

**MOBILE/MANUFACTURED HOME  
DAMAGE ASSESSMENTS FROM  
HURRICANES  
CHARLEY, FRANCES, IVAN, AND JEANNE  
2004**



**Bureau of Mobile Home and RV Construction  
Division of Motor Vehicles  
Department of Highway Safety and Motor Vehicles**

**NOVEMBER 10, 2004**

# MOBILE\MANUFACTURED HOME DAMAGE ASSESSMENTS FROM HURRICANES CHARLEY, FRANCES, IVAN, AND JEANNE

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**NOTE**

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 from 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 Hurricanes Charley, Frances, Ivan, and Jeanne in a sample of 152 mobile home parks affected by these storms. One central focus of these assessments 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 these hurricanes. The other was how the new mobile home installation standards adopted by the DHSMV in 1999 held up to these storm forces.

The assessments found that of the 29,275 mobile homes located in the mobile home parks visited, approximately 3,583 (12.24 percent) were totally destroyed or were not repairable. However, mobile homes constructed post-1994 to the enhanced construction requirements adopted in 1994 withstood hurricane force winds as well as other severe weather conditions and remained intact with minor to no damage. There were approximately 4,056 post-1994 mobile homes in these parks (None of the post-1994 homes experienced any significant damage).

The assessment of storm damage from all four hurricanes indicate that homes installed in accordance with department's uniform mobile home installation rule, Rule Chapter 15C-1 Florida Administrative Code (F.A.C.), remained on their foundations with no movement as a result of severe winds or flood waters, with the exception of three homes impacted by high velocity wave action from Hurricane Ivan. Many homes found destroyed were installed prior to the department's uniform installation Rule Chapter 15C-1, F.A.C. Visual observations found straps and anchors rusted to the point of rendering them ineffective.

In addition to structural damage caused by severe winds to pre-1994 mobile homes, additional damage to mobile homes was due to add-ons such as carports and verandas being blow away. In the case of the older homes, this damage often resulted in damage to roofs which led to serious damage to the home. Since add-ons are not subject to the HUD mobile home construction standards, any improvement in their performance will have to result from changes to state laws, such as section 553.73, Florida Statutes, which concerns the Florida Building Code, and local ordinances governing such construction.

### Summary of Findings from Mobile Home Damage Assessments Regarding Hurricanes Charley, Frances, Ivan, and Jeanne (Numbers are Estimates)

No. of Mobile Home Parks Visited	No. of Mobile Homes (MH)	No. of MH Destroyed Or Not Repairable	No. of Post 1994 HUD Homes	No. of Post 1994 Homes Seriously Damaged
		Percent	Percent	
152	29,275	3,583	4,056	0
		12.24%	13.87%	

**Note:** Damage Reports incorporated within are by mobile home park and by each storm. Therefore, to determine a cumulative effect of the 2004 storms for a specific park, it may be necessary to reference all reports.

# **BACKGROUND**

Through a cooperative agreement with the United States Department of Housing and Urban Development (HUD), the Florida Department of Highway Safety and Motor Vehicles serves as HUD's contract agent in Florida to perform mobile home consumer complaint investigations and in-plant inspections of mobile home plants. These functions are carried out by the Department's Bureau of Mobile Home and Recreational Vehicle Construction (Bureau). In addition to these functions, the bureau licenses and regulates individuals installing mobile homes through the state's Mobile Home Installer Licensing Program. The installer program is a state program and is not part of the cooperative agreement with HUD.

## **National Manufactured Housing Construction and Safety Standards Act**

The National Manufactured Housing Construction and Safety Standards Act of 1974 requires the Secretary of HUD to establish Federal manufactured housing construction and safety standards. The standards apply to all manufactured homes manufactured for sale to purchasers in the United States on or after the effective date of the standards (June 15, 1976). The Secretary is authorized to conduct investigations and inspections necessary to determine if manufactured homes comply with prescribed standards. The Secretary under this act implements these responsibilities through the use of private and state inspection agencies.

The HUD manufactured housing program offers states different levels of participation. States may choose to serve as the State Administrative Agency (SAA) and/or the Production Inspection Primary Inspection Agency (IPIA) in that state. States serving as the SAA investigate consumer complaints and perform mobile home dealer lot audits. States electing to serve as IPIAs perform in-plant inspections of mobile home manufacturing plants to ensure HUD standards are met in the construction of manufactured/mobile homes.

The Department of Highway Safety and Motor Vehicles serves as Florida's SAA, investigating consumer complaints and performing dealer lot audits. The department also serves as the exclusive IPIA in Florida, performing inspections in mobile home plants located in Florida. Other states place these mobile home program activities in other departments including, Department of Community Development, Building Code Commission, Department of Labor, State Fire Marshals Office, Public Service Commission and Department of Insurance. Many states serve as the SAA, with high production states serving as the exclusive IPIA.

Only a state may serve as an SAA, however, an IPIA can be a private entity. If a state chooses not to participate as an SAA, HUD performs that function in the state. If a state chooses not to participate as an IPIA, manufacturers of manufactured/mobile homes may contract with HUD approved private IPIA entities. It is the policy of HUD to involve state agencies in the enforcement of Federal manufactured home standards to the maximum extent possible consistent with the capabilities of such agencies and the public interest.

## **Florida's Manufactured/Mobile Home Program**

Florida's mobile home program, as carried out by the bureau, involves three functional areas; the SAA program, the IPIA program and the Installer Licensing Program. The bureau maintains 38 FTE positions to operate these programs. The following describes the activities in each area:

### **SAA Program**

One of the responsibilities of the SAA is to investigate manufactured/mobile home complaints from consumers, dealers and other SAA's and to ensure the manufactured/mobile home manufacturer adequately resolves the complaint. The bureau maintains a record system of all complaints and reports these complaints to the appropriate manufactured/mobile home manufacturer. If the investigation finds that a complaint was based on a defect introduced into the home at the factory the manufacturer is required to perform a class search of homes to determine if other homes have a similar defect. The bureau monitors the manufacturer to ensure all defects in all homes are corrected. The manufacturer's in-plant complaint records are periodically audited to ensure adequate documentation and resolution of complaints. Another responsibility of the bureau is to perform dealer lot audits to ensure the proper usage of HUD labels affixed to mobile homes on the dealer lot and to ensure that any transit damage or damage incurred while on the lot is repaired. The audit also ensures that any modifications made by the dealer are in accordance with HUD codes.

In addition to and in conjunction with consumer complaint investigations related to the SAA program, the department performs investigations of consumer's complaints in accordance with Florida Statutes, Chapter 320.834 and 320.835. The department investigates complaints that qualify under the statute's one year warranty program, enforcing the one year warranty of manufacturers on the structure of the home and the one year warranty of dealers on the installation of the home.

### **IPIA Program**

HUD requires each manufacturer to obtain the services of an IPIA for each mobile home plant operated by the manufacturer. As the exclusive Production Inspection Primary Inspection Agency (IPIA) in Florida, the bureau is responsible for the in-plant inspections of all manufactured/mobile home factory plants in Florida. All lines of production in the plant are inspected on an ongoing basis to ensure the manufacturer's compliance with design specifications approved in accordance with HUD code. Inspectors visually observe the manufacturing process in each phase of construction to ensure conformance to HUD code. The inspectors also evaluate the plant's quality control system on an ongoing basis to ensure the effectiveness of the system. Deviations from federal standards are documented and action is taken to correct the deviations and prevent their reoccurrence. All deviations from standards are documented and analyzed at bureau headquarters to determine if further action is required to ensure the plant has rectified the causes of the deviations. HUD provides specific guidelines for IPIAs in this process and performs an annual audit of the IPIAs' effectiveness. Inspectors ensure that all nonconformances are corrected while the home is still in the factory.

When the home has been completed and passes final inspection, a HUD label is affixed to the home section attesting that it meets HUD construction code. (A HUD label is required on each section of a multi-sectional home.) No homes are allowed to leave the factory without a HUD label.

### **Programs Revenue**

There are several sources of revenue to support the SAA and IPIA programs. Florida Statute 320.8255 (4) grants the department authority to determine fees for HUD labels. The bureau maintains an inventory of HUD labels and receives \$32.00 (currently) for each label sold. The manufacturer purchases the labels from the bureau and pays an additional \$39.00 directly to

HUD for each label purchased. The bureau also receives revenue for monitoring mobile home construction and working mobile home complaints from HUD at \$11 for each home built in Florida that stays in Florida, \$2.50 for each home built in Florida and shipped to another state, and \$9 for each home built in another state and shipped to Florida. Finally, the bureau charges fees for special inspections

associated with certifying plants, increased frequency inspections when plants are conducting remedial action and some inspections associated with complaint investigations. The fee for special inspections is \$30 per hour plus mileage at the state reimbursement rate for mileage for inspections by compliance examiners and \$45 per hour plus mileage for inspections by the bureau engineer. This revenue intended to cover the expenses of operating the IPIA and SAA programs. Annualized Revenue numbers are available from the department's Annual Revenue Report for fiscal year 2003-04 on page 145.

### **Florida's Installer Licensing Program**

In 1996, the bureau implemented the Mobile Home Licensed Installer's program in accordance with Section 320.8249, Florida Statute. This program includes the testing, licensing and sanctioning of individuals who install mobile homes. The bureau provides individuals with a required eight hour pre-licensure course on Florida rules pertaining to mobile home installation and contracts with a testing vendor to provide the exam which must be passed prior to licensure. The bureau issues a license after the individual completes the course, passes the exam and meets bond and insurance requirements. Licenses are renewed on an annual basis. The bureau, when necessary, issues sanctions in accordance with statute and rule. Licensed installers are required to purchase an installation decal for each home they install. This decal indicates that the home was installed by a Florida licensed installer.

A major function of this program is training county and city building officials on how to inspect the set-up of a mobile home to ensure it meets the department rules. Staff in this program train officials on an ongoing basis in an effort to ensure homes are properly set-up before the consumer moves into the home. In addition to this training responsibility, staff also investigates complaints relating to improper installation of homes.

Revenue to support the program is generated from a \$150 original license fee and \$50 original license application fee, an annual renewal fee of \$100.00 and an installation decal fee of \$10.00.

### **Summary of Changes to Mobile Home Construction and Installation Standards**

In reaction to the devastation caused by Hurricane Andrew in Dade County in 1992, the U.S. Department of Housing and Urban Development (HUD) amended its regulations governing mobile 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 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 mobile homes must be designed by a professional engineer or architect to withstand winds up to certain speeds in the three Wind Zone areas. Mobile 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. Mobile homes built for Wind Zone III must be able to withstand winds of up to 110 miles per hour. Most of Florida is in Wind Zone II, however, there are 14 counties in Wind Zone III. 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 mobile home dealer may not sell a mobile home to a customer that is not designed for the Wind Zone area where the customer intends to install the home.

With regard to the new mobile home construction standards, HUD required the following enhanced construction requirements:

1. Specific minimum connections between the roof and walls and between the walls and the floor assembly.
2. For Wind Zone III larger studs built closer together.
3. Additional design provisions regarding the attachment of exterior coverings and sheathings.
4. Increased resistance of windows to high wind forces.
5. A method for protecting windows and sliding doors from impact damage due to missiles being hurled by high winds.

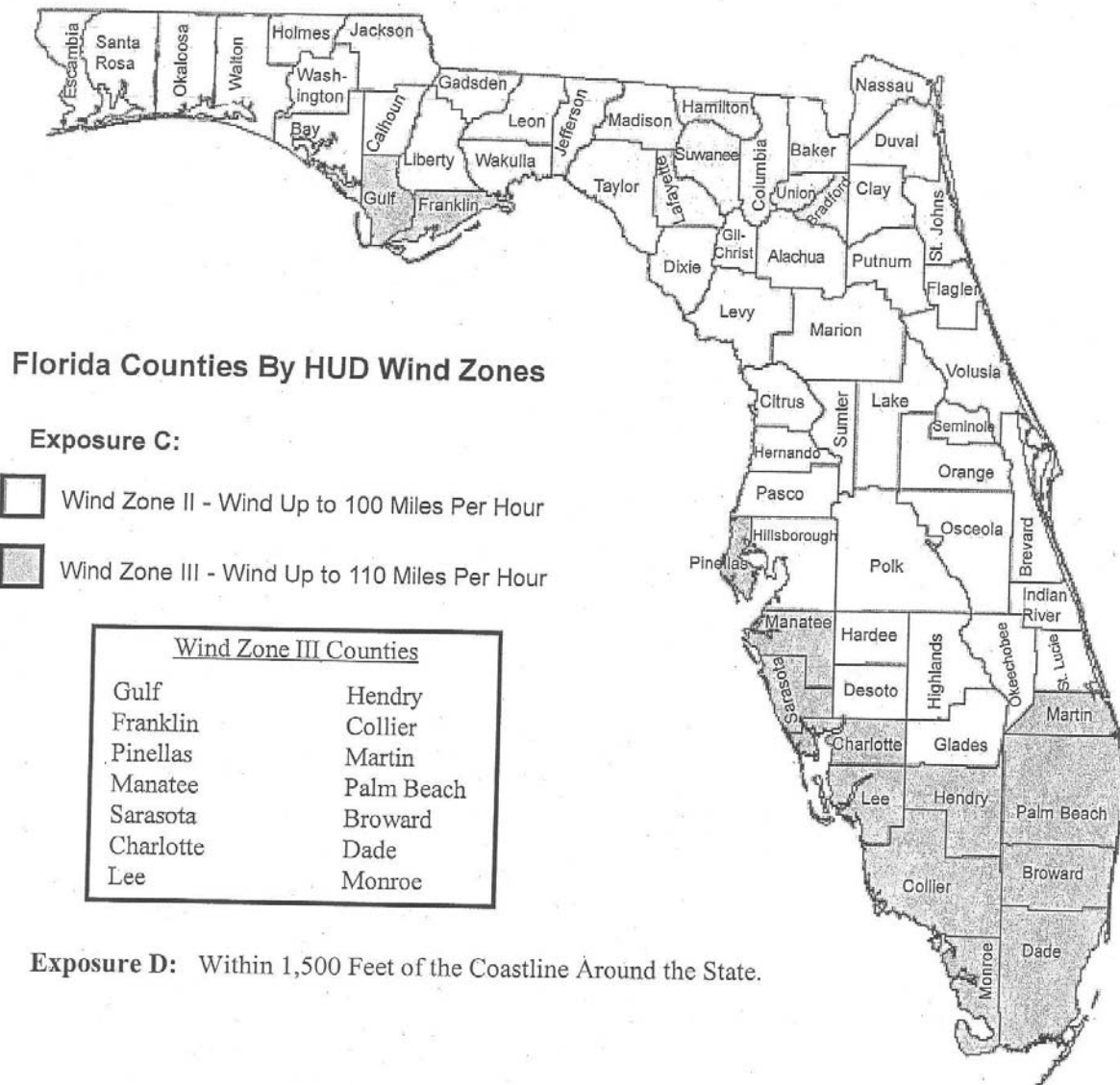
In addition to these HUD requirements, in 1996, the Division of Motor Vehicles in the Florida Department of Highway Safety and Motor Vehicles implemented a mobile home installer program which licenses mobile home installers and requires specific training of all persons seeking a mobile home installer license. Any mobile home installed in Florida must be installed by a licensed mobile home installer in accordance with Department of Highway Safety and Motor Vehicles Rule Chapters 15C-1 and 15C-2, Florida Administrative Code (F.A.C.), which govern mobile home installation. These administrative rules provide standards for mobile home foundations, anchoring straps and the anchors used to secure the home to the ground. These

administrative rules were revised in 1999 to strengthen mobile home installation standards. This was in response to the damage caused by tornadoes in Central Florida in 1998. The key changes to these administrative rules in 1999 are as follows:

1. All anchors must be galvanized.
2. Minimum stabilizer plates 180 square inches, galvanized.
3. Minimum height of 18 inches.
4. 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
5. I-Beam clamp that pivots top of frame only.
6. Side wall and frame ties 5 feet 4 inches on center.
7. Longitudinal anchors, 2 per I-Beam per end.
8. Centerline ties within 2 feet each end.
9. Galvanized straps, 60 ounces both sides or nominal G115
10. Radius clip protection.
11. Soil test by installer to determine proper anchor.
12. Installer plan for 1,000 pounds per square foot soil.

The assessments of mobile home damage caused by the four hurricanes that hit Florida in 2004 found that homes built after the new HUD mobile home construction regulations went into effect held up remarkably well to hurricane force winds, rain and storm surge. None of these homes sustained any significant damage, although some lost add-ons such as carports and verandas. The assessments also found that homes installed by licensed mobile home installers according to the new installation standards did not move from their foundations. Unfortunately, older homes that were not installed in accordance with Rule Chapters 5C-1 and 15C-2 often had tie-down straps and anchors that had rusted away to the point of providing no protection against movement of the home.

**FIGURE 1**





**MOBILE/MANUFACTURED  
HOME DAMAGE ASSESSMENT  
FROM HURRICANE CHARLEY**



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

**FRED O. DICKINSON**  
Executive Director

**DATE:** August 24, 2004

**TO:** Phil Bergelt, Program Manager, Bureau of Mobile Home and RV Construction (BMHRVC)

**FROM:** Wayne Jordan, Community Assistance Consultant, BMHRVC

**SUBJECT:** Manufactured Home study from Hurricane Charley

**FINDINGS:**

On Friday, August 13, 2004 Hurricane Charley came ashore at Charlotte Harbor on a Northeast track through the state. The eye of the Hurricane seemed to go up the harbor and heavily damaged homes in Punta Gorda and Port Charlotte before heading to Arcadia and other areas to the Northeast. (addendum 1 & 2)

This study focuses on Charlotte, Lee, Polk, Desoto, Hardee, Highlands, and Orange Counties and concerns the Manufactured/Mobile Home parks and communities. These areas provide a wide variety of study and includes: newer parks with homes built in the 90s, older parks with homes built in the 60s and 70s, mixed communities with site built and manufactured homes, and parks that allow recreational vehicles.

Seventy-seven parks and communities were studied and statistics were formulated. (addendum 3) The homes build before HUD regulations did not perform well: there were little to no structural requirements. We found roof trusses built out of 3/4" by 3/4" lumber. HUD homes in the 70s and 80s fared somewhat better, but many homes with metal siding and metal roofs had significant rotted wood at the stud to floor connections and collapsed under the heavy winds. Two people were killed and one seriously wounded in a home hit by a spawned tornado: their home had 5 of 10 anchors totally rusted away. The newer homes, built since HUD changed its building code in July 1994, performed (without exception) well structurally. It was not uncommon to see several destroyed homes with a newer HUD home standing alone with the only damage being from flying debris.

The newer homes installed since our rule change in March 1999 showed no movement what so ever. Also, very few older homes left their foundations and those that did had anchors and straps that had rusted away. Interviews with homeowners that stayed in their newer homes said the homes did not move at all during the high winds and those that stayed in older homes felt the homes move. All homeowners interviewed said they would not do it again due to the noise and the flying debris.

Attachments to homes whether new or older homes did not perform as they should. Approximately 75% of carports, awnings, sheds, and additions collapsed or were blown away and became missiles that pounded other homes. Even a high percentage of newer home's carports and sheds were heavily damaged.

Roofovers and one-piece membrane roof covers did not perform well at all. Both of these types of roof coverings had too few fasteners and the fasteners used were too short. This allowed a large percentage to be blown off the home and may have lead to the total loss of the home. The insurance companies may show a higher loss of homes, since almost daily rains continue to penetrate homes with no roof shingles or underlayment and/or missing roof decking.

### **OBSERVATIONS:**

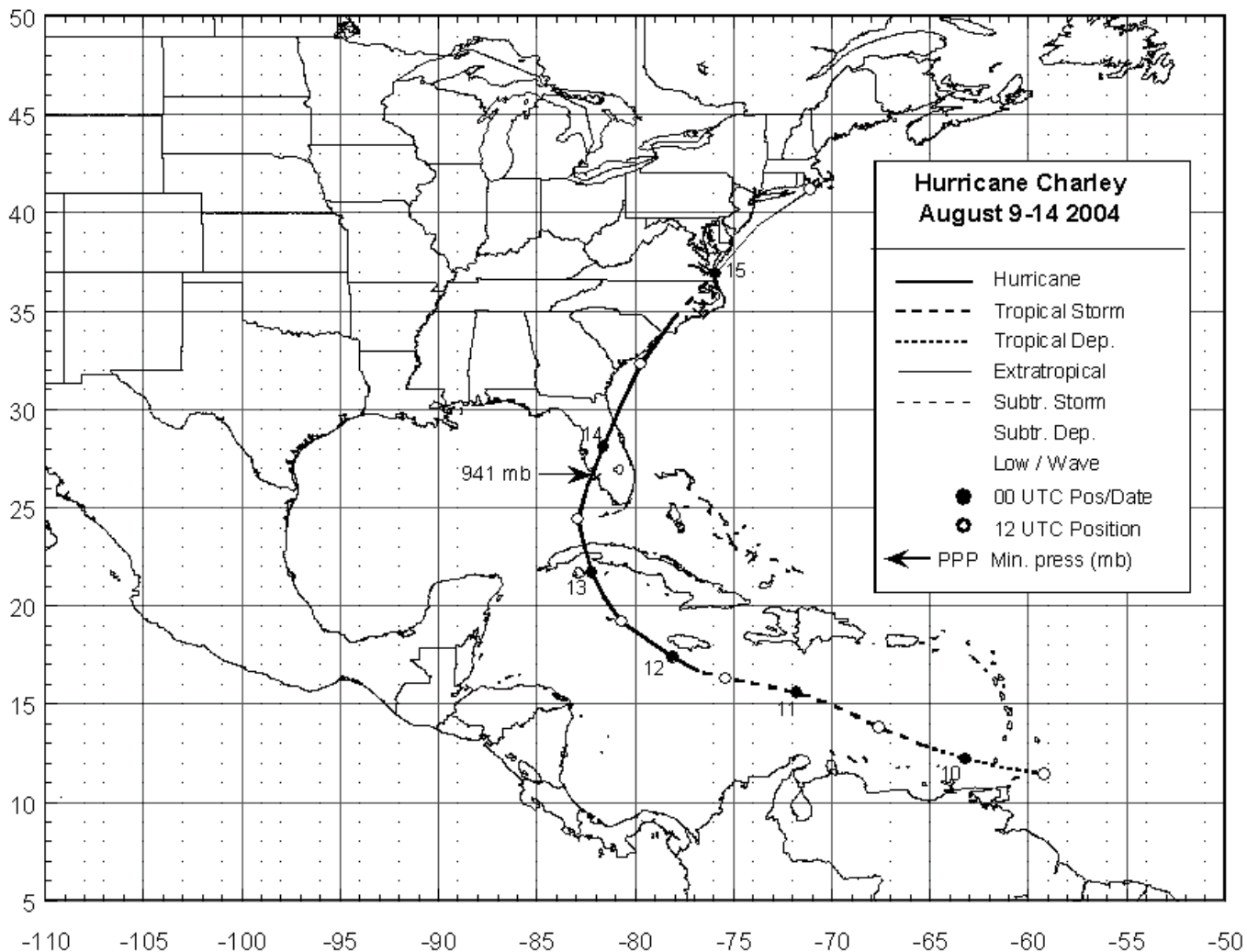
As we work storm-damaged homes through out the state of Florida, we are beginning to find our reports becoming repetitive, whether the storm is a hurricane, tropical storm or a tornado.

- Pre HUD home do not perform well due to lack of structural requirements, rusted anchors &
- Straps and rotted wood studs, perimeter joists and trusses.
- HUD homes from 1976 to July 1994 perform somewhat better, but are starting to experience
- Rusted anchors & straps and wood rotted trusses, top plates, studs, perimeter joists and termite damage.
- This is our first study of a large scale disaster on new homes with our Rule 15C changes of March of 1999. We found four parks with 100% repairable homes.

### **RECOMMENDATIONS:**

1. It was extremely difficult to determine the number of manufactured home parks or communities. We need, by whatever means, a web site that would have each park listed by county and a map of the park. Once we identified a park it was extremely difficult to work the park without a park map. We worked Maple leaf Estates, a park with 1,114 homes and had no map to go by.
2. Manufactured/mobile home owners should take responsibility for on-site inspections of their anchoring systems and retrofit where necessary. In addition, an inspection of the perimeter rim joists and wall connections should be made for rot and termite damage. Far too many homes were destroyed due to rusted anchors/straps and/or rotted trusses, studs, perimeter rail and termite damage. The only deaths and injury was in an older home with rusted anchors and straps where the homeowner's decided to ride out the hurricane. These inspections should follow a list of required component inspections as mandated by our Bureau and be performed by trained Manufactured/Mobile home inspectors licensed by our department. All inspections would be required to be completed and electronically transmitted to our Bureau and could be stored on CDs. We would limit the inspection fee to be charged to a homeowner and dealers could add the fee to the financing. We could charge a \$50.00 fee for a label to be attached to the home to cover our expenses.
3. Within one year review our finding from Hurricane Charley with Licensed Installers and mandate attendance.

**FIGURE 2**  
**THE PATH OF HURRICANE CHARLEY**



**Source:** National Hurricane Center – National Weather Service at <http://www.nhc.noaa.gov/2004charley.shtml>

**FIGURE 3**  
**PATH OF HURRICANE CHARLEY UPON INITIAL IMPACT**



**TABLE 1**  
**A Study of Damage to Mobile/Manufactured Homes Caused By Hurricane Charley**

No.	Date of Inspect.	Park Name Park Location	No. of MH	No. of MH Destroyed or Not Repairable	No. of Post 1994 HUD Homes	No. of Post 1994 HUD Homes Seriously Damaged	Comments
				Percent	Percent		
1	8/14/04	The Ridge	481	0	481	0	No flood damage
		Davenport, Polk County		0.00%	100.00%		
2	8/14/04	Mouse Mountain RV Park	23	0	0	N/A	No flood damage
		Davenport, Polk County		0.00%	0.00%		
3	8/14/04	Lake Region	236	0	9	0	No flood damage
		Haines City, Polk County		0.00%	3.81%		
4	8/14/04	Lake Fox Village	25	0	0	N/A	No flood damage
		Winter Haven, Polk County		0.00%	0.00%		
5	8/14/04	Lakewood Village	223	0	200	0	Some siding off, roof issue; all in tact.
		Punta Gorda, Charlotte County		0.00%	89.69%		
6	8/14/04	Lazy Lagoon	155	39	8	0	75 percent appear repairable. No flooding or injuries.
		Punta Gorda, Charlotte County		25.00%	5.00%		
7	8/14/04	Pines and Palms	121	25	0	N/A	Older homes.
		Punta Gorda, Charlotte County		20.66%	0.00%		
8	8/14/04	Pelican Harbor	135	68	8	0	8 installed since 1999 installer rule change. No structural damage.
		Punta Gorda, Charlotte County		50.37%	5.93%		
9	8/14/04	Palms and Pines	121	25	0	N/A	
		Punta Gorda, Charlotte County		20.66%	0.00%		
10	8/14/04	River Forest	204	110	1	0	Cannot access. Appears to be approximately 50% damage.
		Punta Gorda, Charlotte County		53.92%	0.49%		
11	8/14/04	Pine Acres	140	126	7	0	Older park - less than 5% new homes - 10 repairable. No injuries. 1998 and 2004 homes both in tact.
		Punta Gorda, Charlotte County		92.86%	5.00%		
12	8/15/04	Crystal Lakes	55	41	0	0	All pre-1994 homes. 2 deaths, no flooding.
		Punta Gorda, Charlotte County		74.55%	0.00%		
13	8/15/04	Butterwood Village	270	162	13	0	Older park. 40% repairable. All did well except 3 homes with cut and welded anchors. Only one came off foundation. No flooding.
		Punta Gorda, Charlotte County		60.00%	4.81%		

No.	Date of Inspect.	Park Name Park Location	No. of MH	No. of MH Destroyed or Not Repairable	No. of Post 1994 HUD Homes	No. of Post 1994 HUD Homes Seriously Damaged	Comments
				Percent	Percent		
14	8/15/04	Windmill Village	454	367	15	0	Mostly older homes. 35 homes never inspected after 1994. No flooding or injuries. Lot sets are 15C.
		Punta Gorda, Charlotte County		80.84%	3.30%		
15	8/16/04	Ventura Lakes	260	0	260	0	All new homes. All are 1994 or later. Only colateral damage. Looked at sets. All OK. No flooding. Several homes not set up. One flipped over. Were still anchored.
		Punta Gorda, Charlotte County		0.00%	100.00%		
16	8/16/04	Old Gator Creek Estates	47	7	0	N/A	All pre-1994 homes. Heavy damage/carports and windows. No flooding.
		Punta Gorda, Charlotte County		14.89%	0.00%		
17	8/16/04	Riverside Oaks	430	0	430	0	All 1995 or newer homes. All repairable. Collateral damage to carports/additions. No Flooding. All additions city/county approved.
		Punta Gorda, Charlotte County		0.00%	100.00%		
18	8/16/04	Blue Heron Pines	240	0	204	0	Most post 1994 homes. Some later 1980's. All repairable. Collateral damage/carport additions. No flooding.
		Punta Gorda, Charlotte County		0.00%	85.00%		
19	8/16/04	Alligator Park	323	67	2	0	All in park pre-1994/ only 2 new homes and they were fine.
		Punta Gorda, Charlotte County		20.74%	0.62%		
20	8/16/04	Eagle Point	248	57	2	0	All but 2 pre-1994 homes (1970s & 1980s). 2 new homes, both of which were fine.
		Punta Gorda, Charlotte County		22.98%	0.81%		
21	8/16/04	Park Hill	176	64	17	0	10% new homes. Only collateral damage. No foundation issues.
		Punta Gorda, Charlotte County		36.36%	9.66%		
22	8/16/04	DeSoto Village	135	14	12	0	All houses still on foundations. Most damage is carports, siding, screen rooms, additions, shingles, a roof blown open, broken windows, etc. Tie downs OK
		Arcadia, DeSoto County		10.00%	8.89%		
23	8/16/04	Arcadia Village	375	8	113	0	All homes still on foundations. Damaged roofs, shingles, siding. Extensive damage to screen rooms, additions, carports. Tie downs OK.
		Arcadia, DeSoto County		2.00%	30.00%		

No.	Date of Inspect.	Park Name Park Location	No. of MH	No. of MH Destroyed or Not Repairable	No. of Post 1994 HUD Homes	No. of Post 1994 HUD Homes Seriously Damaged	Comments
				Percent	Percent		
24	8/16/04	Toby's Mobile Home & RV Park	150	0	30	0	All HUD homes still on foundations. A lot of RV's blown over and upside down. Some rolled into HUD homes. Lots of damage to shingles, siding blown off, most of all screen rooms, carport and additions blown apart. Tie downs OK.
		Arcadia, DeSoto County		0.00%	20.00%		
25	8/16/04	Live Oak RV Resort	100	0	80	0	All HUD homes still on foundations but siding and roof damage. Lots of damage done by flying objects to carports, additions, screen rooms, etc. Tie downs OK
		Arcadia, DeSoto County		0.00%	80.00%		
26	8/16/04	Grace Mobile Home Park	28	12	0	N/A	Over the roof tie down straps used. Two homes had the straps snapped. Homes flipped over. Two photos taken.
		Bowling Green, Hardee County		42.86%	0.00%		
27	8/16/04	Stanton, Inc. (Dealer)	1	0	1	0	Home was on dealer lot, not tied down. Minor damage to vinyl siding and roof shingles.
		Bowling Green, Hardee County		0.00%	100.00%		
28	8/17/04	Port Charlotte Village	435	255	10	0	No injuries or flooding.
		Port Charlotte, Charlotte County		58.62%	2.30%		
29	8/17/04	Maple Leaf Mobile Home Park	1,114	272	100	0	No injuries or flooding.
		Port Charlotte, Charlotte County		24.42%	8.98%		
30	8/17/04	Palmetto Mobile Home Park	117	88	0	N/A	No injuries or flooding.
		Port Charlotte, Charlotte County		75.21%	0.00%		
31	8/17/04	Harborview Mobile Home Park	240	56	0	N/A	No injuries or flooding.
		Port Charlotte, Charlotte County		23.33%	0.00%		
32	8/17/04	Mary Lu Mobile Home Park	104	35	0	N/A	No injuries or flooding.
		Port Charlotte, Charlotte County		33.65%	0.00%		
33	8/17/04	Buttonwood Mobile Home Park	6	6	0	N/A	No injuries or flooding.
		Bokeela, Lee County		100.00%	0.00%		
34	8/17/04	September Estates	65	35	1	0	No injuries or flooding.
		Bokeela, Lee County		53.85%	1.54%		
35	8/17/04	Cap'n Max	30	8	1	0	No injuries or flooding.
		Bokeela, Lee County		26.67%	1.33%		



No.	Date of Inspect.	Park Name Park Location	No. of MH	No. of MH Destroyed or Not Repairable	No. of Post 1994 HUD Homes	No. of Post 1994 HUD Homes Seriously Damaged	Comments
				Percent	Percent		
36	8/17/04	Pink Citrus	86	40	0	N/A	No injuries or flooding.
		Bokeela, Lee County		46.51%	0.00%		
37	8/17/04	Pine Island Cove	317	3	5	0	No injuries or flooding.
		St. James City, Lee County		8.11%	1.58%		
38	8/17/04	Cherry Estates	471	12	171	0	No injuries or flooding.
		St. James City, Lee County		2.54%	36.31%		
39	8/17/04	Paradise Mobile Village, Inc.	140	0	3	0	No damage to homes - 3 homes had awnings blown off.
		Lake Placid, Highlands County		0.00%	2.14%		
40	8/17/04	Lakeside Village	225	0	23	0	No damage to homes - 2 awnings blown off.
		Lake Placid, Highlands County		0.00%	10.00%		
41	8/17/04	Tropical Harbor Estates	420	0	210	0	No damage - 4 homes had roof overs peel back.
		Lake Placid, Highlands County		0.00%	50.00%		
42	8/17/04	Bonnie Brae Mobile Estates	146	0	73	0	Mostly newer 1977 - 1994. Some siding damage, awnings and carport damage.
		Avon Park, Highlands County		0.00%	50.00%		
43	8/17/04	Valencia Acres	200	0	100	0	Private property. Many older homes. There was awning and addition damage.
		Avon Park, Highlands County		0.00%	50.00%		
44	8/17/04	Avon Mobile Home Park	87	0	0	N/A	10 wide - 12 wide homes. One home lost roof over. Carports and awnings lost.
		Avon Park, Highlands County		0.00%	0.00%		
45	8/17/04	Orange Blossom Fellowship Com.	60	0	60	0	One home lost about 20% of roof and decking due to carport attachment. In other homes awning and carport damage. Very little siding or shingle damage.
		Avon Park, Highlands County		0.00%	100.00%		
46	8/17/04	Brentwood Mobile Home Park	30	0	0	N/A	Park has only 10 wide and 12 wide units. There was some awning and carport damage.
		Avon Park, Highlands County		0.00%	0.00%		
47	8/17/04	Reflections on Silver Lake	90	0	0	N/A	Only 90 mobile homes in this park. 115 to 150 Park models of which 50% are HUD. There was no significant damage.
		Avon Park, Highlands County		0.00%	0.00%		
48	8/17/04	Adelaide Shores RV Resort	112	0	11	0	MH and RVs - about 50% are MH. Awning and carport damage - one roof over.
		Avon Park, Highlands County		0.00%	10.00%		

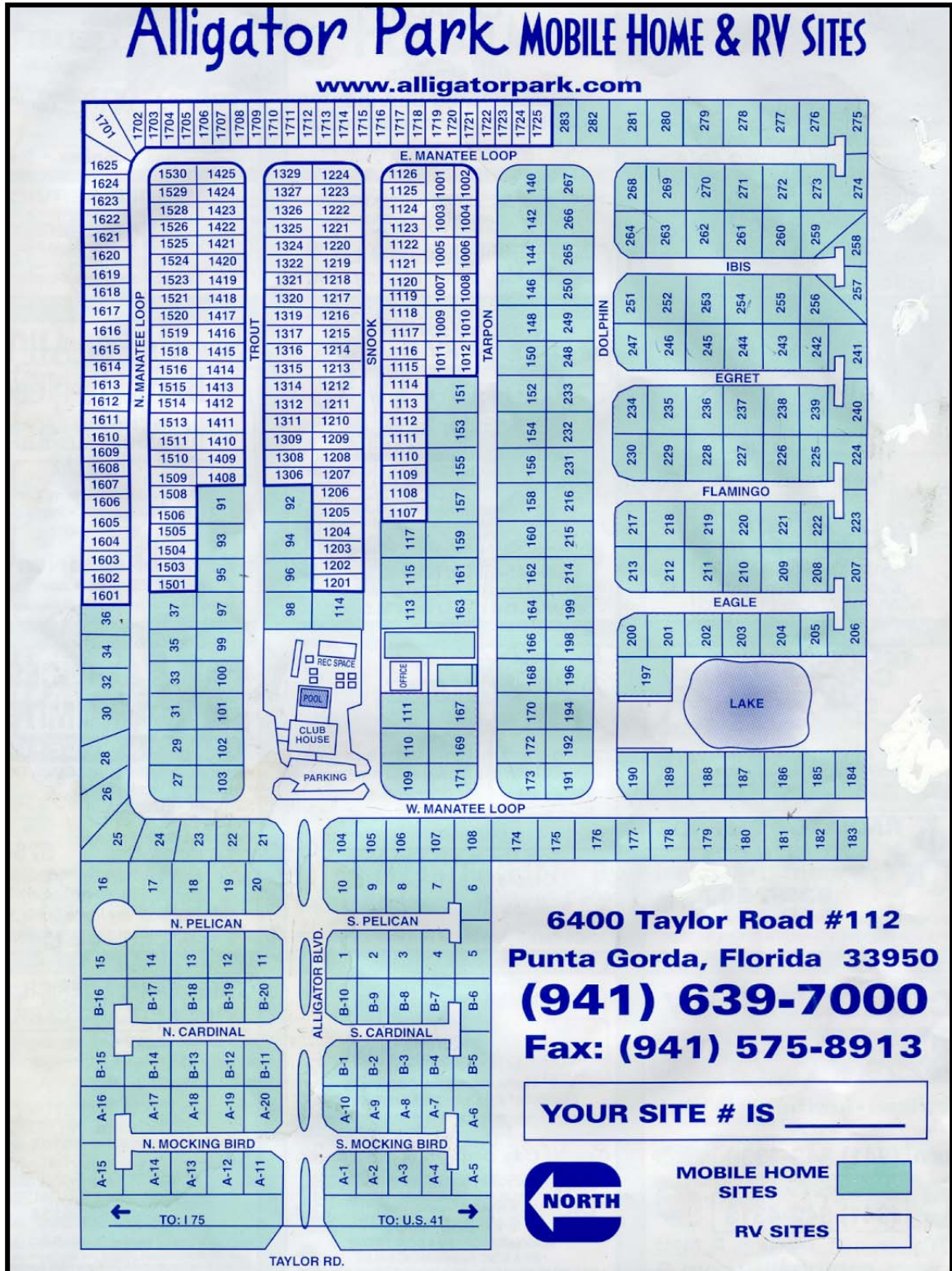
No.	Date of Inspect.	Park Name Park Location	No. of MH	No. of MH Destroyed or Not Repairable	No. of Post 1994 HUD Homes	No. of Post 1994 HUD Homes Seriously Damaged	Comments
				Percent	Percent		
49	8/18/04	River Haven	144	41	0	N/A	No new homes in park.
		Punta Gorda, Charlotte County		28.47%	0.00%		
50	8/18/04	Charlotte Park	40	30	1	0	
		Punta Gorda, Charlotte County		75.00%	2.50%		
51	8/18/04	Slip Not	90	50	0	N/A	
		Punta Gorda, Charlotte County		55.56%	0.00%		
52	8/16/04	South Punta Gorda Heights	250	75	0	N/A	
		Punta Gorda, Charlotte County		30.00%	0.00%		
53	8/18/04	Emerald Lake	201	83	0	N/A	Appears to have been retrofitted. Added longitudinal and frame ties. Homes stayed in place.
		Punta Gorda, Charlotte County		41.29%	0.00%		
54	8/18/04	Shady Oaks Mobile Home Park	27	13	1	0	No flood damage.
		Arcadia, DeSoto County		48.15%	3.70%		
55	8/18/04	Cross Creek Co. Club	50	0	15	0	No flood damage.
		Arcadia, DeSoto County		0.00%	30.00%		
56	8/18/04	Craigs RV Park	21	8	2	0	No flood damage.
		Arcadia, DeSoto County		38.10%	9.52%		
57	8/19/04	Sunshine Trailer Park	15	2	0	N/A	No flood damage.
		Wauchula, Hardee County		13.33%	0.00%		
58	8/19/04	Trevino's Mobile Home Park	5	0	0	N/A	No flood damage.
		Zolfo Springs, Hardee County		0.00%	0.00%		
59	8/19/04	Branch Mobile Home Park	67	3	0	N/A	No flood damage.
		Bowling Green, Hardee County		4.48%	0.00%		
60	8/19/04	Peace River Mobile Home Park	35	17	0	N/A	No flood damage.
		Zolfo Springs, Hardee County		48.57%	0.00%		
61	8/19/04	Downing Place	49	3	0	N/A	No flood damage.
		Wauchula, Hardee County		6.12%	0.00%		
62	8/19/04	Hollons H/H Park	6	2	0	N/A	No flood damage.
		Zolfo Springs, Hardee County		33.33%	0.00%		

No.	Date of Inspect.	Park Name Park Location	No. of MH	No. of MH Destroyed or Not Repairable	No. of Post 1994 HUD Homes	No. of Post 1994 HUD Homes Seriously Damaged	Comments
				Percent	Percent		
63	8/19/04	Avion Palms Resort	15	0	*	*	No flood damage.
		Bowling Green, Hardee County		0.00%	*		
64	8/19/04	Brookside Bluff	258	2	200	0	No flood damage.
		Zolfo Springs, Hardee County		0.78%	77.52%		
65	8/19/04	Citrus Valley Mobile Home Park	58	7	0	N/A	No flood damage.
		Wauchula, Hardee County		12.07%	0.00%		
66	8/19/04	Crystal Lake Village	72	6	0	N/A	No flood damage.
		Wauchula, Hardee County		8.33%	0.00%		
67	8/19/04	Pine Cone Mobile Home Park	25	5	0	N/A	No flood damage.
		Wauchula, Hardee County		20.00%	0.00%		
68	8/19/04	Lazy Acres	38	28	0	N/A	No flood damage.
		Zolfo Springs, Hardee County		73.68%	0.00%		
69	8/19/04	Little Charlie Creek	45	19	10	0	No flood damage.
		Wauchula, Hardee County		42.22%	22.22%		
70	8/19/04	The Village of Little Charlie Creek	29	2	0	N/A	No flood damage.
		Zolfo Springs, Hardee County		6.90%	0.00%		
71	8/19/04	Oak Hill Mobile Home Park	23	2	0	N/A	No flood damage.
		Zolfo Springs, Hardee County		8.70%	0.00%		
72	8/20/04	Burnt Store Colony	240	2	5	0	
		Punta Gorda, Charlotte County		0.83%	2.08%		
73	8/20/04	Wheel Estates	72	0	0	N/A	No flood damage.
		Orlando, Orange County		0.00%	0.00%		
74	8/20/04	Bali Hai Mobile Home Park	204	7	3	0	No injuries or flood damage. Damage caused by trees.
		Orlando, Orange County		3.43%	1.47%		
75	8/20/04	Conway Circle	117	4	0	N/A	No injuries or flood damage. Damage caused by trees.
		Orlando, Orange County		3.42%	0.00%		
76	8/20/04	Belle Isle Oaks	30	0	0	N/A	No injuries or flood damage. Only minor damage.
		Orlando, Orange County		0.00%	0.00%		

\*Unable to determine.

No.	Date of Inspect.	Park Name Park Location	No. of MH	No. of MH Destroyed or Not Repairable	No. of Post 1994 HUD Homes	No. of Post 1994 HUD Homes Seriously Damaged	Comments
				Percent	Percent		
77	8/20/04	Conway Shores	32	0	0	N/A	No injuries or flood damage. Only minor damage.
		Orlando, Orange County		0.00%	0.00%		
<b>TOTALS</b>			11,909	2,413 20.26%	2,898 24.33%	0	A consistent finding was that homes built after HUD's 1994 regulations went into effect survived well.

**FIGURE 4**  
**EXAMPLE OF A GOOD MAP FOR A MANUFACTURED HOME COMMUNITY**



**PHOTOS OF  
MOBILE/MANUFACTURED HOME  
DAMAGE CAUSED BY  
HURRICANE CHARLEY**



**Many older homes collapsed due to the force of the winds.**





Finding roads and parks was difficult.  
A majority of signs had blown down.





**Lakewood Village, HWY 17, Punta Gorda**  
**223 homes with superficial damage only**  
**All homes are repairable.**



**Pine Acres, Hwy 17, Punta Gorda**

**This park was established in the early 80s and was hit hard. Out of 140 homes we estimated 126 homes destroyed or non-repairable. Seven new homes were in the park and all performed well and all are repairable.**



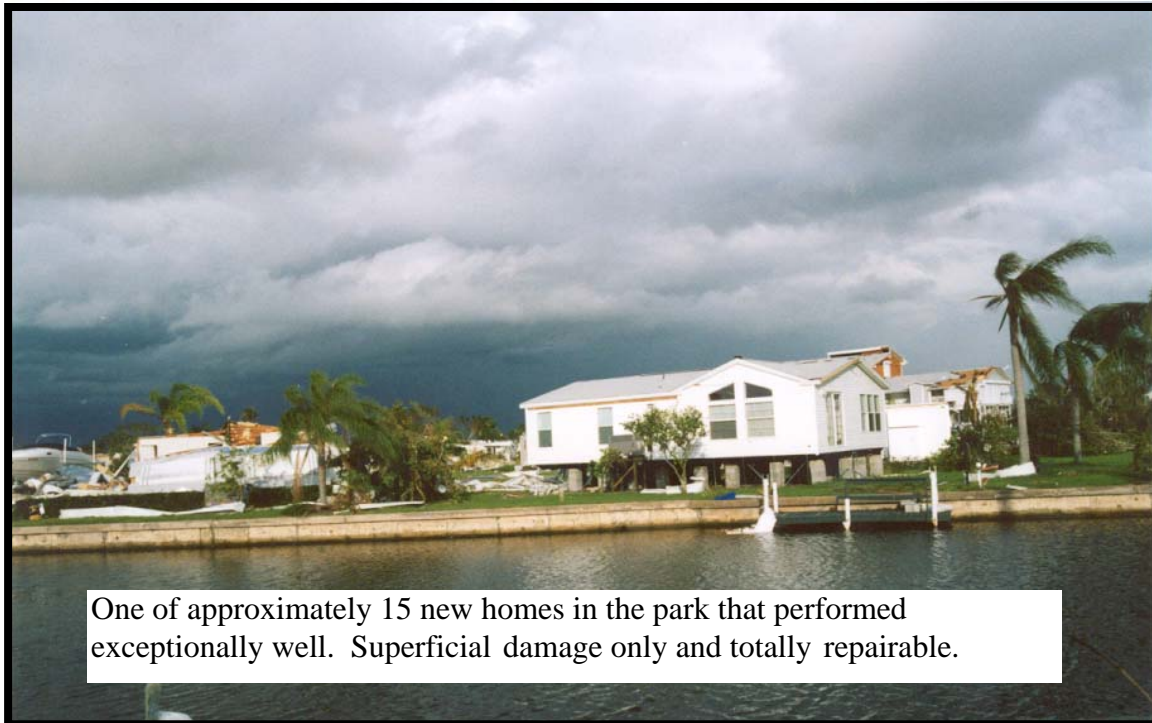


**Windmill Village, Rio Villa Dr, Punta Gorda**

Another hard hit park with an estimated 367 of 454 destroyed or non-repairable.



**Windmill Village, pg. 2**  
**Another view of the destruction in this park.**





## Crystal Lakes, Florida Ave, Punta Gorda

This was an older park with homes back to the 70s and was hard hit. The park had 55 homes and 41 were destroyed or non-repairable.

Two people were killed in this home and one seriously injured.

We estimate a tornado spawned by the hurricane hit this home since it was thrown across the street and the car was in the neighbor's yard.





**These people did not evacuate. Due to the home being in a depression water was able to accumulate under the home and over the years the anchors and tie downs rusted away. There were a total of 10 anchors and tie downs on this home.**



**These straps wrapped the I-beam and broke under pressure from the tornado**



**Old Gator Creek Estates, Jones Loop Rd, Punta Gorda**

**This 70s model home was flipped over and torn from its frame due to rusted tie downs.  
The park across the street is Ventura Lakes where all homes were repairable.**



**Charlotte Park, Bayberry Rd, Punta Gorda**

**This was the only new home in a park started in the 60s. 30 of 40 homes were destroyed or are non-repairable. The home had no attachments and had little superficial damage and the owner was really bragging on her home. The air conditioner set to FEMA height requirements was blown over with its support frame.**





**Rotted perimeter rails, studs and termite damage was a big problem in the older homes.**



**These aluminum posts in a palm tree and through the side of a home shows what a Category 3 Hurricane (wind gusts to 145 m.p.h.) can do.**





**Ventura Lakes, Jones Loop Rd, Punta Gorda**

**Another new park with 260 homes and all are repairable.**

**Homes awaiting installation did not escape damage, however. Two sections of a Palm Harbor triple wide turned over.**







**Going off road.**  
Getting through to the  
different parks.



**MOBILE/MANUFACTURED  
DAMAGE ASSESSMENT FROM  
HURRICANE FRANCES**



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

**FRED O. DICKINSON**

Executive Director

**DATE:** September 10, 2004

**TO:** Ed Broyles, Assistant Division Director, Division of Motor Vehicles

**FROM:** Phil Bergelt, Program Manager, Bureau of Mobile Home and RV Construction

**SUBJECT:** Manufactured Home study from Hurricane Frances

**FINDINGS:**

Late Saturday, September 5, 2004 Hurricane Frances came ashore near Stuart, Florida on a West-Northwest track through the state. The eye of this Hurricane was so large that the National Hurricane Center reported the eyewall as it came ashore encompassed portions of Palm Beach, Martin and St. Lucie counties. The wind speed was 105 miles per hour.

The news media early reports showed carport, sheds and awning damage to mobile/manufactured homes and our finding were similar. Our investigation started in Melbourne and concluded in Vero Beach. We covered approximately 40 miles and concentrated on the area north of the eyewall. This area was covered since damage is usually greater north of the eye and the news media reported a great amount of damage in these areas. The parks we visited were mostly pre HUD parks with very few newer homes. We investigated 24 mobile/manufactured home communities that contained 9,689 homes. We found only one home was totally destroyed. However, 98 other homes were damaged and were not repairable. The insurance companies may total some additional homes if homeowners do not quickly repair their roofs.

It was evident this storm did not produce near the damage as Hurricane Charley. We reported 75% of carports, awnings, sheds and additions collapsed or were blown away with Charley. The percentage with Frances was approximately 25 to 30.

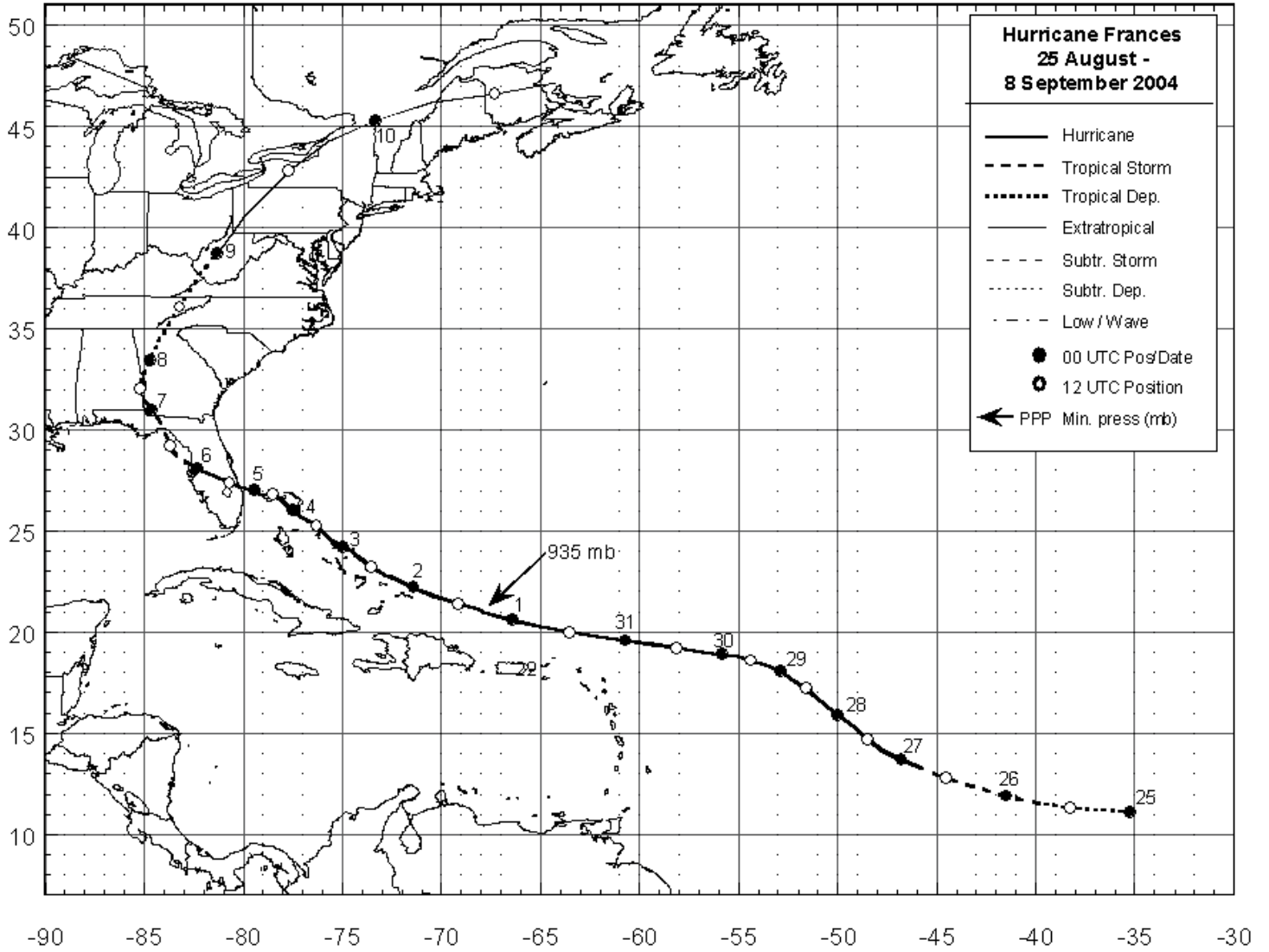
Several statements from our Hurricane Charley report bear repeating here and they are: "The newer homes installed since our rule change in March 1999 showed no movement what so ever. Also, very few older homes left their foundations and those that did had anchors and straps that had rusted away. Attachments to homes whether new or older homes did not perform as they should. Roofovers and one-piece membrane roof covers did not perform well at all. This allowed a large percentage to be blown off the home and may have lead to the total loss of the home."

Our observations will be identical to the Hurricane Charley report.

Ed Broyles  
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In conclusion, with two hurricanes within three weeks and another one on the way some type of action needs to be taken on any type of attachments to mobile/manufactured homes. We are seeing too many homes being destroyed due to these attachments.

**FIGURE 5**  
**THE PATH OF HURRICANE FRANCES**



**Source:** National Hurricane Center – National Weather Service at <http://www.nhc.noaa.gov/2004frances.shtml>



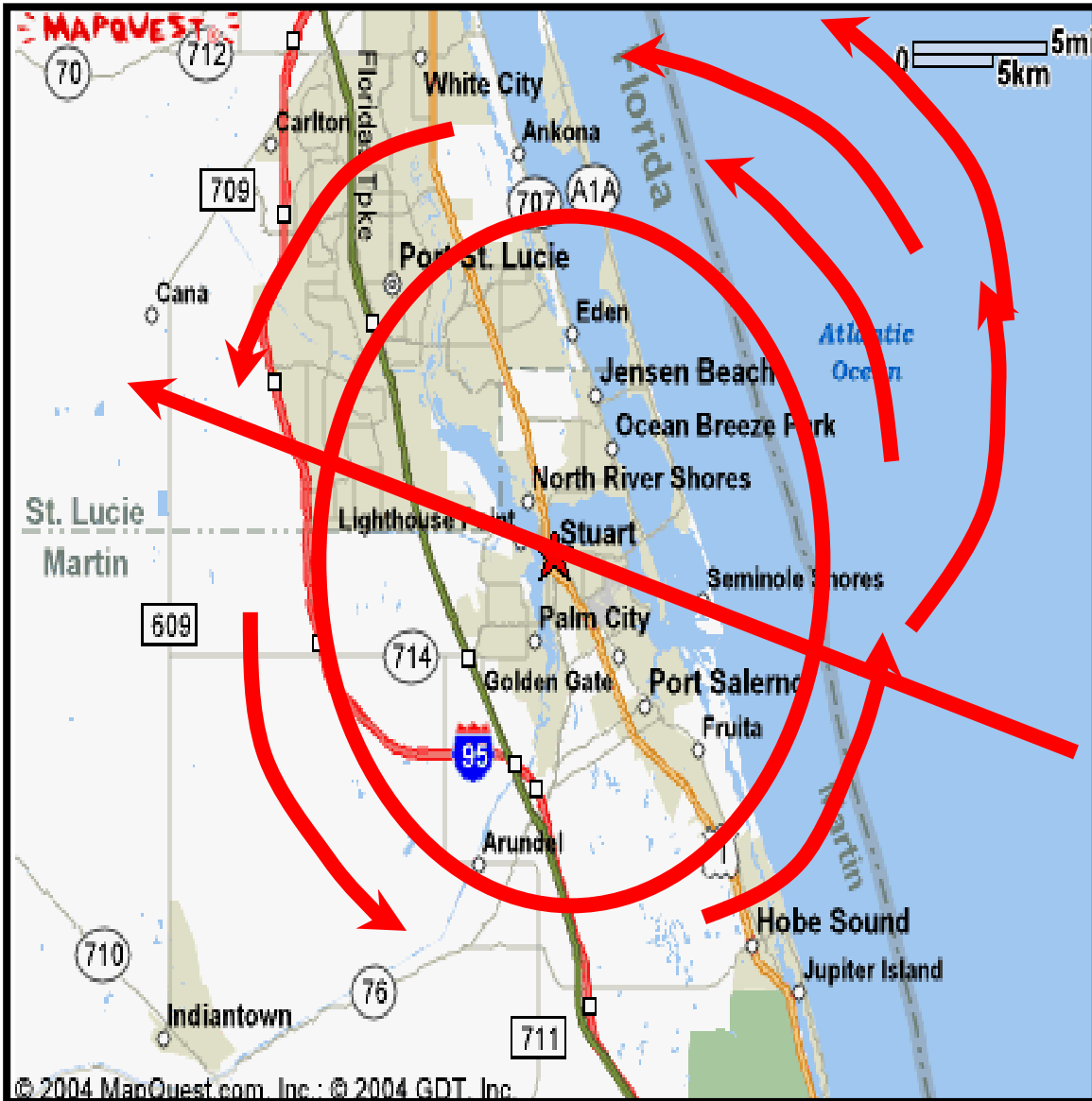
**TABLE 2**  
**A Study of Damage To Mobile/Manufactured Homes Caused By Hurricane Frances**

No.	Date of Inspect.	Park Name Park Location	No. of MH	No. of MH Destroyed or Not Repairable	No. of Post 1994 HUD Homes	No. of Post 1994 HUD Homes Seriously Damaged	Comments
				Percent	Percent		
1	9/8/04	Bay Pines Mobile Home Park	38	4	1	0	Mostly pre HUD regulation homes.
		Palm Bay, Brevard County		10.53%	2.63%		
2	9/8/04	Sun Manor Mobile Home Park	35	1	0	N/A	
		Palm Bay, Brevard County		2.86%	0.00%		
3	9/8/04	Old Fort Tralier Park	30	0	1	0	
		Palm Bay, Brevard County		0.00%	3.33%		
4	9/8/04	Hiawatha Mobile Home Park	20	1	0	N/A	
		Palm Bay, Brevard County		5.00%	0.00%		
5	9/8/04	Hillside Mobile Home Park	19	0	0	N/A	
		Palm Bay, Brevard County		0.00%	0.00%		
6	9/8/04	Fitzsimmons Trailer Park	43	0	1	0	
		Palm Bay, Brevard County		0.00%	2.33%		
7	9/8/04	Palm Bay Estates	287	6	0	N/A	
		Palm Bay, Brevard County		2.09%	0.00%		
8	9/8/04	Southern Comfort Mobile Home Park	38	0	0	N/A	
		Malabar, Brevard County		0.00%	0.00%		
9	9/8/04	Camelot RV Park	44	0	0	N/A	Mostly post HUD regulation homes.
		Malabar, Brevard County		0.00%	0.00%		
10	9/8/04	Snug Harbor Village II	150	0	75	0	
		Micco, Brevard County		0.00%	50.00%		
11	9/8/04	Barefoot Bay and Snug Harbor Village I	4,900	6	50	0	Many post 1994 homes. Only park in this county with more than a few such homes.
		Micco, Brevard County		0.12%	1.02%		

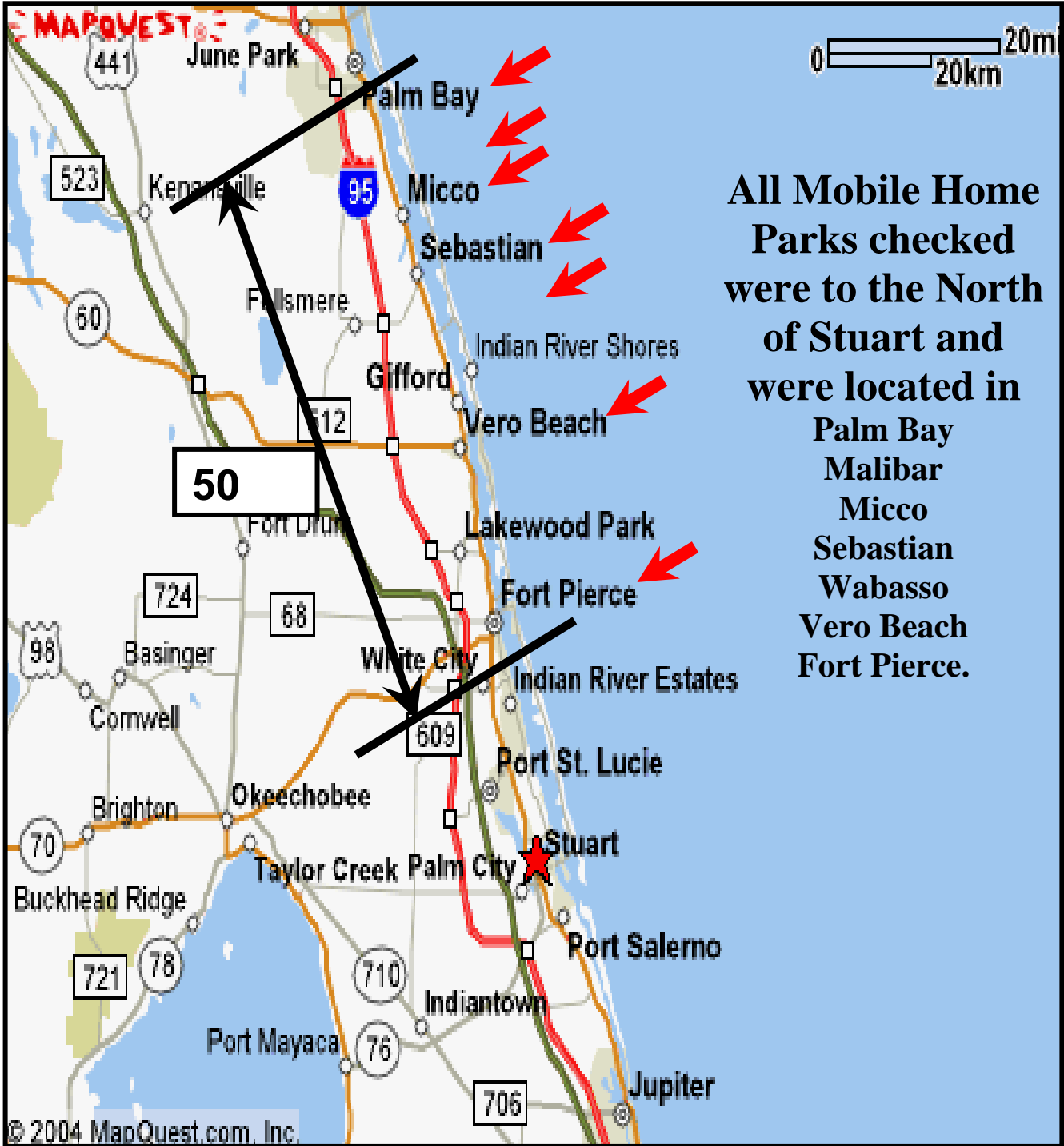
No.	Date of Inspect.	Park Name Park Location	No. of MH	No. of MH Destroyed or Not Repairable	No. of Post 1994 HUD Homes	No. of Post 1994 HUD Homes Seriously Damaged	Comments
				Percent	Percent		
12	9/8/04	Shady Rest Mobile Home Park	117	1	0	N/A	Mostly post HUD regulation homes. Water in streets, not in homes.
		Sebastian, Indian River County		0.85%	0.00%		
13	9/8/04	Whispering Palms	324	5	0	N/A	Mostly pre HUD regulation homes.
		Sebastian, Indian River County		1.54%	0.00%		
14	9/8/04	Fisher's Corner Trailer Park	8	0	0	N/A	
		Sebastian, Indian River County		0.00%	0.00%		
15	9/8/04	Riverview Trailer Park	18	0	0	N/A	
		Sebastian, Indian River County		0.00%	0.00%		
16	9/8/04	Royal Oaks Mobile Home Park	37	0	0	N/A	
		Wabasso, Indian River County		0.00%	0.00%		
17	9/8/04	Connecticut Mobile Home Park	8	0	0	N/A	Mostly pre HUD regulation homes.
		Wabasso, Indian River County		0.00%	0.00%		
18	9/8/04	Midway Estates	204	9	0	N/A	
		Vero Beach, Indian River County		4.41%	0.00%		
19	9/8/04	Tanglewood Village	110	2	0	N/A	
		Vero Beach, Indian River County		1.82%	0.00%		
20	9/8/04	Orchard Mobile Home Park	8	0	0	N/A	
		Vero Beach, Indian River County		0.00%	0.00%		
21	9/8/04	Palms Paradise	44	0	0	N/A	
		Vero Beach, Indian River County		0.00%	0.00%		
22	9/8/04	Southgate Village	109	8	0	N/A	
		Vero Beach, Indian River County		7.34%	0.00%		
23	9/8/04	Fairlane Harbor Mobile Home Park	232	4	0	N/A	
		Vero Beach, Indian River County		1.72%	0.00%		
24	9/12/04	Causeway Mobile Home Park	266	52	0	N/A	
		Ft. Pierce, St. Lucie County		19.55%	0.00%		
<b>TOTALS</b>			7,089	99	128	0	A consistent finding was that homes built after HUD's 1994 regulations went into effect survived well.
				1.40%	1.81%		

**FIGURE 6**  
**EYE AND PATH OF HURRICANE**  
**FRANCES**

All mobile home parks checked were to the North of Stuart since



**FIGURE 7**  
**Mobile Home Parks Checked for Hurricane Frances**



**PHOTOS OF  
MOBILE/MANUFACTURED HOME  
DAMAGE CAUSED BY  
HURRICANE FRANCES**

**This was an anchor set too shallow in the ground which failed as a consequence. This installation was done before the 1999 amendments to the uniform installation standards.**







**Fitzsimmons Trailer Park, Palm Bay**

**This park was low lying and U.S. Highway 1 acted as a berm. The berm and the trees may have deflected most of the wind. 42 homes with 1 or 2 early HUD Models and no homes destroyed.**



**BAREFOOT BAY, near Micco**

This is a large subdivision of Mobile/Manufactured Homes with 7500 homes. This is one of 6 homes destroyed.





## BAREFOOT BAY

A carport that was blown over onto the roof of the home. This is not typical since most carports are blown away and take a portion of the roof with them.







**Barefoot Bay**

**Two homes with both carports blown away.**





**Shady Rest Mobile Home Park in Sebastian had this modified home being used as a clubhouse. It had an aluminum patio roof and it was attached to the clubhouse roof. When the patio roof was blown away it also took the clubhouse roof with it.**





**WHISPERING PALMS**

**324 Homes – most pre HUD  
5 homes destroyed.**

**This was a retrofitted park, but not a  
good park to study retrofitting.  
Other homes without  
retrofitting did not leave  
their foundations either.**



**FAIRLANE HARBOR MHP, VERO BEACH  
232 homes, pre HUD, 4 non repairable**

**This park sustained some storm surge, but the water did not rise enough to get into the homes. Note how the storm surge placed boats into back yards.**







**Fairlane Harbor Mobile Home Park, Vero Beach**





**Fairlane Harbor, Vero Beach**

**Note the water marks from the storm surge. The water did not touch the floor joist or flooring – no damage to the foundation.**



### Causeway MHP, Ft. Pierce

266 pre HUD homes and a few early HUD models with approximately 20 percent nonrepairable. Almost every home had a carport, awning or attachments damaged. Storm surge did occur in this park, but no significant damage occurred as a result of velocity of rising water.





**Another angle on Causeway Mobile Home Park, Ft. Pierce.**



**This was an anchor that rusted because it was not galvanized. This was a installation done before the 1999 amendments to the uniform installation standards.**





**MOBILE/MANUFACTURED HOME  
DAMAGE ASSMENT FROM  
HURRICANE IVAN**



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

**FRED O. DICKINSON**  
Executive Director

**DATE:** September 28, 2004

**TO:** Ed Broyles, Assistant Director, Division of Motor Vehicles

**FROM:** Phil Bergelt, Program Manager, Bureau of Mobile Home and RV Construction

**SUBJECT:** Manufactured Home study from Hurricane Ivan

It seems each Hurricane gives us a study in a different area and Hurricane Ivan was no different. Hurricane Charley was a study of a fast moving storm (22-mph) with extremely high winds (140 mph, with higher gust) with little to no storm surge. Hurricane Frances was a study of a slow moving storm (5-mph) with lower wind speeds (105 mph) with some storm surge.

Hurricane Ivan moved ashore a little west of Gulf Shores, Alabama. Its forward speed was a moderate 13-mph with wind speeds measured near 130 mph. The Florida side of this storm received the northerly winds of Ivan's counterclockwise rotation. Ivan gave us our first study of storm surge with both velocity and rising water without velocity.

Our study includes Manufactured/Mobile Home Parks in Okaloosa, Santa Rosa and Escambia Counties. Twenty-eight parks with 1,398 homes were visited from Destin to southwest Pensacola. Eighty-two homes were destroyed or not repairable. Three parks were found to have significant storm surge damage and this report's main focus will be those parks. Most of findings in the other parks reflect similar findings from Hurricane Charley and Hurricane Frances; the newer homes perform better than the older homes, one new park (Barefoot Bay) had only superficial damage, many of the older homes have significant wood rot and rusted hurricane strapping and anchors and do not fare well.

Several items were unique to the panhandle manufactured/mobile home parks. The parks are occupied with more working families rather than the retirement parks of south Florida. More parks were in mixed neighborhoods (mobiles, site built, and modulars). There were fewer carports, awnings and sheds than their southern counterparts. One other striking difference was the large number of trees in the panhandle parks. Trees were found to be a homes best friend by keeping high winds aloft, but when they fall they can become a home's worst nightmare. Trees may be attributable to the low number of destroyed older homes.

Ed Broyles  
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The three parks with storm surge could be split into two classifications, those with velocity or wave action and homes with slow rising water. Two parks had velocity/wave action exclusively and one park had a combination.

The two parks that had velocity/wave action against some of its homes was at the northern most part of Escambia Bay and were located in the town of Pace. These were two small rental parks with several homes not rented and all homes were pre HUD. The homes nearest the Bay that had wave action them were destroyed. There were 42 homes in both parks with eight being destroyed by wind and velocity/wave action. All destroyed homes had the anchors and straps rusted to a point that there was nothing holding the homes in place.

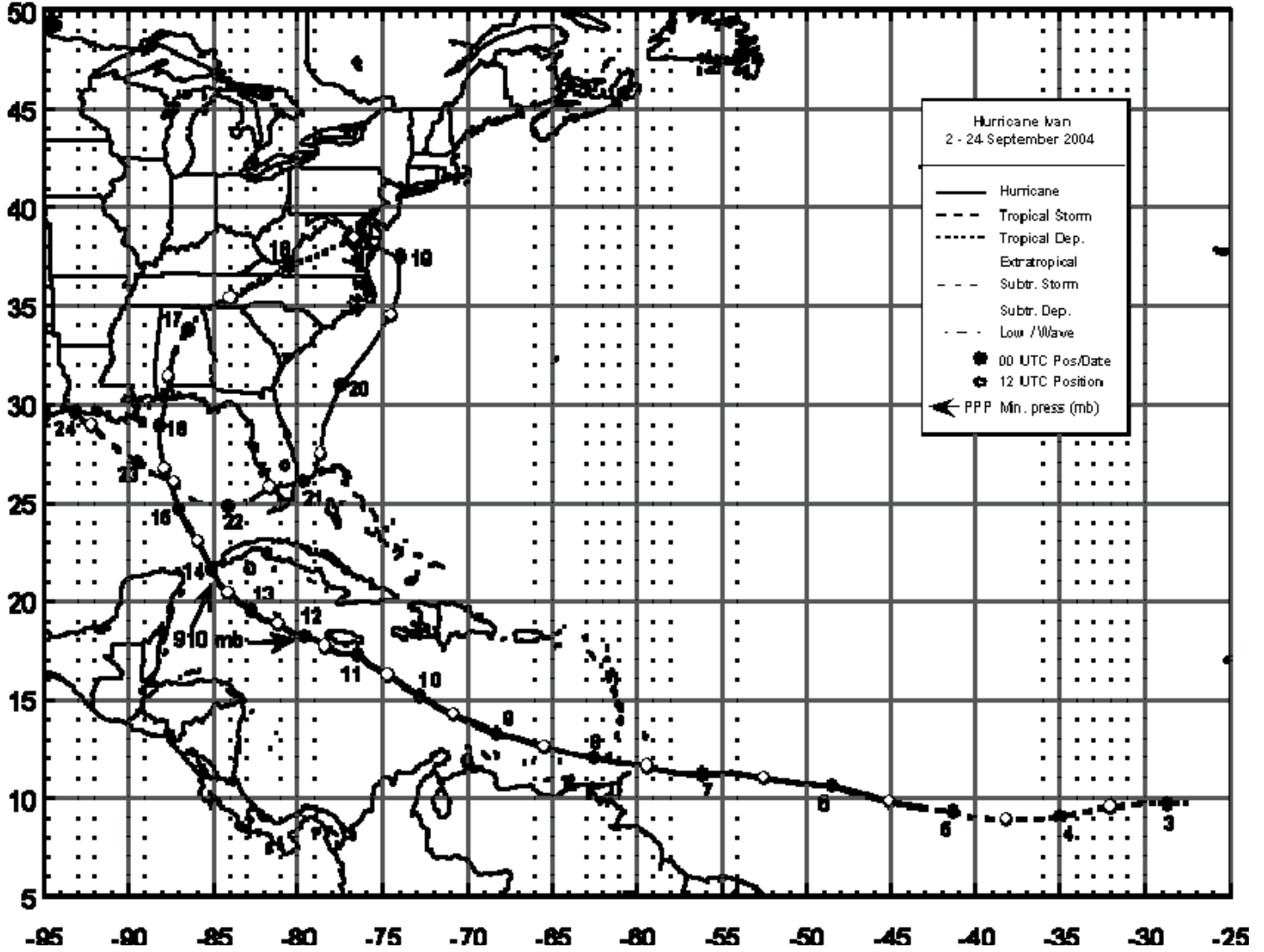
Bayou Grande Villa is a manufactured home community with 218 homes on Bayou Grande just across from Pensacola Naval Air Station and located on Gulf Beach highway. We estimate 90 home had some type of flood damage ranging from the carpet being wet to as much as 4 foot of water in others. The homes on the Bayou had more visible damage than the homes on the canal just off the Bayou. There was a bend in the canal that stopped the wave action and all of the homes on the canal received flood waters, but no homes moved on their foundations. One home on the Bayou was completely destroyed and its anchors and hurricane ties were rusted. Two or three others moved on their foundations from the wave action, but did not leave their foundations.

Two homes in two different parks had some of the piers washed out from under the homes from velocity/wave action. However, the Florida required longitudinal stabilizing devices that were fastened to the I-beams and to the large galvanized pad held the homes up and the anchor and tiedowns held the home in place. No evidence of any flotation of any homes was found.

This study further demonstrates how HUD's Manufactured Home Construction and Safety Standards changed in July of 1994 and Florida's strict installation standards changed in March of 1999 work in hurricane wind forces. Our study also demonstrates how the HUD and Florida standards work in slow rising flood water and to a degree in some velocity/wave flood waters.

FIGURE 8

THE PATH OF HURRICANE IVAN



Source: National Hurricane Center – National Weather Service at <http://www.nhc.noaa.gov/2004ivan.shtml>



**TABLE 3**  
**A Study of Damage To Mobile/Manufactured Homes Caused By Hurricane Ivan**

No.	Date of Inspect.	Park Name Park Location	No. of MH	No. of MH Destroyed or Not Repairable	No. of Post 1994 HUD Homes	No. of Post 1994 HUD Homes Seriously Damaged	Comments
				Percent	Percent		
1	9/20/04	Destin RV Resort	0	N/A	0	N/A	DOH list shows 23 mobile homes, however, all moved out. A couple of trees down. No damage to RVs in park and no injuries.
		Destin, Okaloosa County		N/A	0.00%		
2	9/21/04	Destin Campground, Inc.	21	0	8	0	Only minor damage; a few shingles.
		Destin, Okaloosa County		0.00%	38.10%		
3	9/21/04	Shanyans Mobile Home Park	10	0	10	0	
		Ft. Walton Beach, Okaloosa County		0.00%	100.00%		
4	9/21/04	Plantation Trailer Park	50	0	20	0	
		Ft. Walton Beach, Okaloosa County		0.00%	40.00%		
5	9/21/04	Country Breeze	47	1	0	N/A	
		Ft. Walton Beach, Okaloosa County		2.13%	0.00%		
6	9/21/04	Sir Roberts Trailer Park	18	0	0	N/A	Little to no carports and additions.
		Ft. Walton Beach, Okaloosa County		0.00%	0.00%		
7	9/21/04	Peggy Marler Mobile Home Park	5	0	5	0	Little to no carports and additions.
		Ft. Walton Beach, Okaloosa County		0.00%	100.00%		
8	9/21/04	Pinecrest Trailer Park	66	0	0	N/A	Little to no carports and additions.
		Ft. Walton Beach, Okaloosa County		0.00%	0.00%		
9	9/21/04	Seashore Village	400	0	20	0	
		Ft. Walton Beach, Okaloosa County		0.00%	5.00%		
10	9/21/04	Lindy's Mobile Home Park	24	1	0	N/A	
		Ft. Walton Beach, Okaloosa County		4.17%	0.00%		
11	9/21/04	Laurent Mobile Home Park	30	0	0	N/A	
		Mary Esther, Okaloosa County		0.00%	0.00%		
12	9/21/04	Roses Trailer Park	17	0	0	N/A	
		Mary Esther, Okaloosa County		0.00%	0.00%		

No.	Date of Inspect.	Park Name Park Location	No. of MH	No. of MH Destroyed or Not Repairable	No. of Post 1994 HUD Homes	No. of Post 1994 HUD Homes Seriously Damaged	Comments
				Percent	Percent		
13	9/21/04	Colonial Pines Mobile Estates	176	0	0	N/A	
				0.00%	0.00%		
14	9/21/04	Soundside Manor Mobile Home Park	9	0	4	0	One home had some blocks washed away.
		Navarre, Santa Rosa County		0.00%	44.44%		
15	9/21/04	Magnolia Manor Park	25	0	2	0	
		Gulf Breeze, Santa Rosa County		0.00%	8.00%		
16	9/21/04	Trailer Haven Mobile Home Park	18	2	0	N/A	
		Pensacola, Escambia County		11.11%	0.00%		
17	9/21/04	Greg Mobile Home Park	8	0	0	N/A	
		Pensacola, Escambia County		0.00%	0.00%		
18	9/21/04	Ashton Run Mobile Home Park	40	7	3	0	Open park.
		Pensacola, Escambia County		17.50%	7.50%		
19	9/21/04	Summerset Mobile Home Park	13	1	0	N/A	Trees protected homes.
		Pensacola, Escambia County		7.69%	0.00%		
20	9/21/04	Mixed Subdivision	30	0	0	N/A	
		Pensacola, Escambia County		0.00%	0.00%		
21	9/21/04	Heritage Oaks of North West Florida Mobile Home Park	54	4	8	0	
		Pensacola, Escambia County		7.41%	14.81%		
22	9/21/04	Blakely Avenue Park	13	3	0	N/A	
		Pensacola, Escambia County		23.08%	0.00%		
23	9/21/04	Baya Grande Villa	218	52	25	0	Closer to the water, the worse home damage. AE flood zone. Hard to tell homes flooded because few homes left foundation.
		Pensacola, Escambia County		23.85%	11.47%		
24	9/22/04	PM Mobile Home Park	7	2	0	N/A	
		Pensacola, Escambia County		28.57%	0.00%		
25	9/22/04	Barefoot Bay Estates	68	0	68	0	
		Pensacola, Escambia County		0.00%	100.00%		

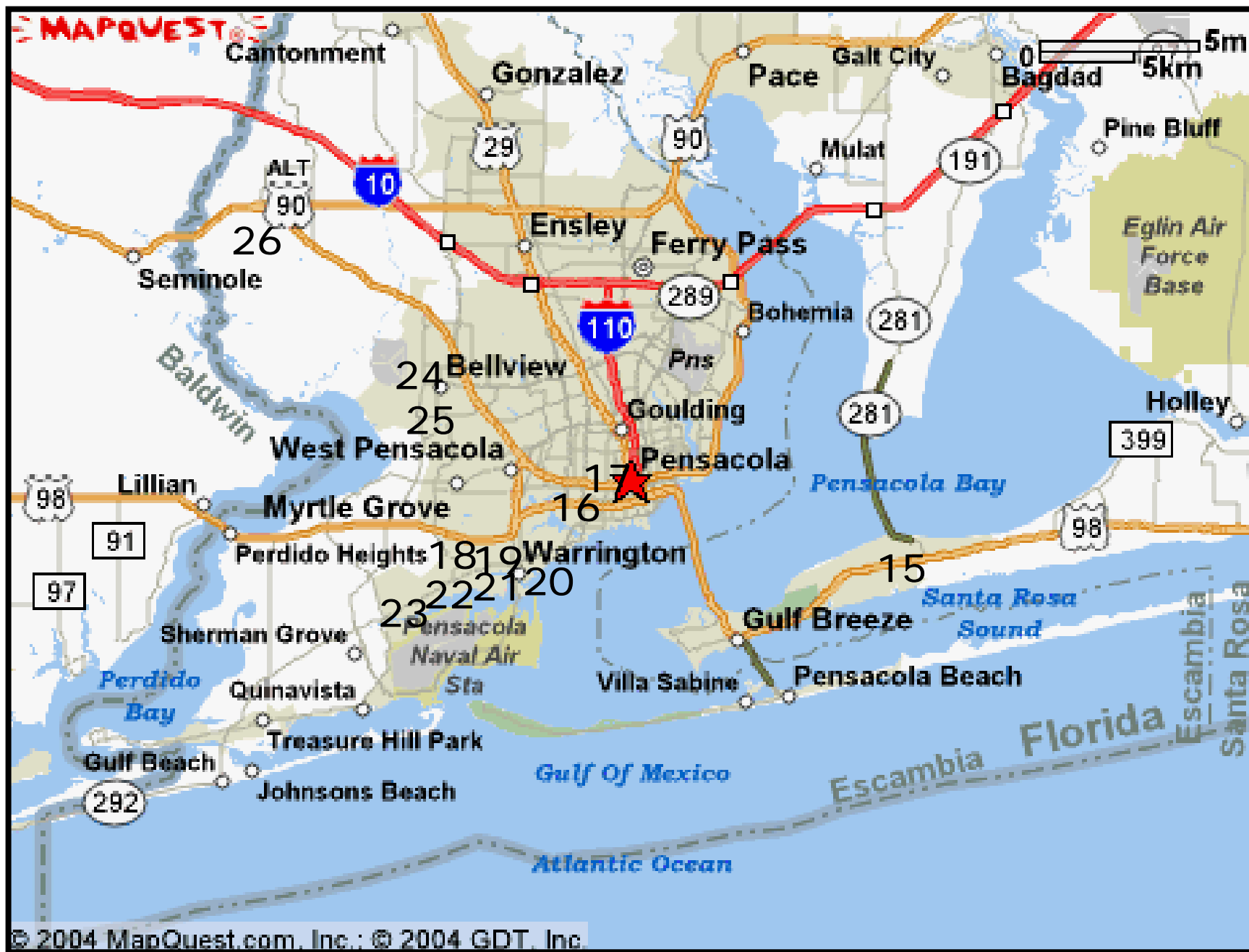
No.	Date of Inspect.	Park Name Park Location	No. of MH	No. of MH Destroyed or Not Repairable	No. of Post 1994 HUD Homes	No. of Post 1994 HUD Homes Seriously Damaged	Comments
				Percent	Percent		
26	9/22/04	Crystal Lake Estates	23	1	13	0	
		Pensacola, Escambia County		4.35%	56.52%		
27	9/22/04	Bay Breeze Park	22	6	0	N/A	
		Pace, Santa Rosa County		27.27%	0.00%		
28	9/22/04	Bayview Court	20	2	0	N/A	
		Pace, Santa Rosa County		10.00%	0.00%		
<b>TOTALS</b>			1,432	82 5.73%	186 12.99%	0	A consistent finding was that homes built after HUD's 1994 regulations went into effect survived well.

FIGURE 9  
THE PATH OF HURRICANE IVAN UPON IMPACT



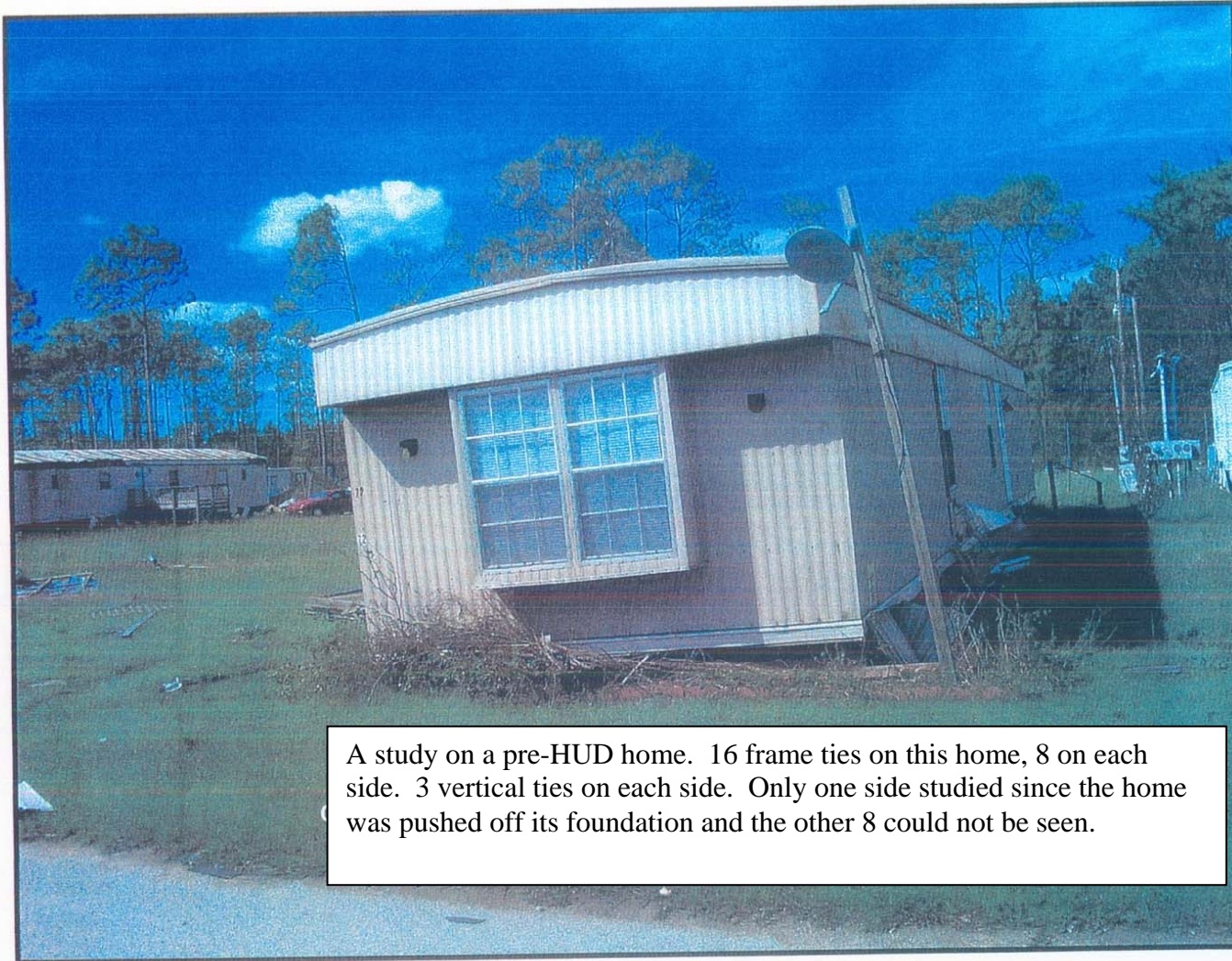


FIGURE 10  
 MOBILE HOME PARKS CHECKED FOR HURICANE IVAN (SEE NUMBERS)



**PHOTOS OF  
MOBILE/MANUFACTURED HOME  
DAMAGE CAUSED BY  
HURRICANE IVAN**

**Older homes not performing well.**

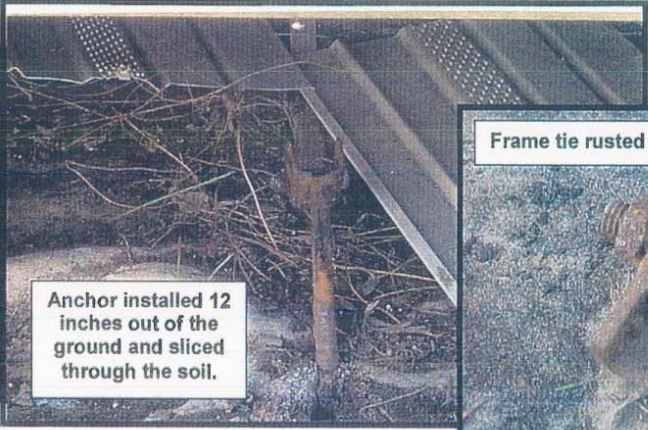


A study on a pre-HUD home. 16 frame ties on this home, 8 on each side. 3 vertical ties on each side. Only one side studied since the home was pushed off its foundation and the other 8 could not be seen.





One anchor installed 24 inches out of the ground. Stabilizer plates were not required when this home was set up.



Anchor installed 12 inches out of the ground and sliced through the soil.



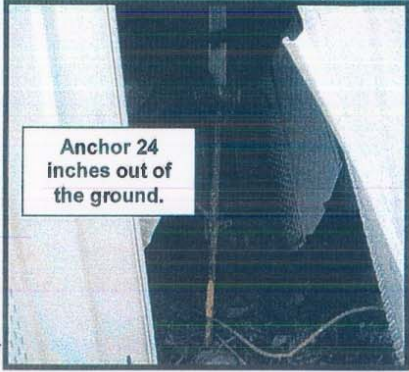
Frame tie rusted away.



Vertical & frame tie rusted away.



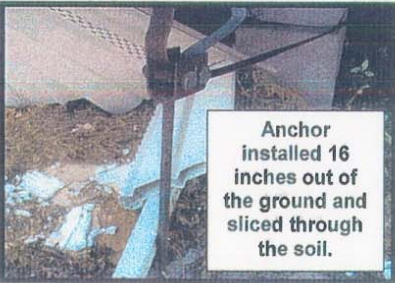
Frame tie rusted away.



Anchor 24 inches out of the ground.



Anchor installed 12 inches out of the ground and sliced through the soil.



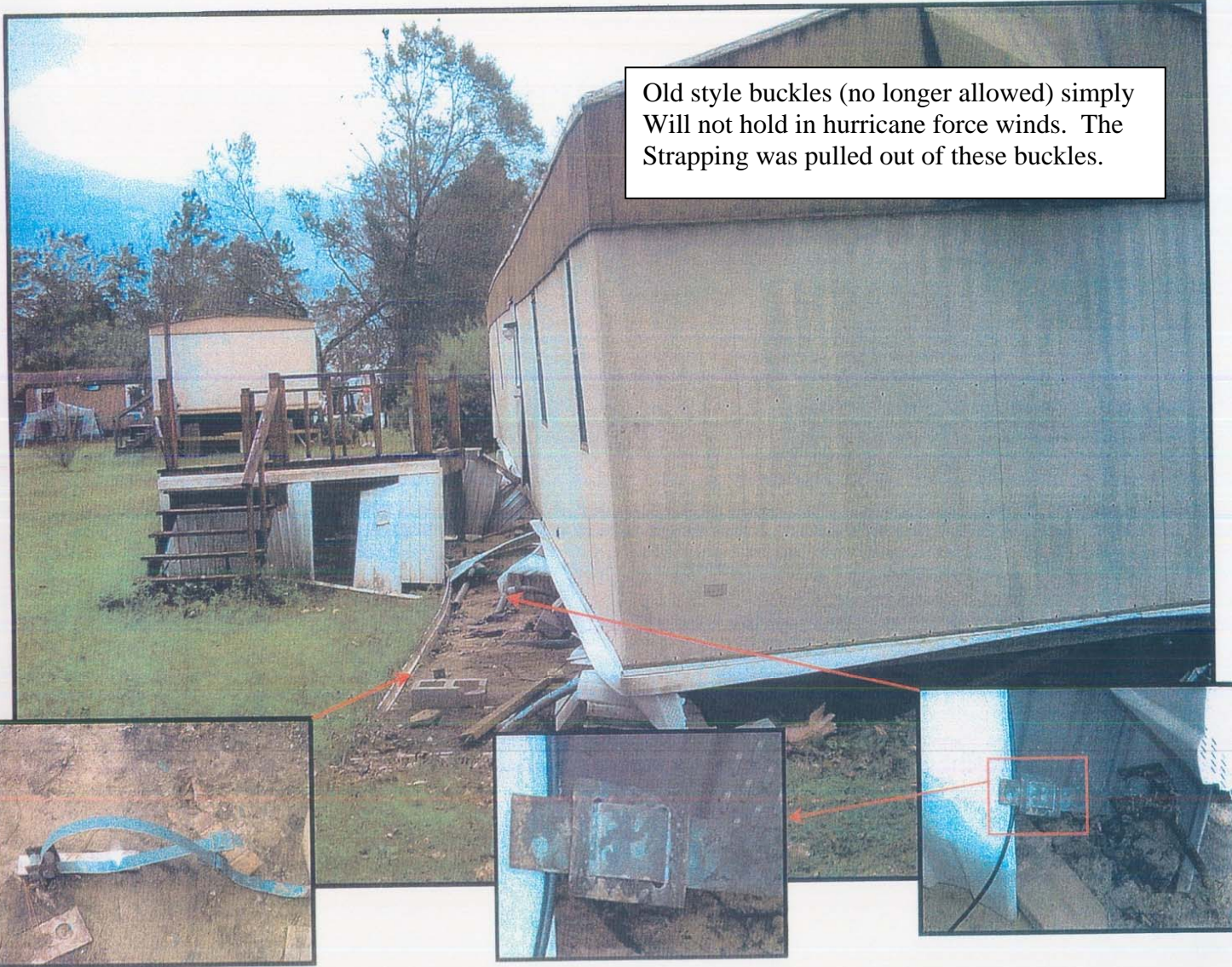
Anchor installed 16 inches out of the ground and sliced through the soil.

## A study of the anchors and tiedowns.



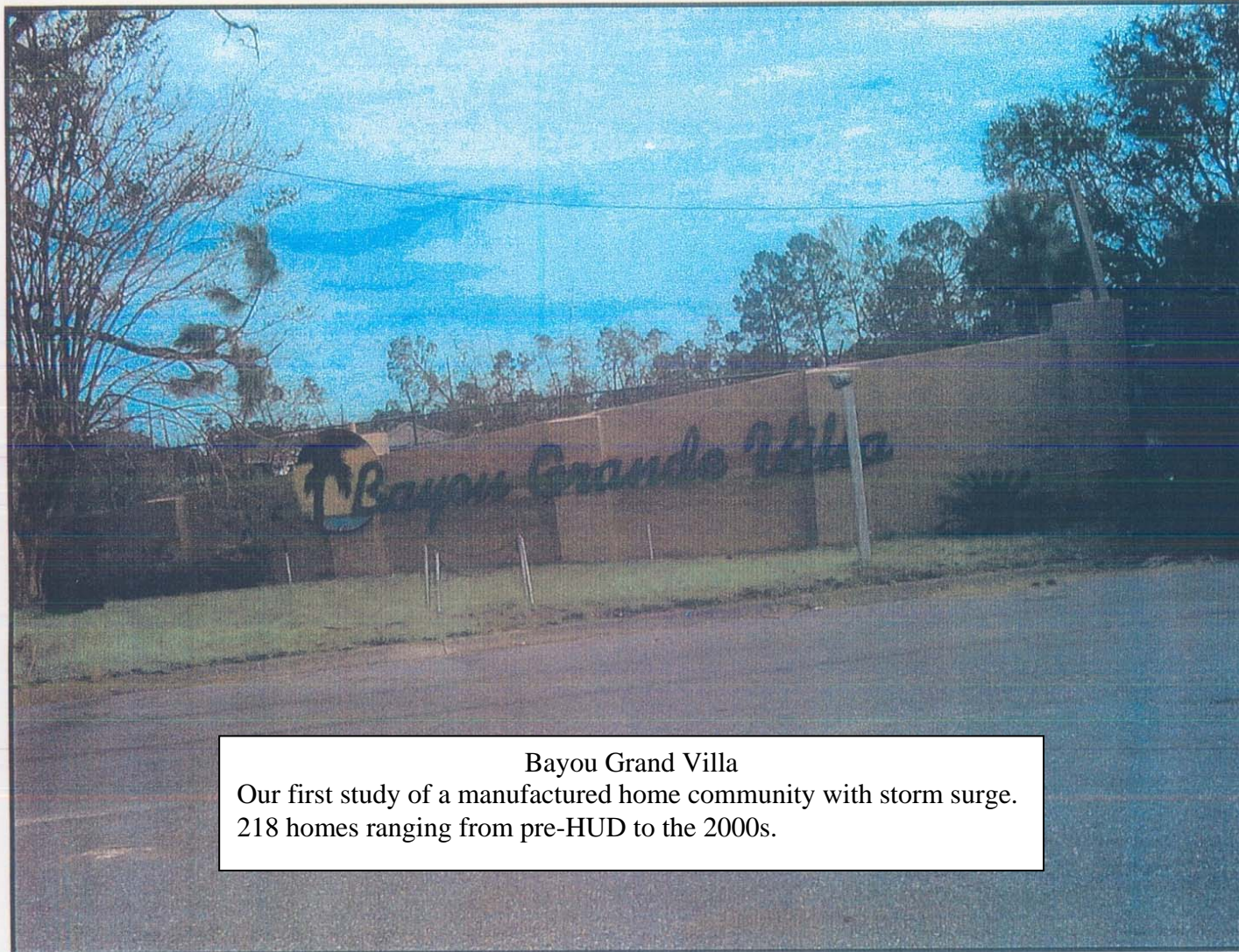






Old style buckles (no longer allowed) simply  
Will not hold in hurricane force winds. The  
Strapping was pulled out of these buckles.

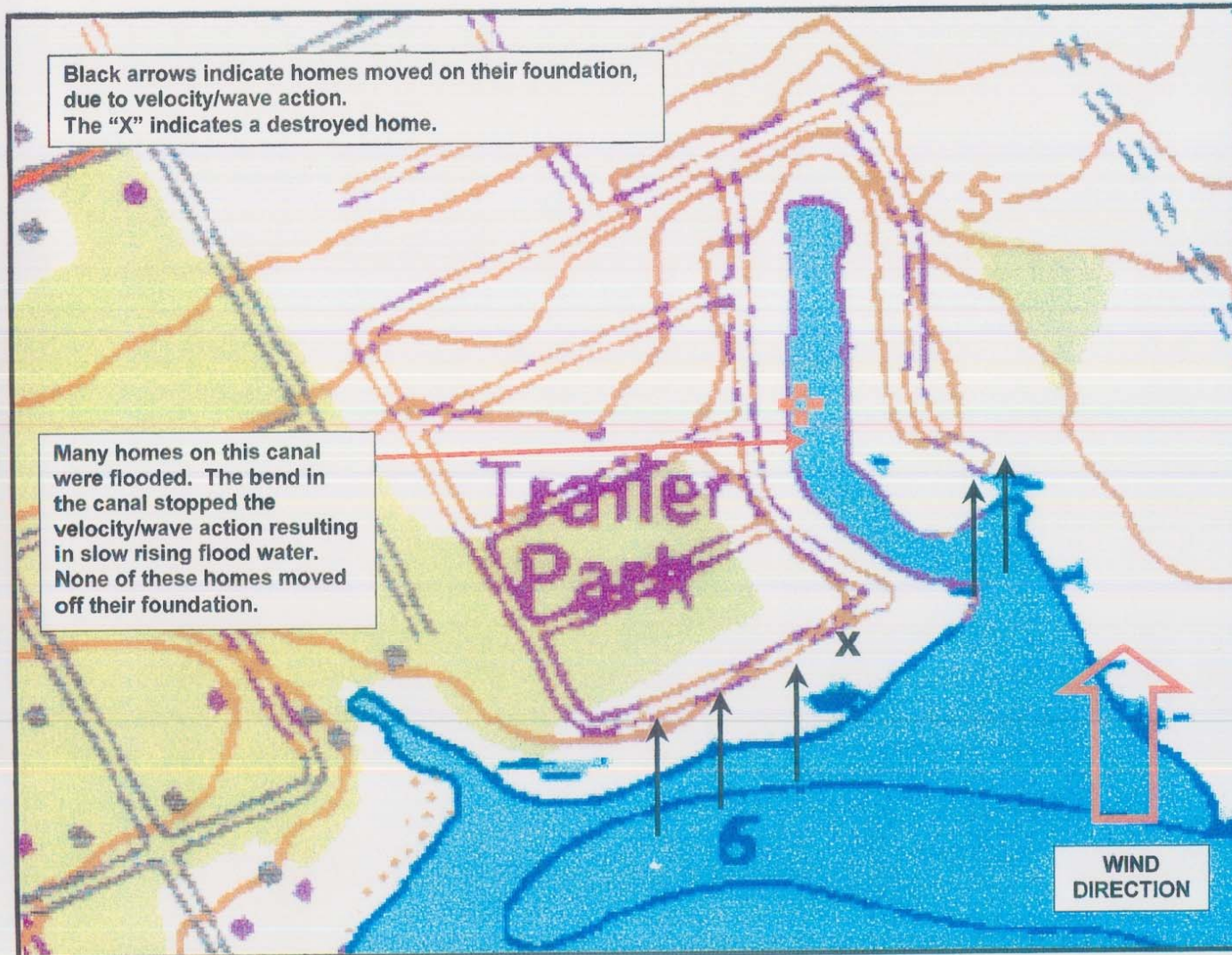




Bayou Grand Villa  
Our first study of a manufactured home community with storm surge.  
218 homes ranging from pre-HUD to the 2000s.



## Bayou Grande Villas, a mobile home community.







The storm surge in Bayou Grande Villas was approximately 10 to 15 feet. Some homes had as much as 4 foot of water in them. This home moved as a result of velocity/wave action. Note that some of the piers fell but the required Florida longitudinal systems held this end of the home up.







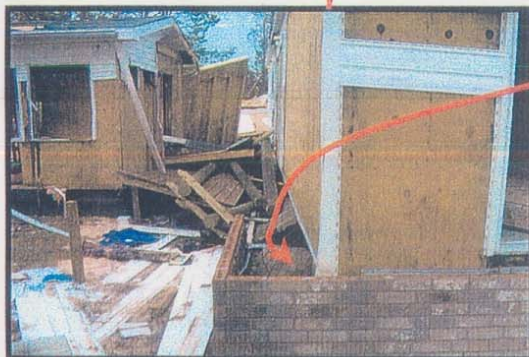
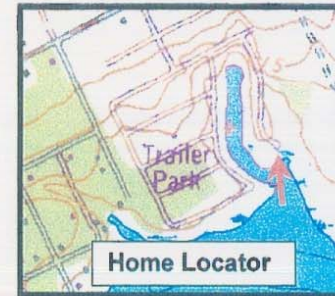
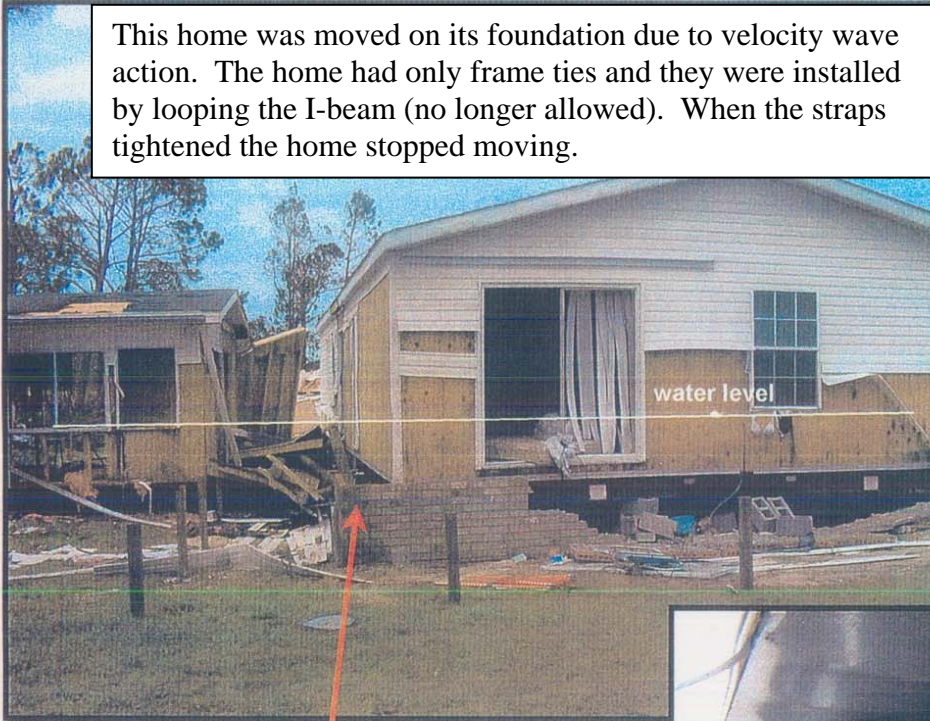
A home that was flooded in Bayou Grand Villa. Note how the home owner parked his truck sideways to the home to protect against the wind.



The approximate height of slow rising flood waters. This home was on the canal and did not move on its foundation. Note the debris that filled the truck window that was knocked down.



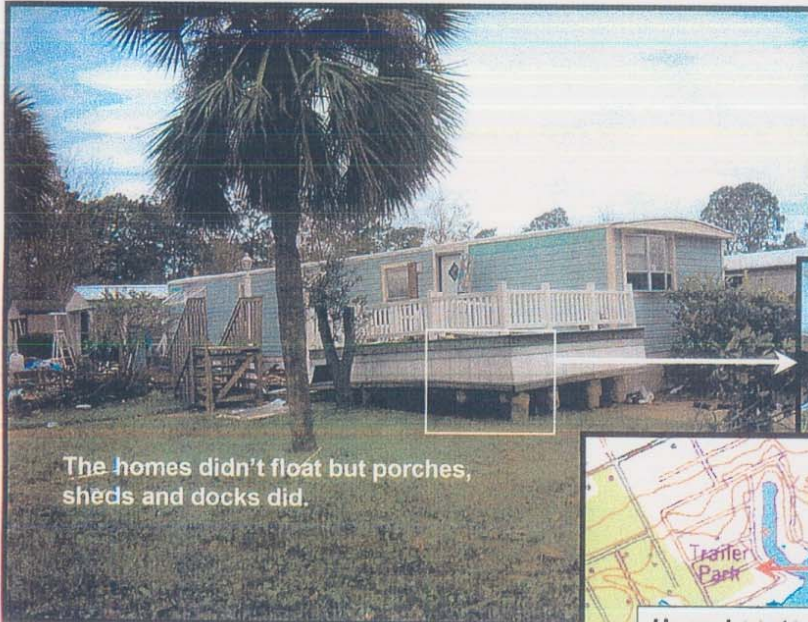
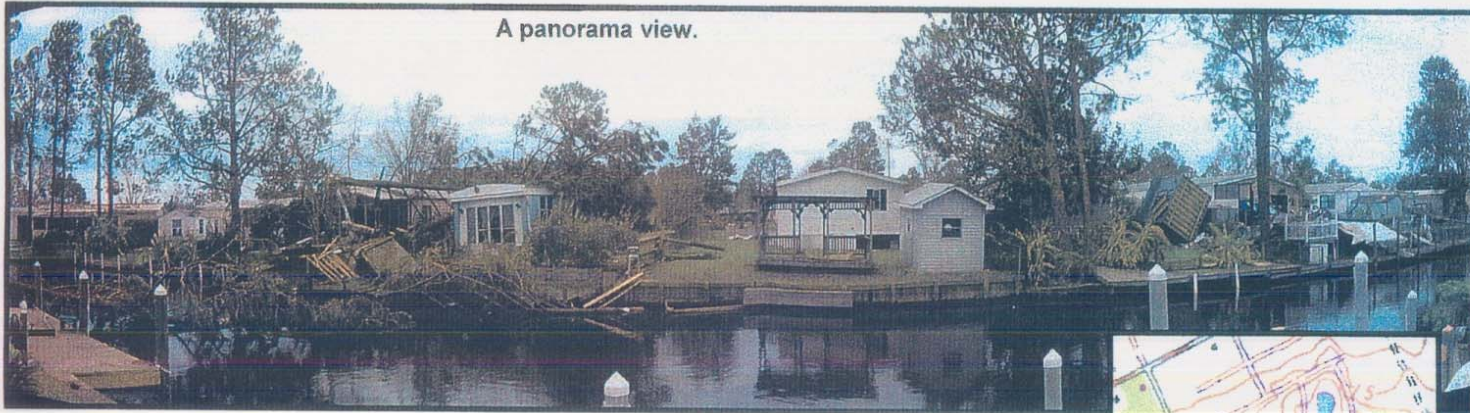
This home was moved on its foundation due to velocity wave action. The home had only frame ties and they were installed by looping the I-beam (no longer allowed). When the straps tightened the home stopped moving.





Homes on the canal in Bayou Grande Villa.  
No homes moved on their foundation as a result of the slow moving water.

A panorama view.



The homes didn't float but porches, sheds and docks did.







**A panorama view of Bay Breeze MHP in Pace.  
22 homes in this park and 6 were totally destroyed due to velocity/wave action.  
All homes were pre HUD and the many straps found on the frames had rusted  
away from the anchors.**

**MOBILE/MANUFACTURED HOME  
DAMAGE ASSMENT FROM  
HURRICANE JEANNE**





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

**FRED O. DICKINSON**  
Executive Director

**DATE:** October 1, 2004

**TO:** Ed Broyles, Assistant Director, Division of Motor Vehicles

**FROM:** James D. McGowan, Community Assistance Consultant, Bureau of Mobile Home and RV Construction

**SUBJECT:** Manufactured Home Study from Hurricane Jeanne

Hurricane Jeanne was a category 3 hurricane with 120 miles per hour sustained winds when it made landfall at Hutchinson Island, Florida. The hurricane was 400 miles wide reaching from Dade County to St. Johns County. Hurricane Jeanne followed in the wake of Hurricane Frances which struck Saturday, September 5, 2004, three weeks prior to Hurricane Jeanne. The paths of Hurricanes Frances and Jeanne were very close in point of land fall and paths taken after land fall. The National Hurricane Center in Miami said the paths of Jeanne and Frances were unprecedented in similarity of paths in the short span of time.

Each county on the East coast has Mobile/Manufactured homes that were damaged by either or both Hurricane Frances and Hurricane Jeanne. It is difficult in many cases to differentiate which hurricane did the damage or in many cases possible both.

Many mobile homes had their additions such as carports, verandas and/or porches torn off from Hurricane Frances. Many of the homes were not repaired from Hurricane Frances before Hurricane Jeanne hit. The damage from Hurricane Frances left openings in the siding and roofs from the additions being taken off which in many cases led to the roof being torn off by Hurricane Jeanne.

It appears additions to mobile/manufactured homes remains a major cause of damage to homes during high wind storms.

There was more damage to mobile/manufactured homes in the areas closest to the open water. The areas along U.S. 1 and River Drive were hard hit but areas just four or five miles inland had minor damage.

Brevard and Indian River counties were hard hit by Hurricane Jeanne. These counties are north of Hutchinson Island where the eye of the storm came ashore. It is common for hurricanes to have higher winds on the North side of the hurricane than on the South side.

Ed Broyles  
Page Two  
October 1, 2004

Barefoot Bay Mobile Home Village is located in South Brevard County. It is composed of 4,900 mobile homes. The park was opened in the early 1970's and a large percentage of the homes there were built in the 1970's and 1980's.

The Brevard County Building Department tagged 502 homes in Barefoot Bay as unsafe structures. According to the Building Department, for a home to be tagged as an unsafe structure it had to have roof damage or severe damage to the exterior construction. The Building Department inspectors performing the inspections did not go into the homes as part of the inspection process. Eleven percent of the homes in the park were tagged by the Building Department as unsafe structures.

Snug Harbor is located next door to Barefoot Bay Mobile Home Village. Snug Harbor has approximately 345 homes. The park was opened in the mid 1980's and the oldest home is a 1984 home. A large portion of the homes in this park are post 1994 homes. The Brevard County Building Department tagged only 12 homes in this park as unsafe structures. Three percent of the homes in this park were tagged as unsafe structures.

Riverview Mobile Village has 216 mobile homes and 30 percent of these homes have major damage or are destroyed. There are approximately 15 newer homes in this park, all of which had minor damage to carports and verandas. There is one 2003 home in the park that is surrounded by homes that were destroyed or have severe damage. The 2003 Nobility home built in Florida had no damage and did not move after being pounded by both Hurricanes Frances and Jeanne.

The results of this inspection of mobile/manufactured homes renders the same results as many before; newer homes do well in high wind storms. Older homes built in the 1960's and 1970's do not fair as well.

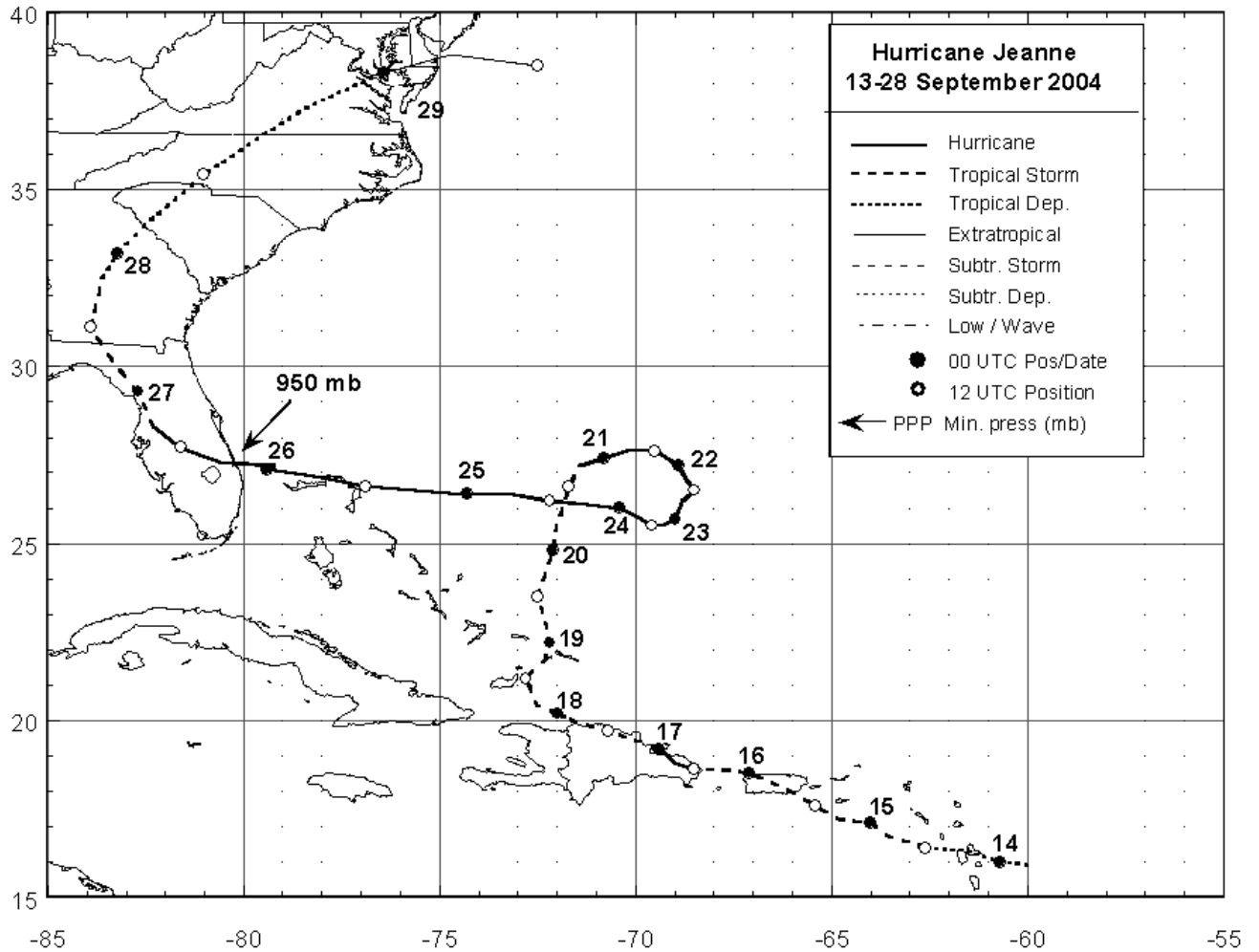
Additions to the mobile/manufactured homes such as carports and veranda rooms remain the main cause of damage to mobile/manufactured homes in parks during high wind storms. Particle board floors in older homes contribute to the failure and collapse of the exterior walls caused by deterioration and swelling of the particle board flooring under the exterior walls.

No mobile/manufactured homes installed by a licensed installer were found to have moved on its foundation.

The following photographs were taken at different locations along the East coast of Florida after Hurricane Jeanne.

**FIGURE 11**

**THE PATH OF HURRICANE JEANNE**



**Source:** National Hurricane Center – National Weather Service at <http://www.nhc.noaa.gov/2004jeanne.shtml>



**TABLE 4  
A Study of Damage To Mobile/Manufactured Homes Caused By Hurricane Jeanne**

No.	Date of Inspect.	Park Name Park Location	No. of MH	No. of MH Destroyed or Not Repairable	No. of Post 1994 HUD Homes	No. of Post 1994 HUD Homes Seriously Damaged	Comments
				Percent	Percent		
1	9/29/04	Pelican Landing	24	18	0	N/A	
		Sebastian - Indian River County		75.00%	0.00%		
2	9/29/04	El Capitan Mobile Home Park	39	23	3	0	
		Sebastian - Indian River County		58.97%	7.69%		
3	9/29/04	Karr's Riverland Mobile Home Park	8	3	0	N/A	
		Sebastian - Indian River County		37.50%	0.00%		
4	9/29/04	Shady Rest Mobile Home Park	117	24	4	0	
		Sebastian - Indian River County		20.51%	3.42%		
5	9/29/04	Riverview Trailer Park	18	6	0	N/A	
		Sebastian - Indian River County		33.33%	0.00%		
6	9/29/04	Whispering Pines	80	7	0	N/A	
		Sebastian - Indian River County		8.75%	0.00%		
7	9/29/04	Orchard Park Mobile Home Park	7	6	0	N/A	
		Vero Beach - Indian River County		85.71%	0.00%		
8	9/30/04	Spanish Lake	1,387	208	69	0	
		Port St. Lucie - St. Lucie County		15.00%	5.00%		
9	9/30/04	Pine View Mobile Home Park	52	6	0	N/A	
		Fort Pierce - St. Lucie County		11.54%	0.00%		
10	9/30/04	Plantation Manor	376	38	8	0	
		Fort Pierce - St. Lucie County		10.00%	2.00%		
11	9/30/04	Dixie Mobile Home Park	54	11	0	N/A	
		St. Lucie County		20.00%	0.00%		
13	9/30/04	Ocean Breeze	587	2	352	0	
		Jensen Beach - Martin County		0.34%	60.00%		

No.	Date of Inspect.	Park Name Park Location	No. of MH	No. of MH Destroyed or Not Repairable	No. of Post 1994 HUD Homes	No. of Post 1994 HUD Homes Seriously Damaged	Comments
				Percent	Percent		
14	9/30/04	River Breeze Cottages	6	5	0	N/A	
		Jensen Beach - Martin County		83.33%	0.00%		
15	9/30/04	River Side Mobile Home Park	95	10	2	0	
		Jensen Beach - Martin County		10.00%	2.00%		
16	9/30/04	Holiday Out	211	0	106	0	
		Martin County		0.00%	50.00%		
17	9/30/04	Nettles Island	116	0	23	0	
		Martin County		0.00%	20.00%		
18	9/30/04	Barefoot Bay	4,900	502	50	0	
		Brevard County		10.24%	1.02%		
19	10/1/04	Snuggs Harbor	345	12	207	0	
		Brevard County		3.48%	60.00%		
20	10/1/04	Intercoastal Estates	110	22	0	N/A	
		Titusville		20.00%	0.00%		
21	10/1/04	Riverview Village	216	65	20	0	
		Sebastian - Brevard County		30.00%	9.26%		
22	10/1/04	Breezeway Mobile Home Parak	24	10	0	N/A	
		Micco - Brevard County		40.00%	0.00%		
23	10/1/04	River Groue Village	73	11	0	N/A	
		Micco - Brevard County		15.00%	0.00%		
<b>TOTALS</b>			8,845	989	844	0	
				11.18%	9.54%		

**PHOTOS OF  
MOBILE/MANUFACTURED HOME  
DAMAGE CAUSED BY  
HURRICANE JEANNE**



Hurricane Jeanne

The following photographs were taken October 1, 2004

Riverview Mobile Home Village  
Bob and Nancy Marra  
Lot 46 Hope Town Road  
Micco, Florida.

2003 Nobility Manufactured Home  
Serial # N1 8973 A/B  
HUD Labels Fla 736546 and 7.  
Installed March 2004

Alberto Diaz, Installer IH0000295  
Installer decal # 195378



The home of Mrs. And Mr. Marra sustained no damages from Hurricane Frances or Hurricane Jeanne.



Photographs # 3 through 10 are homes around the home of Mr. and Mrs Marra.



Photograph # 4





Photograph # 5



Photograph # 6





Photograph # 7



Photograph # 8



Photograph # 9



Photograph # 10





Photographs # 11 through 20 are of the blocking, tie down strap and anchors that show no movement, stress or displacement.



Photograph # 12





Photograph # 13



Photograph # 14



Photograph #15



Photograph # 16





Photograph # 17



Photograph # 18





Photograph # 19



Photograph # 20



**The home was installed by Mr. Diaz licensed mobile home installer IH0000295  
Installer decal affixed to the home by Mr. Diaz. Decal # 195378**



Mr. and Mrs. Marra are proud of their Nobility home and the job Mr. Diaz did on the installation.







Riverview Mobile Village has 216 homes with approximately 15 homes built and installed after 1994. None of these home receive anything other than minor damage to skirting and car ports and verandas.

The majority of the homes in Riverview Mobile Village are from the 1970.

A high percentage of the totally destroyed homes had particle board floors.

Approximately 50% of the homes in this park have major damage.

A possible reason for so many home being totally destroyed in this park and others is this is the second hurricane to hit the east coast in three weeks. Many of the homes had not been repaired from the first storm before the second storm hit. Roofs that received damage from Hurricane Frances and not repaired in many cases were blown off by Hurricane Jeanne.

**Summary:**

New homes built after 1994 and installed properly fair very well in high wind storms.

Older homes do not fair as well.

### Riverview Mobile Village

This was a 1960's or 70's home.

The home has been tagged by the building department as an unsafe structure.

What looks like another mobile home sitting to the right slightly back from the open floor is actually the side walls and roof that had been fastened to the open floor.



This is a new home with what is common in parks. The front veranda room has been torn off with minor vinyl siding damage to the home.





This home was inspected after Hurricane Frances because it had moved off its foundation. The straps were rusted into two pieces and the anchors were approximately 40 years old. The anchor shafts was rusted down to a fine point about 8” to 10” from the head. Hurricane Jeanne made a pile of kindling out of what Hurricane Frances left.



This is a 1988 home installed within 25' of the water. There are two (2) piers knocked down by part of his dock that broke up during the storm and washed under his home.

The next photograph shows the dock under the home.





This photograph shows the dock that went under the home. The mobile home has no damage.





This was a 1972 home installed within 40 feet of the water. This home made it through Hurricane Frances with only minor damage. The next photograph shows the particle board floors and how they swell up when subjected to moisture.



This photograph shows the particle board floor deterioration.



This is the results of a hastily completed temporary set using four anchors and straps. One anchor and strap was connected to a bracket on each corner of this new home. The home was sitting in the middle of an open field.





This is the other half.





# **MOBILE/MANUFACTURED HOME HURRICANE FLOODING DAMAGE ASSESSMENT**



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

**FRED O. DICKINSON**  
Executive Director

**DATE:** October 6, 2004  
**TO:** Ed Broyles, Assistant Director, Division of Motor Vehicles  
**FROM:** Phil Bergelt, Program Manager, Bureau of Mobile Home and RV Construction  
**SUBJECT:** Flooding from Florida's 2004 hurricanes

We have investigated flooding coupled with high winds and its effect on manufactured/mobile homes during the months August and September 2004. All flooding accounts have come from building departments, news media, law enforcement and interviews from park owners and residents. Our active hurricane season has caused all of the flooding that has taken place. We have visited 91 manufactured/mobile parks and communities in 12 counties containing nearly 18000 homes.

Two types of flooding were found in these areas: velocity/wave action and slow rising water. Another factor must be added to flooding and that is the wind speeds that ranged from 105 to 145 miles per hour. Four areas were found where velocity/wave action had an effect on homes and two areas were found where slow rising water penetrated into homes.

Velocity/wave/wind action resulted in 9 mobile homes being destroyed and a few piers had been pushed over on four other homes. However, the tiedown straps and anchors on these 9 homes had rusted to a point that the hold down power was nullified and none had updated tie down components. Three homes with tiedowns in good condition had shifted on their foundation, but none were pushed off their foundation. Two of the three homes had Florida's longitudinal stabilizing devices and they held the home in place whenever piers were have pushed over by velocity/wave action.

Two areas were found where slow rising water penetrated into as many as 90 homes. None of these homes moved on their foundation and none of the homes had floor or wall collapse as a result of slow rising water. The main park effected by slow rising water was the Bayou Grande Villa community in Pensacola and most of the winter residents were back up north. Since many residents were not there, the only way to estimate the number of flooded homes was to look for debris lines on the home.

Older homes with wood rot and/or rusted anchors and straps did not perform well in velocity/wave and hurricane wind conditions. Older homes with no wood rot with anchors and straps that were not rusted performed better and homes built since 1994 were the best performing. The newer homes installed after March 1999 (new Rule 15C requirements) performed admirably with only one home shifting on its foundation as a result of debris impact from velocity/wave action.

**DIVISIONS/FLORIDA HIGHWAY PATROL o DRIVER LICENSES o MOTOR VEHICLES o ADMINISTRATIVE SERVICES**  
2900 Apalachee Parkway, Neil Kirkman Building, Tallahassee, Florida 32399-0500  
<http://www.hsmv.state.fl.us>

Figure 12

# Flood Investigations by County and Hurricane

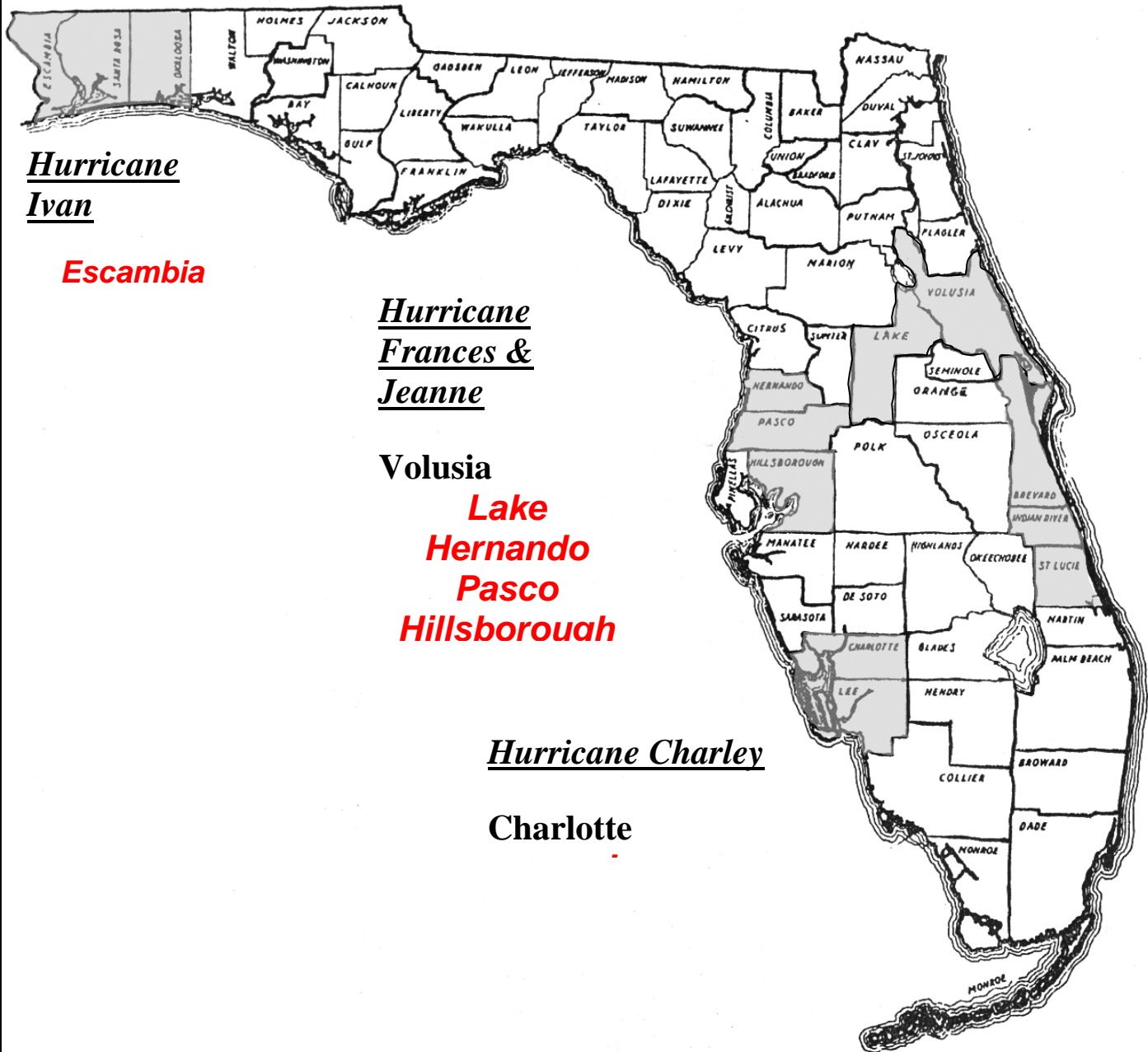




FIGURE 13

### Flood Investigations by Areas.



**PHOTOS OF  
MOBILE/MANUFACTURED HOME  
FLOODING DAMAGE FROM THE  
2004 HURRICANES**

### **Hurricane Charley**

**This storm produced little rain and was fast moving.  
No evidence of flooding was found by rain or storm surge.  
33 manufactured/mobile home parks and communities  
were investigated.**





**Hurricane Frances took out hwy 707 in Martin and St. Lucie Counties. This one home was pushed off its foundation, but it was hard to determine whether it was wind or velocity/wave action. All straps were rusted away.**





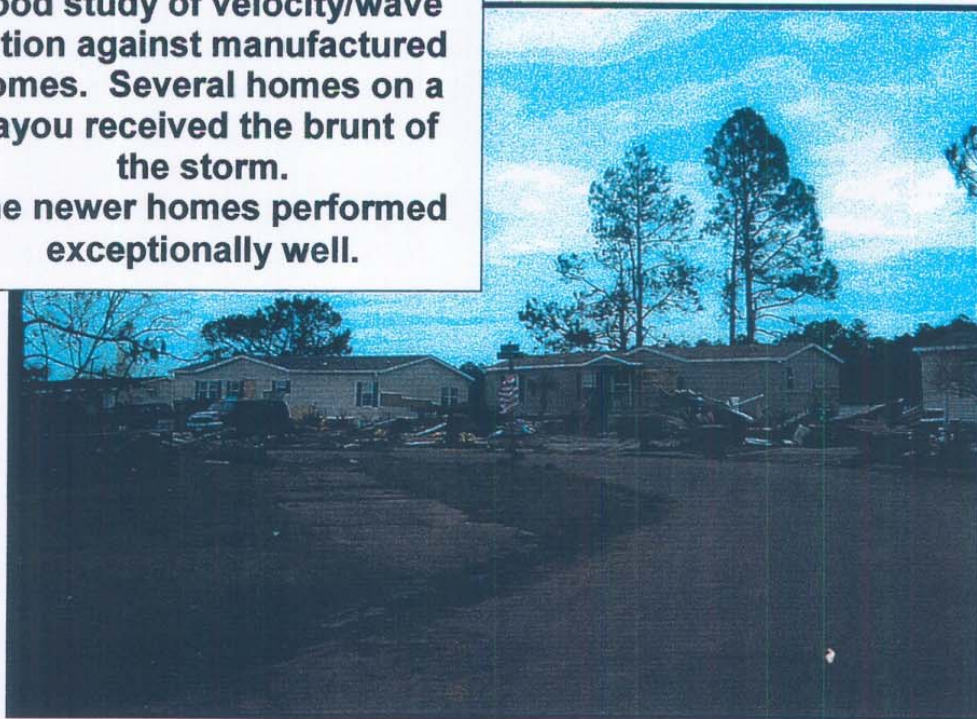
### Hurricane Frances

A slow moving storm with less wind speed. There was some storm surge – note the boats in the back yard, however no evidence was found of water getting into homes or homes moving on their foundation.





**Hurricane Ivan created more storm surge and gave us a good study of velocity/wave action against manufactured homes. Several homes on a bayou received the brunt of the storm. The newer homes performed exceptionally well.**



**Wind, velocity/wave action and debris impact.**

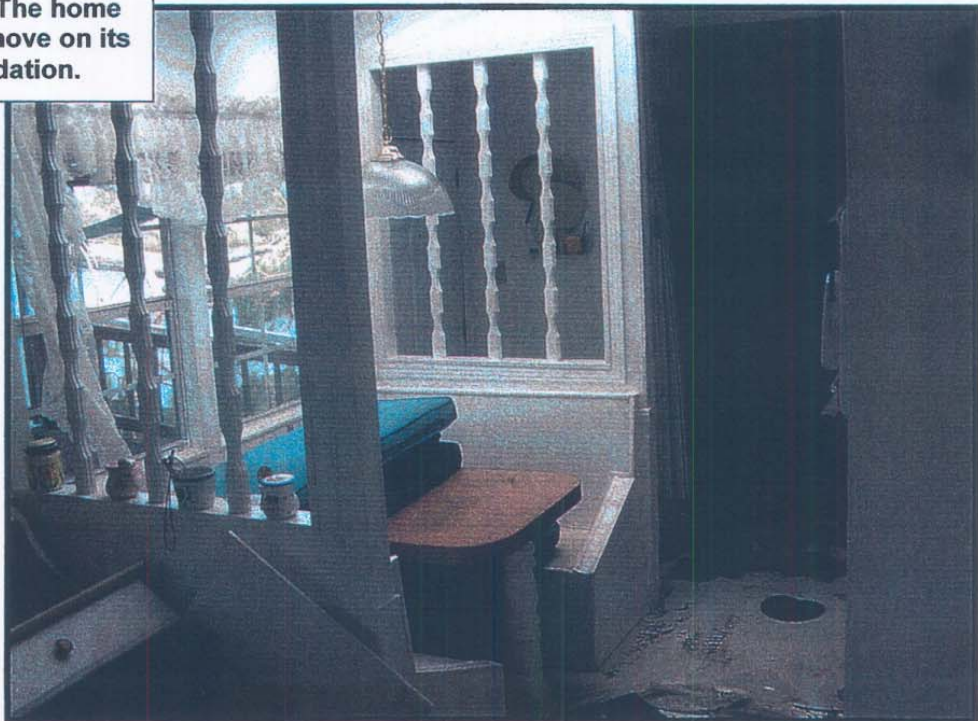


A destroyed home in Bayou Grande Villa. The Site where the home was Installed shows straps Rusted completely away

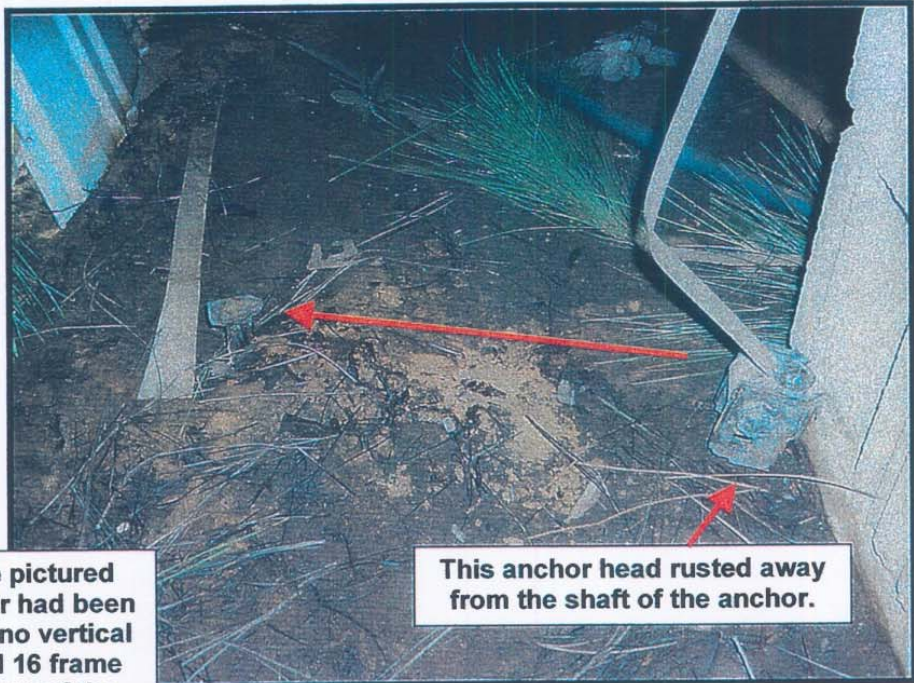




**This home was on a canal in the Bayou Grande Villa community and had 3 to 4 feet of water inside. The home did not move on its foundation.**

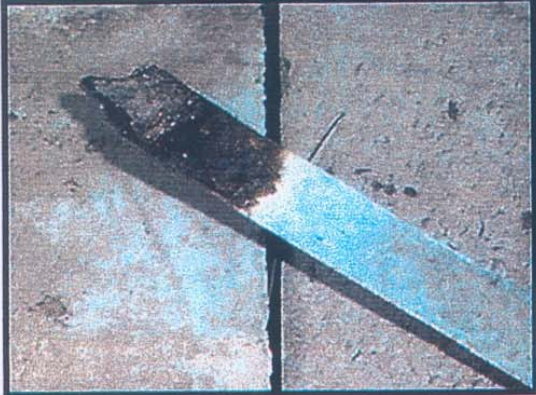






The home pictured where water had been inside had no vertical straps and 16 frame straps. Four of the frame straps had completely rusted away.

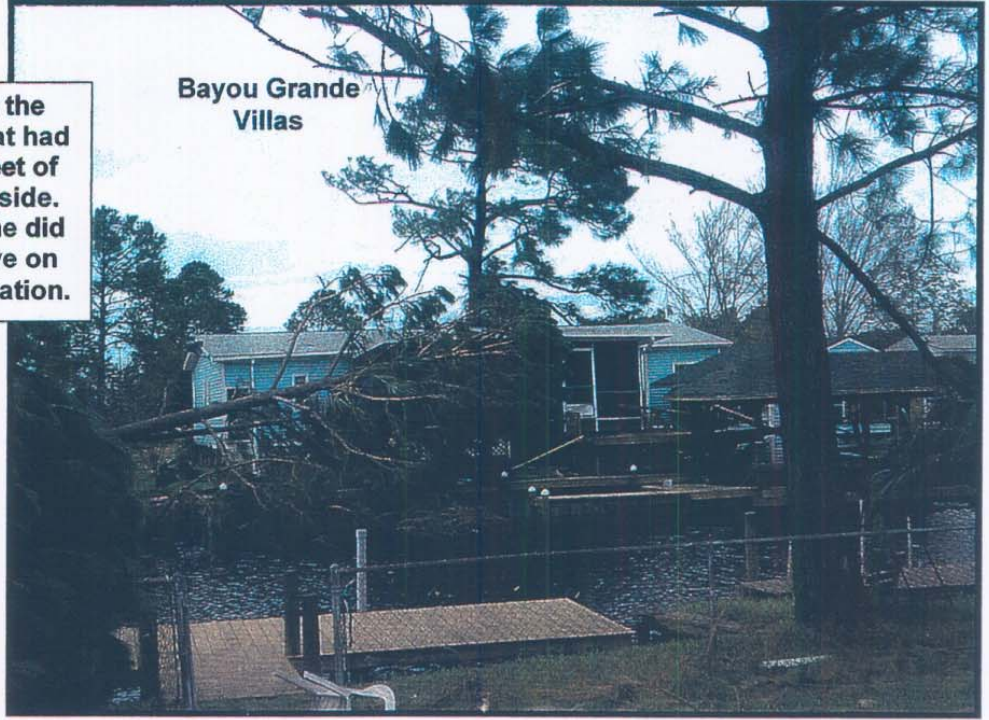
This anchor head rusted away from the shaft of the anchor.



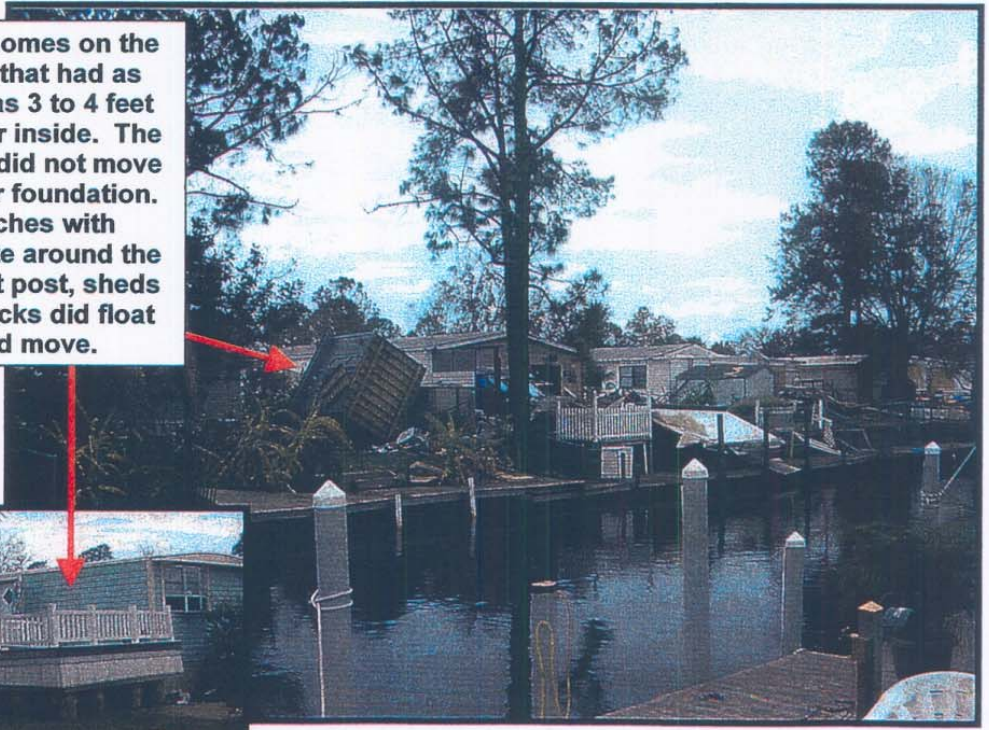


**This is the home that had 3 to 4 feet of water inside. The home did not move on its foundation.**

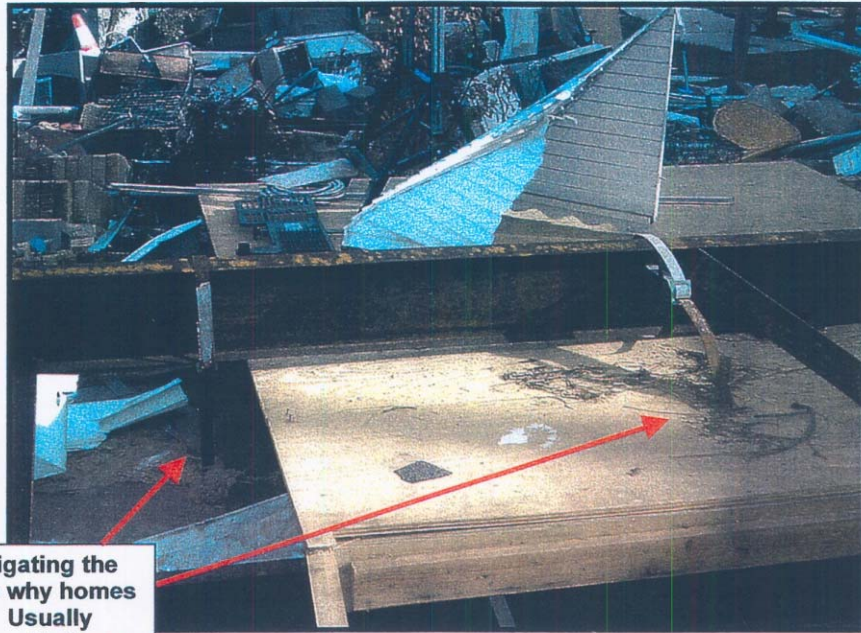
**Bayou Grande Villas**



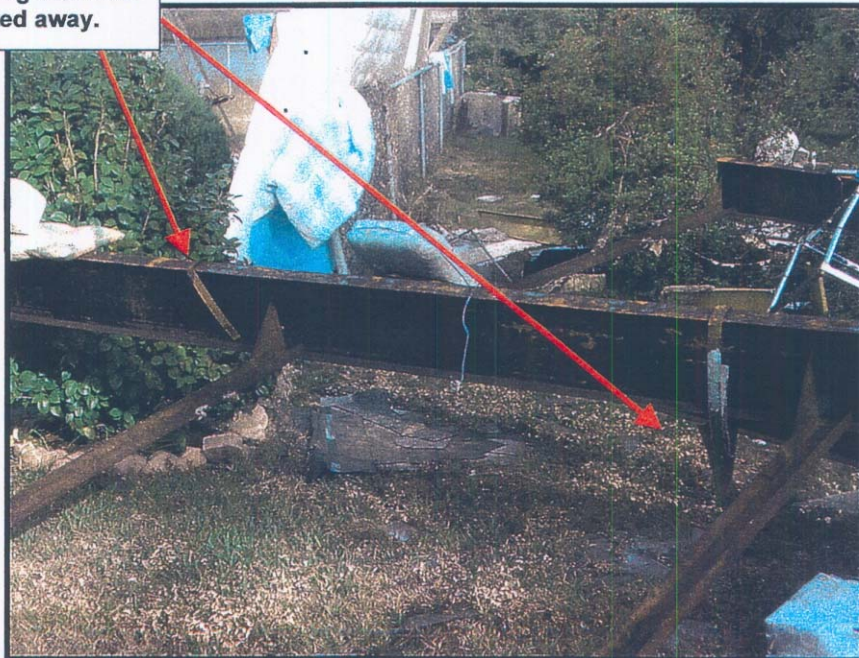
**Other homes on the canal that had as much as 3 to 4 feet of water inside. The homes did not move on their foundation. Porches with concrete support post, sheds and docks did float and move.**



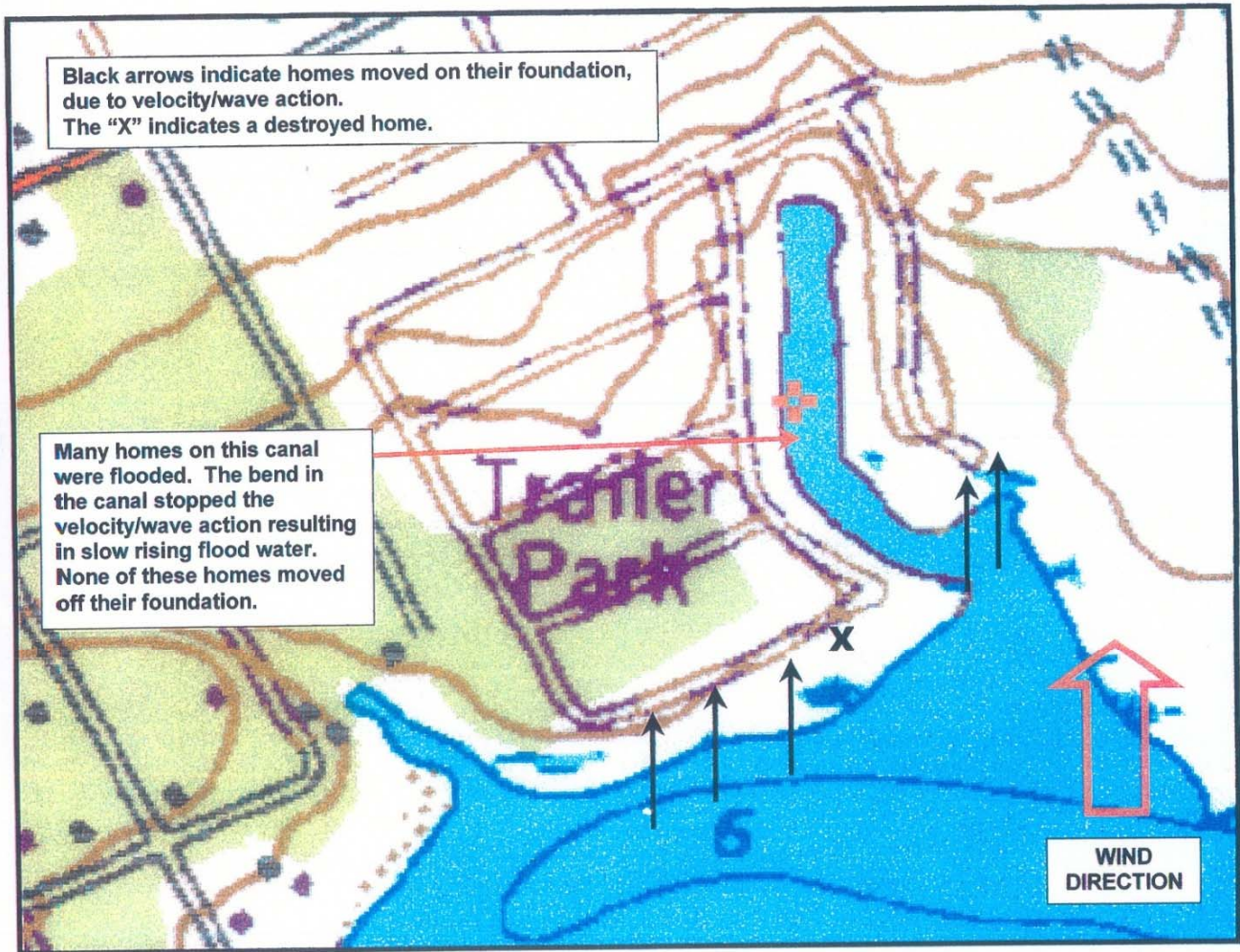




**Investigating the reasons why homes fail. Usually strapping that was rusted away.**

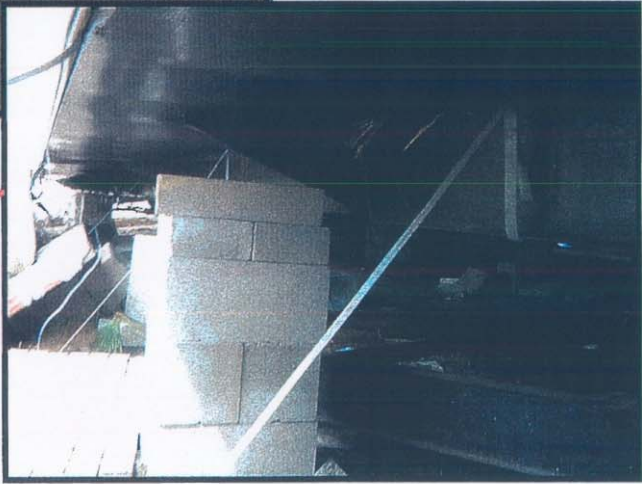
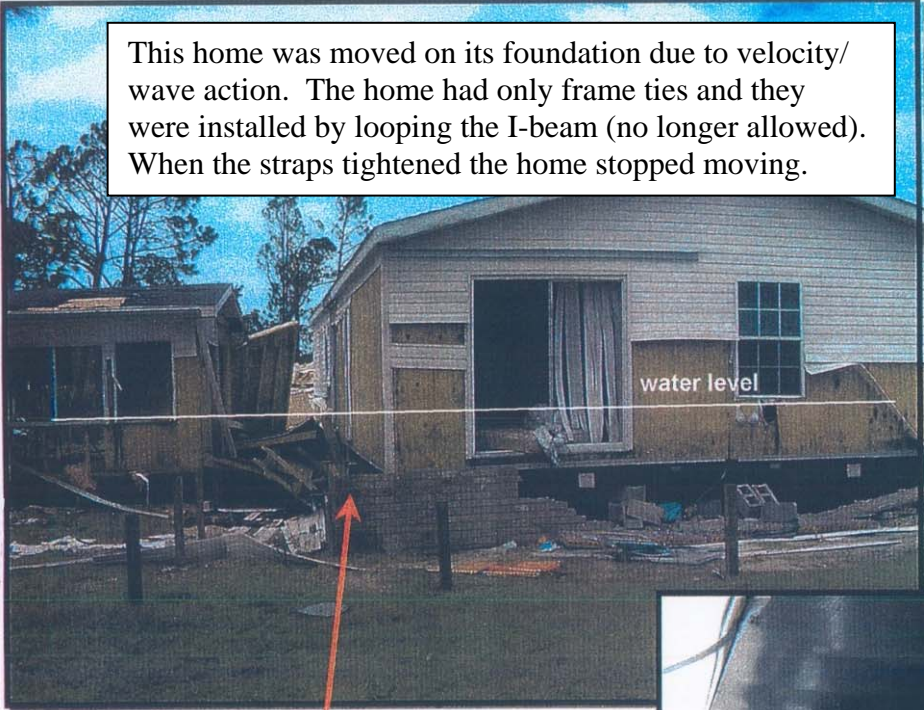


## Bayou Grande Villas, a mobile home community.





This home was moved on its foundation due to velocity/wave action. The home had only frame ties and they were installed by looping the I-beam (no longer allowed). When the straps tightened the home stopped moving.



A home that was flooded in Bayou Grand Villa. Note how the home owner parked his truck sideways to the home for protection against the wind.

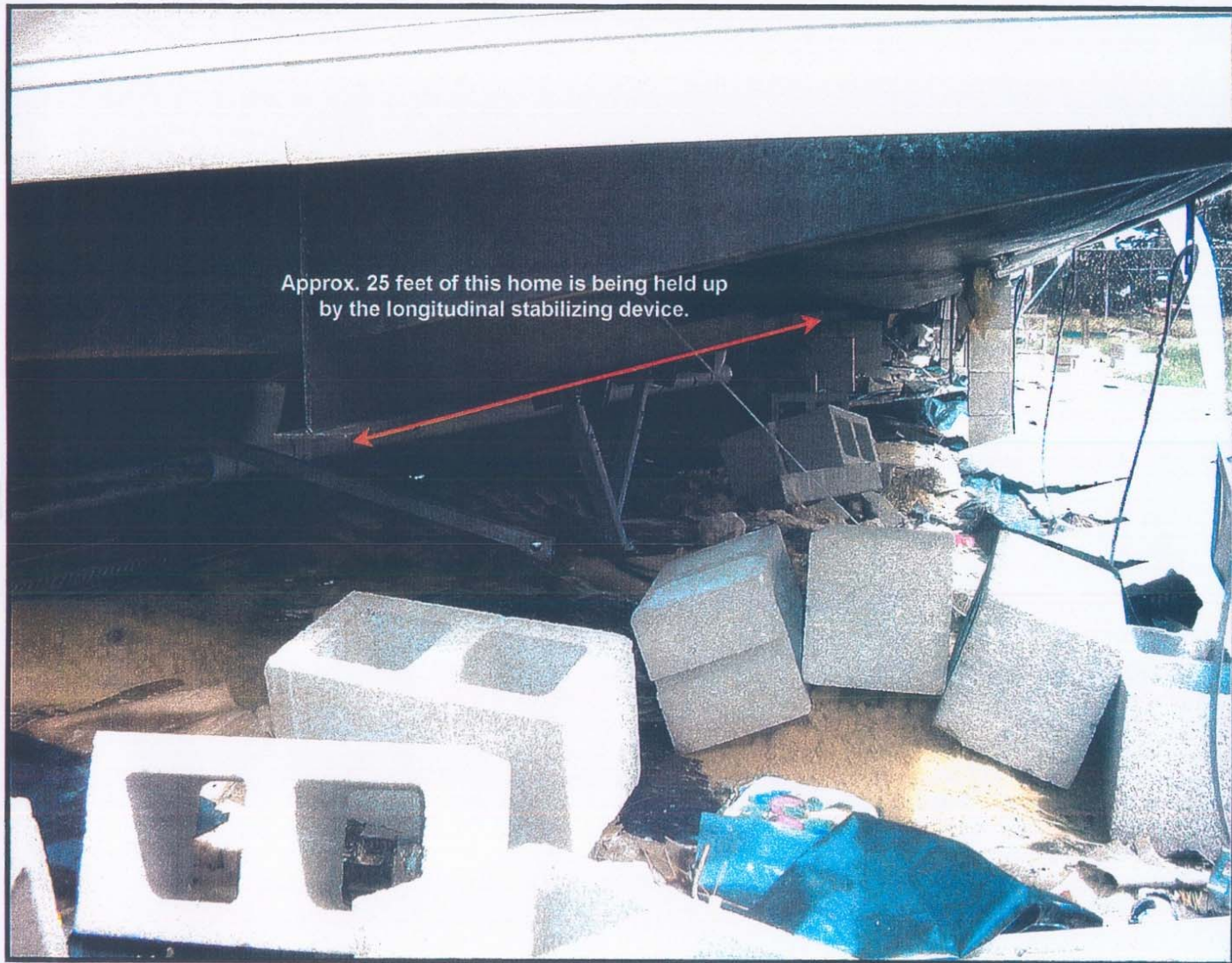


The approximate height of slow moving flood waters. This home was on the canal and did not move on its foundation. Note the debris that filled the truck window that was knocked out.



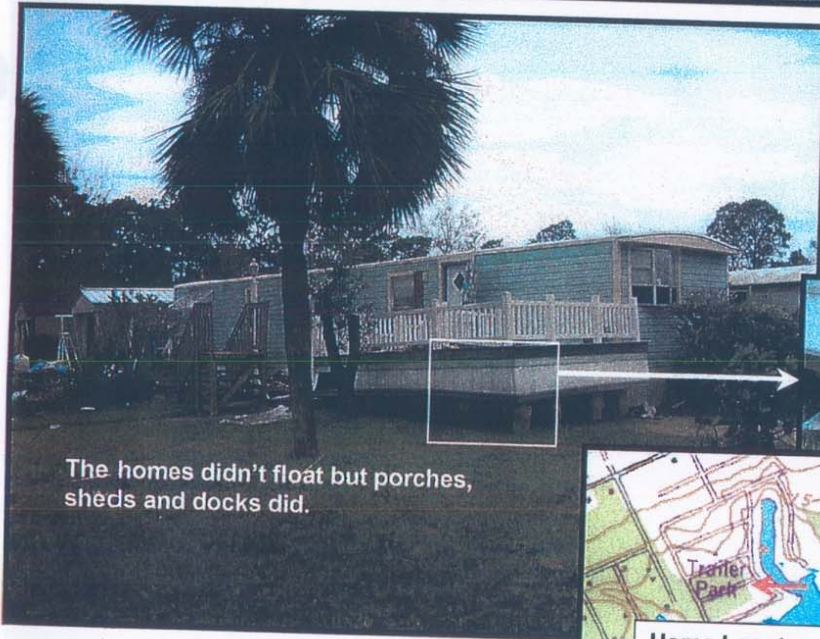
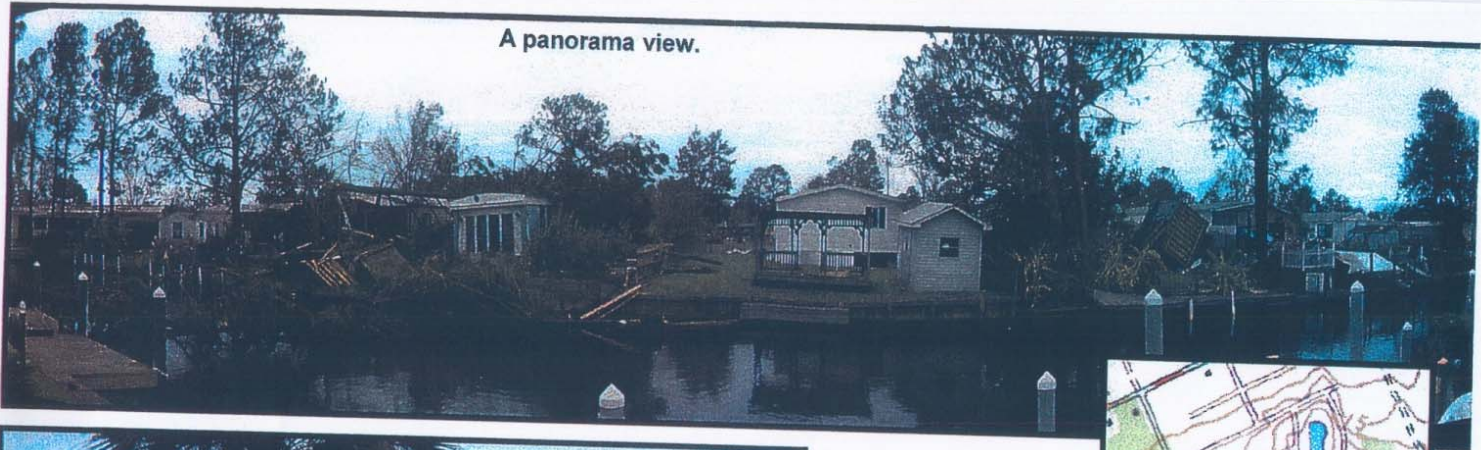






Approx. 25 feet of this home is being held up  
by the longitudinal stabilizing device.

A panorama view.



The homes didn't float but porches, sheds and docks did.





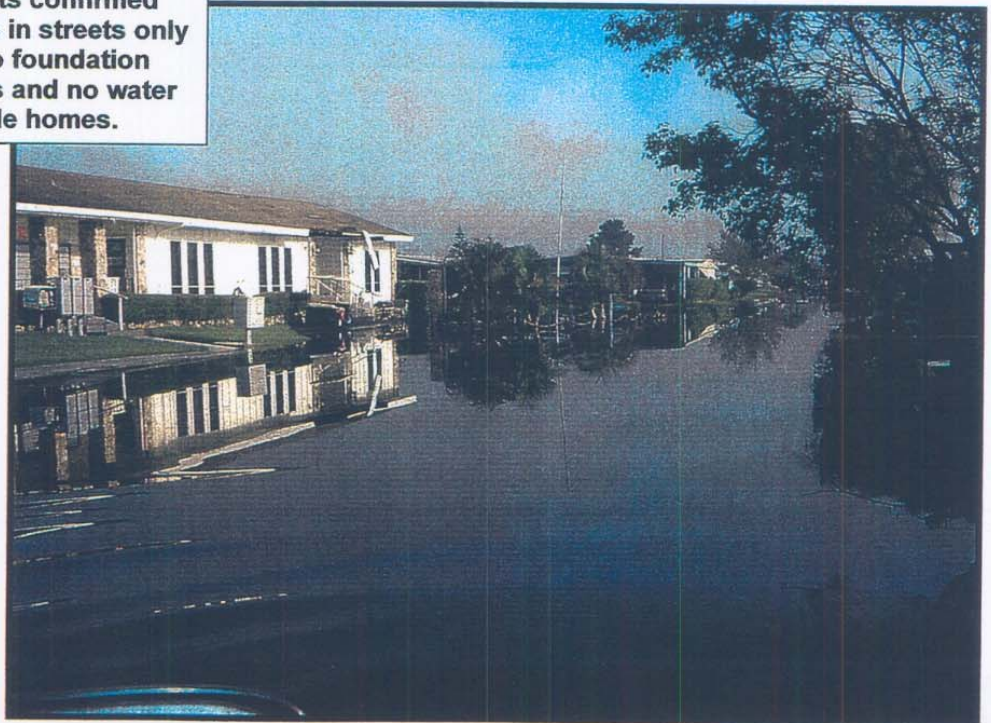


**A panorama view of Bay Breeze MHP in Pace.  
22 homes in this park and 6 were totally destroyed due to velocity/wave action.  
All homes were pre HUD and the many straps found on the frames had rusted  
away from the anchors.**



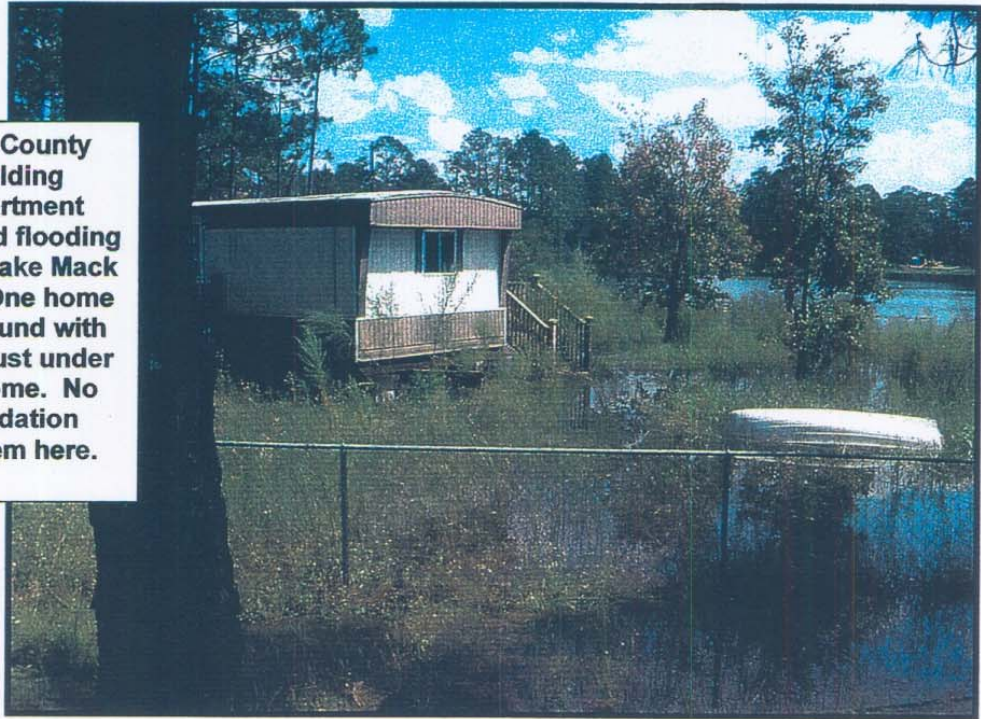


**Serious flooding was reported by the news media in the Emerald Lake area off Hwy 50 near Clermont. We found only flooded streets. Interviews with park management and residents confirmed water was in streets only with no foundation problems and no water inside homes.**

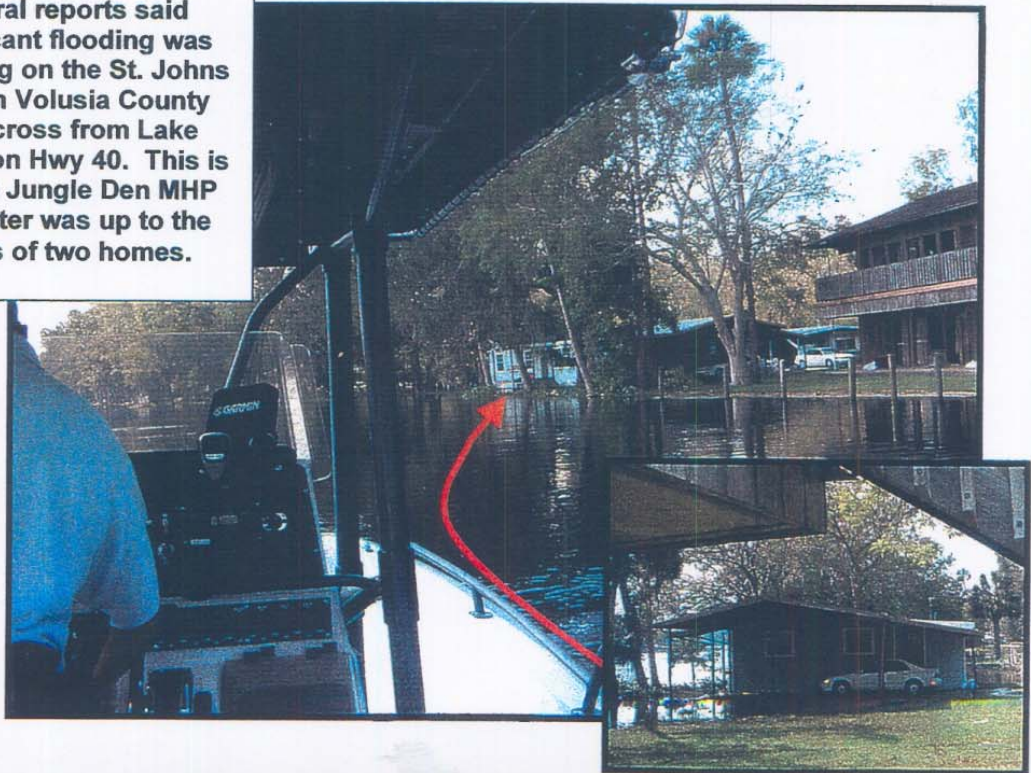




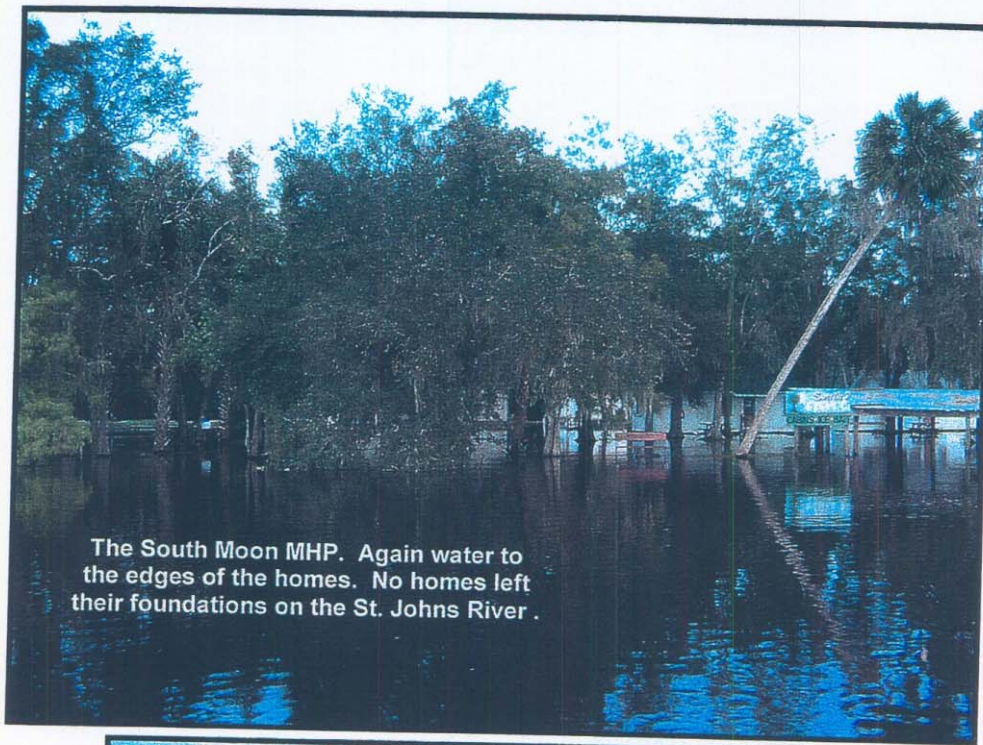
**Lake County Building department reported flooding in the Lake Mack area. One home was found with water just under the home. No foundation problem here.**



**Several reports said significant flooding was occurring on the St. Johns River in Volusia County just across from Lake County on Hwy 40. This is Blaire's Jungle Den MHP and water was up to the edges of two homes.**







The South Moon MHP. Again water to the edges of the homes. No homes left their foundations on the St. Johns River .

**The Bureau thanks the Volusia County Sheriff's Department for providing assisting in the investigations of four manufactured home communities on the St. Johns River between Volusia and Lake Counties.**

