HURRICANE FORCE WINDS

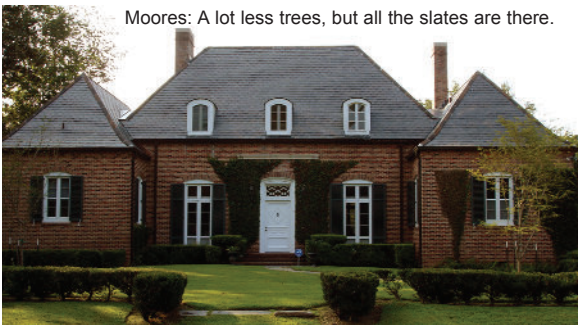
AND HOW THEY AFFECT SLATE ROOFS

Joseph Jenkins

KATRINA WAS BEATING ON THEIR FRONT DOOR. She started blowing at 5:30 in the morning, but the worst didn't hit until mid-day. The wind tried its hardest to blow open the heavy front door as trees fell like dominoes around the house. They could hear the trees cracking, see them through the windows bending to the breaking point. The tops snapped off the tall pines while other trees broke at the base or just blew over, roots and all. They huddled first in one part of the house, then another, waiting in stoic terror as the wind howled and the rain pelted. They finally sat under a stout interior doorway hoping for a vestige of protection. It was hours before the hurricane let up. Katrina's visit would never be forgotten.

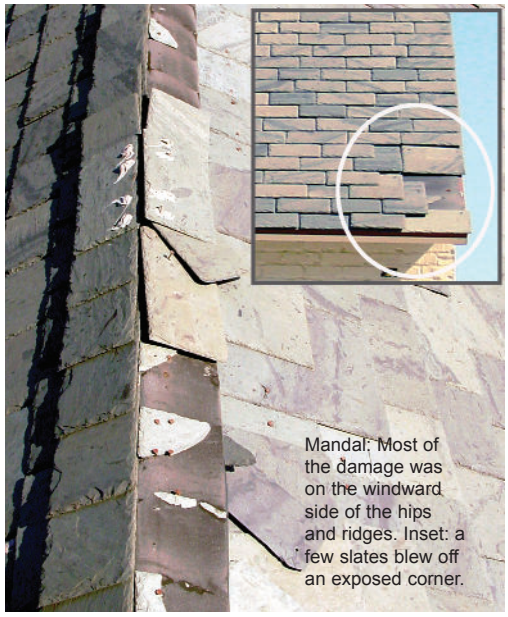
They lost over 72 trees around their house, spending $130,000 just to remove the ones they couldn't chainsaw themselves. The garage roof was demolished. A tree fell on the house next door. It was five days before they could get out their driveway because of downed trees blocking the road. During that time, they had no water, no electricity, no gas and no phone. In fact, their electricity was off for two months. They got lost in their own yard trying to climb over the demolition to get to the road because it was such a tangled mess of trees and debris.

Ann and John Moores lived through the storm of the century in the direct path of Hurricane Katrina, just north of New Orleans. So did their two year old slate roof. What happened to the roof? Like a miracle, no trees fell on the house. A direct impact on a slate roof during severe winds will surely damage the slate. But what about wind uplift? How many slates blew off? What did it cost to repair their roof?



Moores: A lot less trees, but all the slates are there.

The roof damage was nonexistent. That's right — there was no damage to the roof by the hurricane. Not a single slate blew off. As a roof consultant, I had thoroughly inspected the roof the year before the hurricane. My visit after the hurricane confirmed what seems improbable — no damage to the roof. Installed in 2003, the 50 square roof was made of standard-thickness Vermont gray-black slates, 10" wide and 16" long, from Camara and Sons Slate Company. It was installed on approximately a 12:12 slope, with 11 gauge copper, smooth-shank 1.5" slating nails over a traditional board deck.



Mandal: Most of the damage was on the windward side of the hips and ridges. Inset: a few slates blew off an exposed corner.

Perhaps the hurricane had petered out too much by the time it hit the Moore's house north of Lake Pontchartrain. Maybe it had lost some steam and didn't pack enough punch to damage the slates. No doubt the Moores would debate this, yet what *would* have happened if the hurricane had made a direct hit on a slate roof just after it left the Gulf of Mexico, when it was in full force? That's exactly what happened to the Mandal residence in Biloxi, Mississippi.

Bobby Mandal's house had the misfortune of sitting "in the eyewall of Katrina for a solid 12 hours." It was hell. After the hurricane passed, on its way to the Moore residence, blowing down thousands of trees in its path, a ship was left sitting in the nearby woods.

The 136 square Mandal roof, installed in 2004, had a slope ranging from 7:12 to 10:12. It was made of 18" random-width, standard-thickness, unfading gray slate from Evergreen Slate Company, with a 4" headlap, 2" copper smooth-shank slating nails, on a 3/4" plywood deck. It did suffer some damage. The main damage was slates that blew off the saddle hips and ridges, mainly on the windward side. The 7"x14" ridge and hip slates had been nailed with 2" nails also. This roof would have benefitted from 1.5" nails in the field because the 2" nails were too long and broke out the back of the roof decking, effectively diminishing the holding power of the nails (see Figure 2, page 19). The hip and ridge slates, on the other hand, would have benefitted from a more typical 2.5" nail, rather than a 2" nail. There was also some damage in the field of the roof from flying debris. Some slates along some windward edges also blew off. In total, about 250 of the 21,000 slates blew off — about 1.19%, a phenomenally small amount of damage after such a massive assault.

The slate roof on the Longue Vue House and Garden Museum in New Orleans also suffered damage from Katrina. Installed in 1942, the roof is made of 14" long, random-width Buckingham slates, 1/4" to 3/4" thick, with a 4" headlap, nailed to a standard board roof deck on approximately a 7:12 slope with smooth-shank copper slating nails. Although there was virtually no damage to the slates themselves, many of the lead-coated copper ridge and hip coverings blew loose. All of the damage was repairable.

Longue Vue: The damage was limited to the metal hips and ridges.

Dr. David Clark's newly installed slate roof also rode out Katrina with minimal damage. This is discussed in greater detail in the *Senior Slaters* article, page 4.

After personally inspecting the roofs in these four case studies, I think it's safe to assume that slate roofing is highly wind resistant. Slate is a rigid material that does not bend or flap under wind pressure. It is a stiff, low-profile roofing shingle that wind has a hard time getting underneath.

It seems that there are four things we can do to maximize wind resistance on a slate roof: 1) Use more headlap rather than less. Four inch headlap in a high-wind area is recommended. 2) Use the correct length nail. A nail that's too short or too long can reduce the effective holding power of the nail. Smooth shank slating nails apparently have adequate holding power. 3) Use a solid wood roof deck, at least 3/4" thick. 4) Use adequate slope. A slate roof would ideally be too steep to walk on.

Although this is not, by any means, a comprehensive study on slate roof wind resistance, it is nevertheless a collection of data taken from the most severe hurricane event ever to hit the United States. As such, it provides us with a rare glimpse of how slate roofs can hold up under the most extreme wind conditions.

All Photos by Joe Jenkins