

CONCRETE HOUSE STANDS UP TO KATRINA

NOVEMBER 2013

MAKE IT STRONG

Concrete can play a vital role in providing stronger homes, businesses, and communities. Build with concrete and enjoy peace of mind knowing you are providing unsurpassed safety for the building's occupants.

Concrete structural systems have an inherent staying power unmatched by lighter weight, less robust, conventional systems. Durable concrete finishes give the exterior envelope better damage resistance as well.



Pass Christian, MS, October 4, 2005 — Aerial photo shows the only surviving home in the area that was completely destroyed by Hurricane Katrina. Foundations are all that remain of most of the neighboring homes. The surviving home was built using many FEMA standards. Photo courtesy of John Fleck.

The Sundbergs had been building their new home in Pass Christian, Mississippi, when Hurricane Katrina slammed into their area on August 29, 2005. The Category 3 storm brought with it a huge storm surge and reported sustained winds of 125 mph, bringing the water level to a reported elevation of 28 feet. When the winds died down and the water retreated to the Gulf of Mexico, the Sundbergs' home, only 85 percent complete, had survived. It was intact except for unprotected windows that blew out and some loose materials and tools, including panels upstairs that blew away.

"This is where our heart is," said Scott Sundberg, a graduate of the University of Alabama and a structural engineer for 25 years. When building his home, called "Shadowlawn," he utilized his experience with structural physics and design.

In 1998, Hurricane Georges dealt a glancing blow to Pass Christian in Harrison County. When Georges hit, the Sundbergs had just put the forms up for their new home and had rebar in place for the carport slab.

"I became even more convinced [after Georges] that it had to be right, that it had to withstand a Camille," Sundberg said. Hurricane Camille was a Category 5 that raged across the Gulf Coast in 1969, leaving a wide swath of destruction.

Before breaking ground, Sundberg did his homework. He studied the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps for his community to identify where in the flood zone his property is located. He also studied Florida Building Codes and the storm history of the area, and visited abandoned home sites where scars of Hurricane Camille were visible. The information from Sundberg's research, as well as the couple's own conviction, motivated them to build their home to withstand severe storms.

A native of Thornton, Illinois, where there is a major concrete quarry, Sundberg said "concrete has been in my blood since I was young." Accordingly, when it came to building the couple's dream house, he used concrete as the main building material. The result is a sturdy house constructed of insulated concrete form (ICF) walls,

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The water line was at 28 ft. as indicated by the red line in this photo.

Photo courtesy of the Mitigation Assessment Team.



The Sundberg Home was built entirely of concrete and used Insulated Concrete Form (ICF) walls. The mitigation principles and techniques used proved effective when Hurricane Katrina and its storm surge struck a powerful blow.

Photo courtesy of John Fleck.



This photo clearly shows the concrete post and beam construction that supports the 3,000 sq ft structure.

Photo courtesy of John Fleck.

reinforced both horizontally and vertically, post tension concrete slab, concrete columns, and a concrete roof deck.

The Sundbergs' house has spread footings, with concrete columns and beams to distribute the load to the soil. There is connectivity through the house from the roof down to the third floor, on to the second floor, and then to the carport. The house is also built to 'perform elastically' and to withstand winds of between 180 and 200 mph. The bottom of the beam of the first floor living space is 25.4 feet above sea level. The carport elevation is 14.8 feet. The base flood elevation for their area is 14 feet. The slab-floor level of the house is the carport and has a small interior room. This space had breakaway walls which "blew away perfectly [during Katrina]," said Sundberg.

When Hurricane Katrina hit the Gulf Coast of Mississippi, the Sundbergs' home was still under construction. The windows that were installed were sliding vinyl units which were not hurricane resistant. The few windows that did blow out will be replaced and hurricane shutters installed as planned, adding another safety measure to the home.

Sundberg noted that the home also has a second floor area designed as a 'safer' room or room of refuge. The walk-in closets are sheathed in plywood and framed with six-inch 18 gauge metal studs at 12 inches on center, to make them safer than a typical room. The room is 'safer,' but it is not a Safe Room per FEMA 320 Guidelines, which also provides homeowners guidance to tornado risk mitigation.

Sundberg firmly believes that adopting proper building codes, "could prevent 75 percent of the damage." He also stated that "as compliance increases, damage is less." For his own home, Sundberg is following the much-increased codes put into place in the mid-1990s in Florida following Hurricane Andrew's damage to the Homestead area in 1992.

When they visited their new home after Katrina, Sundberg looked for cracking, spalling, and displacement. He was relieved to find no signs that the structural integrity of the home was compromised. "Using concrete adds about 10 to 15 percent above the cost of conventional construction," stated Sundberg. In this case, it proved to be a wise investment since using conventional methods of building may have led to greater losses.

Source: <http://www.fema.gov/business/nfip/>

Portland Cement Association
500 New Jersey Avenue NW, 7th Floor
Washington, DC 20001-2066
202.408.9494 Fax 202.408.0877

5420 Old Orchard Road
Skokie, Illinois 60077-1083
847.966.6200 Fax 847.966.9781
www.cement.org