



Public Library Stands - Read All About It

Full Mitigation Best Practice Story

Lee County, Florida



Sanibel, FL - Hurricanes leave damaged structures, disrupted lives, and disordered routines in their aftermath. While preventive actions like installing shutters can reduce those effects, the staff at the Sanibel Public Library discovered how building strong, and driving pilings deep, stabilized more than the library buildings.

On August 12, 2004, Library Director Pat Allen and her staff readied the 10,000 square-foot expansion of the library for an official opening. That morning, staff guided the delivery crew as they moved equipment and shelving into the new addition. By late afternoon the next day, Hurricane Charley brought fierce winds to Sanibel Island that tested the engineering of both the new expansion and the original building.

“Despite flying debris knocking off a few pieces of roofing material where the two buildings joined, the structures survived unscathed,” said Allen.”

Built in 1994, less than three miles from the Gulf of Mexico, Sanibel’s Public Library has the distinction of being Florida’s first library constructed to withstand 155 mph winds. Knowing the risks of being so close to the hurricane-prone Gulf of Mexico, library administrators hired engineers to calculate the wind loads and document design specifications to withstand those loads. When library officials decided to expand the original structure in 2003, they maintained proactive engineering for the addition and used the same architectural firm to match the Category 5 standards of the original design.

To achieve the high-wind rating, the architects designed a poured concrete skeleton fortified with reinforced steel rods that tied the roofing system to the foundation, and secured the metal roof with hurricane straps to counteract uplift.

Concrete pilings not only provided a secure foundation, but also flood control. The pilings raised the building above Base Flood Elevation (BFE)*, a requirement since Sanibel flood maps show all property on the island to be in a Special Flood Hazard Area (SFHA)**. Local regulations mandated a height of 10 feet above BFE, but the library added an additional 3 feet of freeboard to better counteract flooding and provide covered parking.

The original building’s pilings were driven into bedrock and, because the depths varied with each column, the engineers improved stability with reinforcing metal sleeves around the concrete. They used a different technique when building the expansion. To address differences in rock depth and to avoid structural damage to neighboring buildings from pile driving, they used augers to dig holes allowing pilings to be cast in place.

Library officials also chose to retrofit the original building with the same hurricane-resistant windows they used for the expansion.

“Replacing the windows was the best thing we did,” said Allen. “It brought the whole building up to the 155 mph sustained-wind standard and helped reduce the maintenance needed with the former shutters.”

As a precautionary measure, the library board added a generator to operate essential services, although electricity service usually returns quickly after the loss of power from a storm event because of the library’s proximity to the Sanibel City Hall. The library staff discovered the importance of having working electricity when residents came back to the island after Hurricane Charley. Not only did people use the library as a familiar place to visit, read, or use the Internet, but they drew on its resources to contact relatives, file insurance claims, and register with the Federal Emergency Management Agency (FEMA).

“It was such a joy to serve people as they came inside the library after the disaster,” said Allen. “The staff could listen to their stories and the residents could begin recovering.”

Before residents could return to normal, Hurricane Wilma brought 100 mph winds to Sanibel on October 24, 2005. Again the library suffered no damage and stood ready to welcome residents back to the island.

"I'm glad we built this building strong and hope others can learn from what we did," said Allen, "I think every library should be there for their community."

To discover building techniques, like those used in the Sanibel Public Library to reduce the risk for damage due to hurricanes, flooding, or high winds, visit <http://www.fema.gov> and <http://www.flash.org> in addition to the two other Reference URLs.

* Base Flood Elevation: The elevation that indicates the water-surface surface elevation resulting from a flood that has a 1% or greater chance of being equaled or exceeded in any given year.

* *Special Flood Hazard Area: An area that has a 1% or greater chance of being flooded in any given year.

Activity/Project Location

Geographical Area: **Single County in a State**

FEMA Region: **Region IV**

State: **Florida**

County: **Lee County**

City/Community: **Sanibel**

Key Activity/Project Information

Sector: **Public**

Hazard Type: **Flooding; Hurricane/Tropical Storm**

Activity/Project Type: **Elevation, Structural; Retrofitting, Structural**

Activity/Project Start Date: **01/1994**

Activity/Project End Date: **08/2004**

Funding Source: **Non-profit organization (NPO); Private funds**

Funding Recipient Name: **Sanibel Public Library**

Activity/Project Economic Analysis

Cost: **\$5,306,680.00 (Estimated)**

Activity/Project Disaster Information

Mitigation Resulted From Federal
Disaster? **No**

Value Tested By Disaster? **Yes**

Tested By Federal Disaster #: **No Federal Disaster specified**

Year First Tested: **2004**

Repetitive Loss Property? **No**

Reference URLs

Reference URL 1: <http://www.floodsmart.gov>

Reference URL 2: <http://www.ibhs.org>

Main Points

- The staff at the Sanibel Public Library discovered how building strong, and driving pilings deep, stabilized more than the library buildings.
- They had architects who designed a poured concrete skeleton fortified with reinforced steel rods that tied the roofing system to the foundation, and secured the metal roof with hurricane straps to counteract uplift.
- The original building's pilings were driven into bedrock and, because the depths varied with each column, the engineers improved stability with reinforcing metal sleeves around the concrete.
- Library officials also chose to retrofit the original building with the same hurricane-resistant windows they used for the expansion.
- As a precautionary measure, the library board added a generator to operate essential services.
- Library survived Hurricane Charley and Hurricane Wilma due to building techniques



Sanibel Public Library



Sanibel Public Library Director