



Waterfront High-Rise Survives Katrina

Full Mitigation Best Practice Story

Harrison County, Mississippi

Gulfport, MS – Legacy Towers stands approximately 150 feet tall on the beach facing the Gulf of Mexico. These new luxury condominiums withstood the powerful 30-foot storm surge and winds of more than 140 miles per hour when Hurricane Katrina struck on August 29, 2005.



Penetration of the structure, typically due to compromise of windows and doors, is a major concern during hurricanes, because it can lead to content damage, roof separation, and structural failure. The survival of the condos was primarily attributed to the structure's break-away walls, windows, and doors designed to wash away during high wind and water events. These ground-level-only measures are intended to protect the building from structural loads associated with fast-moving water and water-borne debris.

Property manager Taco Sanchez is proud that the building withstood the storm. "It did what it was supposed to do. The ground level walls blew out and the rest of the building held. The building is a testament to good construction," Mr. Sanchez said.

Mr. Sanchez inspected the property after the storm. He was surprised to find the first floor completely gone, but proud of the building's overall performance. Clothing, food from a nearby restaurant, and building debris were scattered everywhere. Looking out to the Gulf, Mr. Sanchez saw everything imaginable that had been carried out from homes and businesses when the storm surge receded.

Legacy Towers, built of concrete and steel, contains 103 rental condo units. Tower One was completed and the units were ready for occupancy in April 2005. Tenants had moved into forty units by the time Katrina struck. The 14-story building was one of only a few inhabitable buildings standing along the Mississippi Gulf Coast after the storm.

The breakaway walls on the first floor successfully performed their task by releasing outward from the foundation, thereby allowing water and wind to flow freely through the structure and preventing damage to the 13 remaining floors of the building. Concrete walls separating each unit and built perpendicular to the wave crest were another vital structural element. The reinforced steel walls were "tied" to concrete-augured pilings embedded 85 feet into the ground.

Because the walls carried the load and were continuous from the ground to the top floor, there is nearly as much concrete under the ground as above. Tower Two, under construction during Katrina, is being built with 90 feet of concrete embedded in the ground.

The two towers were constructed on post-tension slabs 20 feet above sea level. Decorative concrete columns, located along the front of the building, give additional support to the patio's concrete canopy. The tall columns consist of reinforced concrete wrapped in a metal frame. Additionally, the columns change the direction of the flow of water.

The hardest hit areas were the first and second floors and the southeast corner of the building that was directly in the path of the wind. The first floor received 10 feet of water, which led to mold and mildew. The damaged materials were removed and the walls dried out before renovation began.

Additional damage included the loss of the back-up generator, destroyed by water and debris that also cracked several windows. The roof suffered minor damage but the roof membrane remained intact. The edifice's front railings sustained some wind and water-borne debris damage.

Mr. Sanchez suggested that one technique that should be incorporated into the rebuilding is to construct a concrete wall around the generator to protect it from wave action. "If the generator had not failed because of water damage, the Legacy would have remained operational," Mr. Sanchez explained. The towers were without power until they received a backup generator 10 days after the storm.

Legacy Towers' survival has played a key role in the rebuilding process on the Gulf Coast. The Legacy was one of only a few places able to offer housing to construction and emergency workers immediately after Katrina.

“You have to build it right,” said Casey McGinnis, site superintendent, crediting the survival of Legacy Towers to its excellent design and construction. “Although we had flood insurance, the solution is construction, construction, construction,” Mr. Sanchez added.

Activity/Project Location

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

FEMA Region: **Region IV**

State: **Mississippi**

County: **Harrison County**

City/Community: **Gulfport**

Key Activity/Project Information

Sector: **Private**

Hazard Type: **Hurricane/Tropical Storm**

Activity/Project Type: **Flood-proofing; Retrofitting, Structural**

Structure Type: **Concrete, Reinforced**

Activity/Project Start Date: **09/2003**

Activity/Project End Date: **04/2005**

Funding Source: **Business Owner**

Funding Recipient: **Business/Industry**

Activity/Project Economic Analysis

Cost: **Amount Not Available**

Non FEMA Cost: **0**

Activity/Project Disaster Information

Mitigation Resulted From Federal
Disaster? **Unknown**

Value Tested By Disaster? **Yes**

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

Year First Tested: **2005**

Repetitive Loss Property? **No**

Reference URLs

Reference URL 1: <http://www.msema.org>

Reference URL 2: <http://www.fema.gov/hazard/hurricane/index.shtm>

Main Points

- The survival of the Legacy Towers condos during Hurricane Katrina was primarily attributed to the structure's break-away walls, windows, and doors designed to wash away during high wind and water events.
- These ground-level-only measures are intended to protect the building from structural loads associated with fast-moving water and water-borne debris.
- The breakaway walls on the first floor successfully performed their task by releasing outward from the foundation, thereby allowing water and wind to flow freely through the structure and preventing damage to the 13 remaining floors of the building.
- The 14-story building was one of only a few inhabitable buildings standing along the Mississippi Gulf Coast after the storm.
- Legacy Towers' survival has played a key role in the rebuilding process on the Gulf Coast. The Legacy was one of only a few places able to offer housing to construction and emergency workers immediately after Katrina.



Legacy Towers remains standing along the Gulf front after Hurricane Katrina.



Breakaway walls on the first floor successfully blew out to save the building.