



A Resource of the State of Florida

**Hurricane Loss Reduction  
for  
Residences and Mobile Homes  
in Florida**

**A Research Project Funded by  
The State of Florida Department of Community Affairs  
Through Contract 01-RC-11-13-00-22-004**

**PRELIMINARY REPORT ON  
SHELTERING ISSUES FOR  
MOBILE HOME PARKS**

**DELIVERABLE #9**  
DUE BY MAY 31, 2001

PREPARED BY  
THE INTERNATIONAL HURRICANE CENTER  
FLORIDA INTERNATIONAL UNIVERSITY

## PURPOSE

This report provides preliminary findings regarding critical issues with respect to sheltering of mobile homeowners in mobile home parks. This report reflects the work of the International Hurricane Center (IHC) research team on the topic of *Sheltering Issues for Mobile Home Parks*, one of five research tracks under the project "Hurricane Loss Reduction for Residences and Mobile Homes in Florida" being funded by the Florida Department of Community Affairs (DCA).

The scope of this specific research track is the following:

- Sheltering for Mobile Home Parks: This research effort will examine whether sheltering-in-place is feasible in mobile home parks. The examination will be framed within the concept that sheltering-in-place, in the case of mobile home parks, means sheltering within an appropriate structured within the park as opposed to an individual mobile home. Current programs and initiatives will be analyzed, including:*
- (a) Work funded by the Department of Community Affairs, Division of Emergency Management, regarding the feasibility or retrofitting mobile home park community centers to be used for shelter; and*
  - (b) New community shelter standards recently developed by the Federal Emergency Management Agency (FEMA).*
  - (c) How receptive are [mobile home] park owners and residents to the idea of sheltering-in-place?*
  - (d) Will park residents use an on-site shelter?*
  - (e) What regulatory criteria govern such on-site shelters?*
  - (f) What liability barriers are there to overcome, such as who is responsible for people using on-site shelters?*
  - (g) Successes and barriers in the implementation of on-site sheltering programs;*
  - (h) Necessary criteria to make implementation acceptable and feasible; and*
  - (i) The necessary regulatory environment to make on-site sheltering programs feasible.*

The issue of sheltering vulnerable population in the event of a hurricane is of great importance to the state. In order to properly evaluate all factors affecting this issue it must be placed within a larger context that includes at least the

following additional issues (DCA Secretary - State Board of Education Meeting:, March 14, 2000)

- (a) Evacuation criteria and procedures;
- (b) Building construction and design criteria;
- (c) Comprehensive planning;
- (d) Local and family emergency plans;
- (e) The Local Mitigation Strategy (LMS)

In the aftermath of Hurricane Andrew (1992) an ad-hoc Governor's Disaster Planning and Response Review Committee (Lewis Commission Report) identified hurricane sheltering as a critical planning issue for Florida. Driven by the Lewis Commission Report the state legislature enacted House Bill 911 in 1993 setting the objective of eliminating a deficit of safe shelter space in Florida by 1998.

Florida statutes, such as Sections 235.26(9)(a), 235.26(9)(b) and 252.385(1), address this issue of sheltering by mandating that the state must implement a *Statewide Emergency Shelter Plan (the Plan)* designed to establish design and construction criteria for educational facilities to meet the need for public shelter space. These statutes also give authority to DCA to be responsible for the administration of the program to eliminate shelter space deficits throughout the state. To carry out this responsibility DCA has incorporated the American Red Cross (ARC) *Guidelines for Hurricane Evacuation Shelter Selection - ARC 4496* into the Model Hurricane Evacuation Shelter Selection Guidelines.

Florida statutes also require DCA to review and update its Statewide Emergency Shelter Plan every two years in order to provide information on existing and future emergency shelter space requirements by county.

Further underscoring the importance of this issue the Florida Governor's Hurricane Task Force convened a *Hurricane Shelter Summit* in 2000. Also the FY 2001 budget includes an earmark of approximately \$13.5 million for addressing the shelter deficit, which as of the end of 2000 had reached 1.5 million spaces or 27.9 million square feet. This deficit is projected to grow to 1.6 million spaces or 30.4 million square feet by 2005 (Florida Department of Transportation - DOT Report - Ch. 5, 2000)

Population growth in Florida, especially along the more vulnerable coastal regions, plus the fact that hurricane shelters must be activated practically across the whole state even when a hurricane warning may only affect a couple of counties, also contribute to aggravating this critical situation. Against this background, it is important to take into account that all 67 counties in the state require evacuation of mobile home parks in the event of a hurricane.

Work by the IHC research team, as preliminary reflected in this report, is showing there are several other issues of perception, attitude etc. among mobile home park owners and residents that also come into play. In some cases such factors may act as barriers against on-site sheltering programs and, as such, must be overcome before an effective program can be implemented.

This report has been completed by Betty H. Morrow (FIU), Walter G. Peacock (FIU), Nicole Dash (IHC) and Timothy Rinhold (Clemson). Ricardo Alvarez (IHC) also contributed.

This report has been prepared in compliance with the deliverable requirements of DCA Contract Number 01-RC-11-13-00-22-004 executed September 8, 2000 and modified through Amendment #1 executed January 18, 2001. This report specifically complies with deliverable #9 of said contract, due by May 31, 2001, which reads as follows:

*By May 31, 2001, the Contractor shall submit in both hard-copy and electronic format a preliminary report on Sheltering Issues for Mobile Home Parks. The report shall include research conducted on items a-l referenced under this Scope of Work, section A, Part II Research, Item 1.*

## SHELTERING FOR MOBILE HOME PARKS

Florida’s coastal population continues to rise each day, compounding the evacuation and sheltering scenario. Mobile home residents comprise an especially vulnerable segment of the state’s population, making up a large portion of those involved in evacuation and sheltering.

It is generally accepted that mobile homes provide less protection in severe windstorms than that provided by conventional site-built homes. Preliminary data from the telephone survey conducted as part of this project indicate that mobile home residents tend to be aware of their risk with 71.5% reporting that their mobile home is less or much less safe than a single family house (see table below). However, it is not encouraging to also note that 28.5% of these mobile home residents believe their homes are as safe, safer or much safer than single family site built homes!

**safety of mobile home vs. single family**

		Frequency	Percent	Valid	Cumulative Percent
Valid	Much safer	7	1.4	1.5	1.5
	Safer	18	3.6	3.9	5.4
	No Difference	108	21.8	23.1	28.5
	Less	207	41.7	44.3	72.8
	Much less safer	127	25.6	27.2	100.0
	Total	467	94.2	100.0	
Missing	dk/nr	29	5.8		
Total		496	100.0		

The historical vulnerability of mobile homes is also borne out by death and injury statistics for tornadoes. Statistics for the years between 1985 and 1998 indicate that 40 percent of deaths from tornadoes occurred in mobile homes while about 27 percent of deaths occurred in site-built homes in spite of the lower proportion of mobile home residents in the general population [1].\*

The greater vulnerability of mobile homes is reflected in the common requirement that they be evacuated for all hurricanes. While there is mounting evidence that most households evacuate to the site-built homes of family and friends, those without this option either go to hotels or shelters, depending on their socio-

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\* A similar comparison of death statistics for hurricanes would not be valid since most coastal areas require evacuation of mobile homes during hurricanes.

economic status. Recent studies have shown that Florida does not have enough available shelter space particularly for storms on the higher end of the Saffir-Simpson scale. After the Hurricane Floyd evacuation, which ended up being the largest evacuation in Florida's history and accompanied by significant confusion, Governor Jeb Bush asked a team of state, local, and private sector officials to study the evacuation issue in Florida. This task force found that "the State of Florida suffers from a statewide deficit of over 1.5 million 'safe' public shelter spaces which means that for most residents vulnerable to the effects of hurricanes the only alternative protective action is evacuation across county, regional and even state lines" (Task Force Report, Chapter 5). According to the report, only six counties have enough shelter space for their evacuees. Making up for this shortfall has been a major issue for the Department of Community Affairs/Emergency Management.

When the hurricane situation is coupled with increasing concern about the tornado risk in Florida (as evidenced by deadly tornados in the last few years), the State has begun to look for alternate means for protecting Florida's residents. Since a particularly vulnerable population is mobile home residents, one effort has been placed on looking for better ways to address their sheltering needs.

This research effort examines the feasibility of sheltering-in-place in mobile home parks for tornadoes and hurricanes. Sheltering-in-place refers to sheltering within an appropriate structure within the park. This report will address five key areas related to this issue. They are: 1) What is the regulatory climate for sheltering in mobile home parks; 2) What programs are currently in place through the Department of Emergency Management; 3) How receptive are park managers and owners to the idea of sheltering in place, and do residents seem willing to use such facilities; 4) How is the issue addressed in other states; and 5) Under what conditions could a program be successful?

## **REGULATORY ISSUES**

A review of key regulatory considerations that affect the sheltering issue include those factors related to evacuation, shelter design and construction, liability issues, and federal allocations for shelter construction. This section briefly reviews the regulatory issues involved.

## Evacuation and Sheltering

Evacuation and sheltering is a mandated function for Florida's Division of Emergency Management. Both are delineated in the basic fundamental statutes that explain legislative intent for the Division of Emergency Management, as well as directing the powers of the Division.

### Chapter 252.311 (2) Legislative Intent:

*It is the intent of the Legislature to reduce the vulnerability of the people and property of this state; to prepare for efficient evacuation and shelter of threatened or affected persons; to provide for the rapid and orderly provision of relief to persons and for the restoration of services and property; and to provide for the coordination of activities relating to emergency preparedness, response, recovery, and mitigation among and between agencies and officials of this state, with similar agencies and officials of other states, with local and federal governments, with interstate organizations, and with the private sector.*

### Chapter 252.35 Emergency management powers; Division of Emergency Management:

*(1) The division is responsible for maintaining a comprehensive statewide program of emergency management. The division is responsible for coordination with efforts of the Federal Government with other departments and agencies of state government, with county and municipal governments and school boards, and with private agencies that have a role in emergency management.*

*(2) The division is responsible for carrying out the provisions of ss. 252.31-<sup>1</sup>252.91. In performing its duties under ss. 252.31-<sup>1</sup>252.91, the division shall:*

*(a) Prepare a state comprehensive emergency management plan, which shall be integrated into and coordinated with the emergency management plans and programs of the Federal Government. The division must adopt the plan as a rule in accordance with chapter 120. The plan shall be implemented by a continuous, integrated comprehensive emergency management program. The plan must contain provisions to ensure that the state is prepared for emergencies and minor, major, and catastrophic disasters, and the division shall work closely with local governments and*

*agencies and organizations with emergency management responsibilities in preparing and maintaining the plan. The state comprehensive emergency management plan shall be operations oriented and:*

*1. Include an evacuation component that includes specific regional and interregional planning provisions and promotes intergovernmental coordination of evacuation activities. This component must, at a minimum: contain guidelines for lifting tolls on state highways; ensure coordination pertaining to evacuees crossing county lines; set forth procedures for directing people caught on evacuation routes to safe shelter; establish strategies for ensuring sufficient, reasonably priced fueling locations along evacuation routes; and establish policies and strategies for emergency medical evacuations.*

*2. Include a shelter component that includes specific regional and interregional planning provisions and promotes coordination of shelter activities between the public, private, and nonprofit sectors. This component must, at a minimum: contain strategies to ensure the availability of adequate public shelter space in each region of the state; establish strategies for refuge-of-last-resort programs; provide strategies to assist local emergency management efforts to ensure that adequate staffing plans exist for all shelters, including medical and security personnel; provide for a postdisaster communications system for public shelters; establish model shelter guidelines for operations, registration, inventory, power generation capability, information management, and staffing; and set forth policy guidance for sheltering people with special needs.*

As discussed earlier, shelter space is at a premium in the state. Each evacuation highlights the concern for adequate shelter space. Chapter 252.385, Public Shelter Space, highlights the legislative concern regarding shelter deficits. It is the intent of the legislature that *“this state not have a deficit of safe public hurricane evacuation shelter space in any region of the state by 1998 and thereafter.”* Much effort has been placed on meeting the sheltering needs of the residents of Florida through both legislatively mandated shelter retrofit programs, and mandated shelter consideration in new state buildings.

All coastal counties require mobile home households to evacuate for a minimal hurricane. Looking at available web pages for inland counties, it appears that inland counties also mandate evacuation. In Alachua County, for example, for

any “inland high wind watch for hurricane force winds” mobile homes are evacuated.

Bradford County emphasizes the following: “Do not stay in a mobile home during a hurricane. Even if a mobile home is anchored, there is no guarantee it will withstand the strong winds of a hurricane.”

### Shelter Design and Construction

There are a number of levels of protection that can be considered in establishing shelter design criteria. These options range from buildings built to local site built home design and construction standards to tornado shelters designed and built to meet the National Performance Criteria for Tornado Shelters [2].

Preliminary survey results compiled for this project indicates that, for hurricanes, most inhabitants of mobile homes evacuate to site built homes inhabited by friends or relatives. Thus, the first level of increase in protection would be a building built to conventional site built housing standards. While this would afford the level of protection selected by most inhabitants of mobile home parks, it falls short of the level of protection normally sought by Emergency Managers when they select buildings and establish community hurricane shelters. At the other end of the spectrum would be tornado shelters, individual or community, that are built to standards outlined in the National Performance Criteria for Tornado Shelters [2] as interpreted by FEMA 320 [3] and FEMA 361 [4], respectively. Between these two limits, in increasing order of protection, would be buildings designed by a structural engineer, shelters selected according to the American Red Cross ARC 4496 Guidelines [5], and shelters designed using the Florida Department of Education Public Shelter Design Criteria, State Requirements for Educational Facilities (SREF) Section 5.4 [6].

A comparison of the various levels of sheltering can be made by considering the relative protection against wind loads and the impact of wind borne debris that is afforded by buildings that meet these various design criteria. Table 1 provides rough estimates of the differences between design wind loads and wind borne debris impact resistance for the various design criteria. It should be noted that the various design guides for improved sheltering reference wind load provisions from different editions of the American Society of Civil Engineers Standard ASCE 7. The wind speed maps, averaging times used to specify wind speeds, load factors, treatment of wind directionality, and wind pressure coefficients for

cladding elements used in the different editions of the standard have changed over the years. Consequently, the estimates of differences in loads vary based on the component being considered and whether allowable stress (ASD) or load and resistance factor (LRFD) design procedures are used. The estimates included in Table 1 are based on main wind force resisting system (MWFRS) wind loads and expected or specified wind borne debris impact resistance.

Table 1. Comparison of Typical Wind Load and Wind Borne Debris Impact Design Criteria or Expected Performance

Type of Building	Ratio of Expected MWFRS Design Capacity to Loads Specified in ASCE 7-88	Expected Debris Impact Resistance
Pre 1976 Mobile Home	<1.0 for anchorage <1.0 for structural design Poor roof to wall and wall to frame connections Poor shear resistance	Walls and roof penetrated by 9 lbs. 2x4 at 8 to 26 mph Windows are easily broken Significant source of wind borne debris in severe wind storms
1976 - 1994 Manufactured Housing units and post 1994 units that are not wind rated	<1.0 for anchorage <1.0 for structural design Relatively poor roof to wall and wall to frame connections	Walls and roof penetrated by 9 lbs. 2x4 at 8 to 26 mph Windows are easily broken Significant source of wind borne debris in severe wind storms
Post 1994 high wind rated Manufactured Housing units	1.0 for wind loads <1.0 for expected anchorage performance	Walls and roof penetrated by 9 lbs. 2x4 at 8 to 26 mph Windows are easily broken
Site built homes	In many cases, <1.0 for connections <1.0 for roof sheathing attachment For light frame construction, shear and anchorage resistance may be <1.0	Roof penetrated by 9 lbs. 2x4 at 22 to 26 mph For light frame construction with vinyl siding, walls penetrated by 9 lbs. 2x4 at 8 to 26 mph Masonry walls or walls with dimensional wood siding are expected to resist 9 lbs 2x4 at 34 mph. Windows are easily broken
Buildings designed by a structural engineer using the Standard Building Code or Pre- 1992 South Florida Building	0.9 for wind loads	Roof damage likely, debris resistance depends on roof type and thickness For many light weight cladding systems, penetration by 9 lbs. 2x4 at less than 34 mph

Code		Windows and glazed openings break for impacts well below 9 lbs. 2x4 at 34 mph
Buildings designed by a structural engineer using ASCE 7, 1988 or later editions	1.0 or greater for wind loads	Roof damage likely, debris resistance depends on roof type and thickness For many light weight cladding systems, penetration by 9 lbs. 2x4 at less than 34 mph Windows and glazed openings break for impacts well below 9 lbs. 2x4 at 34 mph Opening protection required for high wind areas in 1995 and 1998 editions or design for higher internal pressures
ARC 4496 Compliant Shelters (ASCE 7-88 wind loads)	1.0 for wind loads Warns against using rooms attached to, or immediately adjacent to, un-reinforced masonry walls or buildings Warns against use of gymnasiums, auditoriums or other large open areas with long span roofs during hurricane conditions	Warning to avoid areas near glass unless glass surface is protected by adequate shutter, suggests that windows and roof will be damaged – plan accordingly. Warning to avoid wall sections where portable or modular classrooms are in close proximity
Enhanced Hurricane Protection Areas built using Florida Department of Education Public Shelter Design Criteria	If designed using ASCE 7-93 wind loads as a Category III (essential buildings) structure, design loads are 1.15 to 1.23 times ASCE 7-88 or 93 loads for normal buildings, depending on proximity to the coast. If designed using preferred alternate recommendation (map speed plus 40 mph and importance factor of 1.0), design loads are 1.86 to 2.09 times ASCE 7-88 or 93 loads for normal buildings, depending on map speed.	Materials used for all walls, roofs, windows, louvers, and doors must withstand 9 lbs. 2x4 impacting at 34 mph. Glazed openings or protective systems over glazed openings must also meet cyclic loading requirements after being impacted by 2x4 missile.
FEMA 320 or 361 Shelters – 200 mph 3 second gust design wind speed	Typically, MWFRS wind loads for design of the roof or walls are increased by 2.7 to 4.5 or more times the ASCE 7-	15 lbs. 2x4 missile impact at 100 mph for walls and 67 mph for roofs. Impact momentum increased by a factor of 5 for

(approximately 170 mph fastest mile)	88 or 93 loads for normal buildings, depending on map speed.	walls and 3.3 for roofs over 9 lbs 2x4 impact at 34 mph.
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As Table 1 illustrates, there is a tremendous step up in both design wind loads and wind borne debris impact resistance when the FEMA 320 or FEMA 361 guidance is used to develop a shelter. The FEMA guidelines are aimed at “near ultimate” protection and are focused primarily on tornado protection. In addition to the use of high design wind speeds, these guides assume a large contribution from internal pressures despite the increase in missile protection requirements. For small shelters suitable for a single family, the debris impact requirements tend to dominate, while the wind load provisions become more important for larger community size shelters. It is certainly not practical to try and solve the 1.5 million person shelter deficit for the state of Florida using shelters that meet the FEMA 320 or 361 level of protection. However, future FEMA related shelter funding may be tied to meeting these higher design criteria for shelters. Consequently, it may be important to consider multi-layered shelters that contain areas hardened to meet the highest criteria but which provide larger spaces that are developed along the lines of the Florida Department of Education Public Shelter Design Criteria.

One application of that approach would be to add a tornado shelter module to existing community centers in mobile home parks while strengthening the existing community center to provide an improved level of protection even if it is not possible to raise it to the level of the Florida Department of Education Public Shelter Design Criteria. Research has shown that providing debris impact protection that is sufficient to meet the South Florida, Southern Building Code Congress International of American Society of Testing and Materials large missile impact standards (a 9 lbs. 2x4 wood member impacting end on at 34 mph) can be achieved with about ¾-inch thick plywood sheathing, 1-inch thick oriented strand board sheathing, or thin gage corrugated steel panels [7]. For light frame construction, retrofits would likely require removal of the interior or exterior finishes from the building, the addition of strapping to tie all the structural members together and to adequately anchor the structure to the foundation or slab, and then the addition of sufficient sheathing or metal panels to provide the debris impact protection.

In many cases, the basic structure may not be suitable for the upgrades and it may be more cost effective to build a new building that achieves the desired

protection objectives. Establishing the target objectives and balancing risks and prudence raises another set of questions. First, as noted earlier, a disproportionate number of people are killed in mobile homes by tornadoes than are killed in site built homes. Thus, the location of tornado shelters in mobile home parks could help reduce this vulnerability if they are close enough, accessible enough and there is sufficient warning times for residents to act.

However, when considering the location of hurricane shelters in mobile home parks, other factors must be considered. It should be recognized that the hurricane shelter wind borne debris impact criteria being used throughout the State of Florida is not particularly high. The debris impact criteria was largely developed for window protection where the objective was to reduce the chances that an entire window would be broken out, resulting in pressurization of the building and progressive failure of other portions of the building. It was calibrated to some extent to the general level of protection afforded by masonry houses built to South Florida Standards. The original proposal was for protection from a 9 lbs 2x4 traveling at close to 100 mph. However, at those speeds the missile would perforate just about any conventional building and the reduced speed was adopted as a compromise. It is clear from damage surveys following Hurricane Andrew that the failure of mobile homes generated a tremendous amount of wind borne debris that damaged neighboring mobile homes and site built homes near the parks. Studies of missile generation, transport, and impact conducted by Applied Research Associates [8] for site built homes clearly demonstrated that the debris impact protection requirements increased significantly when weaker homes that were more likely to produce missiles were included. There are enough older mobile homes in parks throughout Florida and there are enough concerns about the performance of anchoring systems under the best of conditions to raise serious questions about the prudence of locating hurricane shelters in mobile home parks unless the debris impact resistance is significantly increased above current levels.

### Liability Issues

Of particular interest for the purpose of this research project is the issue of liability. Chapter 252.51 addresses the issue of liability when part of a mobile home park has, or may have, received the designation of shelter from the local emergency management agency.

252.51 Liability:

*Any person or organization, public or private, owning or controlling real estate or other premises who voluntarily and without compensation, other than payment or reimbursement of costs and expenses, grants a license or privilege or otherwise permits the designation by the local emergency management agency or use of the whole or any part of such real estate or premises for the purpose of sheltering persons during an actual, impending, mock, or practice emergency, together with her or his successor in interest, if any, shall not be liable for the death of, or injury to, any person on or about such real estate or premises during the actual, impending, mock, or practice emergency, or for loss of, or damage to, the property of such person, solely by reason or as a result of such license, privilege, designation, or use, unless the gross negligence or the willful and wanton misconduct of such person owning or controlling such real estate or premises or her or his successor in interest is the proximate cause of such death, injury, loss, or damage occurring during such sheltering period. Any such person or organization who provides such shelter space for compensation shall be deemed to be an instrumentality of the state or its applicable agency or subdivision for the purposes of s. 768.28.*

## Funding

On March 22, 2001, the U.S. House of Representatives voted 401-6 in support of H.R. 247, the Tornado Shelters Act. This act authorizes “communities to use community development block grant funds for construction of tornado-safe shelters in manufactured home parks.” (See Act text) At this time, legislation in the Senate is still pending. Current law allows CDBG funds to be used for shelter construction only in low to moderate income housing communities and apartment buildings. These new changes allow these funds to be used for manufactured home communities, but still keep in place the low to moderate-income requirement. Meeting this requirement, in general, should not be difficult for the majority of mobile home parks.

The language of 42 U.S.C. 5305 was amended to specifically allow the following:

*The construction or improvement of tornado- or storm-safe shelters for manufactured housing parks and residents of other manufactured housing, the acquisition of real property for sites for such shelters, and the provision of assistance (including loans and grants) to nonprofit or for-*

*profit entities (including owners of such parks) for such construction, improvement, or acquisition, except that a shelter assisted with amounts made available pursuant to this paragraph shall be located in a neighborhood consisting predominantly of persons of low and moderate income, except that a shelter assisted with amounts made available pursuant to this paragraph may not be made available exclusively for use of the residents of a particular manufactured housing park or of other manufactured housing, but shall generally serve the residents of the area in which it is located.*

In addition to standard funding, the new changes authorize a specific allocation of \$50 million to be spent for fiscal year 2002. The Senate Bill, S 680, was referred to the Committee on Banking, Housing and Urban Affairs on April 3, 2001.

## **PROGRAMS IN FLORIDA**

As part of the Florida Warning and Information Network program began in 1999, the Florida Department of Community Affairs began an initiative to identify five mobile home parks in the state where a community center or other building was appropriate for retrofitting into an approved shelter for park residents . Emergency managers and others were asked to identify potential candidates. The results were disappointing; in all there were about 35 applications from the entire state. Engineers then evaluated each as a potential shelter, i.e. it was not in a storm surge or flood plain area and could be retrofitted to Enhanced Hurricane Protection guidelines within a budget of \$90,000. Only two good candidates were identified, so another call for applications went out. As a result, DCA is now working on four projects, with a fifth one in the earliest stages. Engineering firms have completed plans (at DCA cost) for two projects and the work will begin soon. The site owner can choose the construction company, but with DCA approval. The goal remains to complete five demonstration projects before the end of the grant period, June 2002.

The idea of retrofitting buildings within mobile home parks so they can be used as tornado and hurricane shelters was considered reasonable by all the persons we interviewed. In fact Florida was a leader with this idea, but it has since been picked up nationally and federal low cost loans are now being made available for this purpose. Why then has it taken two and a half years to make any headway on this project? The reasons gleaned from the state staff, county emergency

managers, mobile home park managers and mobile home residents we interviewed cover a variety of issues and concerns.

In addition to structural problems with potential shelters themselves, DCA staff report other reasons preventing this project from proceeding as hoped. Homeowners' associations are active in many parks, often governing park activities and projects. Some homeowner associations have had difficulty getting sufficient consensus on this issue to proceed. In one case this has prevented a good candidate from participation. Some park homeowners are concerned about outsiders using the shelter. While they were assured that the shelter was intended for their residents and would not be advertised as a public shelter, no one could in fact be turned away. In some cases property changed ownership midstream and this stopped the project. In other instances \$90,000 was insufficient to bring the building up to the standard and the owner was not willing to pay the additional costs, even though it would improve the property. In fact property improvement was seen as a detriment by one park owner who did not want his taxes raised.

We talked with five emergency managers in the regions we surveyed for this project: Alachua, Broward, Hillsborough, Leon and Miami-Dade. All thought retrofitting sounded like a good idea, but was unworkable. Each had tried to locate candidates for the retrofitting program, to no avail. In one county, out of 63 mobile home parks contacted by phone to explain the program, none were interested. Most reported that they did not have a building of sufficient size and structure to be considered. Often these community buildings are unsubstantial structures, sometimes manufactured housing, and often with lots of windows. In visiting parks in these areas, however, our research team found several that might be candidates. The idea of getting a \$90,000 grant to upgrade and shutter a multi-purpose building seems like the kind of deal a business owner would welcome. However, only one manager of the 12 parks visited expressed any interest. The concerns seem to be complex and are covered later in this report. Whether the program should be continued will require evaluation of the five projects when completed, as well as an assessment of the cost-benefit, given the amount of administrative and other costs associated with this project.

## **PROGRAMS IN OTHER STATES**

The issue of sheltering in mobile home parks is not a new one to many states. Below is a short discussion of three states that have taken the steps to adapt legislation to make mobile home park sheltering required or more feasible.

### Minnesota

Minnesota State Law addresses the issue of sheltering separately for those manufactured home parks with less than ten and parks with more than ten homes. Additional variation is based on time of licensing. For those with less than ten lots, the park is required to have *“a plan for the sheltering or the safe evacuation to a safe place of shelter of the residents of the park in times of severe weather conditions, such as tornadoes, high winds, and floods.”* The plan must be developed in conjunction with the local municipality and posted prominently throughout the park, and must be given to each resident.

For those parks with ten or more homes and licensed prior to March 1998, the park *“shall provide a safe place of shelter for park residents or a plan for the evacuation of park residents to a safe place of shelter within a reasonable distance of the park for use by park residents in times of severe weather, including tornadoes and high winds.”* Local municipalities are required to approve these plans. The statute gives municipalities the authority to require the construction of a shelter if the municipality *“determines that a safe place of shelter is not available within a reasonable distance from the park.”*

Parks with ten or more homes licensed after March 1, 1998 are required to provide shelter. Information can be found at:

<http://www.revisor.leg.state.mn.us/slaws/1994/c592.html>

### Iowa

Iowa State Law grants counties the right to require mobile home parks to construct a storm shelter for those parks opened after July 1, 1999. The law further states that *“in lieu of requiring construction of a storm shelter, a county may require a park owner to provide a plan for the evacuation of park residents to a safe place of shelter in times of severe weather including tornadoes and high winds if the county determines that a safe place of shelter is available within a reasonable distance of the mobile home park for use by park residents. Each evacuation plan prepared pursuant to this subsection shall be filed with, and approved by, the local emergency management agency.”* The policy, then,

relates to new mobile home parks, and does not address parks opened prior to July 1999.

Counties appear free to adopt an ordinance of their choice as long as it does not require:

1. That the size of the storm shelter be larger than the equivalent of seven square feet for each manufactured or mobile home space in the community.
2. That the storm shelter include a restroom if the shelter is used exclusively as a storm shelter
3. That the storm shelter exceed the construction specifications approved by a licensed professional engineer and presented by the owner of the community.

For Iowa, a storm shelter is defined as “*a single structure or multiple structures designed to provide person with temporary protection from a storm.*” See <http://www.legis.state.ia.us>, Chapter 331.301, subsection 12, Code 2001.

### Alabama

The current session of the Alabama legislature is considering both a house and senate bill that would address the need for a sheltering of those living in mobile home parks. According to the Andalusia Star-News the bills would “*require mobile home parks or communities with 10 or more mobile homes established prior to June 30, to provide a safe place of shelter at a reasonable distance from the park to be used by park residents in the event of severe weather.*” (The Andalusia Star News, March 15, 2001) According to the report, the shelter would have to be approved by the Alabama Emergency Management Agency.

Looking at the text of the current bills the responsibility falls on local municipalities to determine which areas have heightened tornado risk, in other words, a local tornado alley. The laws seem to focus on the use of safe rooms. Laws further adopt rules that give rebates for bomb shelters and tornado shelters.

### Summary

These three examples illustrate how some states are handling the issue of sheltering for mobile home residents. Regardless of the approach that Florida ultimately chooses, legislative language will be required to make it a reality.

## **PERCEPTIONS OF MANAGERS AND HOUSEHOLDERS**

### Managers

As part of the qualitative interviewing being conducted for this project, our research team conducted face-to-face interviews with several managers of large mobile home parks in each of the four regions selected, which include parks in and around the following areas: Gainesville, Tallahassee, Tampa, and South Florida. Face-to-face interviews were conducted with a total of 12 park managers.

It appears that mobile home parks are of two general types: more exclusive gated communities that are typically limited to residents 55 years of age or older, and parks that cater to low-income or working class families offering few if any amenities. In both cases units typically are owner-occupied with a few being owned by the park owner and rented. Unit owners are not supposed to rent their units, but in fact many do, at least in the lower-end parks. Residency was relatively stable; in the vast majority of cases when residents move they do not remove their units, but sell them in place.

No park in our sample had a building designated as an official shelter. The single most deterring factor was that most of these parks did not have a building that was large or substantial enough. Of those with community centers, most described them as not strong enough to be considered, or as having too much uncovered glass. In two cases there were community centers in the park where residents sometimes came to wait out hard thunderstorms. However, the managers did not recommend this practice.

In one case the community center had been used in the past, but the current owner was too concerned about liability to allow it to be used as a shelter. This liability issue was a major concern. When asked, no park manager knew about the new legislation that frees park owners from liability as long as the county had approved the shelter. When told about it, there was skepticism. As one said, "That doesn't keep people from suing." In other words he might win, but it could be an expensive and time-consuming process. In some cases managers and

owners simply do not want to be bothered. One park manager said that he had enough to do to get ready for a hurricane without having to worry about preparing a shelter. They wanted to evacuate everyone, including employees, and lock up the park. There was concern about what would happen afterwards. Even if residents emerged safely from a shelter after a hurricane destroyed their park, there could be a serious safety and health hazards with high potential for injuries, as well as looting and other problems.

Another common reason managers thought sheltering-in-place was not a useful idea was that they perceived park residents as preferring to go where they could be more comfortable than in a shelter, either to the home of family or friends or to a hotel. At the parks we visited, it was reported that few residents used the local county-provided shelters in past evacuations.

As for tornados, none of these parks had any program to warn residents of a possible tornado. They felt that people had plenty of opportunity to get the information from their own radio or television. Only one manager had a NOAA radio in his office, but several said they had given them to residents who agreed to monitor them for the park. There did not seem to be too much concern; in fact several indicated that there “wasn’t much you could do anyway” in the case of tornados. In one case a resident spoke about running to a nearby restaurant when a tornado warning was issued.

Only one manager had any interest in a possible program to retrofit a community building into an approved shelter. This was a relatively small park (143 units) in Gainesville in which 30% of the units were rented, as opposed to owner occupied.

### Residents

Analysis is currently underway of the qualitative data collected in 120 face-to-face interviews with mobile home residents in the four regions. Early analysis of the sheltering-in-place issue indicates most mobile home owners are aware of the danger of remaining in mobile homes during a hurricane. Most are aware of evacuation orders and either have or plan to comply. Some think it would be a good idea to have a shelter in the park and would use it if available. Many, however, report that they prefer going to friends, family, hotels or other destinations rather than a shelter, even one in the park. Concerns include the

danger from trees and debris, and being cut off from the outside world. Further analysis should shed more light on attitudes about sheltering-in-place.

The statewide telephone survey is still underway. However, preliminary analysis of the first responses (approximately 500) from mobile home households reveal some interesting trends relative to the sheltering issue. Because of the timing issues involved with tornado and hurricane sheltering, questions were asked separately to assess the effect of type of hazard affect on expected use.

While the survey is not complete, these preliminary results give a general idea of how households stand on the particular issue. Results will be finalized for the final report.

### **GENERAL QUESTIONS ON RISK AND PLANS**

The questions in this section give a general sense of how mobile home householders perceive the risk of hurricanes and tornados. These questions help establish how salient these risk issues are for these respondents. An encouraging result is that almost 78% of the respondents realize that mobile homes need to be evacuated for hurricanes. Over 81% of respondents indicate that their household has a hurricane evacuation plan with about 30% expecting to use a public shelter. Unfortunately, less than a quarter of all households indicate they have a NOAA weather radio.

**How Likely is a Major hurricane this season**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very likely	45	9.1	10.4	10.4
	Somewhat likely	153	30.8	35.5	45.9
	Not Very likely	233	47.0	54.1	100.0
	Total	431	86.9	100.0	
Missing	dk/nr	65	13.1		
Total		496	100.0		

**Major hurricane likely in next 10 yrs**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very likely	76	15.3	19.8	19.8
	Somewhat likely	192	38.7	50.0	69.8
	Not Very likely	116	23.4	30.2	100.0
	Total	384	77.4	100.0	
Missing	dk/nr	112	22.6		
Total		496	100.0		

**Required evacuation of mobhome residents**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	369	74.4	77.7	77.7
	No	59	11.9	12.4	90.1
	Not sure	47	9.5	9.9	100.0
	Total	475	95.8	100.0	
Missing	dk/nr	21	4.2		
Total		496	100.0		

**Tornado likely this season**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very likely	23	4.6	5.2	5.2
	Somewhat likely	160	32.3	36.0	41.2
	Not Very likely	261	52.6	58.8	100.0
	Total	444	89.5	100.0	
Missing	dk/nr	52	10.5		
Total		496	100.0		

**Hurricane plan for evacuation**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	398	80.2	81.4	81.4
	No	91	18.3	18.6	100.0
	Total	489	98.6	100.0	
Missing	dk/nr	7	1.4		
Total		496	100.0		

**Where evacuate to**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Home of friend	52	10.5	13.2	13.2
	Home of relative	82	16.5	20.8	34.0
	Shelter	118	23.8	29.9	64.0
	Motel/Hotel	52	10.5	13.2	77.2
	Other, specify	90	18.1	22.8	100.0
	Total	394	79.4	100.0	
Missing	dk/nr	4	.8		
	System	98	19.8		
	Total	102	20.6		
Total		496	100.0		

**NOAA Weather Alert radio in home**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	105	21.2	21.3	21.3
	No	387	78.0	78.7	100.0
	Total	492	99.2	100.0	
Missing	dk/nr	4	.8		
Total		496	100.0		

**Shelter Specific Questions**

A little over 50% of respondents indicate that their mobile home park has some type of community building that could be used for a shelter. About 68% indicated some degree of likelihood that they would use a park shelter in the event of a tornado. Slightly fewer respondents, about 62%, indicated that they might use such a shelter for a hurricane. Interestingly, preliminary results suggest that the presence of a shelter in a park could be an effective marketing tool with about 70% indicating that having a shelter would be an important factor in selecting a park.

**Does your Park have a community bldg. that could be used for shelter?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	239	48.2	54.4	54.4
	No	200	40.3	45.6	100.0
	Total	439	88.5	100.0	
Missing	dk/nr	19	3.8		
	System	38	7.7		
	Total	57	11.5		
Total		496	100.0		

**If park has or had a storm shelter how likely would you use it for tornadoes?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very likely	198	39.9	45.8	45.8
	Somewhat likely	96	19.4	22.2	68.1
	Not Very likely	48	9.7	11.1	79.2
	Not likely at all	90	18.1	20.8	100.0
	Total	432	87.1	100.0	
Missing	dk/nr	26	5.2		
	System	38	7.7		
	Total	64	12.9		
Total		496	100.0		

**If park has or had a storm shelter how likely would you use it for a hurricane?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very likely	174	35.1	40.7	40.7
	Somewhat likely	92	18.5	21.5	62.1
	Not Very likely	45	9.1	10.5	72.7
	Not likely at all	117	23.6	27.3	100.0
	Total	428	86.3	100.0	
Missing	dk/nr	30	6.0		
	System	38	7.7		
	Total	68	13.7		
Total		496	100.0		

**If you were selecting a mobile home park, would a shelter be important in selection**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very important	169	34.1	36.1	36.1
	Somewhat important	156	31.5	33.3	69.4
	Not Very important	60	12.1	12.8	82.3
	Not important at all	54	10.9	11.5	93.8
	Does not matter	29	5.8	6.2	100.0
	Total	468	94.4	100.0	
Missing	dk/nr	28	5.6		
	Total	496	100.0		

**Conclusion**

The evacuation and sheltering of Florida’s growing population from the threat of hurricanes and tornados is a serious concern of emergency managers. Mobile home residents are particularly vulnerable and make up an important segment of hurricane evacuees and shelter populations. Further they are at serious risk from tornados.

It makes sense to provide shelters in the largest mobile home parks. Requiring that new parks of a certain size have a community center that is an approved shelter is a good idea. There are applicable standards in place and the additional constructional costs do not appear prohibitive. However, since most of Florida’s mobile home parks are old and few new ones are being built, this does not address the problem in any serious way. Thus, DCA’s initiative to retrofit buildings in existing parks appears a good solution. Moreover, the state has developed a plan to pay for the some of the retrofiting. All in all, it sounds like a no-lose situation. However, the results to date have been disappointing.

Early analysis indicates that mobile home residents tend to be aware of and concerned about the risk. Most understand the need to evacuate and seek shelter elsewhere. It appears that many would be interested in having a shelter in their park. If moving to a new park, most respondents thus far have indicated that the presence of a shelter would be a positive factor in their choice. The idea seems to have merit from their point of view.

The major obstacle is that most existing parks do not have a building that could realistically be turned into an approved shelter. Most of the smaller parks do not

have a building of sufficient size. Where there is a community center in the larger parks, the buildings may not be suitable for shelter use, or require too much construction in order to bring them into compliance with standards. The entire process of retrofitting is an expensive, labor-intensive one, requiring engineering evaluation, preparation of plans, selection of approved contractors, permitting, and supervision of the necessary demolition and construction. The administrative costs for this program are high.

An equally important obstacle to the program, however, is the attitude of the park owners and managers. They appear less enthusiastic than residents about sheltering-in-place. Most would prefer not to have the responsibility, before, during or after a hazard event. Liability concerns remain an important concern. There are also issues of privacy and property security. Since turnover rates tend to be low and occupancy rates high, there is no market incentive to participate in the program at the present time.

In summary, while sheltering-in-place in mobile home parks is a worthwhile concept, based on our preliminary analysis it does not appear to be a feasible way to significantly address Florida's sheltering problems.

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