It doesn't take the 140-mph winds of Hurricane Katrina, which leveled this house in Mississippi, to wreak havoc on a home. Wind speeds of even 70 mph can blow off a roof.

SHELTER NO MORE

BY JAMES GLAVE

Protect your home and property from storm damage.

Here are 13 easy, affordable things you can do right now.

BY JAMES GLAVE

BRACING FOR THE BIG ONE
et ready for “another above-normal year for hurricane activity,” he says. Dennis Frigolet, a spokesman for the National Oceanic and Atmospheric Administration (NOAA), Katrina and Rita may have been a year ago, but the images of devastation are still fresh in our minds. And now, as another storm season gets under way, it’s not just Florida and the Gulf States that need to be worried. The whole Eastern Seaboard, from Miami to Boston, is vulnerable. According to NOAA, we can expect up to 16 named storms this summer, with eight to 10 reaching hurricane proportions, and as many as six of those hitting destinaties Category 3 strength or higher. And those aren’t the only weather systems we need to watch out for. Just ask folks in the stretch of the country nicknamed as Tornado Alley, or the victims of hailstorms in Colorado.

The good news is that with a little tool, a weekend, and a little know-how, homeowners can take meaningful steps today to improve their home’s odds of surviving severe weather, whether it’s a hurricane in Florida or a twister in Texas. To help you get started, we can ask our friends, contractors, architects, emergency managers, and, of course, our own experts, and compile our best must-and-bolt advice. The bottom line: You don’t have to spend a bundle for protection. Not do you have to live in a bunker—though if you’re tempted, we’ve got just the thing for you (see page 144). Even a handful of nails or a few tubes of strategically applied construction glue can dramatically increase your house’s odds of standing up in a storm.

The fact is, your home is your single greatest investment, and when it comes to protecting it from ferocious weather, you simply can’t afford to skimp it. There’s a storm in your future, and your game plan for fighting it starts right now.

Since 1988, when this tornado moved through Atlanta, new building codes have been introduced nationwide, with the aim of protecting houses against damage from high winds. But even if new construction doesn’t mean a thing in your area, go to work anyway.

The Deeper As hurricanes winds pass over a roof (1), they create powerful upward-sucking force (2). If shingles or other roofing materials are not securely placed, they will simply peel off (3), opening avenues for water to infiltrate. In the worst-case scenario, roof sheathing pulls off too, compromising the house’s structural integrity while it exposes the inside to the elements.

Potential Solutions For the new construction or additions, here’s what you should be built to withstand codes for your area, with 7-1/2 inch plus wood decking, fastened securely to the roof framing. Waterproof the seams with self-adhering flashing tape. Cover the sheathing with roofing felt, and on the whole thing off with shingles rated for wind and impact resistance. Typically, these are laminated sandwich of fiberglass and asphalt held down by nails in an octagonal pattern. In addition, glue down shingles within 2 feet of the roof’s eavestrough edges with an asphalt cement. Look for the MRI rating on the label; this highest industry standard for asphalt shingles.

What You Can Do Now

Bracing

The roofs in which all four sides slope toward a central ridgepole, are naturally more wind resistant than gable roofs. One way to strengthen a gable roof is to brace the end walls, which are the most vulnerable to uplift. Get up on the attic and either screw an 8x4x8 inch “x” pattern—one extending from the peak of the gable to the bottom corner of the fourth brace, and the other from the bottom corner of the gable to the top corner brace of the fourth from the peak—into the wood sheathing with 4-inch screws, or use 1/4 inch plywood braces whenever you need roof members with 3-1/2 inch galvanized steel. If your roof is braced with others, you can strengthen it by adding corner ties. Adding corner ties will improve wind ability to bend but not break,” says John Konowski of Damon-Dowling Group Engineers, Fort Lauderdale, Florida. Drive every pair of rafters by running a long brace from one side of the roof to the other, three-quarters of the way up the slope of the rafters (ignore the corners), then fasten it at each end with 16 galvanized 1 1/4 inch wood screws and then driving screws alternately on the two sides of the brace, effectively creating a bridge across the inside of the roof. A

Uncrowned Nails

With its extra high head, heavy-duty, split-tongued nails at the top, the Hard-Quake nail is designed to increase a roof’s resistance to uplift forces by as much as 25 percent. In tests, 1 lb. of pull out even when subjected to wind gusts of up to 170 miles per hour. A nailing pattern that makes change, in earthquakes, for a nail that will outlast will help you save about $150 on a whole house. Go to this tool for more details.

Illustrations by Jason Cole

AUGUST 2006 THE OLD HOUSE 307
Windows

The Danger: High winds and flying debris will smash unprotected windows, setting off the catastrophic phenomenon known as internal pressurization. “The wind comes in through a broken window or failed door, and it’s gotta come back out,” explains Leslie Chapman-Henderson, CEO of the Federal Alliance for Safe Homes, a coalition of insurance firms, private corporations, and government agencies. “The pressure will build, and it will literally explode out wherever weak spots it finds in your structure.”

Permanent Solution: Install new impact windows, touted to one of the major standards (see box, right). Available from most leading manufacturers, these consist of a layer of plastic sandwiched between two pieces of glass. “Impact windows are similar to your car’s windshield, but quite a bit thicker,” says Steve Berg, coastal products manager for Andersen Windows. The superstrong glass may crack if hit hard enough by flying debris, but the bonded plastic interlayer will keep the pane intact and keep the wind out. Impact windows come in a variety of styles, including historically accurate double-hungs. Expect to pay between 75 and 120 percent more for an impact resistant insulated window than for the conventional strength variety.

What You Can Do Now

Protect your windows with storm shutters made of steel, aluminum, or high-strength polycarbonate plastic such as General Electric’s Lexan. Dozens of companies manufacture shutters. Here are a few common permanent and removable options.

1. ALUMINUM PANELS
Interlocking corrugated metal panels slide into a pre-mounted track and attach with wing nuts. The permanent track can be painted to match the house’s exterior. Panels provide solid protection against debris and wind, but they’re tough to handle (and the sharp edges), bulky to store, and time-consuming to install, especially on upper floors. For a good-sized family home, two people should allow at least a half day to mount them. Around $10 to $10 per square foot.

2. FABRIC SHIELDS
PV-coated polyester fabric panels don’t offer the same degree of protection as steel or aluminum, but they do meet Florida Building Code standards. Unlike metal shutters, they’re easy to handle and store, and won’t leave your home in total darkness. “The Fabric Shield allows enough light in that it makes you raise your blinds and shutters,” says Mike George, a spokesman for manufacturer Wayne Dalton. About $10 to $15 per square foot, installed.

3. COLONIAL
Along with Bahama-style shutters, which swing down to cover a window from the top, these permanent swing-out shutters in aluminum or fiberglass combine protection and convenience with architectural style. When a storm approaches, just pull them closed and latch them securely. You can manually do this from inside the house, which means no perilous work atop ladders. The downside? They’re expensive, at $100 to $150 per square foot, installed.

4. ROLL-DOWN
When not in use, steel roll-downs retracted into a housing above or beside the window. They can be operated manually or automatically. If you opt for motorization, just remember to install a battery backup. “Roll-downs are the best of both the storm-shutter world,” says Steve Buatta, owner of manufacturer MetalTech in Hollywood, Florida. He’s not kidding: It can cost tens of thousands of dollars to have a pro to recap a 2,000 square-foot house with the fully automated variety.

In the Testing Lab

If you buy new windows or doors for use in a hurricane region, you can rest easy knowing that they will have already taken some serious hits in the lab. That’s because building-envelope products—roofing, windows, doors, and so on—are held to so-called high-velocity wind zones are required to meet stringent ASTM International standards for wind pressurization and debris impact. To determine if the goods are up to snuff, independent testing facilities simulate a hurricane’s fury. To test how well impact windows perform, for instance, technicians fire a 9 pound 2x4 out of an air cannon at 50 feet per second. Should the wooden missile penetrate or significantly crack the window, then it’s back to the drawing board for the manufacturer.
Garage and Entry Doors

**The Danger:** If your home has an attached garage, think of that wide, roll-up door as a hurricane-welcome mat. When 200-plus-mph winds hit the relatively thin aluminum panels of a standard door, typically, that door buckles and fails, allowing pressure to build up inside the house until it blows apart. The same is true of double entry doors: Without adequate reinforcing, they can potentially blow in or be pulled off.

**Permanent Solution:** Replace garage and entry doors with storm-rated models. For garage doors, that means braced steel construction with beveler rollers, furring, and tracks, and additional track-attachment points. Reinforced entry doors typically are made of fiberglass, steel, or solid wood with impact glazing. Prices range from a few hundred dollars for steel to several thousand for top-of-the-line fiberglass, like the Craftsman-style model from Jeld-Wen’s Aurora collection. “It’s made to emulate a hardwood door,” says Kevin Pine, associate marketing manager for Jeld-Wen Doors. “But it’s a much stronger product than a conventional slim and rail door.”

**What You Can Do Now:**

**REMOVABLE BRACING SYSTEM**
Temporary reinforcing posts will improve your chances against a blow-in or pull-off. A retrofit kit, like the aluminum Collier Fortress Brace or the Secure Door system, sells for about $350 for a standard single door; vertical posts slot into holes drilled in the floor and fasten at the top via a preinstalled bracket. When a storm warning goes out, you simply insert the posts to bolster the door. (collierproducts.com; securedoor.com)

**BEEFED-UP DOOR HARDWARE**
Some simple hardware changes are all it takes to dramatically improve the strength of a double entry door. For starters, replace hinge screws with longer versions that extend all the way through the surrounding framing. Change out the standard deadbolt for a longer throw version, and add deadbolts top and bottom. Multiple-point locking systems, like the Trinkum from W&F Manufacturing (starting at $300; wfg.com), have two or more internal deadbolts, giving you added protection without compromising looks. Finally, add vertical locking pins to the top and bottom of the moveable door; in a traditional setup, only the stationary door has them. Make sure the lower pin extends down into concrete or solid wood.

“More than 90 percent of the time, the garage door is the first thing to go,” says Leslie Chapman-Henderson, CEO of the Federal Alliance for Safe Homes. Fortunately, it’s also one of the easiest parts of the house to strengthen against blow-in.
The Danger: When the ground is saturated by floods or heavy rain, poorly rooted or silted trees can blow over onto your house or onto power lines, and dead branches can snap off and become airborne missiles. And it’s not just trees that pose a hazard. Even landscape features like the pool can be a problem. If flooding causes it to overflow, the chlorinated water can damage plants and grass, so remember to lower the water level in advance of the storm.

Permanent Solution: If you’re establishing a new landscape, plant well-rooted varieties of trees, which tend to be slower-growing species with smaller leaves. Ask a local nursery for wind-tolerant choices, but good bets include live oak, beech, Indian tamarind, and bald cypress.

*Slower-growing trees tend to have stronger wood,” says Charles Livio, vice president of the Landscape Inspectors’ Association of Florida. Proper planting techniques help trees develop a strong root system, says This Old House landscape contractor Roger Cook. Avoid planting a large tree in a small area, such as an narrow strip alongside a driveway. If the roots are constrained, they can’t get a good purchase in the soil, increasing the chance of a blowdown.

What You Can Do Now:

PRUNING AND BRACING

Well-pruned trees will weather a bad storm far better than those that are simply left to grow unattended. Structural pruning, particularly in a tree’s early years, can prevent it from developing competing trunks (called “co-dominant leaders”) that grow alongside each other from a central point. “That’s like the San Andreas Fault waiting to open up the next time there’s a big wind,” says horticulturist Charles Livio. “The trees just split in half.”

Prune mature trees so the wind can blow through the canopy of leaves, not against it. “Very dense foliage presents a sail effect,” Livio explains. As for fruit trees, pick the fruit in advance of a storm if possible. “That will lighten the load and reduce the risk of projectiles,” Livio says.

Finally, brace younger trees in advance of a storm with stranded nylon rope and 3-foot-long sections of #4 or #6 rebar, or wood stakes pounded into the ground at 45-degree angles away from the trunk. Be sure to remove the stakes and ropes after the danger passes.
**Security Blankets**

*A Seat Belt for Your House*

Back in 2004, while passing blighted tracts on the freeway near Orlando, Florida, structural engineer Frank Bennardo marveled at how well mesh tarp held down the big rig's loads. "Why not do the same thing for houses?" he wondered. And so he did. Teaming up with shutter manufacturer Michael Madden, Bennardo invented the Cut 5 Hurricane Netting System. Throw a few 10-foot-wide bolts of the PVC-coated polyester over your house, hook it to anchors sunk into the ground, tighten the straps, and you effectively batten down the whole homestead. "It literally Saran-Wraps your house together," says Bennardo. "It deflects the wind and diverts it over the whole structure." Consider it a supplement to storm shutters or impact windows. But at just 85 cents a square foot, plus $2.50 or so per tie-down, it sure costs less than a new roof. hurricane-net.com

**Portable Power**

It could take a week or more for utilities to restore power to storm-lashed neighborhoods. Here, a trio of solutions to keep you rolling through the blackout.

1. **FRIDGE AND FREEZER:** The Yamaha EF3000iSE portable gas generator pumps out enough juice to power your fridge, freezer, and a few lights for as long as 20 hours per 3.4 gallons of regular unleaded. The built-in power inverter means that the engine output increases as power needs do, which conserves fuel and reduces noise. $2,099; yamaha-motor.com

2. **MOBILE PHONE:** Your cell phone may be your lifeline to the outside world. Keep it going with little more than sunshine and the Brunton Solaris 6. Just unfold the 29 by 9-inch panel in the sun, plug in your phone, and the unit will charge it in about one to three hours. $129; brunton.com

3. **WEATHER RADIO:** The Freesplay Eyemax will give you the latest news, but it also receives continuous advisories from NOAA Weather Radio. Don’t worry about batteries—it’s powered by a hand crank that folds out of the housing. Thirtysix seconds of cranking keeps it going for a half hour. $70; freesplayenergy.com

**Basement Bunker**

Folks in tornado country know all about storm shelters. But after last year, some people in hurricane-prone regions are seeking a more secure place to hunker down than the “windowless interior room” recommended by emergency agencies. Those people might want to check out DuPont’s Kevlar-reinforced StormRoom. The prefabricated shelter comes in sizes from 4 by 6 feet to 12 by 12 feet ($6,000 to $12,000, installed). Once bolted and epoxied to a house’s concrete foundation, it withstands winds in excess of 250 mph. But make sure to assess your flood risk first. “Storm shelters might provide protection from flying debris and wind,” deadpans Mark Smith, of the Louisiana Governor’s Office of Homeland Security and Emergency Preparedness. “But they don’t float.” stormroom.dupont.com