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EXPERT WITNESS

1095 Florida Ave.
Slidell, LA 70458

P.O. Box 2830
Slidell, LA 70459

985-649-5832
FAX 985-641-5950

Hurricane Katrina

Effects on Lake Pontchartrain

Hurricane Katrina had the western edge of its eye passing just west of the I-10 bridge on Lake Pontchartrain, probably in the Irish Bayou area, in the early daylight hours of Monday, August 29, 2005. The eastern edge of the eye was in Mississippi, possibly the Bay St. Louis area.

To properly discuss what happened at various locations around the eye, at different times during its passing any particular point, one must remember that: 1.) Winds rotate counter clockwise around the eye. 2.) The most damage will be felt in the northeast quadrant of the hurricane, outside the eye. 3.) Winds will diminish in speed as the distance from the eye increases.

Winds as noted at 130 mph were near ground level were reported by the Louisiana Office of State Climatology, Baton Rouge, Louisiana. Winds at higher altitudes (500' +/-) were over 200 mph. Information from the National Weather Service at Slidell indicates that stronger winds, which were found at higher altitudes, have the capability to dip down, causing gusts or other temporarily increased winds at the surface. TORNADOS also add to the possibilities when one group of houses are totally ravaged and others nearby are not.

To discuss the severity of wind and water actions on buildings, signs, trees, etc., that are in the path of a hurricane, one must recognize the laws of science that govern the way forces act on these objects.

Surges:

Wave pressure at 10 mph moving water:

- a. 1 foot wave = 209 lbs/ft²
- b. 2 foot wave = 418 lbs/ft²
- c. 3 foot wave = 627 lbs/ft²

The more intense the storm and the closer to the right front quadrant, the greater the storm surge, as that is the strongest part of the storm. Conversely, the winds on the northwest and west quadrant are working to diminish the surge, by driving it to the southwest and later the south, as the eye passes. The homes in the eastern Lake Pontchartrain area, namely Treasure Isle, Rigolets Estates, Lakeview Drive, Carr Drive, Eden Isles, Irish Bayou in New Orleans and as far away as Bayou Liberty in Slidell were all in this area where the storm surge was diminished to the point that it was not recognized as a surge by eye witnesses. Eye witnesses located in Rigolets Estates, St. Nicholas Church at Lake

Catherine, Irish Bayou, Carr Drive and on Bayou Liberty in Slidell, reported no storm surge and no wave action that would have reached above a sixteen foot elevation to pound the walls of a residence.

Wind Action on Buildings:

Wind pressures on surfaces perpendicular to the wind direction are recognized as:

- a. At 100 mph, wind pressure = 32.78 lbs/ft²
- b. At 120 mph, wind pressure = 36.86 lbs/ft²
- c. At 130 mph, wind pressure = 43.26 lbs/ft²
- d. At 140 mph, wind pressure = 50.176 lbs/ft²

Wind pressure against the sides, roof and other projections of a building can tear the building apart, or topple the building with a force that is calculated using the formula $F = .00256 V^2$, where F (force) is measured in lbs. per ft².

A hypothetical residence, or other building, measuring 40 ft. x 50 ft. in area, with nine foot ceilings and built on columns that are ten feet high, presents approximately 450 s.f. of wall surface to a wind that is blowing perpendicular to its length. If the wind is blowing 130 mph, a pressure of approximately 43 lbs/ft² would be exerted on this surface, not to mention the roof, negative pressures on the opposite side, etc. With the main floor 10 feet above the base of its columns, and the average roof height being 10 feet, the total pressure exerted on the column base plates would be approximately 560,000 ft lbs. Wind gusts would cause this pressure to increase. For a building with 24 columns, this amounts to more than 23,000 ft lbs. of force acting on each column to destroy its connection to the slab.

A home that is raised and with two or more floors above the column connection to the frame of the house would be subject to even higher pressures.

Many houses in the area of destruction fell into the category above, but were built to meet the older building codes with lower requirements for winds. Conversely, a predominant number of homes in the Rigolets Estates area were designed to meet the new International Building Code and survived the hurricane with their structure intact.

It is interesting to note that variations in buildings and building components, and the angle that the wind or water strikes an object, all come into play when determining the force that an object is subjected to. A round column, for instance, decreases the pressure by approximately 33% in comparison to a square column.

Water presents much more pressure per square foot on an object than wind, but it has to get to the object to do so. This is why most of these residences were raised, had columns to hold them up rather than walls, and had blow out relief by using breakaway walls or windows below the 16' level.

All of the houses on Treasure Isle, Lakeview Drive and Carr Drive along the north shore of Lake Pontchartrain, had sustained flood and wind damage in past hurricanes, the difference being that they were nearer the center of this hurricane than the previous ones. They all withstood the pressures exerted by these past floods, with little to no structural damage. It makes no sense that flooding of Hurricane Katrina could then wipe them all out.

There were numerous tornados scattered around the eye of the storm. One eyewitness counted seven that he saw from his refuge along I-10 in Slidell.

Many of these homes were built with their main floors at approximately elevation 6.0, or 7.0, NGVD. These houses suffered the same wind pressures as did the ones with higher main floor elevations. For a similar wall exposure of these houses that are mostly over 30 years old, and built to no particular standards, the same pressures would work to tear them apart. As far away as Carr Drive in Slidell (six miles West of Treasure Isle) eyewitness reports describe how roofs and parts of houses were flying objects before they were moved by flood waters into the marsh.

Sincerely,

Emmett G. (Pete) Dammon, P.E.
La. License 8796

Hurricane Katrina References:

1. Wind Speeds vs. Water Level CNMOC, Stennis, Mississippi
2. Inundation and Base Flood Overview – FEMA
3. Hurricane Storm Surge Hindcast CNMOC, Stennis, Mississippi
4. Computed Tides and Surge, ADCIRC
5. Louisiana Office of State Climatology (LSU)
6. National Weather Service New Orleans/Baton Rouge
7. Numerous Home Videos Taken During Hurricane
8. Eyewitness Reports

HURRICANE KATRINA EYEWITNESSES

Eyewitnesses:

1. Mr. Glenn Ellis, III – District Chief
St. Bernard Parish Fire Department
8201 W. Judge Perez Dr.
Chalmette, LA 70043
2. Mr. Leonard Brown – Rigolets Estates
Marlin Drive @ Moray Drive
Rigolets Estates
Slidell, Louisiana
3. Joe Perez/(Volunteer Fire Department)
St. Nicholas Church/Lake Catherine Hwy 90
New Orleans, Louisiana
4. Kennard Jackley (video)
265 Carr Drive
Slidell, Louisiana
5. Emmett G. (Pete) Dammon
34487 Torregano Rd. (Bayou Liberty)
Slidell, Louisiana
6. Jimmy Ray Lemoine
Irish Bayou
New Orleans, Louisiana
7. Grant Geiger
406 Carr Drive
Slidell, Louisiana
8. Bob Turner
Lake Borgne Levee

Other Eyewitnesses:

1. James P. Osborn
4003 Kyushu St.
Bay St. Louis, MS
2. Rita Adams
4043 Madagascar Street
Bay St. Louis, MS
3. Randy Netto
4043 Madagascar Street
Bay St. Louis, MS
4. Glen Hood/Louisiana Log Homes
1200 I-10 Service Road