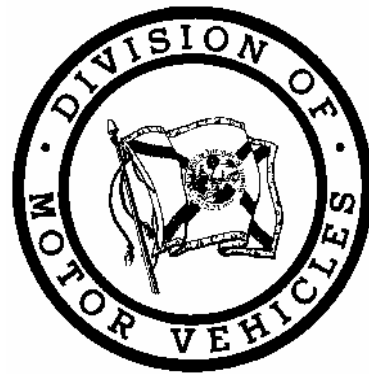


**MOBILE/MANUFACTURED HOME  
DAMAGE  
ASSESSMENT FROM  
HURRICANE KATRINA  
2005**



**BUREAU OF MOBILE HOME AND RV CONSTRUCTION  
DIVISION OF MOTOR VEHICLES  
DEPARTMENT OF HIGHWAY SAFETY AND MOTOR VEHICLES**

**August 29, 2005**

# **MOBILE HOME DAMAGE ASSESSMENT FROM HURRICANE KATRINA: 2005**

## **TABLE OF CONTENTS**

I.	Note on Limitations of the Report.....	ii
II.	Executive Summary.....	iii
III.	Background.....	1
IV.	Findings.....	5
V.	Photos of Mobile/Manufactured Home Damage Cause By Hurricane Katrina.....	11

## **TABLES AND FIGURES**

Figure 1:	Florida Counties by HUD Wind Zone.....	4
Figure 2:	The Path of Hurricane Katrina.....	7
Table 1:	A Study of Damage to Mobile/Manufactured Homes Caused by Hurricane Katrina .....	8

# **MOBILE/MANUFACTURED HOME DAMAGE ASSESSMENT FROM HURRICANE KATRINA: 2005**

## **NOTE: LIMITATIONS OF THE REPORT**

The purpose of this report is strictly for the use of the Florida Department of Highway Safety and Motor Vehicles to determine the effectiveness of current department administrative rules governing the installation of mobile/manufactured homes.

All statistics reported here are from a sample of mobile home parks. In addition, due to debris, entry into some of the mobile homes observed was not possible to make more specific determinations. Consequently, the statistics reported here are estimates. There may be differences between what is reported here and determinations by local building departments, insurance companies or other government agencies

When reporting the number of homes "destroyed or non-repairable" the totals represent homes with severe roof damage to the point of the roof being blown from the home, one or more exterior walls being separated from the home or water completely penetrating the unit.

## **EXECUTIVE SUMMARY**

Staff of the Bureau of Mobile Home and Recreational Vehicle (RV) Construction in the Division of Motor Vehicles (DMV), Department of Highway Safety and Motor Vehicles (DHSMV), assessed mobile home damage caused by Hurricane Katrina in a sample of 25 mobile home parks in the path of this hurricane. One central focus of this assessment was how the amendments to mobile home construction standards adopted by the U.S. Department of Housing and Urban Development (HUD) in 1994 held up to the wind, rain and storm surge forces of this hurricane. The other was how the new mobile home installation standards adopted by the DHSMV in 1999 held up to these storm forces.

The assessment found that of the 3,291 mobile homes located in the mobile home parks visited, only 12 were destroyed or were not repairable. Half of these homes were damaged by wind and the other half were damaged by falling trees. Generally, the homes damaged by wind had their roofs blown off. All of the damaged homes were older homes built in the 1960s, 70s or 80s. None of the homes built subsequent to the 1994 revisions of HUD's mobile/manufactured home construction standards received any significant damage. There was substantial flooding of some mobile home parks with water up to 12 to 18 inches. The water did not, however, get into the homes. No homes moved from their foundations.

The minimal damage to mobile homes caused by Hurricane Katrina was, in part, due to the fact that it was a very compact storm with a fast forward speed when it hit Florida; much more compact and faster moving than the hurricanes that hit Florida in 2004.

# **BACKGROUND**

## **Regulation of Mobile/Manufactured Home Construction**

The National Manufactured Housing Construction and Safety Standards Act of 1974 authorized the U.S. Department of Housing and Urban Development (HUD) to regulate the construction of mobile homes which are now called manufactured homes. This law required HUD to develop construction standards for manufactured homes and regulate the construction process. HUD implemented this program in 1976.

HUD regulates manufactured home construction through its agents which are called Production Inspection and Primary Inspection Agencies (IPIA). In 8 of the states where manufactured home construction occurs, the IPIAs are state agencies. In the other 10 states where manufactured home construction occurs the IPIAs are private contractors. Manufactured home complaints are handled by State Administrative Agencies (SAA). There are 38 state agencies which serve as SAAs. In the other 12 states, HUD handles manufactured home complaints directly. In Florida, the Bureau of Mobile Home and Recreational Vehicle (RV) Construction (BMHRVC) in the Division of Motor Vehicles (DMV), Department of Highway Safety and Motor Vehicles (DHSMV) serves as both the IPIA and SAA.

In reaction to the devastation caused by Hurricane Andrew in Dade County, Florida in 1992, HUD amended its regulations governing manufactured home construction to ensure that they were more resistant to wind damage. These new regulations in HUD's National Manufactured Housing Construction and Safety Standards, which appear in Title 24 Code of Federal Regulations, Part 3280, went into effect in July, 1994.

In its regulation revisions, HUD created a third Wind Zone category for the areas which receive the most severe winds. Wind Zone I areas are those with the least wind and Wind Zone III areas those with the most severe winds. HUD specified the Wind Zones for all areas of the United States. These regulations required that manufactured homes must be designed by a professional engineer or architect to withstand winds up to certain speeds in the three Wind Zone areas. Manufactured homes built for Wind Zone I must be able to withstand winds of up to 90 miles per hour. Mobile homes built for Wind Zone II must be able to withstand winds of up to 100 miles per hour. Manufactured homes built for Wind Zone III must be able to withstand winds of up to 110 miles per hour. In Florida 53 counties are designated Wind Zone II and 14 counties are designated Wind Zone III (see Figure 1). In addition, HUD has specified "Exposure D" areas. These areas are located within 1,500 feet of the coastline. Homes constructed for these areas require some additional strengthening. A manufactured home dealer may not sell a manufactured home to a customer that is not designed for the Wind Zone area where the customer intends to install the home.

Revisions in federal construction requirements for mobile/manufactured homes went into effect in 1994 along with the new wind zone designations. These revisions significantly enhanced the wind resistance of mobile/manufactured homes.

The following is an overview of the new construction standards:

1. Increased strength in the tie-down connections between the roof and walls and between the walls and the floor assembly.
2. Wind Zone III homes required to have larger studs (2x6) and studs to be placed closer together. All homes build prior to 1976 have 2x3 studs. Wind Zone II homes built after 1976 have 2x4 studs.
3. Additional design provisions required for the attachment of exterior coverings and sheathings. Siding is now required to be structurally supported, thereby helping to keep siding in place during wind events.
4. Increased resistance of windows to high wind forces. Density of window panes required to be thicker for improved wind deflection.
5. Extra framing is added in window and door openings to allow the inclusion of storm shutters, thereby reducing impact damage due to flying debris.

### **Regulation of Mobile/Manufactured Home Installation**

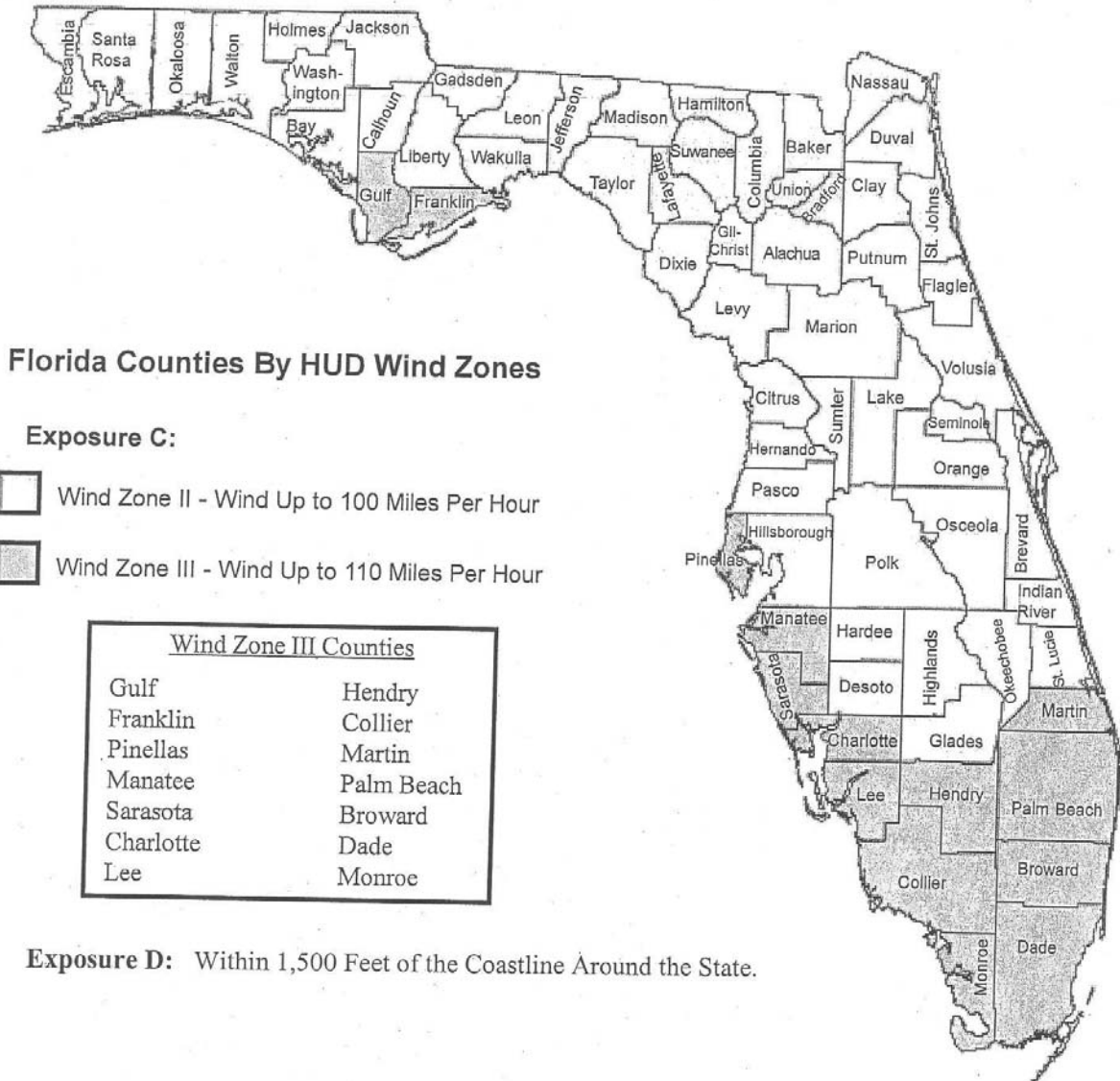
In 1996, pursuant to section 320.8249, Florida Statutes (F.S.), the DHSMV began to regulate manufactured home installation in an effort to improve the safety of mobile/manufactured home tie-downs. DHSMV promulgated administrative rules which govern the structural standards of manufactured home piers, anchors, tie-down straps, and site preparation. These rules also specify the number of tie-downs required to install a manufactured home. The bureau licenses and regulates manufactured home installers. Section 320.8249, F.S., provides that all manufactured homes installed in Florida must be installed by a licensed installer. In 1999, the department amended its manufactured home installation standards to make them more stringent. Key elements of these amendments include the following:

- All anchors must be galvanized.
- Minimum stabilizer plates 180 square inches, galvanized.
- Minimum height of 18 inches.
- Ground anchors/Florida Only.
- Type I 4 feet for use above 276 pounds inch torque value.
- Type II 5 feet for use below 275 pounds inch torque value.
- I-Beam clamp that pivots top of frame only.
- Sidewall and frame ties 5 feet 4 inches on center.
- Longitudinal anchors, 2 per I-Beam per end.
- Centerline ties within 2 feet each end.
- Galvanized straps, 60 ounces both sides or nominal G115.
- Radius clip protection.
- Soil test by installer to determine proper anchor.
- Installer plan for 1,000 pounds per square foot soil.

In December 2005, HUD will promulgate regulations governing manufactured home installation. Any state that does not have a program in this regard will be regulated directly by

HUD. Florida's manufactured home installation program is generally considered a model for the United States.

**FIGURE 1**







**State of Florida**  
**DEPARTMENT OF**  
**HIGHWAY SAFETY AND MOTOR VEHICLES**  
TALLAHASSEE, FLORIDA 32399-0500

**FRED O. DICKINSON**  
Executive Director

**DATE:** August 29, 2005  
**TO:** Philip R. Bergelt, Program Manager  
**FROM:** James D. McGowan, Community Assistance Consultant  
**SUBJECT:** Hurricane Katrina in South Florida.

Hurricane Katrina with sustained winds of 75 miles per hour and gust to 115 miles per hour came ashore in South Florida at the Dade, Broward county line. The path of the storm angling south west from Ft. Lauderdale through South West Miami, Coral Gables home of the University of Miami, continuing through Homestead and exiting the state around Flamingo Florida, the most southern point of the continental United States.

Wind damages to mobile/manufactured homes from Hurricane Katrina were minimal. Several older mobile homes had their metal roofs blown off and others were damaged by falling trees. There was very little damage to screen rooms, carport and veranda room attachments to mobile/manufactured homes. This is unusual since additions are normally the first thing to be blown down.

Following the path of Hurricane Katrina, inspection of mobile home parks were conducted in parks located in Dade and Broward counties. In Broward County, this resulted in a very high percentage of the mobile/manufactured homes that were checked for damages were 1960's, 70's and 80's models.

In Broward County, fifteen (15) mobile/manufactured home parks with a combined total of 4017 homes were inspected for damage along the path of Hurricane Katrina through Broward County. The majority of the mobile homes that were damaged in Broward County were in the City of Davie. The City of Davie has several older mobile home parks. Most of the homes were built in the 60's and 70's and many of the homes have been remodeled. The major damage to the mobile homes in Davie was caused by either wind damage or from falling trees. Metal roofs were blown off several mobile homes. This is unusual, as there was no other damage to the homes and the mobile homes around them also have no damage.

The second cause of damage to mobile homes in the City of Davie was from falling trees. Many of the older mobile home parks have very large older trees as seen in one of the attached photos.

In Palma Nova Mobile Home Park in the City of Davie, two of the homes with blown off roofs were occupied by the residents when it happened. One resident stated the home did not move she just heard a loud boom and she looked out and saw her roof laying in the yard. No one

Philip R. Bergelt  
Page Two  
August 29, 2005

was hurt. In another home a very large tree fell on it and again the residents were home and did not receive a scratch. Both of these homes are shown in the photographs.

In North Dade county, North Miami Beach, area three mobile home parks were checked for storm damage with a combined total of 134 mobile homes built in the 50's and 60's with no damage. These three parks are just off Old Dixie Highway and just south of the Broward county line.

In South Dade County most of the manufactured homes are 1990's and 2000's. The reason for the newer manufactured homes in this area is a result of Hurricane Andrew in 1992.

In South West Dade County, Redlands area, two mobile home parks were checked for storm damage with a combined total of 192 mobile homes built in the 70's and 80's. There was little damage. One home had its shutters blown back over the roof but no other wind damage was seen. Both parks were entirely flooded with 10" to 18" of water. None of the homes had water in the home. One park resident at Silver Palm Place Mobile Home Park stated this was the first time the park had flooded. The water was not bothering her but she wanted the power turned back on. One and a quarter million homes were without electricity in south Florida on Friday, August 26. The area affected by the electrical outage was from South Palm Beach County through Broward County and Dade County.

South West Dade County, in Florida City, the Gold Coaster Trailer Park was inspected for storm and flood damage. The park has 275 manufactured homes. There was no wind damage to any of the homes. The entire park was flooded with 12" to 18" of water. One resident stated this is the third time the park has been flooded since it was completely rebuilt after Hurricane Andrew. He further stated the water was receding and it was now approximately 2" lower than it had been earlier in the day. None of the homes have water in the home.

South East Collier County, Chokoloskee, Everglades City area, there are three mobile/manufactured home parks that were checked for storm damage. The combined number of homes was 46. There is no damage in any of the parks. These homes were built between 1950 and 2005. Everglades City is the most southern area on the north side of the Everglades National Park.

Katrina had a windy start as it entered the state with Broward County reporting winds to 115 mph and only receiving 2 inches of rain. The Miami Herald newspaper reported Homestead got the worst of the water. This area received as much as 18" of rain.

Six people died in accidents relating to Hurricane Katrina in South Florida but no one died as a result of failure of construction of a site built home or mobile/manufactured home. Four people were killed by trees falling and two died in boating accidents.

No damage was seen on any manufactured home built after July 13, 1994.

**FIGURE 2**  
**THE PATH OF HURRICANE KATRINA**



**Source:** Wikipedia – The Free Encyclopedia at: [http://en.wikipedia.org/wiki/Hurricane\\_Katrina](http://en.wikipedia.org/wiki/Hurricane_Katrina)

**TABLE 1**

**A study of Damage to Mobile/Manufactured Homes Caused by Hurricane Katrina**

Map #	Date	Mobile Home Park	Address	City	County	Age of park	# Homes in Park	# Homes destroyed or nonrepairable	# of 94 or newer homes	No. of Injured or Killed	No. of Homes Flooded
	08/28/05	Chokoloskee Island Park	1150 Hamilton Lane	Chokoloskee	Collier	60s	31	0	0	0	0
Notes:											
	08/28/05	Buttonwood Mobile Home Park	1165 Rewis Drive	Chokoloskee	Collier	50s - 60s	9	0	0	0	0
Notes:											
	08/28/05	Glades Haven	801 Copeland	Everglades City	Collier	2000's	6	0	0	0	0
Note s:	8 Ft high FEMA Sets										
	08/27/05	Palm Garden Manufactured Home Community	28501 SW 152 Ave	Homestead	Dade	94 newer	275	0	275	0	0
Notes:											
	08/27/05	Goldcoaster Trailer Park	34850 Sw 187 Ave	Homestead	Dade	90s	348	0	348	0	348
Notes:											
	08/27/05	Sun Haven Tailer Park	19500 W. Dixie Hwy	N. Miami Beach	Dade	40s-50s	56	0	0	0	0
Notes											

Map #	Date	Mobile Home Park	Address	City	County	Age of park	# Homes in Park	# Homes destroyed or	# of 94 or newer	No. of Injured or	No. of Homes
-------	------	------------------	---------	------	--------	-------------	-----------------	----------------------	------------------	-------------------	--------------

								<b>nonrepairable</b>	<b>homes</b>	<b>Killed</b>	<b>Flooded</b>
	08/27/05	Dixie Mobile Court	19640 W. Dixie Hwy	N. Miami Beach	Dade	50s-60s	47	0	0	0	0
Notes:											
	08/27/05	Coes Mobile Court	19770 W. Dixie Hwy	N. Miami Beach	Dade	50s-60s	31	0	0	0	0
Notes:											
	08/27/05	Redlands Mobile Home Park	17360 SW 232 St	Homestead	Dade	70s -80s	112	0	50	0	112
Note s:	Park flooded										
	08/27/05	Silver Palm Mobile Park Inc.	17350 SW 232 St	Homestead	Dade	70s -80s	80	0	50	0	80
Note s:	Park flooded										
	08/27/05	Palma Nova	3020 SW 61 Ave	Davie	Broward	70s	944	12	100	0	0
Notes:											
	08/27/05	Hollywood Estates	3300 N. S.R. 7	Hollywood	Broward	70's	400	0	50	0	0
Notes:											
	08/27/05	Dale Village	4901 SW 27th Ct	Pembroke Park	Broward	60s	329	0	0	0	0
Notes:											
	08/27/05	Bamboo Mobile Home Park	2430 Charles Rd	Pembroke Park	Broward	60s - 70s	46	0	0	0	0
Notes:											
	08/27/05	Lake Shore Mobile Home Park	2701 Park Rd	Pembroke Park	Broward	50s-60s	0	0	0	0	0
Notes:											
	08/27/05	Holiday Mobile Estates	3120 W. Hallandale Beach Blvd.	Hallandale	Broward	50s-60s	127	0	0	0	0
Notes:											

Map #	Date	Mobile Home Park	Address	City	County	Age of park	# Homes in Park	# Homes destroyed or nonrepairable	# of 94 or newer homes	No. of Injured or Killed	No. of Homes Flooded
	08/27/05	Home Mobile Home Park	480 SW 8th Ave	Hallandale	Broward	60s - 70s	136	0	0	0	0
	08/27/05	Lone Pine Mboile CC West	3030 W Hallandale Beach Blvd	Hallandale	Broward	70s	220	0	0	0	0
Notes:											
	08/27/05	Golden Trio	700 SW 8th Ave	Hallandale	Broward	50s	40	0	0	0	0
Notes:											
	08/27/05	Snowbird haven Mobile Home Park	855 SW 7TH St	Hallandale	Broward	50s	54	0	0	0	0
Notes:											
<b>TOTALS</b>							<b>3,291</b>	<b>12</b>	<b>725</b>	<b>0</b>	<b>540</b>