivers these benefits for builders and homeowners:

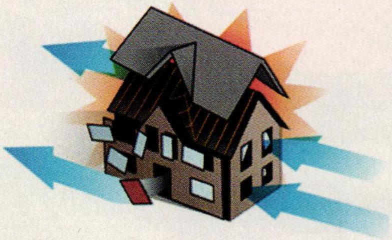
- Maximum security for homes that face hurricanes and other extreme conditions
- An interlayer that is 100 times more rigid than the industry standard
- Windows that meet the nation's toughest building codes
- 10-year warranty among the best in the industry

To stand up to the worst that Mother Nature can offer, JELD-WEN windows and doors offer storm-tested options, including JELD-WEN ImpactGard™ protection for windows.

How it works

ImpactGard protection is a complete window system that includes laminated glass, which means it has an interlayer sandwiched between two sheets of glass manufactured to deliver extra impact resistance. What makes ImpactGard protection different is that the interlayer JELD-WEN uses is 100 times more rigid than the industry standard, delivering five times the tear strength.

Window strength and structural integrity



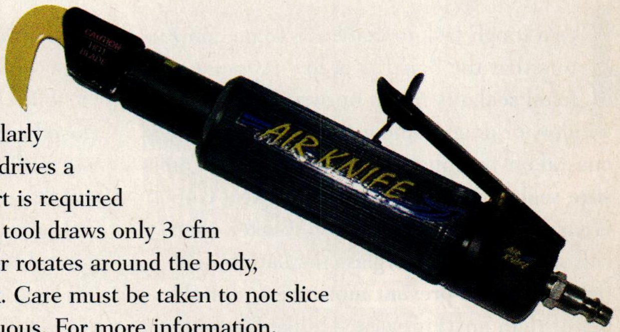
Maximum window strength is important in severe weather because a broken window or door can affect a home's structural integrity. Positive and negative air pressure caused by a storm can cause serious damage, and if a window or door breaks, that pressure can literally destroy the entire structure.

ImpactGard protection helps prevent structural damage by resisting impacts from wind-borne debris and keeping windows sealed and intact during storms. Windows with ImpactGard protection can withstand a nine-pound 2x4 board traveling at 34 miles per hour. Even if the glass cracks under pressure or is hit by wind-born debris, the fragments will adhere to the interlayer, so the shards remain within the frame and the danger of falling or flying glass is minimized.

ImpactGard protection is available monolithic or with insulating glass, including optional Low-E glass for greater energy efficiency and year-round comfort.

For more information on storm protection features for windows and doors, call (800) 877-9482 xADV600 or visit www.jeld-wen.com

Pneumatic Shingle Knife



ROOF MATES AIR KNIFE

The **Roof Mates Air Knife** — a pneumatic-powered hook knife designed to trim asphalt roofing — can simplify and reduce fatigue when making starter shingles, trimming rake edges and valleys, and creating the cutout in a shingle for plumbing boots, particularly on heavy, wind-rated laminated shingles. With a pneumatic piston that drives a 1 1/4-inch-deep hook blade, cutting is not super fast, but almost no effort is required to pull the pneumatic knife through two heavy laminated shingles. The tool draws only 3 cfm of air from the compressor and weighs only 2.5 pounds. A paddle trigger rotates around the body, allowing the operator to position his or her hand for any angle of attack. Care must be taken to not slice through base layers of roofing and flashings that should be kept continuous. For more information, contact Roof Mates, 866/766-3628, www.roofmates.com.

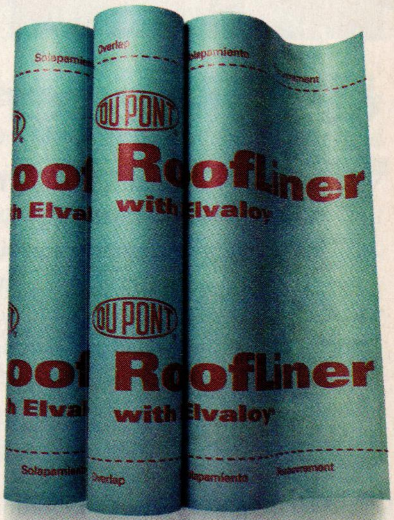
Cellular PVC Decking


AZEK DECK

Expanding on its well-known line of cellular PVC trim, Azek Building Products has launched a new brand of cellular PVC decking. Like Azek Trim, **Azek Deck** is completely impervious to weathering, mold, and rot, and it can be shaped with ordinary woodworking tools. Best of all, perhaps, the new decking reportedly resists stains, including those from wet leaves, berries, juice, wine, grease, and ketchup — all common ingredients of disaster on an outdoor deck and often the downfall of composite deck materials that contain wood fibers, which absorb and hold the stain. According to the manufacturer, a light cleaning with detergent to remove dust and dirt from the surface is all that's needed to keep the material looking as good as it did the day it was installed. For more information, contact Azek Building Products, 877/275-2935, www.azek.com.

Last Line of Defense

Disaster-mitigation experts are beginning to look closely at the new breed of roof underlayments hitting the market. When a major storm event rips the shingles or tiles off a home, it may be that the underlayment is the last and perhaps the strongest line of defense against a deluge of rainwater leaking into the home. Among the newest entries into this category is **DuPont's RoofLiner**, made with a class of copolymers, branded Elvaloy, that add strength and flexibility. According to DuPont, the underlayment suffused with these copolymers will resist blowoff better than felt, with fewer tears around fasteners. Add lightweight to durability, as well as significant resistance to heat and UV rays, and asphalt felt seems best left to the past, especially for builders in hurricane-prone regions. Like most single-ply roof liners, DuPont's is intended for use on roofs with slopes greater than 2:12, unless you plan to waterproof overlaps. RoofLiner meets the AC-188 Acceptance Criteria for Roof Underlayments, which establish requirements for recognition of roof underlayments under the ICC Evaluation Service. For more information, contact DuPont, www2.dupont.com/Building_and_Construction/en_US/.



DUPONT ROOFLINER

For more product information, visit ebuild, Hanley Wood's interactive product catalog, at www.ebuild.com

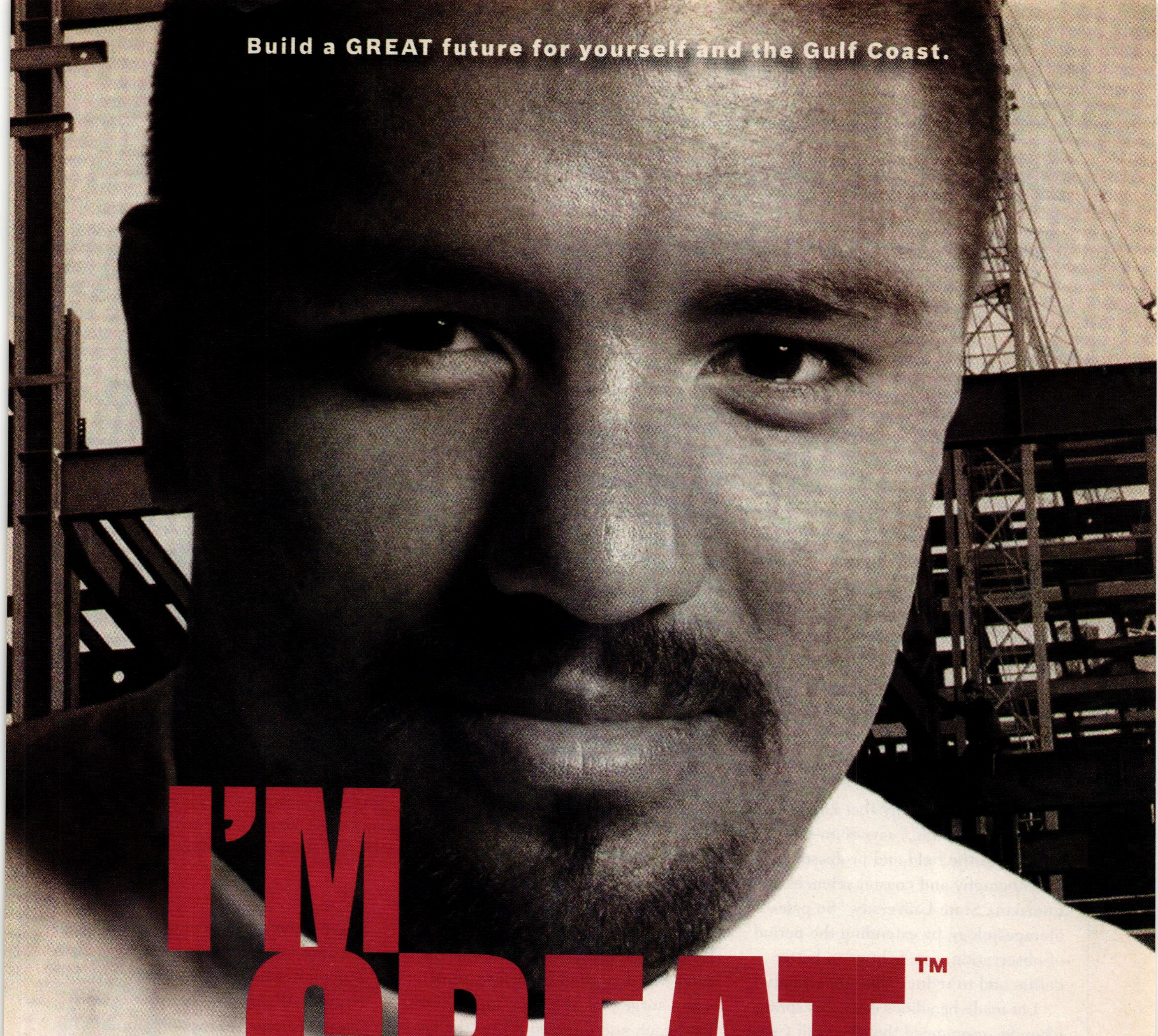
~Products

Fiber Grenades

Designed to protect concrete reinforcing from corrosion, **MCI Fiber Grenades** also reduce plastic shrinkage cracking by up to 66% in poured wall and slab foundations, says the manufacturer, Cortec. What's more, they're kind of cool. According to Cortec, each grenade (actually a water-soluble polyvinyl alcohol bag) holds fibers and powders containing migrating corrosion inhibitors (MCI) that are released when the grenades are added to the water during the concrete mixing. Toss one in and boom: corrosion protection for your concrete. (Manufacturer's recommended dosage: one grenade per 1/2 cubic yard of concrete.) Cortec claims concrete with the fiber grenade additives improves the "impact strength testing" of concrete. Samples tested per the American Concrete Institute Committee 544 guidelines for impact resistance showed a marked improvement over equivalent concrete without the grenades, according to Cortec. For more information, contact Cortec Corporation, 800/426-7832, www.cortecvci.com.

CORTEC MCI FIBER GRENADE

For more product information, visit ebuild, Hanley Wood's interactive product catalog, at www.ebuild.com


Build a GREAT future for yourself and the Gulf Coast.
I'M GREAT.™

Deep History

Tracking hurricanes through the past

Since about 1850, the U.S. coast has been hit by only three Category 5 storms. That's hardly enough to hazard when and where they will strike again. And yet, these destructive storms are precisely the ones it would be most useful to predict.

Practitioners of the new science of "paleotempestology" believe they have a solution. Written records may date back only 150 years, but the history of older and even ancient storms remains — buried underground, captured in ancient charcoal, hidden away in caves. The paleotempestologists' goal: to free this history, filling in the record of intense hurricanes and other major storms through thousands of years ago.

"It's the uncertainty that kills people, or concerns people," says Kam-biu Liu, a leader in the field and professor of oceanography and coastal sciences at Louisiana State University. "So paleotempestology, by extending the period of observation, can help us to better define and to reduce that uncertainty."

Liu made headlines early this spring when he announced that the Gulf Coast appeared to be in a thousand-year period of few Category 4 and Category 5 storms making landfall. Four sites along the coast from New Orleans to the Florida Panhandle had been hit only once by Category 4 or 5 storms in the current millennium, although they were blasted more often during the period between 3,800 and 1,000 years ago, Liu reported.

He drew his findings from perhaps the most mature of paleotempestology's emerging tools: sediments retrieved from coastal lake or marsh bottoms.

Captured in long tubes plunged deep into the muck, those sediments are composed of muck interspersed with layers of sand. Liu contends that the sand was deposited in major storms, when surge picked up the sand from the beach and dumped it into the lake or marsh. "If the storm surge is high enough, it would overtop the coastal sand barrier, and it would wash the sand into the bottom," Liu explains.

KAM-BIU LIU

Paleotempestologists plumb the depths of Western Lake near Panama City, Fla., for "sediment cores." The layers of mud and sand found in each core give researchers an impression of the storm activity that washed sand ashore, indicating a likely hurricane that can be radiocarbon-dated. Cores from this site indicated three distinct sand layers, dating back to roughly 1,800, 1,400, and 1,300 years from today.

There are caveats. Some critics argue that the coast may have been different in the past. That could mean the study lake was far away from the ocean, and the sand deposited by, say, a river. Liu says examination of tiny fossils reveal the old sand contained the same organisms found near the beach today, suggesting the lake's setting was similar.

Regardless of how that argument plays out, paleotempestology is gathering momentum. Liu notes that scientists are mining corals, tree rings, and stalagmites for evidence of ancient hurricanes. All appear to contain a heavy oxygen isotope that is common in rain from large hurricanes but otherwise very rare, suggesting that the isotope may serve as a good indicator of past major storms, he says.

Between Texas and Maine, Liu adds, there are perhaps a dozen "paleoweather" stations — sites where researchers have sought to determine ancient hurricane activity. Many more are needed before paleotempestology becomes a useful predictive tool. "How accurate could our normal weather forecasting be if we had only a dozen weather stations along our entire coastline?" he asks. — *Aaron Hoover*