



## **HURRICANE LOSS REDUCTION FOR HOUSING IN FLORIDA**

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### **FINAL REPORT**

#### **VOLUME 2**

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**PREPARED BY**  
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**Eliminating State and Local Barriers to  
Upgrading Mobile Homes and Communities**

**Volume 2  
Chapter I**

## 1. EXECUTIVE SUMMARY

The team from the University of South Florida School of Architecture and Community Design focused on two key issues:

- Eliminating state, local barriers to upgrading existing mobile homes and communities
- Research and development related to hurricane loss reduction devices and techniques for site built houses.

The team focused primarily on west central Florida, with a particular emphasis on Polk County. This report is based on: analyses of codes and plans and local land use laws; interviews with manufactured home park residents, managers, manufacturers, and agents/brokers; interviews and discussions with architects and engineers who practice in hurricane prone areas; meetings with staff from building and planning offices, and mobile home park owners; observations of mobile home parks; analyses of storm data; literature and internet searches; and development of GIS based maps

The team identified numerous issues of concern and need for future study:

- Nearly 1% of the mobile homes in Polk County have been damaged in significant storms over the last nine years, despite the lack of hurricanes that hit the area directly.
- There is duplication and/or contradiction of information in zoning codes and building codes regarding mobile homes. The resulting lack of clarity (as to which code addresses important health safety and welfare issues) causes accountability problems.
- There are promising options for replatting and redeveloping mobile communities into more sustainable layouts, with safer, permanent houses. Zoning laws, cost, real estate ownership issues, and traffic codes may obstruct redevelopment.
- Information gaps, such as inaccessible information regarding codes, inhibit oversight of mobile home installation and maintenance by renters, owners, and building officials.
- Architects and engineers are not trained to understand and deal with hurricane threats as regular parts of their education, internships, and examination. There is no single cohesive textbook on the subject.
- The *Florida Building Code's* prescriptive standards assure that components of houses should survive the full range of hurricane effects of a significant storm. However, because of the lack of performance standards, there is little assurance

that the whole building will survive. There is potential for more significant linking of code requirements to hurricane categories.

- Several alternatives to conventional framing show promise in hurricane resistance, affordability, energy efficiency and aesthetics. These materials include structural insulated panels, polystyrene blocks, structural steel, etc.
- The team recommends post disaster assessments of: a) communities designed using new urbanist principles, b) landscapes, c) buildings designed under the new Florida Building Code, d) houses built with alternative methods.

## **2. INTRODUCTION**

### **2.1 Objectives**

#### **2.1.1 Eliminating state, local barriers to upgrading existing mobile homes and communities.**

Initial research from phase I of this project indicates that there are significant federal, state and local barriers to upgrading existing mobile homes and communities in Florida. Many of these barriers, which include knowledge gaps and regulatory barriers, are unintentional and put mobile home residents at risk. The USF research team identified and investigated these issues in land use regulations, community design guidelines, and building/zoning codes. The work focuses on the west central region of Florida. Among the key areas of investigation are: zoning and building code issues (additions, tie downs, maintenance, incompatible land use, hazard zones); platting issues options for replatting mobile home parks, case studies of small lot communities, options for replacement structures); and information gaps.

#### **2.1.2 Research and development related to hurricane loss reduction devices and techniques for site built houses.**

The team developed a “best practices” outline to the planning, siting, design, and maintenance of residential communities in hurricane prone areas. In particular, the guide addresses areas of concern to architects and other house designers. It focuses on community (public Information/policy, infrastructure, landscape); building form (geometry, roof, attachments, interiors); and building technology (fenestration, roof/sheathing, structure, alternative construction, maintenance). In each category, the team developed guidelines for: best practices; supporting codes, guidelines, statutes; incentives for implementation; barriers to implementation; need for information/future study; and references.

### **2.2 Methodology**

This report is based on:

- Analyses of zoning codes, comprehensive plans, floodplain management plans, storm water management, and other local land use laws from all relevant

jurisdictions in Polk counties. Polk includes 18 local governments. (17 municipalities and the unincorporated county)

- Interviews with manufactured home park residents, managers, manufacturers, and agents/brokers.
- Meetings with staff from building and planning offices, and mobile home park owners
- Observations of mobile home park conditions. (In addition to work completed in phase I, the team looked at three parks from each of three counties – Pinellas, Hillsborough, and Polk. The subject parks were chosen by a combination of random selection, park accessibility, and the willingness of interviewees to participate in the process.)
- Interviews and discussions with architects and engineers who practice in hurricane and earthquake prone areas
- Analyses of storm data
- Development of an additional three in depth case studies of 3 mobile home parks in Polk County.
- Literature and internet searches
- Development of GIS based maps to compare mobile home locations to natural hazard zones, land use districts, and other conditions (in order to determine patterns of vulnerability).

### **2.3 Research Team**

The team members for this project are all associated with the University of South Florida School of Architecture and Community Design (Florida Center for Community Design and Research). The principal investigator is Associate Professor Stephen Schreiber. Faculty contributors include Associate Professor T. Trent Green and Visiting Assistant Professor George Epolito. Research assistants on the project are architecture students Deepangkar Bhattacharjee, Mike Dailey, Swapnali Salunkhe, and Kevin Nickorick.

### **3. ELIMINATING BARRIERS TO UPGRADING EXISTING MOBILE HOMES AND COMMUNITIES.**

#### **3.1 Background**

Throughout the state of Florida, and particularly in the west central Florida region, there are significant numbers of older mobile homes in use today. Many of these structures were installed between the early 1950's and late 1980's and have been consistently inhabited ever since. This category of mobile home tends to be the most vulnerable under adverse weather conditions. A combination of factors-- age, sustained use, inability to be upgraded or renovated to comply with current codes and standards, substandard modifications-- contribute to unsafe and hazardous conditions. The fact that most of these structures were built under less stringent regulations, using construction methods that would be considered "outdated" today, suggests that many of these mobile homes should be retired from further use. Most of these mobile home structures are of the "singlewide" configuration and were installed on either leased or purchased lots. Invariably, these structures incorporated approximately 500 to 700 square feet of floor area in a rectangular unit, and occupied regular-shaped parcels - some with typical dimensions as small as 25 feet by 40 feet

It is unlikely that the manufactured housing industry will implement significant new changes in the foreseeable future, to further minimize the risk of property loss and damage due to hurricanes or other severe weather conditions. While modest improvements have been made in enhancing the structural integrity of mobile homes over the last two decades, current trends in this type of construction appear to be focused on increased space, the inclusion of more amenity features and enhanced curb appeal or character. This being the case, newer mobile homes have become much more appealing and marketable to that segment of the general public that will consider this form of housing as a first choice, or as an alternative to conventional site-built houses. As the inventory of newer, mostly doublewide mobile homes are purchased and installed; there is an increasing supply of older ones that remain on the market and in continuous use. According to the *Tampa Tribune*:

"Mobile homes seem to be popular among winter residents and retirees and are increasingly popular with families on limited budgets. 'You can get in a brand new mobile home for as little as \$28,000,' said Scott Davis, a sales executive at Oakwood Homes. Mobile homes range in cost from a few thousand dollars to

more than \$100,000. Rent ranges from less than \$100 per week to several hundred dollars per month.” (Alberto)

Mobile homes, while affordable and easily sited, are particularly vulnerable to wind damage. They are not designed to withstand the wind velocities of a Category 3 or greater hurricane. Local emergency management agencies recommend evacuation of mobile homes for Category 1 or greater hurricanes. This presents a challenge for many Florida communities with many mobile homes. The *Ledger* recently reported:

‘Hurricane shelters is something Polk County has never enforced in its land-development code,’ [a city official] said. It has been an ongoing issue not only because of the number of mobile homes in Polk County, but also because of the fact that inland areas such as Polk may be evacuation areas for coastal residents from adjacent areas such as Hillsborough and Manatee counties. (Palmer)

Because of the dismal performance of mobile homes in Hurricane Andrew, new wind standards went into effect in the HUD Code in July 1994-- manufactured homes placed in high-risk hurricane areas now must be designed to withstand approximately 100 mile-per-hour winds. (HUD)

In coastal areas, storm surges during hurricane events can be devastating to mobile homes. Floods can cause strong pressures on foundations or piers, and floating debris can cause further damage to the exterior. Interior damage to the structure can be extensive.

Some wind and flood damage can be avoided by proper installation, by raised installations using properly designed fill and/or posts, and by using tie-down. However, local building inspectors may be unfamiliar with the particular needs of manufactured houses. This may be especially true in small communities where inspectors do not specialize. Also, inspectors or inspection agencies may easily miss resold manufactured/mobile homes. (Housing Assistance Council)

### **3.2 Scope**

Initial research of Hillsborough and Pinellas, from phase I of this project, indicates that there are significant federal, state and local barriers to upgrading existing mobile homes and communities in Florida. Many of these knowledge gaps and regulatory barriers are unintentional put mobile home residents at risk. This report focuses on west-central Florida, with an emphasis on Polk County. This work includes analyses of Polk County

land use regulations and mobile home parks conditions to supplement work completed on Pinellas and Hillsborough counties in phase I.

### **3.3 Mobile Home Parks in Polk County**

Polk County's total population in 2000 was 484,000—about three percent of the Florida's entire population. It is the eighth most populous county in the state. Polk's total population is expected to grow to an estimated 550,000 by 2010. Approximately 63 percent of Polk County's total population resides in the unincorporated area of the county. The other 37 percent of the population live in Polk County's 17 cities. The total area of the county is approximately 2,010 square miles, which makes it the fourth largest county in Florida. Polk County has 554 natural freshwater lakes, which occupy approximately 135 square miles.

Polk County's largest city is Lakeland, with a 2000 population of 78,452, followed by Winter Haven with a 2000 population of 26,487. Other municipalities include: Auburndale, Bartow, Davenport, Dundee, Eagle Lake, Fort Meade, Frostproof, Haines City, Highland Park, Hillcrest Heights, Lake Alfred, Lake Hamilton, Lake Wales, Mulberry, and Polk City. (<http://www.polk-county.net/pcfacts.htm>)

According to Florida Department of Health statistics, there are over 6000 licensed mobile home parks in Florida, with a total of 430,000 mobile home spaces. Polk County is home to over 500 of these mobile home parks, with nearly 46,000 mobile home spaces. The US census estimates that there are more than 50,000 mobile homes (many are not in parks) in the county, the most of any county in Florida. This number surpasses Hillsborough and Pinellas. (Alberto). “There has been a lot of redevelopment and attrition in Pinellas County,’ said Frank Williams, spokesman for the Florida Manufactured Housing Association in Tallahassee, explaining many mobile home parks were 50 or 60 years old and have been replaced with other types of development. Pinellas, whose total land area is only about 15 percent of Polk's, doesn't have much land available for new development, Williams said, contrasting that with Polk, which still has plenty of available land” (Palmer). The largest of the mobile home parks in Polk has over 1000 spaces.

**TABLE 1**

<b>POLK COUNTY MOBILE HOME PARKS</b>		
COMMUNITY (self reported)	MOBILE HOME PARKS (registered with Dept of Health)	MOBILE HOME SPACES
Auburndale	37	2603
Avon Park	2	20
Babson Park	4	87
Bartow	15	966
Bradley	2	12
Davenport	27	4689
Dundee	7	547
Eagle Lake	1	8
Eaton Park	3	93
Eloise	1	26
Fort Meade	13	888
Frostproof	25	2705
Haines City	38	4532
Highland City	5	69
Homeland	1	7
Lake Alfred	5	487
Lake Wales	58	4056
Lakeland	173	14,903
Loughman	3	217
Mulberry	12	1445
Polk City	6	452
River Ranch	2	97
Wahneta	8	102
Winter Haven	54	6799
TOTAL	502	45,810

The *Ledger* reports:

Local planners, building officials, code enforcement officers and residents attribute the popularity of mobile homes to the relatively low cost of living in a county between two major cities, Tampa and Orlando, and the availability of land.

Ron Borchers, Polk's director of planning services, said that Polk County doesn't do anything special to attract mobile homes, but in general, officials have not discouraged them. Part of the reason for the prevalence of densely populated parks is the fact that mobile homes are grandfathered into the zoning. Many mobile homes in Polk were built in the 1970s and predate zoning laws. The regulations have become stricter in recent years, largely because of Polk's comprehensive development plan, approved by the state in 1991. (Ferrante).

The market is greater in unincorporated sections of the county because mobile homes are not as welcome in cities. There are no separate districts for mobile homes in unincorporated Polk County. Their placement depends on their location relative to development within the area. Polk County ``mobile home friendly," is said Christina Hummel, a senior county planner. ``If your neighbors have a mobile home, you can have one, too. It's a majority rules situation." (Alberto). Mobile homes may be permitted in all of the following locations:

- A. Within any registered mobile home park that has been approved by Polk County;
- B. Within any platted residential subdivision that has been approved by Polk County as a mobile home subdivision;
- C. Within any platted residential subdivision in which more than 50 percent of the developed lots contain mobile homes;
- D. On any un-platted parcel in the A/RR district;
- E. On any un-platted parcel that is five acres or larger in the RS district;
- F. On any un-platted parcel where more than 50 percent of all contiguous residential lots or parcels are developed with mobile homes. Contiguous lots and parcels are those that share a common boundary, but not including those that intersect only at a corner point. Lots or parcels that are otherwise contiguous except for intervening local roads shall be considered contiguous for this calculation (Polk County Land Development Code)

*The Strategic Regional Policy Plan*, of the Central Florida Regional Planning Council provides this assessment of the mobile homes in the region:

The only segment of the housing market that has answered the call for affordable units is the mobile/manufactured housing industry. Mobile homes, both in

planned communities and sold as individual units, have the largest market share in the affordable category, because they are generally less expensive than conventional housing and often require as little down payment as a car, but they present unique problems in the Region. Ineffective local policies governing the placement of mobile homes, which are reinforced by the State's misplaced assumption that permissive regulations and minimum infrastructure makes them affordable housing, only adds to the depreciation of the housing stock in Central Florida counties. In addition, the spread of mobile homes dramatically increases the risk of storm damage to a growing portion of the population.

### **3.4   Storms in Polk County**

While Polk County does not have any coastal areas, it suffers from frequent severe storms year round. According to the National Oceanic & Atmospheric Administration (NOAA), 200 severe storm events (floods, hurricanes/tropical storms, tornadoes, and thunderstorms) damaged at least 440 mobile homes in Polk County over the last nine years. This indicates that about 1% of the mobile homes in the county were damaged--by wind and/or water events-- in less than a decade, in a period that no major hurricanes hit the area directly.

**TABLE 2**

<b>MAJOR STORM EVENTS AFFECTING POLK COUNTY: 1993-2002</b>		
source: NOAA		
<b>Storm Type</b>	<b>Number of Events</b>	<b>Reported Damage to Mobile Homes</b>
Flood	25	1997 Six mobile homes received nearly \$155,000 dollars worth of structural damage  1998 Localized flooding of homes occurred on lakes in Polk county.
Hurricane/ Trop. Storm	13	1999 One mobile home lost its roof from tropical storm force winds on Rock Ridge Road in Lakeland.
Tornado	34	1997 Seventy-five homes were destroyed, another 75-100 suffered major damage while another 75-100 received minor damage. Most of the homes destroyed were mobile or pre-fabricated homes.

		<p>1997 A tornado touched down in the Oakwood Estates mobile home park along Spirit Lake Road south of County Road 540. Approximately twelve mobile homes sustained minor to moderate roof, lanai and siding damage.</p> <p>1999 A tornado initially touched down in the Heatherwood Village Mobile Home Park and caused minor to moderate damage to the roofs, carports, lanais, and awnings of over 30 mobile homes. Two additional mobile home rooftops were removed by tornadic wind on Inman Drive while a shed and carport were destroyed at the intersection of Dorothy Street and Central Avenue.</p>
Thunderstorm High Winds	128	<p>1993 Strong winds knocked a mobile home off its foundation.</p> <p>1993 Two houses and eight mobile homes suffered severe damage in Winter haven.</p> <p>1995 A thunderstorm downburst of 45 mph damaged two carport roofs at a mobile home park.</p> <p>1995 Thunderstorm winds damaged ten manufactured homes and eight six-unit apartment buildings near Fedhaven. Estimated damage of \$250 thousand.</p> <p>1996 Twelve mobile homes, two sheds and a screen enclosure were also damaged by thunderstorm winds. Most of the damage occurred on North Lake Lulu Drive and Rolling Oaks Drive in the Oakwood Estates subdivision. The wind blown debris was scattered over a four-block area.</p> <p>1997 Thunderstorm winds overturned and demolished five mobile homes on wheels at the Homes of Merit mobile home plant located at the Bartow Airport. Three additional mobile homes at the plant incurred minor structural damage.</p> <p>1997 Four mobile homes suffered moderate roof damage, crumpled carports and screened porches at the Cypress</p>

		<p><b>Greens and Lake Alfred Mobile Home Parks</b></p> <p>1997 Thunderstorm winds ripped off the roof of a mobile home on Sonora Road near State Road 557-A.</p> <p>1997 Thunderstorm winds overturned a mobile home on Alderman Road, damaged mobile homes at the Hampton Mobile Home Park and downed several trees along U.S. Highway 92.</p> <p>1997 Thunderstorm winds overturned a few mobile homes and damaged the roofs of twelve others in Bartow. Four of the mobile homes were destroyed</p> <p>.</p> <p>1997 Two mobile homes sustained major roof damage from thunderstorm winds at the Royal Oak mobile home park</p> <p>.</p> <p>Thunderstorm winds up to 50 mph caused minor porch roof and skirting damage to 16 to 20 mobile homes in the Pine Lakes Estates and Imperial Lakes subdivision in Lakeland.</p> <p>1997 Thunderstorm winds caused minor to moderate wind damage to 30 mobile homes in two mobile home parks in the vicinity of Harden Blvd. and Beacon Road. Three of the mobile homes incurred minor roof damage while the majority of the damage was limited to carports and awnings.</p> <p>1999 Thunderstorm winds, estimated at 50 mph by the public, caused minor damage to carports and screen porches of ten manufactured homes in the Four Lakes Golf Club Manufactured Home Park of Winter Haven.</p> <p>2001 The Polk county sheriffs department reported that thunderstorm winds caused moderate to minor damage to twelve mobile homes and caused minor hangar damage at the Lake Wales Municipal Airport.</p>

<b>TOTALS</b>	<b>200 events</b>	<b>Damage to at least 440 mobile homes</b>
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### 3.5 Polk County Land Development Codes

The Polk county study area for this research is comprised of 18 governmental jurisdictions: the County of Polk and its 17 incorporated cities (Lakeland, Winter Haven, Auburndale, Bartow, Davenport, Dundee, Eagle Lake, Fort Meade, Frostproof, Haines City, Highland Park, Hillcrest Heights, Lake Alfred, Lake Hamilton, Lake Wales, Mulberry, and Polk City)

Zoning information was obtained by an electronic search was conducted on [www.municode.com](http://www.municode.com) using "mobile homes" as the primary key words for several representative communities. The Polk County Land Development Code is available on the county's web site. The applicable portions from these zoning documents have been extracted and are recorded in Appendix A.

**Mobile Home Developments – General:** At least eight jurisdictions within the study area have identifiable zoning/land use districts that specifically recognize new or existing mobile home residential developments. These eight include: Davenport, Dundee, Eagle Lake, Lake Wales, Lakeland, Polk City, Winter Haven, and Polk County. "We permit them in mobile home parks and mobile home subdivisions, but not on individual lots," said Lakeland planner Bruce Kistler. (Palmer) Winter Haven also restricts mobile homes to mobile home parks.

TABLE 3

<b>SUMMARY OF ZONING CODES IN POLK</b>			
AREA	POPULATION	ZONING CODE ON-LINE?	MOBILE HOME ISSUES IN CODE?
Auburndale	11,032	YES	NO
Bartow	15,340	YES	NO
Davenport	1924	YES	YES
Dundee	2912	YES	YES

Eagle Lake	2496	YES	YES
Fort Meade	5691	NO	N/A
Frostproof	2975	NO	N/A
Haines City	13,174	NO	N/A
Highland Park	244	NO	N/A
Hillcrest Heights	266	NO	N/A
Lake Alfred	3890	YES	NO
Lake Hamilton	1304	NO	N/A
Lake Wales	10,194	YES	YES
Lakeland	70,576	YES	YES
Mulberry	3230	NO	N/A
Polk City	1516	YES	YES
Winter Haven	26,487	YES	YES
Polk County	302,797	YES	YES

Landscape Buffers: Several jurisdictions, that acknowledge mobile home developments in their zoning regulations, specifically require such developments to be contained within landscape buffers.

For example, Lakeland requires:

A landscaped buffer not less than fifteen (15) feet in depth shall be provided around the entire perimeter of each mobile home park, mobile home subdivision and recreational vehicle park. The landscaped buffer shall be interrupted only where necessary to provide for vehicular and pedestrian access. It shall contain a visual screen consisting of berms and vegetation which have a minimum opacity of seventy-five (75) percent to a height of not less than six (6) feet. It shall be landscaped as set forth in Section 33.05.03.00. Masonry or wooden fences meeting the requirements of Section 30.03.08.00 may be substituted along common property lines other than street right-of-way lines.

Eagle Lake requires:

If the developer chooses, a 50-foot landscaped and structurally open buffer from the property line may be provided in lieu of RDMH. Such space may be vehicular oriented in character, such as a perimeter road or off-street parking. A third option available to the developer is a solid screening material such as a wood fence, or block wall, each of which shall be 6 feet in height, and placed 10 feet

back from the property line. The 10-foot setback area between the property line and solid screening shall be grassed and landscaped and maintained in good condition at all times. Such areas shall be undeveloped other than landscaping, contain no accessory buildings and treated as front yards for the district.

### **3.6 Polk County Mobile Home Park Case Studies**

The team studied a sample of existing mobile home parks in Polk County to better understand specific conditions affecting these communities. The team analyzed: site acreage, density of living units, prevalent building orientation or discernable site design, a sense of community, effective communication systems for evacuation or emergency response, demographics of the parks and surrounding area, flood hazard areas (if any), typical floor heights above grade, park amenities, existing buffers, surrounding context, level of maintenance in the park and the surrounding context, and outward signs of income levels of park residents and those surrounding the park.

The Parks: The three parks studied in Polk County are: Tower Manor (Auburndale), Sunshine Village (Lakeland), and The Village Lakeland (Lakeland). These three parks were chosen primarily for their condition, but other factors such as proximity to flood hazard areas, diversity of living units and size were also considered. The Sunshine Village is a large park (over 300 units). This park was considered for its large size, generally good condition, and its siting near a lake. The Village: Lakeland is smaller with a diversity of units. Tower Manor is the smallest has the least amount of community amentias.

Most of the parks observed were located in business or industrial districts. Some share boundaries with apartment complexes. Few are directly adjacent to single family neighborhoods.

The large parks all had some sort of recreational and community facilities where residents can congregate. Most of the parks are sequestered behind walls or other buffering devices used to shield them from the view of their neighbors. These buffers do little to mitigate damage to surrounding neighborhoods and the mobile home parks from high winds. Older parks have no walls or buffering at all and connect well with surrounding neighborhoods. These connections may be useful in the period after a storm when communication and access is important.

Description of Living Units: The team found a wide variety of living units available in the mobile home parks of Polk County, ranging from 50 year-old single wides the size of

modern travel trailers all the way up to staggered triple wide units. There appears to be a correlation between the numbers of single wides with lower incomes in the parks. Singlewide units are more prone to overturning in high winds and therefore need more tie down measures to keep them safe. Most of the units in the large parks had at least

an attached carport and many had screened porches or decks. Many had site-built room additions.

The more prosperous parks enforce a uniform skirting style and require the skirting to be maintained. They typically use white brick laid in a pattern with openings to promote ventilation. Older parks use aluminum screening or no screening at all. Finally, there also appeared to be a correlation between demographics, income and the debris. The parks with the least amount of debris were the seniors-only parks with relatively higher incomes. The most debris was found in the small parks and the parks that cater to economically challenged families.

### **3.7 Zoning and Building Code issues**

#### **3.7.1 Background**

Numerous zoning codes for Polk County (analyzed as part of this phase) and Hillsborough and Pinellas Counties (analyzed in phase I of this project) include requirements that should be building codes --especially for tie downs, additions, foundations, etc. Zoning officials, in many cases, do not have the expertise or training to enforce these requirements.

The duplication of information and requirements in the zoning codes and building codes is confusing to consumers, government officials, and building professionals. Often times, building code issues were added to zoning codes, because it was a simpler process to change the latter in certain municipalities. However, the result is a lack of clarity as to which code—zoning or building—addresses important health safety and welfare issues, such as tie downs, additions, and maintenance.

#### **3.7.2 Additions**

The team was concerned about the significant number of site built attachments to mobile homes in the parks it visited. Most zoning codes have authority over the

locations of residential structures, but the laws are unclear, or apparently unenforced, for mobile homes within parks. The site built additions are a significant cause of windborne debris in hurricanes.

The following are examples of references to additions in zoning codes in the study area:

Polk County land development code:

All manufactured homes and park model trailers placed or substantially improved, together with all mechanical and electrical equipment, on individual lots or parcels, in expansions to existing manufactured home parks or subdivisions, or in substantially improved manufactured home parks or subdivisions, must meet all the requirements for new residential construction contained in this Section, including elevation, and anchoring.

I .Any additions to manufactured homes subject to provisions of this Section shall also be considered "new construction" since they must be supported by an independent foundation system. "Additions" must therefore comply with the provisions contained in this Section, including elevation. This may necessitate elevating an existing manufactured home to match the required elevation of the "addition."

Dundee (Polk) zoning code: "Carports, porches, and awnings which are physically attached to mobile homes. Such structures shall not exceed a cumulative total of 35 percent of the lot area."

The Florida Building Code indicates:

§3401.2.1 Alterations, repairs or rehabilitation work may be made to any existing structure, building, electrical, gas, mechanical or plumbing system without requiring the building, structure, plumbing, electrical, mechanical or gas system to comply with all the requirements of the technical codes, provided that the alteration, repair or rehabilitation work conforms to the requirements of the technical codes for new construction. The building official shall determine the extent to which the existing system shall be made to conform to the requirements of the technical codes for new construction.

It shall apply to all new buildings, to additions to existing buildings and manufactured homes, to renovations to existing buildings, both public and

private, with certain exceptions, to changes of occupancy type, to the site-installed components and features of manufactured homes at their first set-up

### 3.7.3 Tie downs

Several jurisdictions contain mobile home anchorage requirements in their zoning regulations. While these documents' intention may be to draw emphasis to this critical need, the inclusion of these requirements in the zoning codes are problematic.

First, this is an on-site construction matter that is more properly addressed in the communities' building codes. It is the local building departments, not the zoning departments that typically have the resources and staff expertise to review submitted construction documents, perform on-site inspections, and exercise the power of enforcement. (In the field, the team observed many older mobile home units with rusting, missing, improperly installed tie-down straps).

Second, not only do the contents vary within these zoning codes, it is not at all apparent that the requirements meet, much less exceed, the tie-down standards established by the State. Typically, the requirements set forth in the local documents only entail one or two pages. The *Rules of the Department of Highway Safety and Motor Vehicles – Division of Motor Vehicles – Chapter 15C-1*, on the other hand, is a thirty-four page document that contains both "descriptive-based" and "performance-based" specifications for all of the necessary components used in the installation of mobile homes, including site preparation and soil compaction requirements. Detailed and complete with illustrations, these rules also incorporate by reference, a number of ASTM specifications on material quality. Equally important, the rules also contain a series of variables according to the year of manufacture, unit size, and site location relative to certain identified wind and flood zones. By its very nature, these rules have been written as a technical construction code intended for an informed readership. (Another information source is a twenty page brochure titled *Mobile/Manufactured Home Installation Standards* prepared by the Department of Highway Safety & Motor Vehicles – Bureau of MH/RV Construction, which contains much of the same general information, eliminates the technical jargon, and is designed for the lay-consumer.) Further, the respective role of the state and local authorities regarding mobile home installation is clearly defined on one of the State's web sites, [www.hsmv.state.fl.us/mobile](http://www.hsmv.state.fl.us/mobile) home. Under the heading "Before You Buy a Mobile Home", the following, brief explanation of the home's "Tie-Down (Anchor) Requirements is given:

"All mobile homes are required to be tied down in accordance with the specifications provided by the manufacturer. In the case of a used home, and in the absence of the manufacturer's tie-down instructions, the home must be tied down in accordance with the specifications provided in Department of Highway Safety and Motor Vehicles Rule 15C-1. Each county is responsible for assuring compliance with tie-down regulations, through permitting and onsite inspections."

And third, the local communities can avoid conflict, confusion, and perhaps unnecessary duplication in their many ordinances by striking all references to mobile home installation in their zoning codes and making simple reference to "Rule 15C-1 Latest Edition" in their respective building ordinances. The State could also render a valuable service to its citizens by including mobile home installation requirements in its *Florida Building Code*. In short, local zoning and on-site building construction requirements, including those for mobile home installations, are separate issues that should be complete and conveniently located in their respective sections of each jurisdiction's body of ordinances

The following are examples of references to tie downs in zoning codes in the study area:

Davenport (Polk) zoning code: "In order to provide safety, each mobile home in a mobile home park shall be firmly fastened to the ground with no less than four (4) anchors of the screw auger type having five-eighths inch of rod diameter, and four (4) feet of length, or of an arrowhead type, deadman type or equivalent, with a horizontal area of at least twenty-eight (28) square inches not less than thirty-eight (38) inches below finish grade. Each mobile home shall be placed on a foundation that shall consist of concrete or metal blocks, or piers on concrete pads with a bearing surface of at least one hundred forty-four (144) square inches. Such bearing pads shall be spaced not more than fifteen (15) feet apart in all directions beneath the mobile home."

Eagle Lake (Polk) zoning code: "*Approved foundations required in residential districts.* Where approval of homes or model plans does not also include approval of type of foundation, no RDMH shall be placed or occupied for residential use on a site in a residential district until such foundation plans have been submitted to and approved by the Administrative Official. Such approval shall be based upon the appearance and durability of the proposed foundation and its being acceptably similar or compatible in appearance to foundations of residences built or located on adjacent or nearby sites"

Temple Terrace (Hillsborough) zoning code:

- In all areas of special flood hazard the following provisions are required:
- a New construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure;
  - b Manufactured homes shall be anchored to prevent flotation, collapse, or lateral movement. Methods of anchoring may included, but are not limited to, use of over-the-top or frame ties to ground anchors. This standard shall be in addition to and consistent with applicable state requirements for resisting wind forces. Specific mobile home requirements shall be:
    - 1 Over-the-top ties shall be provided at each of the four corners of the mobile home, with one additional tie per side at intermediate locations for mobile homes less than fifty (50) feet long. Mobile homes more than fifty (50) feet long shall have two additional ties per side;
    - 2 Frame ties shall be provided at each of the four corners of the mobile home, with two additional ties per side at intermediate locations for mobile homes more than fifty (50) feet long, one additional tie per side for mobile homes less than fifty (50) feet long;
    - 3 All components of the anchoring system shall be capable of carrying a force of 4,800 pounds; and
    - 4 Any additions to the mobile home shall be similarly anchored.
    - 5 Lots or pads shall be elevated on compacted fill or by any other method approved by the City Engineer so that the lowest habitable floor of the mobile home is at least eighteen (18) inches above the base floor (sic) elevation.
    - 6 Adequate surface drainage and access for mobile home haulers shall be provided.
    - 7 Load-bearing foundation supports such as piers or pilings must be placed on stable soil or concrete footings no more than ten (10) feet apart, and if the support height is greater than seventy-two (72) inches, the support must contain steel reinforcement.

The new Florida Building Code includes the following similar provisions:

#### §3109.7.4 Manufactured Homes

§3109.7.4.1 Installation. Manufactured homes to be located in a special flood hazard area shall be elevated and anchored to resist flotation, collapse or lateral

movement. Methods of anchoring include, but are not limited to, use of over-the-top or frame ties to ground anchors.

§3109.7.4.2 Foundation. Manufactured homes to be located in a special flood hazard area shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is at or above the base flood elevation; and be securely anchored to an adequately anchored foundation system in accordance with §3109.7.4.1.

§3109.7.4.3 Placement of manufactured homes. The placement of manufactured homes shall not be permitted within a designated floodway or coastal high hazard area.

### **3.7.4 Maintenance**

No Polk County zoning codes specifically address mobile home maintenance. Some, such as the county itself, require inspections for used mobile units that are moved:

All used mobile homes and park trailers more than three years old as counted from the date of manufacture shall require payment of a fee and pre-inspection for compliance with the standards listed in Sections B through F [Fire safety, construction, etc.], before being placed on site.

In fact, poorly maintained units plague many areas of the county. For example, as reported in the *Tampa Tribune*:

For others, mobile home living is a necessity. Katrina Kirkland pays \$250 a month rent to live in a rundown trailer on a dirt road in Kathleen, a community north of Lakeland. She shares the home with her daughter, Beth Stephenson, and three grandchildren. The home isn't in the best shape, Stephenson said.  
``The windows leak and don't open. The walls are falling apart. If you look behind our couch, you can see daylight.'' (Alberto)

According to *Strategic Regional Policy Plan*, Central Florida Regional Planning Council:

Mobile home communities, which are generally safer than individually sited units due to tougher development standards, are not being developed to meet the demand for affordable units among the two groups who need them the most: the farm workers and the low income wage earners.

### **3.7.5 Incompatible land use**

Another threat to Polk County mobile home parks (similar to conditions in Pinellas and Hillsborough) is incompatible land use. Polk County itself allows mobile home parks in several different land use zones. Many parks are not located in compatible zones, and are susceptible to development and commercial and other uses. As in Pinellas and Hillsborough, it is often the parks in incompatible land uses are poorly maintained, and vulnerable in storms.

Of the 436 parks the team could locate, 273 are located in unincorporated Polk. Almost all are in compatible districts. (A detailed analysis was not conducted to determine whether or not the parks meet current zoning standards.) Those that are not are susceptible to development and commercial and other uses. As in Pinellas and Hillsborough, it is often the parks in incompatible land uses are poorly maintained, and vulnerable in storms.

**TABLE 4**

<b>POLK COUNTY MOBILE HOME PARKS LOCATED IN COMPATIBLE LAND USE DISTRICTS</b>		
Land Use District	Full name	Mobile Home Parks
A/RR	Agriculture/Rural Residential	59
RCC-R	Rural Cluster Center	6
RS	Rural Suburban	77
RL	Residential Low density	60
RM	Residential Medium Density	8
RH	Residential High Density	0
<b>TOTAL</b>		<b>210</b>

**TABLE 5**

<b>POLK COUNTY MOBILE HOME PARKS LOCATED IN INCOMPATIBLE LAND USE DISTRICTS</b>		
Land Use District	Full name	Mobile Home Parks

BPC	Business Park Center	9
CC	Convenience Center	1
IND	Industrial	3
INST	Institutional	4
LCC	Linear Commercial Center	27
LR	Leisure/Recreational	7
ROS	Recreation/Open Space	7
TC	Tourism	1
	Other	4
<b>TOTAL</b>		<b>63</b>

Jurisdictions in Polk County address non-conforming mobile home parks in the following ways:

Dundee: "Existing mobile home parks which are nonconforming by use shall not be redesigned, expanded in area, or modified to accommodate additional mobile homes. Replacement of existing mobile homes in such parks shall be prohibited"

Lakeland: "Units may be placed or replaced within legally non-conforming mobile home park developments which were existing or approved prior to November 20, 1972, provided the resulting density does not exceed that originally approved, or seven (7) units per acre, whichever is greater. Alterations or development site area expansions which increase conformance with site improvement requirements are permitted, in accordance with Section 42.05.02.01. All regulations pertaining to use non-conformities as set forth in Section 42.05.00.00 shall apply to non-conformities, within MH Districts."

Winter Haven: "Once a nonconforming manufactured home is removed from its location, no other manufactured home shall be substituted in its place. The exception is a manufactured home replacement in an existing manufactured home park zoned to allow manufactured homes. The replacement of an existing manufactured home on property that is not designated for manufactured home use on the official zoning map shall be prohibited".

### **3.7.6 Hazard zones**

Some Polk County zoning ordinances address flood and wind damage control for future development but appear to have a limited impact on the existing conditions. Since these

regulations usually apply only to new parks, or to new mobile homes within parks, most existing mobile home parks have not been upgraded. This is particularly problematic, because the 2000 FEMA flood maps for Polk County show that 40 percent of the county is in a flood zone. In Polk County, 109 out of 436 mobile home parks (that the team could locate) are positioned within 1000 feet of a lake or other waterway, the most likely flood hazard in this non-coastal area. Almost all are within a mile of a lake.

Davenport requires:

Located within areas of special flood hazard established in section 8-6 are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of floodwaters which carry debris, potential projectiles and has erosion potential, the following provisions shall apply: Prohibit the placement of manufactured homes (mobile homes), except in an existing manufactured homes (mobile homes) park or subdivision. A replacement manufactured home may be placed on a lot in an existing manufactured homes park or subdivision provided the anchoring standards of subsection 8-76(1)b. and the elevation standards of subsection 8-77(1) are met.

Polk County requires:

#### Manufactured homes in Flood Hazard Area

All manufactured homes and park model trailers placed or substantially improved, together with all mechanical and electrical equipment, on individual lots or parcels, in expansions to existing manufactured home parks or subdivisions, or in substantially improved manufactured home parks or subdivisions, must meet all the requirements for new residential construction contained in this Section, including elevation, and anchoring.

### 3.8 Platting issues

#### 3.8.1 General discussion

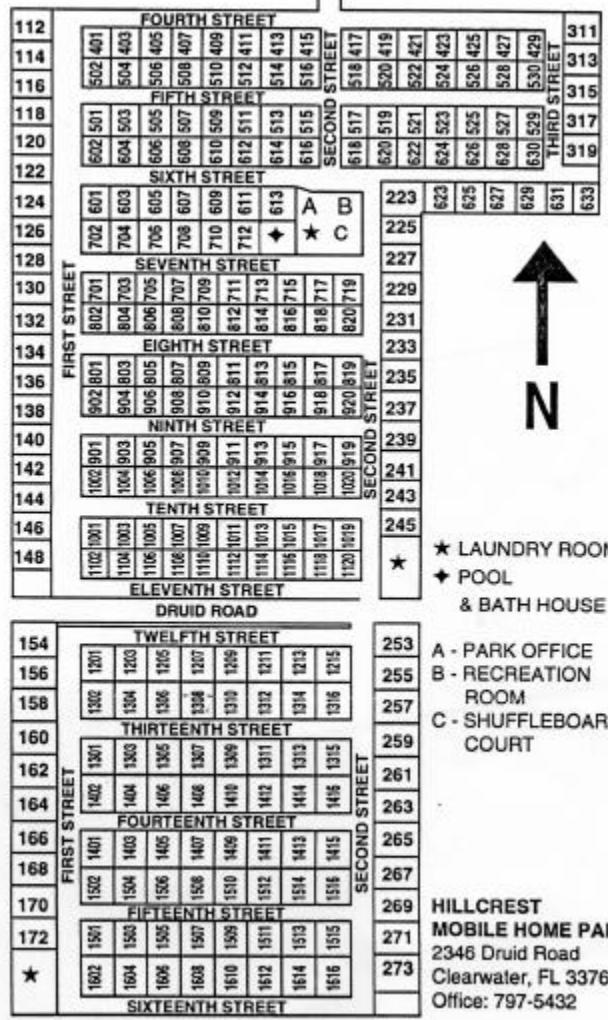
Given the number of older mobile home units still in use today, it is reasonable to explore alternatives that will minimize the potential of human injury and loss of life, as well as major property damage and destruction resulting from their continued use. One approach that would prove beneficial would be the adoption of policies and regulatory

measures for retiring or phasing out older mobile home units, and replacing them with small “site-built” houses. This approach suggests that older mobile home parks with units in excess of thirty years old, phase in a “cottage development” pattern (detached dwelling units), or one that incorporates a modest form of “party-wall” residential construction. This approach would over time, make use of the original mobile home lot platting patterns, by replacing older mobile homes with another form of affordable housing that will withstand the elements far greater than the older structures they replaced.

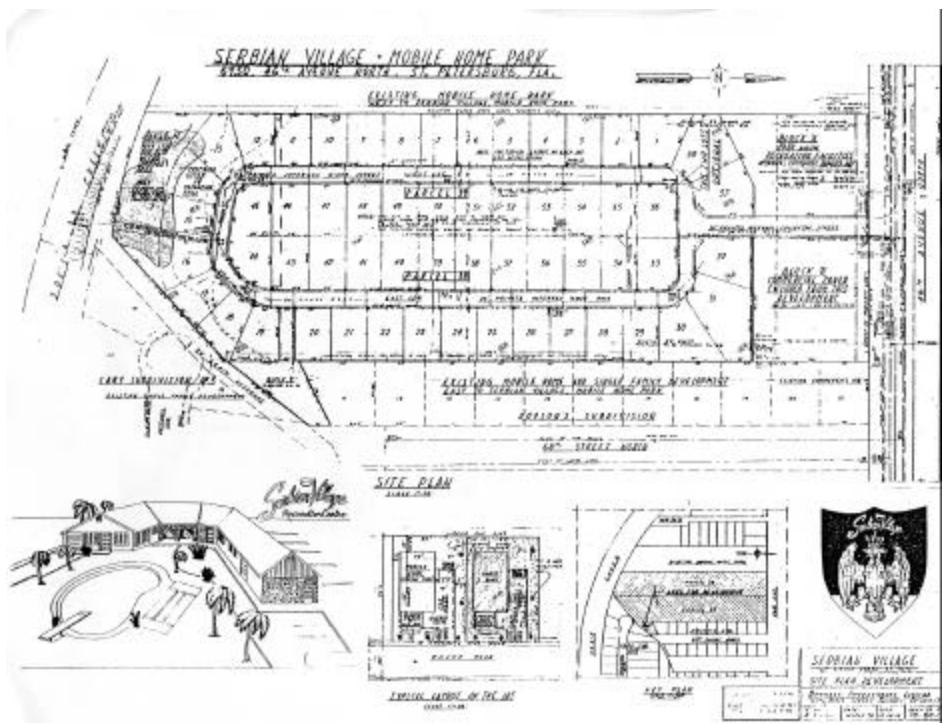
Most mobile home parks in Florida were platted for travel trailers; or older, small singlewide mobile homes. Modern larger mobile homes, with safer design features, do not fit on the older plats. Therefore park owners are unable to accommodate new mobile homes and maintain required setbacks. The team investigated several case studies of parks where these barriers exist, and propose solutions for replatting and/or modification of setbacks.

In general, mobile home parks are little subdivisions. Therefore they tend to follow the patterns of larger residential subdivisions developed at the same time, i.e. with gridded, arterial, cul de sac street patterns. That is, many were developed on a strict gridded format at a time when other residential communities were so-planned, and more recent parks have moved to an arterial model at the same time that residential suburbs have done so.

Figure 1 shows a typical park layout for a mid Pinellas County park that was established approximately 50 years ago. Figure 2 shows a St. Petersburg park dated 1978. Figure 3 is an excerpt from advertising literature for a new manufactured home park in Flagler County, late 1990's.



**Figure 1**



**Figure 2**



**Figure 3**

Many mobile home parks also embody many of the principles of New Urbanism: narrower, pedestrian-friendly roadways with low speed limits; the close proximity dwellings to the roadway; and the enhanced abilities of home occupants to observe and interact with passersby. This may partly be a function of their age, given that New Urbanism looks to older communities for precedents.



**Figure 4**

(Note that mobile home parks in general have dismal rear yard access or orientation – see Figure 5). Many parks have an abundance of front screened porches and lanais (due in part to the frontal orientation of the units and their smaller size which creates an incentive for residents to create additional spaces by adding outdoor living spaces) and gathering places (such as local community mailboxes, recreation centers, swimming pools, and management offices).



**Figure 5**

Park layout does not have a direct physical impact on storm survivability, but layouts can affect the sense of community. The research team suggests that strong community pride is directly related to safer neighborhoods with greater potential for successfully surviving major traumas such as hurricane and other storm events. Additionally, alternate park layouts may allow for increasing densities that would promote the economic viability of the manufactured home parks as businesses and thereby continue to provide a stable housing alternative. This stability will lead to an increase in investment in the parks – both financially by owners and qualitatively by residents who view these accommodations as “home.”

The team also analyzed “small unit” housing alternatives. These are structures that resemble in size or configuration existing manufactured homes and provide the same visual effect as a manufactured home, but are newer. These newer, permanent homes are inherently safer due to the incorporation of stricter building codes. As well, being larger, they may reduce the need for outbuildings and attached structures.

### **3.8.2 Options for Replatting**

Most manufactured home park share many similar characteristics, such as an emphasis on the narrow end of the lot facing the street, setbacks on all four sides of the unit that result in the unit being centrally located on its lot, and a lack of usable green space in the area immediately surrounding the unit.

The following example indicates how manufactured home parks can be reconfigured to allow more green space for the residents while maintaining the unit density of the park

and, thereby, maintaining its economic viability. Figure 6 exhibits the layout of a sample park previously discussed in this report. The area of study is circled. This park has existing lot sizes of 48' by 70' and is 300' wide overall.

The team's proposed reconfiguration involves replacing the existing stock of older manufactured homes with attached units (duplexes). Each of the attached units would be narrower than an average house (following the model of other skinny house types such as the "shotgun" house or the Charleston-style side-entry house). Each of the attached pair would be placed next to a lot vacated by one of the removed older homes (see Figure 7). Multiple rows would be offset so that the rear of each attached pair would open to a vacant lot as well.

Having the north unit could provide variability in unit size and plan of each pair built two stories high. This would allow for extra bedrooms and alternate floor plans in addition to providing the north unit with direct access to the sun for natural lighting. As well, the height would generate shading over the common yard.

The reconfiguration opens up each unit on three sides and this is an advantage, which would offset the loss of independence caused by having a shared wall. This makes it possible for floor plans to be oriented to the side and rear that increases flexibility in the layout and outdoor access. Using a common wall also frees up additional yard space by eliminating the 10-foot unit-to-unit setback. Part of the common area could be used for off street parking as is shown in the figure. This park layout does not require any changes to the existing roadways or laneways in the park. Some rearrangement of the utilities would be necessary.

Figures 8 and 9 reveal how the change provides for a more pleasant community feel and creates substantially more usable green space. There are no longer any abandoned or unused side and rear yards.

The second park plan reconfiguration is more extensive. It retains individual detached dwellings but calls for replacing these with narrower, permanent structures affixed to foundations. The houses, of varying plans and heights, are grouped into cul-de-sacs which themselves are linked to an arterial road that connects to the public road.

The proposed reconfiguration includes lots of 30 feet by 68 feet as well as pie-shaped lots 50 to 70 feet deep. The current park encompasses overall dimensions of 300 feet by 1500 feet and contains 110 individual units. The reconfiguration will accommodate 9 cul-de-sacs at 15 homes each for a total of 135 housing units. Decreasing the lot size

from 3360 square feet to 2100 square feet and reducing the number of lanes and roadways accomplish this.

Both proposed park reconfigurations involve the replacement of the current manufactured home stock with new, permanent structures. This would represent a substantial investment on the part of the homeowner and, if the land were still to be rented, may require a change in lease terms. It is possible to consider changing the legal structure such that the dwelling occupants own the lots. It is unlikely that the resulting homes would be as low-cost as the existing housing units. However, the changes would retain the higher density of the land use while still retaining the community feel of the existing parks—particularly that of individual houses (or duplexes) on their own plots of land.

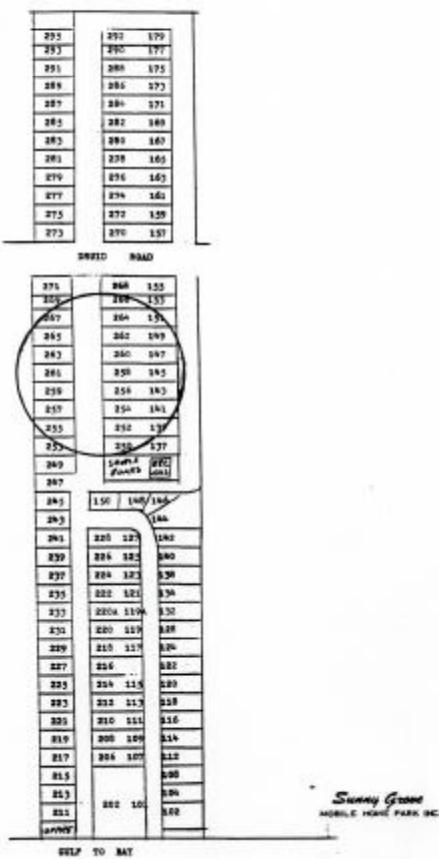
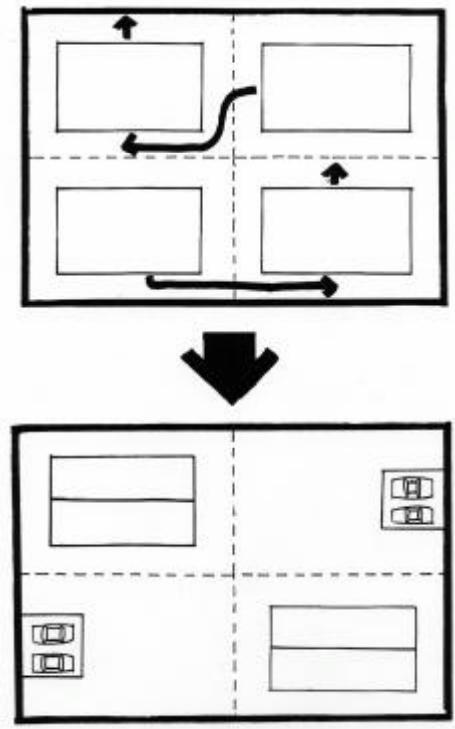
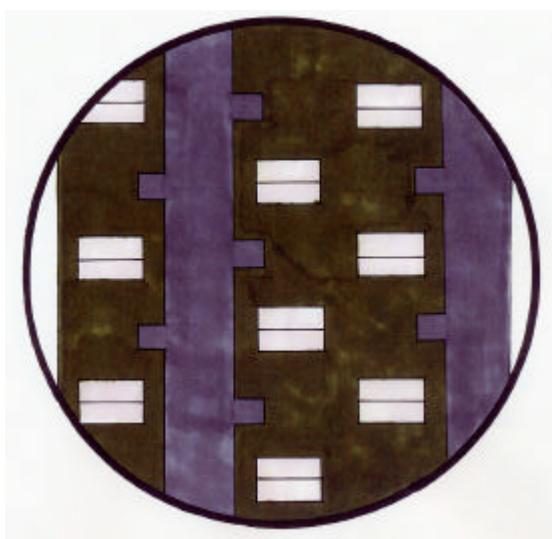


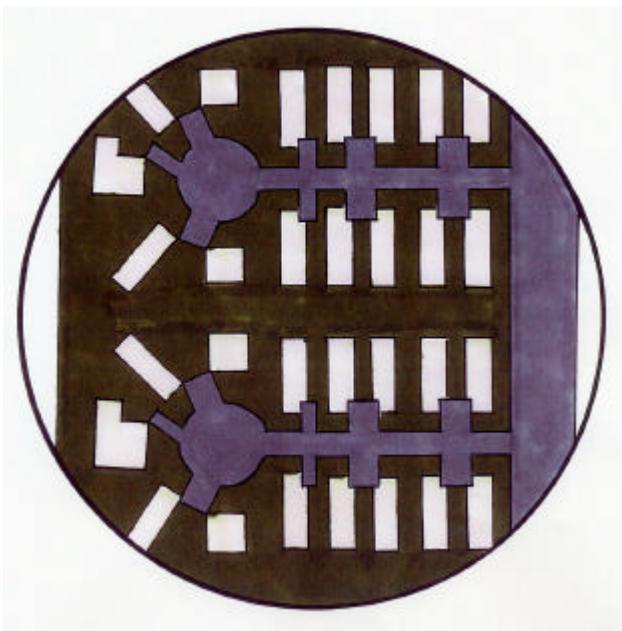
Figure 6



**Figure 7**



**Figure 8**



**Figure 9**

### **3.8.3 Options for Small lot communities**

The small parcel layout is common in older mobile home parks in the west central Florida area, and allowed for a convenient and economical use of land for platting purposes. While the resulting close proximity of individual mobile home units may suggest some degree of perceived shelter, the fact remains that the structural integrity of most, if not all of these homes in questionable under abnormal or extreme weather conditions. In many instances, carports and porches that have been attached to many of these structures provide a small degree of lateral stability; any benefit may be offset by a lack of structural integrity, inadequate tie-downs, and the inability to withstand impacts from wind-borne debris.

It is probably not feasible, nor practical to try to renovate or upgrade older mobile homes. The costs associated with any such investment would not be effective in realizing any significant benefits. Any serious attempt at renovating these older structures would ultimately prove to be exorbitant in cost and face the following barriers (among others):

- An inability to support appreciating values,
- Difficulty in complying with current codes
- Continuing poor performance in providing shelter that can reasonably withstand severe natural weather phenomena.

As a practical and economic alternative, mobile home parks could be transformed into small lot cottage communities, similar to those that have withstood decades of adverse weather conditions.

Some communities, such as Pinellas Park, actually encourage the redevelopment of mobile home parks in some zones:

The 'T-1' Mobile Home Subdivisions District is established in order to identify and stabilize those geographic areas within the City of Pinellas Park that are presently platted or developed as mobile home subdivisions. The district is intended to be used primarily for mobile home dwellings for residential occupancy upon lots owned by the resident or his designated tenant, but conversion of these sites to standard single-family detached dwellings is encouraged as a means of improving these areas over time. It is the intent of the City to strictly limit further rezoning of land into this zoning category.

The team identified several precedents that can be looked at to provide insights on the use of small-lot platting for single-family housing:

- The Port Tampa area at the southwestern end of the city's Interbay Peninsula.
- Cottage communities in Langley, Washington
- Oak Bluffs, Massachusetts on Martha's Vineyard
- Bungalow Terrace, in Tampa
- And the re-use of former mobile home lots in Indian Shores, Florida.

#### Port Tampa, Tampa, Florida:

Port Tampa was originally a separate suburban municipality adjacent to Tampa, and was established in 1893 as a "maritime community" associated with Henry Plant's railroad and port activities just prior to the turn of the 20<sup>th</sup> century. The area was originally platted with rectangular blocks that were predominantly built out with

modest “worker cottages” and bungalows. Most of the early structures in Port Tampa were erected just prior to and after the turn of the 20<sup>th</sup> century on lots that were smaller than the 50’ x 100’ residential lots that became the standard for communities throughout the area. Most of these houses were of wood-frame construction and built above the ground on raised foundations and seemed to weather storms of the past with modest damage. However, because this area remained a small municipality until the 1960’s, a variety of residential conditions emerged in response to the predominant small-lot platting.

The residential parcels in this neighborhood vary in size, but are generally rectangular in shape and are oriented perpendicularly to the street. Most parcels encompass approximately 4000 to just over 5000 square feet of area. While some areas were later platted for mobile homes, most of the neighborhood conforms to the single-family house development pattern. With its small lot and village-like character, this general order compares with similar conditions found in some mobile home parks. Where older mobiles exist in areas with this type of platting, taking advantage of the small-lot development pattern is an opportunity to reduce the potential for future property destruction and loss. By replacing older, vulnerable mobile home structures with more stable, site-built houses would prove to be a prudent, proactive and cost effective measure.

### Langley, Washington

Another alternative for converting older mobile home parks into less vulnerable residential enclaves is the approach of cottage housing developments (CHD’s). These are small residential neighborhoods that are build on small-lot parcels, with site-built cottage-type houses. This trend is manifested by the emergence of new “pocket neighborhoods” in Washington that are based a new zoning regulations that encourage development of “small lots”.

The City of Langley, WA adopted the Cottage Housing Development (CHD) zoning code provision in 1995. The innovative nature of the zoning provision is that it recognizes that a 1 or 2 bedroom home with less than 975 square feet of living area should not be treated the same as the typical 2,000 to 3,000 SF home. The zoning provision permits 4 to 12 small, detached cottages on a site that would normally be developed with half that number of large homes. The zoning provision permits this type of innovative change as a conditional use in all single-family zones. Half the cottages

can be no more than 800 SF, and the other half 650 SF, on the first floor and no more than 975 square feet including a second floor. Each cottage must be adjacent to a common area. Parking at a minimum 1.25 space per cottage must be screened from the street.

The first CHD project, completed January 1998 by The Cottage Company successfully demonstrated that 8 small cottages would fit into an existing single-family neighborhood as well as 4 larger homes. (<http://www.cottagecompany.com/cczoning.html>)

The parallel with older mobile home parks here in the West Central Florida area is that many of these mobile home communities already exist as “pocket neighborhoods” and can be easily adapted to the cottage housing development model. Existing platting in older mobile home parks, with lots generally 20 to 25 feet in width by 40 to 80 feet in depth would easily lend themselves to this type of development approach. This platting, or “parcelization” framework, would in most instances, allow for the construction of permanent cottages of one or two stories, within the same footprint of an existing older singlewide or doublewide mobile home. A major benefit of this approach is that it provides a comprehensive approach aimed at reducing future hurricane-related losses, while at the same time realizing more permanent and desirable living conditions.

#### Oak Bluffs, Massachusetts on Martha's Vineyard

Another community that is based on “small-lot” platting in an area that is susceptible to storm and hurricane damage is the historic community of Oak Bluffs on Martha’s Vineyard, Massachusetts. Originally built as a late 19<sup>th</sup>-century campground and religious retreat, Oak Bluffs is the amalgamation of three separate small-lot and cottage communities. In a manner similar to planned mobile home parks common in the West Central Florida area, the houses in Oak Bluffs appear to “... huddle together according to some undiscovered law of affinity”. These small lots and houses, and their close proximity with each other, helps to create a unique “village-like” context that is characteristic of some mobile home parks. Learning from this development pattern and adapting it to current-day circumstances would serve as a promising response to dealing with outdated mobile home parks and structures that are increasingly vulnerable and susceptible to significant damage and destruction under severe weather conditions.

### Bungalow Terrace, in Tampa

Bungalow Terrace in Tampa's Hyde Park is another example of a "small-lot" subdivision with site-built houses. This now historic neighborhood of 1920's bungalow cottages, are concentrated on two short streets with lots that were originally platted with 1,200 to 1,700 square feet. Although this development would have predated most of the area's mobile home parks, its general order could serve as a model development pattern for older mobile home parks that should be phased out of existence. This development pattern would easily allow for the construction of site-built structures on the same land parcels that were previously platted for mobile homes.

### The re-use of former mobile home lots in Indian Shores, Florida

The Town of Indian Shores in Pinellas County has initiated an effort to redevelop several acres of land that was originally platted for mobile homes back in the late 1940's. This "paper" subdivision, so named as a result of its original speculative and "impermanent" nature, is currently in the city's Town Square Planning Area. It was originally laid out as five slender blocks running parallel the main north-south thoroughfare. Characteristic of a typical surveyor's plat for a mobile home park, this area had just fewer than 200 lots each with dimensions of 25feet by 40 feet. Although all of the original mobile homes are gone, several of the lots were improved over the years with various types of site-built structures. Today, the town is considering redeveloping the remaining vacant lots in this subdivision with various types of "live/work" townhouses. This type of party wall construction is very appropriate for this type of narrow-lot platting. Several years ago, the Town enacted restrictions on placing mobile homes on these lots because of their proximity to the Gulf coast and the likelihood of major property damage following a hurricane or storm. This has created an opportunity for the Town to re-claim all of the land from this former mobile home park and adapt it to a small-lot subdivision with a more stable form of site-built houses.

### Regulatory Issues Associated with the Conversion of Older Mobile Home Parks to Permanent Communities with Site-Built Structures

Several municipalities, as well as Polk, Hillsborough and Pinellas counties have a variety of zoning and other building code restrictions that apply directly to mobile homes and mobile home parks. Except in those areas where mobile homes are still permitted,

most of these ordinances have “grandfathered in” many older mobile home facilities. Where cities and counties are faced the challenge of what to do with these older mobile home structures, from a public safety point of view, they should consider creating “cottage development” or similar ordinances that permit small, site-built dwellings on atypically small lots. These types of ordinances would allow for the phased or sustained replacement of older mobile homes with more stable structures that will help minimize property loss and damage in severe weather conditions and also enhance the physical character of these communities.

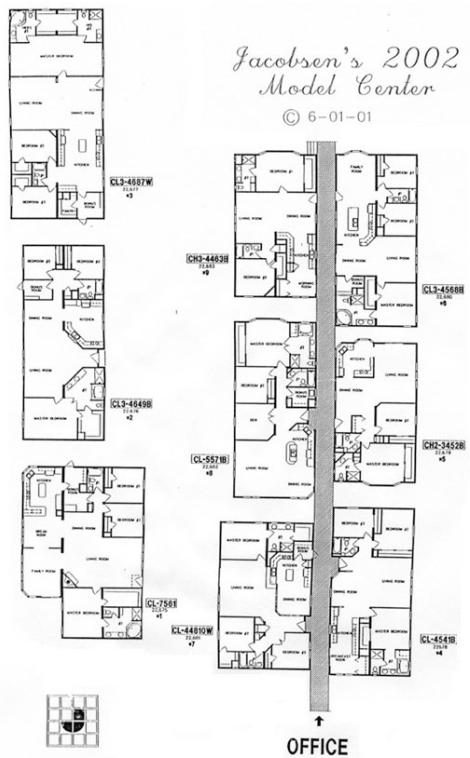
These “cottage development” ordinances and other flexible zoning regulations can easily accommodate conversions of older mobile home parks. The “small-lot” development patterns that they focus on are directly related to conditions in mobile home parks where individual lots were initially platted for dwellings of less than 1,000 square feet. In many instances, the use of similar types of “replacement” ordinances can serve as progressive and proactive measures for minimizing mobile home property loss, as well as general public safety in these areas.

### **3.8.4 Options for replacing older units**

The team has identified four structural alternatives to the existing stock of manufactured homes in parks today. These are: new manufactured homes, park model homes, modular homes, and site-built permanent structures.

#### **New Manufactured Homes**

Figures 10 and 11 are floor plans of new manufactured homes currently available for purchase. There are singlewide, doublewide and even triple-wide units available (see Model CL-7561 in Figure 11). It is still possible to purchase singlewide units today that will fit on the narrower lots in older parks.



**Figure 10**

## MANUFACTURED HOMES FOR THE FLORIDA LIFESTYLE

**PICK YOUR SIZE.** We offer a complete line of manufactured housing, ranging from space-efficient single-wide Park Models, to spacious three-bedroom Manufactured Homes. We specialize in matching your family's housing needs with the perfect size home for your building site.

**INSIDE AND OUT.** Because your new home is only good as its set-up, we pay particular attention to making sure the home is set up according to exacting HUD, state, and county regulations. To ensure protection against inclement weather, your completed home will be able to withstand winds up to 110 mph.

**OUR PRICING PACKAGES** include appliances, plus floor, window and wall coverings. Also included

is the complete set-up of your home, including air conditioning, sales tax, skirting and steps.

**WE DO IT ALL!** Want to add a car port, concrete driveway, lanai, or utility room? We can also design, engineer, and construct a complete exterior package for your home. Lee Corp/Golden Rule Homes provides turn-key service, beginning with the permits all the way to the final landscaping.

**OUR MODEL CENTER** features the full range of manufactured housing Lee Corp/Golden Rule Homes has to offer. Come see us!



### Double-wide Park Model

**The Sandpiper**  
24' x 36'  
828 sq. ft.

### Double-wide Manufactured Home

**The Presidential**  
28' x 36' = 1,512 sq. ft.

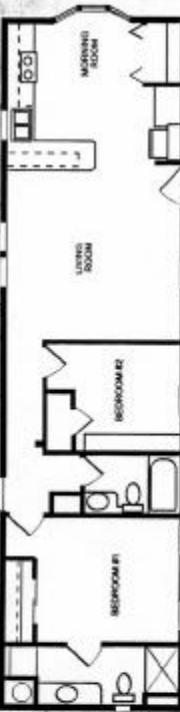
Our popular "Presidential" double-wide home features three bedrooms, two baths, plus living room and family room. With over 1,500 square feet, this home even has a bonus room for washer and dryer, or the family computer. Our manufacturers have a host of other two, three and four-bedroom floor plans to meet your family needs.

### Single-wide Park Model

Single-wide Park Models are ideal for RV communities. They provide spacious two-bedroom, two-bath living, but are under 7000 square feet. Custom designing the floor plan, plus selecting the floor, window and wall coverings helps make these homes uniquely individualized.

### Single-wide Manufactured Home

**The Driftwood**  
16' x 60'  
960 sq. ft.



This single-wide home features a spacious front kitchen plus laundry closet. But there is still plenty of space for two bedrooms and two baths. Prefer a split-bedroom plan? We can design one to meet your needs.



Figure 11

## **Park Model Homes**

An alternative to standard singlewide manufactured homes, park models are shorter and able to be accommodated in the more shallow lots of older parks. A cursory review of the Internet will reveal a generous offering of manufacturers and numerous floor plans.

Park model homes are very closely related to standard manufactured homes. They are completely assembled before leaving the factory, travel on wheel systems attached to their chassis, and are able to be moved for future relocation. It should be noted that manufactured homes, while capable of subsequent relocation after their initial installation, are often not moved, and can sustain considerable damage if moved again.

Park model homes can be considered as a subset of manufactured homes. One major difference is that they are retailed by RV (Recreational Vehicle) dealers in addition to being available through manufactured home dealers. They serve as small cottages that can be taken to remote sites and, as such, exhibit an RV quality. They are well dimensioned to fit in manufactured home parks. Typical widths range from 8 to 13 feet and lengths range from 25 to 45 feet. They can have well-appointed interiors including full-size appliances and loft spaces made available by the incorporation of vaulted ceilings in their construction.

Being of newer design and construction, park model homes have larger, more house-like windows and doors. They also have more house-like construction including 2 x 6 walls, 2 x 6 floors, asphalt shingles, and vinyl or wood siding.

Possibly as a function of their RV quality, they are also available with various "options" such as porches, bump-outs, and other attachments that are specifically designed for particular units. These present a unified visual aesthetic in addition to offering a standardized construction. This avoids the haphazard, do-it-yourself attachments and outbuildings that are visible in older manufactured home parks.

## **Modular Homes**

This home type may at one time have been known as "manufactured homes" but never actually were mobile homes. Modular homes are permanent structures that are not site-built, but are site-assembled from component parts. In this respect, they share a characteristic with the contemporary multi-width manufactured homes that are also site-assembled to a certain degree.

Modular homes are houses made of component pieces. The individual components are manufactured in a factory, then shipped to a site where they are assembled together onto a foundation that is site specific. They differ from manufactured homes in that the components are not completed to the same degree as a manufactured home. Also, they may be hauled on trucks or towed with some type of wheel/trailer assembly, but they do not have the same chassis structure in their floor that manufactured homes have. They are not meant to be moved once installed. Installation may include the use of a crane.

Manufactured homes may be on a foundation of some sort or may be tied down but they do not require a foundation system beyond a concrete pad on which to sit level. Modular homes can come to the site with pre-assembled floors but still require a conventional site-built foundation for their ultimate structural strength.

Modular homes can have various levels of pre-assembly at the factory ranging from stress skin panels, to partial wall segment assembly, to complete joining of walls, floors, and ceilings up to one half of an entire house. This includes the installation of rough in electrical, plumbing, and HVAC systems.

Many new building systems, such as structural insulated panels (SIP's), provide the speed of construction and quality control of modular homes, with the ease of access and custom features of site built houses. Two brothers recently completed a demonstration house in Oldsmar, using Structall SIP's for the floors, walls and roof. The house is raised on stilts because of the high base flood elevation. The *St. Petersburg Times* reported:

The high-ceilinged house, in a Florida vernacular style, has three bedrooms and two baths in 1,500 square feet, a workshop, carports and two decks with magnificent views of Tampa Bay. Jeffrey demonstrated how the panels snap and lock together with a tongue and groove, fastened with a silicone adhesive. "They lock closely together and form an airtight seal, so you don't need a vapor barrier," he explained. And, he said, jumping up and down on one of the 8-inch-thick foam sandwiches, "they're incredibly stiff."

One major characteristic shared with manufactured homes and distinguishing them from site-built houses is the stable construction environment in which the component pieces are built. There is a properly trained and supervised staff using the right tools in a weather-protected and temperature and humidity-controlled environment. All of this should provide a superior quality construction.

## **Site-Built Structures**

These represent the typical housing stock in the typical subdivision. In Florida that generally means a slab-on-grade foundation with site-constructed CMU ground floor and CMU or wooden upper floors and roof. The largest prefabricated components would be roof trusses and cabinetry.

These do have an advantage over modular homes in that, being site-built from scratch, they can be constructed in areas that are difficult to access. This represents a particular advantage over housing forms require the use of large tractor-trailers and cranes. The poor accessibility afforded by many manufactured home parks means that often construction materials need to be brought on site in a largely non pre-assembled form.

### **General**

The park model and the modular home hold the most promise for revitalizing manufactured home parks. New manufactured homes are too large to fit on the older, shallow lots. Site built houses may invoke local codes and ordinances that affect many aspects of the park. That is, placing typical residential housing in a manufactured home park would likely change the zoning such that, where 25 residences per acre might be allowable today, only 6 or 7 per acre may be allowed in the future. This would substantially reduce the stock of housing and would eliminate a low-cost housing option.

Modular homes, depending on how they are viewed by the local authorities may trigger the same effect on communities. If these partially assembled houses were to be recommended as an alternative to the aging ‘mobile homes’ then there would need to be agreement with the authorities to allow these modular homes to retain the status of the manufactured home they replace. As well, builders of these houses would need to produce small floor plan options that could be brought into existing parks.

Economics is a significant factor in determining replacement housing. As has been observed, this is a low-cost housing stock and residents would not tolerate any large increases in the cost of the housing unit itself. Also, park owners cannot take the risk to invest in expensive (i.e. non low-cost) alternatives on the expectation of future sales or tenancies.

Part of the team’s study included a sampling of existing manufactured home parks that were currently for sale. In the economics of real-estate investment and financing, there

is the principle of HABU (Highest and Best Use). HABU means that a property must be valued at the market price that would be attained if that property were put to its most financially rewarding use. Often in edge properties like manufactured home parks and even houses that were in residential neighborhoods but now border onto commercial strips, the current use of the land is not the same as the use that would bring the greatest financial benefit. For example, the house located near a shopping mall may be better used as a small law office or accountant's office than as a residence. The deciding factor is what use for the property will bring out that property's greatest financial potential. That would be the "highest and best use" of that property. This can at times be in conflict with what the current use of the subject property actually is.

This principle becomes important when the ownership of the property changes. The purchaser will want the best financial return on the investment and the current use may not provide that. Even if the purchaser should want to preserve the current use, the finance company may not allow money to be loaned on property that is not achieving its full value potential.

In metropolitan counties (such as Pinellas and Hillsborough) many manufactured home parks that were economically viable as semi-rural locations now find themselves in dense commercial areas. Keeping them as manufactured home parks with lots rented out to tenants who own their units may not be the best use for that land which could be developed for a commercial retail use. This may be the origin of the remark of the realtor who opined to the team that it was time for these older parks to be allowed to go out of business so as to allow the land to be put to better (financially speaking) use.

The challenges presented by the application of the HABU principle should not be underestimated. It remains a very real possibility that the older parks will 'limp along' financially until they are slowly emptied by vacating tenants and finally sold so that the land they occupy can be used for some new economic purpose.

### **3.9 Information Gaps**

In the process of conducting the research for this report, the researchers discovered numerous gaps in information that impeded the team's progress. These same gaps can be barriers to upgrading mobile home parks in west central Florida. Some of the main areas of concern are listed below.

#### **3.9.1 Number of Mobile Homes in Polk County**

The estimate of the number of mobile homes in Polk County varies widely. In Spring 2002, for example, the Tampa Tribune estimated that there are 84,000 mobile homes in the county (Alberto), while the Lakeland Ledger estimated the number to be 50,000 (Schneider, Palmer). The Ledger's on line guide to the county gives different number: 61,000 mobile homes (Ferrante). The research team counted 46,000 mobile home spaces in mobile home parks from data provided by the department of health. The wide range of estimates indicates that there are probably a large number of mobile homes that are not accounted for (and not inspected).

### **3.9.2 Locations of Mobile Home Parks**

Addresses for mobile home parks in Polk County are listed in a wide range of formats on department of health documents. The same road might be indicated by its local informal name; by the county, state, or federal route number; or in some other manner. These discrepancies made it very difficult for the team to geocode many of the parks for the GIS based maps.

### **3.9.3 Accurate site plans of mobile home parks**

Site plans of mobile home parks on file in the department of health are presented in a wide range of formats. Many are sketched, not to scale, and/or not accurate. These poorly drawn site plans make it difficult for inspectors to identify possible zoning or building code violations. Also, representatives of government agencies are not always aware of how to find these site plans. For example, representatives of the planning and building departments for several jurisdictions, had no copies of these site plans, and were not aware what agency did have them.

### **3.9.4 Accessible zoning information**

Only 11 of the 18 jurisdictions in Polk County have zoning information available through Municode or other searchable means. However, even this information is not easily found through most of the communities' web sites. Polk County does have a link to frequently asked questions about developing mobile homes in the unincorporated county.

### **3.9.5 Flood and land use maps**

While 40% of Polk County is in flood zones, this information is not available on line (Schneider). By comparison, several Florida counties include storm surge and flood maps on their web sites, as a means of educating the public. Similarly, GIS based information for land use, demographics, and other conditions in Polk County are not readily accessible.

## **4. RESEARCH AND DEVELOPMENT RELATED TO HURRICANE LOSS REDUCTION DEVICES AND TECHNIQUES FOR SITE BUILT HOUSES.**

### **A. Best practices**

Residential construction is especially vulnerable to damage during hurricanes, because less engineering oversight is applied to design and construction of houses (compared to other building types). Public buildings, which are "fully engineered," perform well in high winds, because of the attention given to connections and load paths. Historically, the bulk of the wind damage in the United States has occurred to residential construction. Fully engineered construction, on the other hand, has suffered relatively little damage. (Ayscue)

Houses in hurricane-prone areas, however, must be designed constructed to resist forces from many directions. Once any one building element fails, the other elements of the structure are at an increased risk. Further, not only must the individual structural elements remain intact, they must also provide unbreached load paths from one to the other.

When houses are exposed to hurricane forces, roofs are most susceptible to damage, followed by walls and openings, and then foundations. Roofs must not only be well constructed, but also adequately connected to walls. Walls in turn, must not only contain suitably strong windows and doors, but must also provide a load path from the roof to the foundation. Foundations must be capable not only of supporting the gravity load of the structure above them, but they must also be connected to the structure in a way that addresses flotation and horizontal loads. (Ayscue)

The team developed a "best practices" outline to the planning, siting, design, and maintenance of residential communities in hurricane prone areas. In particular the "best practices" guidelines address areas of concern to the architect or house designer, including:

- Planning and site design. Initial research indicates that a well-planned and designed community will greatly enhance the success of mitigation efforts, evacuation procedures, post-disaster relief and recovery effort. The document provides guidelines for selecting the most appropriate sites for residences in terms of hazard mitigation, land use compatibility and other issues

- Landscaping. While our initial studies indicate that several codes include landscape requirements in their zoning codes, the purposes of the requirements are not for wind mitigation, but for aesthetics. Initial studies indicate that thoughtful landscape plans can obstruct, filter deflect, and guide significant winds.
  - Building form. While codes address multiple prescriptive concerns about construction assemblies, these guidelines also include some principles regarding overall building geometry, roof shape, and additions and attachments.
  - Building technology. The guidelines summarize pertinent principles for construction materials and methods.
- Maintenance. State and local building codes are relatively silent on continuing maintenance standards. Poorly maintained houses are the most hazardous in hurricane events (internally and externally).

The team identified numerous issues of concern and need for future study. In particular:

- To prepare this document, the team interviewed architects and engineers who regularly design houses in hurricane prone areas. Many commented that architects and engineers are not trained to understand and deal with hurricane threats as regular parts of their education, internships, and examination. (These concerns are reinforced by a review of the curricula of architecture schools, the registration exam specifications, and internship requirements).
- The *Florida Building Code*'s prescriptive standards assure that components of houses should survive the full range of hurricane effects of a significant storm (in the Category 2 range). However, because of the lack of performance standards, there is little assurance that the whole building will survive.
- Codes should be more explicit about linking construction standards to hurricane categories. For example, a coastal community could require all houses to be built to a "Category 4 standard", for example, if these linkages were understood. Such standards would also encourage holistic approaches to building standards, thus avoiding "wink links", e.g., a house designed with a very strong roof assembly but a weak fenestration shuttering system.
- Much of the information needed by architects working in hurricane-prone regions has never been coordinated or assembled into a single cohesive textbook. For example, over 20 separate sources (books, articles, web sites) are referenced in these guidelines, indicating that there is a wealth of knowledge available--spanning the range from fundamental research to storm damage assessments. The information is not available in a comprehensive, usable format.

- The insurance industry and code officials have provided few incentives for homeowners to renovate existing houses. In fact the team is concerned about the increasing number of exceptions being granted (to the new code), particularly to renovators.
- Numerous new products have been developed in response to the new *Florida Building Code*'s hurricane protection requirements. Prices on these products (shutters, laminated glass, etc.) are dropping as the markets expand.
- Several alternatives to conventional framing show promise in hurricane resistance, affordability, energy efficiency and aesthetics. These materials include structural insulated panels, polystyrene blocks, light gauge structural steel, etc.
- In the last decade, a lack of major hurricanes that have struck Florida, combined with an explosion of new residents who have never experienced a hurricane, is leading to "hurricane amnesia". This condition is leading a relaxation of wind, flood, and storm related building standards in some regions.
- There is ongoing need for research in a number of different areas related to architecture and community design. In particular, the team recommends post disaster assessments of: a) communities designed using new urbanist principles, b) landscapes, c) buildings designed under the new Florida Building Code, d) houses built with alternative construction methods

**AN OUTLINE OF  
ARCHITECTURE AND COMMUNITY DESIGN  
“BEST PRACTICES” IN FLORIDA**

**I. COMMUNITY**

**A. Public Information/Public Policy**

1. Best practices
2. Supporting codes, guidelines, statutes
3. Incentives for implementation
4. Barriers to implementation
5. Need for information/future study
6. References

**B. Infrastructure**

1. Best practices
2. Supporting codes, guidelines, statutes
3. Incentives for implementation
4. Barriers to implementation
5. Need for information/future study
6. References

**C. Landscape**

1. Best practices
2. Supporting codes, guidelines, statutes
3. Incentives for implementation
4. Barriers to implementation
5. Need for information/future study
6. References

**II. BUILDING FORM**

**A. Geometry**

1. Best practices
2. Supporting codes, guidelines, statutes
3. Incentives for implementation
4. Barriers to implementation
5. Need for information/future study
6. References

- B. Roof/Sheathing**
  - 1. Best practices
  - 2. Supporting codes, guidelines, statutes
  - 3. Incentives for implementation
  - 4. Barriers to implementation
  - 5. Need for information/future study
  - 6. References

- C. Attachments**
  - 1. Best practices
  - 2. Supporting codes, guidelines, statutes
  - 3. Incentives for implementation
  - 4. Barriers to implementation
  - 5. Need for information/future study
  - 6. References

- D. Interiors**
  - 1. Best practices
  - 2. Supporting codes, guidelines, statutes
  - 3. Incentives for implementation
  - 4. Barriers to implementation
  - 5. Need for information/future study
  - 6. References

### **III. BUILDING TECHNOLOGY**

- A. Fenestration**
  - 1. Best practices
  - 2. Supporting codes, guidelines, statutes
  - 3. Incentives for implementation
  - 4. Barriers to implementation
  - 5. Need for information/future study
  - 6. References

- B. Roof/Sheathing**
  - 1. Best practices
  - 2. Supporting codes, guidelines, statutes
  - 3. Incentives for implementation

- 4. Barriers to implementation
- 5. Need for information/future study
- 6. References

C. Structure/Connections

- 1. Best practices
- 2. Supporting codes, guidelines, statutes
- 3. Incentives for implementation
- 4. Barriers to implementation
- 5. Need for information/future study
- 6. References

D. Alternative Construction

- 1. Best practices
- 2. Supporting codes, guidelines, statutes
- 3. Incentives for implementation
- 4. Barriers to implementation
- 5. Need for information/future study
- 6. References

E. Maintenance

- 1. Best practices
- 2. Supporting codes, guidelines, statutes
- 3. Incentives for implementation
- 4. Barriers to implementation
- 5. Need for information/future study
- 6. References

## I. A. COMMUNITY-- Public Information/Public Policy

### Best practices

Homeowners in hurricane hazard areas should be provided with the information necessary to understand the nature of the hurricane hazard and to assess the degree to which their homes are at risk. Homeowners cannot be expected to address the risk of property loss if not first educated to understand it. This is an area in which governmental agencies and the insurance industry could be especially effective.

Governmental agencies, especially local governments, must accept their responsibility to the public to rigorously enforce building codes. Building codes are only effective when followed. Too much of the damage from recent hurricanes is attributable to substandard construction. (Ayscue)

- Account for the entire community in the disaster management strategy. While this is important, it is exceedingly important for mitigators to look beyond individual buildings to consider the entire built environment -- the block, neighborhood, and community; the streets, parks, and infrastructure that connect them; and other systems and components that unify and define this complex system. (Geis)
- Promote public awareness. Educating the public -- through risk communication materials, media activity, and other means -- will ensure that planning efforts go beyond the local authority to reach the entire community. (Geis)
- Develop warning function to evacuate people from harm's way, before the event
- Where possible, keep development away from the most vulnerable areas of the coast, through effective land use planning, in the first place (Geis)
- Mitigation is also concerned with planning and building transportation systems and shelter facilities required to make what evacuation is needed as effective as possible.
- Development neighborhood/city wide web sites documenting hazard zones, and hurricane mitigation measures.
- Self-help information should be made available to homeowners. While retrofitting is necessarily less comprehensive than steps taken during initial construction, the homeowner can make significant improvements. These include strengthening roof bracing and connections from within attics, shuttering windows, and strengthening foundation connections on elevated housing in wave erosion and flood zones.
- Include flood hazard warnings on purchase agreements
- Maintain natural defenses of coast: beaches dunes, etc.

## **Supporting codes, guidelines, statutes**

- **Coastal Construction Control Line (CCCL).** During the 1980's, the State of Florida's Department of Environmental Protection established a Coastal Construction Control Line (CCCL) to increase the standards that guide land use and building construction standards in high hazard coastal areas. The CCCL defines the zone along the coastline subject to flooding, erosion, and other impacts during a 100-year storm. Properties located seaward of the CCCL are subject to State enforced elevation and construction requirements. The CCCL foundation and elevation requirements seaward of the CCCL are more stringent than NFIP coastal (V-Zone) requirements.
- **National Flood Insurance Program (NFIP)** As required, communities participating in the NFIP must adopt and enforce a floodplain management ordinance that meets or exceeds NFIP construction requirements, and enforce the NFIP construction requirements in the Special Flood Hazard Areas as identified in the Flood Insurance Rate Maps (FIRM) issued by FEMA.

## **Incentives for implementation**

- **Flood insurance.** At the local or county level of government, construction along and near the Florida coastline is generally governed by the Florida Building Code and the NFIP construction requirements, which are both enforced by the local or county governments. In exchange for adopting the ordinance and enforcing the NFIP construction requirements, individuals and businesses within the communities are eligible to purchase flood insurance. The program first helped develop maps of all areas that have a 1% chance of serious flooding each year. Local governments were also encouraged to adopt regulations to reduce the impacts of future flooding. If a community does not adopt regulations to reduce flood impacts, property owners in the community are not eligible for federal flood insurance. Federally insured lenders therefore, cannot provide mortgages in non-participating communities. The NFIP uses the Federal Emergency Management Agency's storm surge model to predict the base flood elevation and breaks Special Flood Hazard Areas into two main categories, V-zones and A-zones. ([www.fema.gov](http://www.fema.gov))
- **Home Insurance.** In parts of Florida, mortgage companies have developed prevention loan program. FNMA, for example, has made \$50 million available for Florida. Applicants can borrow up to \$20,000 for a 10-year period, and it's an unsecured loan. (Safe House)

- **Code enforcement.** Developing and implementing a Building Code Effectiveness Grading Schedule created by the Insurance Services Office Inc. is a priority with the Institute of Business and Home Safety. The grading schedule would rate municipalities on the quality of their building codes and the level of enforcement. It was tested as a pilot project in 1995 in Florida and is being extended to all states. (Safe House)
- In Florida, local and regional **comprehensive planning** is required, including a coastal management element.
- **Local Mitigation Strategies.** Integrated plans seek to reduce or eliminate, where possible, damage due to storms or other disaster events before they occur

## **Barriers to implementation**

- Cost
- Lack of hurricane activity in Florida since Hurricane Andrew. In California, prospective buyers are asking how a home has been retrofitted to protect against earthquakes. That sort of thinking is transferable Florida regarding hurricanes.
- Enforcement of building codes
- Exceptions granted to new Florida Building Code
- Local mitigation strategies are not effectively connected to land use.

## **Need for information/future study**

- Hurricane resistance grading/ranking system for properties for sale.
- Effectiveness of buildings constructed under the CCCL guidelines and/or under the new Florida Building Code

## **References**

- “Safe House”, *Best Review*, August 1999
- Florida Local Government Comprehensive Planning and Land Development Regulation Act
- *Coastal Construction Manual*, FEMA, Third edition
- Institute of Business and Home Safety literature
- “Creating Sustainable and Disaster resistant Communities”, by Donald E. Geis *The Aspen Global Change Institute WORKING PAPER* July 10, 1996
- Report on Costs and Benefits of Natural Hazard Mitigation: Land Use and Building Codes: Florida's Coastal Construction Control Line, <http://www.fema.gov/>
- Jon K. Ayscue, *Hurricane Damage to Residential Structures: Risk and Mitigation*, Natural Hazards Research Working Paper #94, University of Colorado Natural Hazards Research and Applications Information Center, November, 1996

## I.B. COMMUNITY-- Infrastructure

### Best practices

- **Avoid placing a road close to the shoreline and creating small lots between the road and the shoreline.** The resulting buildings, roadway, and utilities are extremely vulnerable to erosion and storm damage. (Coastal Construction Manual)
- **Locate the shore-parallel road sufficiently landward to accommodate coastal flooding** and future erosion (Coastal Const. Manual)
- Create all lots so that their **full width extends from the shoreline to the road.** (Coastal Construction Manual)
- **Occupy a small fraction of the total buildable parcel** and to accommodate erosion by moving threatened buildings to other available sites on the parcel. (Coastal Construction Manual)
- **Avoid creating lots between or landward of gaps** between large buildings or objects capable of channeling floodwaters and waves.
- **Mandate more stringent siting and building standards.** For example, some counties in Florida enforce V-zone construction standards for single-family residential structures on all of the barrier islands, even when A zones are identified on FIRM maps. The application of the higher standards is credited with significantly reducing damages to a zone buildings caused by Opal and hurricane George (fema.gov)

### Supporting codes, guidelines, statutes

- Chapter 161, "Beach and Shore Preservation," and Chapter 498, "Land Sales Practices," of the Florida Statute address property disclosure statements.
- Section 161.57, "Coastal properties disclosure statements," sets forth specific requirements
- Section 498.037 requires that any public offering statement for subdivided lands disclose fully and accurately the physical characteristics of the lands and make known to prospective buyers all unusual and material circumstances of features that affect those lands.
  - CCCL
  - NFIP

### Incentives for implementation

- Florida's Development of Regional Impact process for large scale development

### **Need for information/future study**

- Hurricane resistant qualities of new urbanist principles. Conduct damage assessment of appropriate coastal new urbanist communities (Seaside, Windor) after storm events.
- Post hurricane assessment of communities designed under FEMA guidelines.
- Relationship of repetitive loss properties to community design issues.

### **References**

- *Mitigation of Flood and Erosion Damage to Residential Buildings in Coastal Areas.* FEMA 257. Federal Emergency Management Agency. 1994
- Morris, M. 1997. *Subdivision Design in Flood Hazard Areas.* Planning Advisory Service Report Number 473. American Planning Association.
- *Building Performance Assessment: Hurricane Georges in the Gulf Coast,* 1999, FEMA BPAT
- *Coastal Construction Manual,* FEMA 55, Third edition
- *Report on Costs and Benefits of Natural Hazard Mitigation: Land Use and Building Codes: Florida's Coastal Construction Control Line,* <http://www.fema.gov/>

## I.C. COMMUNITY-- Landscape

### Best practices

- **Maintain the urban forest** in the community and around homes. Healthy forests forming an over story vegetation canopy and growing as a windbreak can reflect, deflect and filter strong winds. Studies after Hurricane Andrew demonstrated that windbreaks saved multiple mobile homes from substantial wind damage. (McDonald, et. al.)
- Native trees, particularly slow growing trees with **wide spreading branches, low centers of gravity, strong deep penetrating root systems, and small leaf size** seem to hold up better in tropical storms. Multi-trunk trees with low centers of gravity can withstand 120 mph winds. Multi-trunk trees with low centers of gravity-sweetbay magnolias, river birches, and red maples-also weathered 120 mph winds. (Abbey)
- **Avoid weak and most misshaped trees** in the area. Avoid severe root and limb pruning from sidewalk construction or the installation of pipe, line and cables
- **Avoid non-native trees.** The classic "victim" tree has a high center of gravity and is weighted down by a dense canopy. Fast growing, weak-wooded trees and shallow-rooted trees set in dense clay soil or saturated ground often are uprooted or snapped during tropical storms. (Abbey)
- Develop **mixed groves** of trees. Lone growing solitary specimens have less wind resistance than massed trees
- New plantings should consider large, sturdy "**wind deflector**" trees. Dense, low trees, with strong root systems and powerful main limbs like live oaks work well. Magnolias, live oaks, cypress trees, ground covers, shrubs, and various native plants act as natural windbreaks. Live oaks forced surface winds up and over buildings in urban areas. Plant these trees away from buildings so they can sway in a storm and prune to keep limbs above rooflines. In front of the wind deflector trees should be living walls of dense hedges that divert winds and airborne debris away from structures. If used alongside buildings, such walls create a "dead air" space that intercepts the "forward-return" hurricane winds. One study found that heavy hedges cut wind velocity by 60 percent of its open field force. Double and triple living walls are even more effective, especially when used with "wind-deflector" trees. This measure works better if the wall does not exceed the height of the building fascia. (Abbey)
- **Sentinels obstruct and break up wind flows** by initiating a turbulence zone above the site, helping to relieve wind pressure on plants near buildings. Because they shoulder the brunt of the storm, sentinels should be tall and flexible (Abbey)

- **Protector plant groves of tightly planted trees intercept flying debris** which, when thrown at 100 mph, cause serious damage. Although similar in function to living walls, plant groves are more aesthetically pleasing. Plant groves shield parking areas, satellite dishes, utility connections, and pet shelters. (Abbey)
- **Vine-covered chain-link fence filter wind.** Any vines covering a hurricane fence should be thinned to allow winds to filter through. Cutting the main stem several days prior to a storm will cause vine leaves to wilt, thereby lessening wind load and overturning moment. (Abbey)
- **Wind baffles constructed of dimensional lumber** resemble decorative open fence panels. A baffle filters or slows the wind instead of obstructing, guiding, or deflecting it. Protecting building windows from flying projectiles is a baffle's primary function. An effective baffle is secured with concrete footings, dense hardwoods, and sound rustproof metal connectors. (Abbey)
- **Storm walls, especially ones with layered plantings on the windward side, can mitigate wind damage** near building entrances and parking lots. A masonry storm wall deflects winds over rooftops while simultaneously sheltering window laden building elevations. Two or more walls of various heights are often used to lift winds. To reduce wind loads on walls, small metal grill openings should be part of the design. And to prevent flash flooding near the foundations of structures, include an oversized drainage weep. (Abbey)
- **Earth berms** four to five feet tall can be sculpted on properties with available fill soil. The proper length, height, and slope of earthen walls help direct wind movement over structures and provide locations for flexible trees and taller masses of storm-resistant shrubs. These pockets of higher elevations throttle wind speed. (Abbey)
- **Remove weak and diseased trees** as well as any large trees within one hundred feet of your home or car. Prune and thin trees to give them a lower center of gravity and to lessen leaf mass. Sculpting a tree will allow wind resistance to increase. Lightly fertilize annually and be sure that all trees are growing where their root zones are covered with a good organic mass of healthy forest floor material. (Abbey)
- **Replace gravel/rock-landscaping** material with shredded bark.

<b>Supporting codes, guidelines, statutes</b>
<ul style="list-style-type: none"> <li>▪ Local government tree ordinances (e.g., Tampa)</li> </ul>
<b>Incentives for implementation</b>
<ul style="list-style-type: none"> <li>▪ Relatively low cost and aesthetic means to protect property.</li> <li>▪ Serves other purposes: summer shade, etc.</li> </ul>
<b>Barriers to implementation</b>
<ul style="list-style-type: none"> <li>• Even though some coastal states have adopted building codes to help build roofs and walls that withstand high winds and rising waters, the codes exclude landscape features that are found around homes, businesses and industry. Site amenities such as landscape plantings, pavilions, fences, pools, walls, landscape lighting and gazebos are often designed without high winds in mind. (Abbey)</li> <li>• Most public information regarding hurricanes emphasizes the negative aspects of landscaping (i.e., broken limbs, toppling trees, windborne debris)</li> </ul>
<b>Need for information/future study</b>
<ul style="list-style-type: none"> <li>▪ Post hurricane assessment of the effects of different kinds of landscape on mitigating wind.</li> <li>▪ Develop prototypical hurricane resistant landscape plans</li> <li>▪ Conduct survey on post construction conversions of open under stories to habitable rooms.</li> </ul>
<b>References</b>
<ul style="list-style-type: none"> <li>• "A Systematic Survey of Manufactured Housing Performance in Hurricane Elena," McDonald, J.R., Vann, W.P. and Levitan, M., Report MHI-508, prepared for the Manufactured Housing Institute, Arlington, VA, by McDonald, Mehta and Minor, Consulting Eng., Lubbock, TX, 1987</li> <li>• <u>Hurricane Resistant Landscapes</u>, Buck Abbey, <u>City Trees</u>, The Journal of The Society of Municipal Arborists, Vol 34, Number 6, November/December 1998</li> </ul>

## II.A. BUILDING FORM—Geometry

### Best practices

The design of aerodynamic building shapes should be encouraged and promoted. More aerodynamic building systems reduce direct wind forces experienced perpendicular to windward planes of buildings and also the consequent effect of whirling air flows, called vortices, that accumulate at the corners and edges of the planes. The accumulation of both the direct and negative pressures resulting from these wind flows is particularly prevalent in the more abrupt or orthogonal planes of gabled roof systems. (Ayscue)

- **Avoid asymmetric structures.** Squared-shaped houses have a higher chance of withstanding high wind velocity than rectangular houses. Because the direction of the winds is unpredictable, the ideal form is a pyramid or a dome. However it is impractical to suggest that all future buildings in hurricane prone areas take on these forms.
- **Avoid complex designs** and houses with more than one story.
- **Elevate as much above base flood elevation (BFE) as possible**, especially for manufactured homes. (Coastal Construction Manual)
- Elevating a building in a coastal A zone on an **open foundation or using only breakaway walls** for enclosures below the lowest floor significantly reduces the potential for the structure to be damaged by waves, erosion. (Coastal Construction Manual)
- **Study impact of large volumes:** cathedral ceilings, scissor trusses, etc.
- Plan: **Chamfer corners** reduces high suction at corners
- Elevation: **Rounded parapet** reduces high suction at corners
- External **3-dimensional features** (balconies, mullions, etc.) can reduce suction on elevation.
- **Safe Room.** Identify a safe room in the home and reinforce it as necessary.

### Supporting codes, guidelines, statutes

- CCCL
- NFIP
- Florida Building Code
- ASCE-7, ASCE-24

### Incentives for implementation

- Reduces the potential for the structure to be damaged by waves and/or floodwaters

- Ability to get building permit/ insurance

### **Barriers to implementation**

- Raising ground floor above BFE may conflict with community building height restrictions;
- Raised structure may expose structure to additional lateral forces;
- Longer pilings may cost more
- Cost
- Footprint/volume issues are not explicitly addressed in codes.
- Post-construction conversion of enclosures to habitable space remains a common violation of floodplain management requirements and is difficult for communities and states to control.
- Architects and engineers typically do not have specific education and training in hurricane resistant design principles
- No sourcebook for architects on hurricane resistant design
- Florida Building Code has mainly prescriptive requirements, not performance requirements
- ASCE-7 assumes simple geometries

### **Need for information/future study**

- Impact of large volumes: cathedral ceilings, scissor trusses, to story spaces, etc.
- Vulnerability of non-raised houses that are sandwiched between neighboring structures that are on grades raised above BFE
- Mechanisms for requiring architects/engineers to have specialized education in hurricane resistant design (i.e., professional exam)

### **References**

- “Safe House”, *Best Review*, August 1999,
- *Coastal Construction Manual*, FEMA 55, Third edition
- Jon K. Ayscue, *Hurricane Damage to Residential Structures: Risk and Mitigation*, Natural Hazards Research Working Paper #94, University of Colorado Natural Hazards Research and Applications Information Center, November, 1996

## II.B. BUILDING FORM—Roof

### Best practices

Roofs are subjected to wind forces from many directions. Direct wind pressure can loosen shingles and tiles. Suction forces on the surface of the roof and vortices on the roof corners can lift both roof cladding and sheathing. Internal pressure generated when windows, doors, or sections of the roof itself are breached can lift and separate the roof from the rest of the structure (Ayscue)

- **Hip roofs**, which slope in four directions, **are less prone to breaching** than gable roofs, which slope in two directions. HUD examined damage from Andrew and found that only 6% of houses with hip roofs were rated at the highest level of roof damage, while 33% of houses with gable roofs received this rating. Hip roofs do not present any flat surfaces to the wind despite wind direction, and the sloping faces of hip roofs enhance the performance of the roofing material. Hip roof framing is effective structurally because it laterally braces the primary roof trusses, or rafters, and supports the top of the end walls of the home against lateral wind forces. The hip roof generates much less uplift and is structurally better braced than a gable system. Hip roof framing is effective structurally because it laterally braces the primary roof trusses, or rafters, and supports the top of the end walls of the home against lateral wind forces. Further, hip roofs eliminate the "hinge" formed between a gable end and gable-end wall (Ayscue)
- **Steep pitch is better than low pitch.** The roof pitch should not be less than 20° (ideally 30° or more). Very low and very steep sloped roofs generally create increased uplift and lateral wind loads, respectively, and should be avoided.
- **Overhangs** should be no more than 18" (horizontal distance from wall) if boxed and 8" if unboxed
- Roof extensions for patio and verandas should be **constructed separate** from the main roof.
- Higher uplift pressures and local velocities typically occur at **roof edges, corners and ridge**. Thus the failure in these areas is more likely.
- Venting with adequate openings to relieve induced internal pressures on roof structures is recommended. However, venting must be installed in such a manner that the entry of uncontrolled airflow is not allowed. Such uncontrolled airflow could result in a buildup of induced internal air pressure. (Ayscue)

### Supporting codes, guidelines, statutes

- Florida Building Code
- ASCE-7

<b>Incentives for implementation</b>
<ul style="list-style-type: none"> <li>▪ Code requirements</li> <li>▪ Common practice</li> </ul>
<b>Barriers to implementation</b>
<ul style="list-style-type: none"> <li>▪ Many coastal communities have building height restrictions that, when coupled with building owner's desires to maximize building size and area, encourage the use of low-slope roofs. These roofs can be more susceptible to wind damage and water penetration problems.</li> <li>▪ Wide overhangs are preferred for general moisture control and prevention</li> </ul>
<b>Need for information/future study</b>
<ul style="list-style-type: none"> <li>▪ Wind testing of site built houses</li> </ul>
<b>References</b>
<ul style="list-style-type: none"> <li>▪ "Toolkit: A Manual for Implementation of the Hurricane-resistant Home Improvement Program in the Caribbean", Caribbean Disaster Mitigation Project Unit of Sustainable Development and Environment Organization of American States (OAS) Washington, DC Revised December 1999. (HTML 75k),  <a href="http://www.oas.org/en/cdmp/document/toolkit/toolkit.htm">http://www.oas.org/en/cdmp/document/toolkit/toolkit.htm</a></li> <li>▪ <i>Coastal Construction Manual</i>, FEMA 55, Third edition</li> <li>▪ Jon K. Ayscue, <i>Hurricane Damage to Residential Structures: Risk and Mitigation</i>, Natural Hazards Research Working Paper #94, University of Colorado Natural Hazards Research and Applications Information Center, November, 1996</li> </ul>

## **II.C. BUILDING FORM--Attachments**

### **Best practices**

- Where possible, the decks should be supported with the same type of foundation and structural system as the primary building. If this is not possible, care should be taken to ensure that the main building and attachment have similar stiffness. (Coastal Construction)
- Either decks and other structures should be structurally independent of the main structure, or the additional forces they will generate should be expressly considered in the design of the main structure and the attachment to the main structure. (Coastal Construction)
- Floor level of decks should be lower than the surface the inside floor level to help prevent water infiltration.
- Open-riser stairs, where permitted by code, will let flood water through the stair stringers,
- Construct the stairs so they are retractable.
- The roof of open-air porches, and similar structures, are especially vulnerable to wind damage. Be careful to maintain continuous load paths.
- Pools should not be structurally attached to buildings, because an attached pool can transfer flood loads to the building. Building foundation designs should also account for increased flow velocities, wave ramping, wave deflection, and scour that can result from the redirection of flow by an adjacent pool.

### **Supporting codes, guidelines, statutes**

- Florida Building Code
- ASCE-7, ASCE-24

### **Incentives for implementation**

- Protection from future storm events

### **Barriers to implementation**

- Cost
- No incentive to renovate existing houses
- Architects and engineers typically do not have specific education and training in hurricane resistant design principles
- No sourcebook for architects on hurricane resistant design

### **Need for information/future study**

- Assessment of the effect of hurricanes on buildings constructed under the new Florida Building Code
- Mechanisms for requiring architects/engineers to have specialized education in hurricane resistant design (i.e., professional exam)

## References

- *Coastal Construction Manual*, FEMA 55, Third edition
- Florida Building Code

## **II.D. BUILDING FORM--Interiors**

### **Best practices**

- Where first floor is below BFE, and house is built on a crawl space, insulate with non-water absorbing foam insulation under the first floor. Above the foam, install blocking to create a physical barrier to prevent water from damaging the insulation above. (113 Calhoun).
- In some historic houses, wooden panels, called wainscoting, have been installed to approximately BFE. These panels are less water-absorbent than is wallboard and can be removed after a flood event, allowing both the panels and the wall space to dry thoroughly. Wallboard absorbs water, which then wicks upward damaging walls to a level well above the actual flood level. (113 Calhoun).
- Interior mechanical units, ductworks, and returns, should be located above BFE.
- All electric, telephone and computer outlets must be located above BFE. In addition, minimize splices or connections below BFE.
- One of the most damaging classes of failure during hurricanes is the loss of gypsum wallboard ceilings. The rain is driven in through gable-end vents and roof turbines, through the joints between roof sheathing panels after roofing was blown off, and directly into the attic space of failed roof systems. Rain can quickly saturated the insulation and the ceiling. The loss of ceiling strength due to water saturation, and the increased weight of the wet insulation, caused widespread collapse of ceilings. (Ayscue)

### **Supporting codes, guidelines, statutes**

- The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings, where appropriate

### **Incentives for implementation**

- Protect historic houses
- Protect interiors in general

### **Barriers to implementation**

- Cost
- Lack of knowledge of BFE

### **Need for information/future study**

- Detailed analysis of best materials and methods for interiors of coastal houses

### References

- 113 Calhoun: Center for Sustainable Living, <http://www.113calhoun.org/>
- Jon K. Ayscue, *Hurricane Damage to Residential Structures: Risk and Mitigation*, Natural Hazards Research Working Paper #94, University of Colorado Natural Hazards Research and Applications Information Center, November, 1996

<b>III.A. BUILDING TECHNOLOGY--Fenestration</b>
<b>Best practices</b>
<ul style="list-style-type: none"> <li>▪ Maintaining an airtight enclosure is a key to reducing damage during a hurricane. Parts of the house most vulnerable to breaking this desired hermetic seal are garage doors, skylights, French doors, and large expanses of unprotected glass surfaces. Provide shutters for all such areas.</li> <li>▪ Reinforce garage doors. Garage doors should have steel bracing or wooden 2"x6" stiffeners running the full width of the door approximately 18" apart.</li> <li>▪ Use polycarbonate, plastic laminate, or other hurricane resistant windows, or shutters, or plywood/sheet metal coverings</li> <li>▪ Locate windows away from outer corners where pressure is greatest</li> <li>▪ Limit use of patio doors and skylights</li> <li>▪ Improve flashing and weather-stripping around windows and doors</li> </ul>
<b>Supporting codes, guidelines, statutes</b>
<ul style="list-style-type: none"> <li>▪ Florida Building Code</li> </ul>
<b>Incentives for implementation</b>
<ul style="list-style-type: none"> <li>▪ Some mortgage companies will reduce the interest rate if a homeowner makes the home safer from hurricanes. Insurers already provide discounts of 6% to 14% for homes with storm shutters in addition to the building-code credits.</li> <li>▪ Storm shutters or other protective devices for doors, windows, skylights, and vents can also mitigate hurricane losses. Insurers have begun offering credits that reduce premiums for customers who install such devices.</li> <li>▪ Florida Windstorm Underwriting Assoc. provides insurance discounts for mitigation measures</li> <li>▪ Some insurers will not pay for hurricane related damage if openings were not properly protected</li> </ul>
<b>Barriers to implementation</b>
<ul style="list-style-type: none"> <li>▪ Shutters/coverings require someone to be present</li> <li>▪ Cost of shutters--\$5 to 10,000 per house average</li> <li>▪ Low coastal wind requirements in some counties</li> <li>▪ Impact requirements not required</li> </ul>
<b>Need for information/future study</b>
<ul style="list-style-type: none"> <li>▪ New, innovative types of shuttering devices</li> </ul>

## **References**

- *Coastal Construction Manual*, FEMA 55, Third edition
- “Safe House”, *Best Review*, August 1999
- Florida Building Code

### **III.B. BUILDING TECHNOLOGY—Roof/Sheathing**

#### **Best practices**

- Install roof shingles, sidings, and other exterior finish materials with adequate fastening to prevent tear-off and water entry in at least common tropical storms or moderate hurricanes. For roof shingles this may simply involve the use of more nails than required, especially on courses near roof edges.
- Use asphalt roof shingles with high bond strength. Asphalt shingle is warranted for wind gusts of 60 mph, although performance can be improved by sealing the edges at the roof eaves and rakes with roofing cement, and by using six nails per shingle rather than four nails or staples. Performance can be improved by sealing the edges at the roof eaves and rakes with roofing cement, and by using six nails per shingle (Ayscue)
- State Farm demonstration house in east Florida uses cement tiles that can withstand winds of 140 mph. A new adhesive foam that fills in the spaces is stronger than mortar and won't disintegrate. The adhesive also can protect the roof from leakage if a storm blows off some of the tiles (Safe house)
- Tiles should be tied down with clips were wired to battens. Because roof tiles (and attaching mortar) are so brittle and easily damaged, one option is not to use roof tiles in hurricane areas. Instead, metal panels that simulate tile could be used (Ayscue)
- When replacing roof, remove coverings down to the bare wood sheathing. Confirm rafters and trusses are securely connected to the walls. Refasten existing sheathing according to proper building code requirements for high-wind regions. Use a heavier felt roofing paper, secured with sufficient fasteners, to increase protection from water damage, and install a roof covering designed to resist high winds.
- There are several ways to improve the roof sheathing attachment. The cheapest and easiest is to re-nail or better yet, screw down the sheathing when you replace your roof covering. If you are not ready to replace the roof covering the adhesive method described in this brochure may be an option.
- OSB performance tends to be inferior to that of plywood, tending to disintegrate and/or curl at the edges under cyclic wind loading and/or moisture penetration
- On flat roofs, use pavers instead of loose laid gravel
- Install wood siding instead of vinyl siding

#### **Supporting codes, guidelines, statutes**

- Florida Building Code

## Incentives for implementation

- Code
- Most hurricane damage begins at the roof, but the most widespread ineffective director of fit our roofs as they are replaced on a regular basis. Access to the deck can happen during roof replacements. Upgrading of sheathing, hurricane straps, and roof material can happen at this time.
- Florida Windstorm Underwriting Assoc. provides insurance discounts for mitigation measures

## Barriers to implementation

- No incentive to improve existing houses
- Uneven inspections by code officials
- Workmanship standards not included in new Florida Building Code
- Low coastal wind requirements in some counties
- Impact requirements not required
- The lack of a high-wind-rated composition shingle
- The lack of tiles with high ductility

## Need for information/future study

- Effectiveness of new Florida Building Code

## References

- *Residential Structural Design Guide: 2000 Edition*, U.S. Department of Housing and Urban Development, Washington, DC
- Florida Building Code
- *Coastal Construction Manual*, FEMA 55, Third edition
- “Safe House”, *Best Review*, August 1999
- Jon K. Ayscue, *Hurricane Damage to Residential Structures: Risk and Mitigation*, Natural Hazards Research Working Paper #94, University of Colorado Natural Hazards Research and Applications Information Center, November, 1996

### III.C. BUILDING TECHNOLOGY—Structure/Connections

#### Best practices

- **Continuity of load path (foundation to roof).** The load path is a series of connections that allows forces pass from one part of a structure to another and allow the building to move as a unit. Without a continuous load path, there are “weak links” in a building’s connections. Roof-to-wall connections are the most important. This is not only because of the large uplift forces that may be at work on the roof, but also because the number of connections is limited to the number of roof rafters or trusses in the system. At lower levels in the structure, the number of possible connections is greater. For example, in wall construction, nailed plywood sheathing can be used to supplement strap connections between roof and wall, and wall and sill plate. (Ayscue)
- **Embedment of piles.** Piles must be deep enough to maintain integrity in storm event. In coastal areas, inadequate pile embedment depths are a main source of failure. Soil erosion and scour cause the pile foundations to be undermined. (Coastal Construction)
- Highest forces are along **building edges**.
- **Truss bracing.** When the trusses are exposed, check to make sure that they are properly fastened. Fasteners include nails and staples. If the fasteners have missed the truss, the roof is weakened. You may want to add nails if they are scarce or if many have missed the top cord of the roof.
- **Gable end bracing.** If roof is gabled, structure must include braces to attach the trusses or rafters at each end to the other truss. Also, there should be wood sheathing (planks or plywood) behind stucco of the triangular gable end walls.
- **Hurricane straps to prevent uplift.** If roof has trusses, they must be tied to the wall by either anchoring to the top plate and then the top plate to the wall stud, or strapping the truss directly to the wall stud.
- **Attach roof sheathing with adhesive** This inexpensive job can substantially increase the strength of a roof. It involves applying construction-grade glue along the joints where the sheathing sits on the rafters or truss. The glue is applied to the roof trusses and the underside of the roof and seals seams between the sheathing panels to prevent leakage if the roof covering is damaged
- **Include shear walls** to stiffen the framing. Designers and plan reviewers should pay greater attention to lateral load transfer mechanisms because of high lateral loads generated by hurricane winds. At the construction stage, greater attention must be paid to the proper installation of all lateral load transfer mechanisms inherent in conventional building framing, especially hurricane straps and clips.

- In coastal areas, **corrosion of hurricane straps** is a recurring problem stated in various sources. One architect stated that for this reason alone, they specify only stainless steel for hurricane straps to avoid such a potentially great problem.
- The use of braced truss roof systems that will sufficiently resist lateral forces independent of roof sheathing should be required. Roofing systems could be considerably improved if simple secondary bracing or blocking were to be applied within the truss network (thus relieving the roof's reliance on diaphragm sheathing alone). (Ayscue)

#### **Supporting codes, guidelines, statutes**

- Florida Building Code

#### **Incentives for implementation**

- Code
- Florida Windstorm Underwriting Assoc. provides insurance discounts for mitigation measures

#### **Barriers to implementation**

- Cost
- No incentive to upgrade existing buildings
- Uneven inspections by code officials
- Workmanship standards not included in new Florida Building Code

#### **Need for information/future study**

- Effectiveness of new Florida Building Code

#### **References**

- *Residential Structural Design Guide: 2000 Edition*, U.S. Department of Housing and Urban Development, Washington, DC
- Florida Building Code
- *Coastal Construction Manual*, FEMA 55, Third edition
- Jon K. Ayscue, *Hurricane Damage to Residential Structures: Risk and Mitigation*, Natural Hazards Research Working Paper #94, University of Colorado Natural Hazards Research and Applications Information Center, November, 1996

### III.D. BUILDING TECHNOLOGY—Alternative Construction

#### Best practices

Among the numerous promising alternatives to conventional framing are:

- **Polystyrene blocks** with hollow cores are stacked, and reinforcing rods are inserted both horizontally and vertically in the hollow cores. The cores are then filled with concrete. The result is an insulated, reinforced concrete wall system that can better resist lateral forces due to the continuity of forces characteristic of the monolithic material.
- **Structural Insulated Panels (SIP's)** are inherently stronger than stick frame and are extremely strong in racking and shear, which are the primary issues with seismic and hurricane calculations. According to some manufacturers, standard construction details with 3 5/8" SIPs using hurricane clips meets the 110 mph test. 5 5/8" SIPs with screws and hurricane clips calculate for most designs up to 160 mph. (SIPS)
- **Exterior Insulation and Finish Systems (EIFS)** must be installed on a solid substrate such as plywood in order to provide enhanced resistance to missile penetration. Punctures of EIFS by windborne debris are also common in high-wind events. A minimum plywood thickness of 15/32-inch is recommended. (Coastal Construction)
- A composite of **phenolic resins blended into a reinforcing matrix of structural glass fibers** is used in some new housing. Wall, roof, and floor panels consist of a thin, but exceptionally strong, layer of the composite on the interior and exterior sides bonded to PVC I-beams at 24"oc. Installation of the composite housing system is said to be quick, simple, and relatively easy due to the light weight of the materials. Despite its lightweight, it is strong enough to withstand hurricane-force winds and damage from impact, and it is resistant to moisture, rot, corrosion, and insect and rodent infestation. (NAHB)
- **Light-Gauge Structural Steel** floor, wall, and roof systems. Galvanized steel framing components as a direct substitute for conventional wood framing systems
- **Welded-wire sandwich panels (shotcrete)** also are promising as a hurricane resistant alternate to conventional framing. (Coastal Construction)

#### Supporting codes, guidelines, statutes

#### Incentives for implementation

- Lower cost, more durable, more energy efficient
- Fast construction time

### **Barriers to implementation**

- Knowledge and experience of local trades
- Costs can be higher due to inexperience of local contractors or unavailability of material

### **Need for information/future study**

- Durability of alternative construction methods in hurricane conditions

### **References**

- Composite of phenolic resins: [www.asc-housing.com](http://www.asc-housing.com)
- Structural Insulated Panels: [www.sips.com](http://www.sips.com)
- NAHB Research Center: [www.nahb.org](http://www.nahb.org)
- Visit to Structall factory in Oldsmar

### **III.E. BUILDING TECHNOLOGY—Maintenance**

#### **Best practices**

**Repairing and replacing structural elements**, connectors, and building envelope components that have deteriorated over time, because of decay or corrosion, will help maintain the building's resistance to natural hazards. Maintenance is a constant and ongoing process. Typical maintenance items include:

- **Foundation:** Woodpile – decay, termite infestation, severe splits, connection to framing. Sill plates – deterioration, splits, lack of attachment to foundation. Masonry – deteriorated mortar joints, cracked block, step cracks indicating foundation settlement. Concrete – spalling, exposed reinforcing steel, vertical cracks or horizontal cracks with lateral shift in the concrete across the crack
- **Exterior walls:** Siding – deterioration, withdrawal of nails, discoloration, buckling, nails missing studs, caulking. Trim – deterioration, discoloration, separation at joints
- **Porches/columns:** Condition of top and bottom connections to framing, deterioration at base of wood columns
- **Floors:** Joists or beams – decay, termite infestation, corrosion at tie down connectors, splits, excessive holes or notching, excessive sagging. Sheathing – deterioration, “squeaky” floor, excessive sagging, nails missing joists
- **Windows/doors:** Glazing – cracked panes, condensation between panes of insulated glass, nicks in glass surface, sealant cracked/dried out. Trim – deterioration, discoloration, separation at joints, caulking dried out or separated
- **Roof:** Asphalt shingles – granule loss, shingles curled, nails withdrawing from sheathing. Wood shakes – splits, nails withdrawing, discoloration, deterioration, moss growth. Metal – corrosion, discoloration. Flashings – corrosion, joints separated, nails withdrawing
- **Attic:** Framing – condition of truss plates, sagging or bowed rafters or truss chords, deterioration of roof sheathing, evidence of water leaks, adequate ventilation

(Coastal Construction Manual)

#### **Supporting codes, guidelines, statutes**

- Florida Building Code

#### **Incentives for implementation**

- Hurricane safety, aesthetics

- Most hurricane damage begins at the roof, but the most widespread ineffective director of fit our roofs as they are replaced on a regular basis. Access to the deck can happen during roof replacements. Upgrading of sheathing, hurricane straps, and roof material can happen at this time.

### **Barriers to implementation**

- Not explicitly required in building codes
- Cost
- Lack of knowledge

### **Need for information/future study**

- Case studies on maintenance issues

### **References**

- *Coastal Construction Manual*, FEMA 55, Third edition

## **1. APPENDICES**

### **A. Zoning summaries**

Applicable excerpts from the zoning ordinances and municipal codes for local governments in Polk counties

### **B. Maps:**

- Polk County mobile home parks
- 1. Cities and population
- 2. Geographic distribution
- 3. Environmental land uses
- 4. Land uses (unincorporated Polk County)
- 5. Parks within 1000 feet of lakes
- 6. Parks within 5000 feet of lakes

### **C. Case studies**

- 1. Sunshine Village Mobile Home Community  
1234 Reynolds Road, Lakeland, FL 33801
- 2. The Village Lakeland  
448 Oak Ridge Road, Lakeland, FL 33801
- 3. Tower Manor Mobile Home Community  
2604 Saddle Creek Road, Auburndale, FL 33823

### **D. Mobile home parks for sale**

### **E. Parks visited**

### **F. Interview summaries**

## 2. REFERENCES

### **Codes, laws, statutes, comprehensive plans**

2001 Florida Building Code, SBCCI, Alabama, 2001

Zoning codes and comprehensive plans: Polk County and its incorporated communities

*Strategic Regional Policy Plan*, (Central Florida Regional Planning Council)

State of Florida, Division of Motor Vehicles. *Rules of the Department of Highway Safety and Motor Vehicles – Division of Motor Vehicles – Chapter 15C-1*, 2000.

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## Maps

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Florida Department of Environmental Protection, *The Coastal Construction Control Line (CCCL) Maps*

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## Handbooks/Web sites

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NOAA web site for information on storms: <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

*Project Impact* web site, FEMA, <http://www.fema.gov/impact/>

Polk County web site, <http://www.polk-county.net/pcfacts.htm>

## **Appendix A**

## **Polk County**

### **Land development code**

#### **Mobile Home Parks and Subdivisions**

1. A proposed mobile home park or mobile home subdivision shall be approved only if it is determined by the Planning Commission to be compatible with the established character and development trends of the surrounding area.
2. Mobile home subdivisions shall comply with Chapter 8. Mobile home subdivisions may, at the applicant's discretion, be designed in accordance with the standards for Cluster Design or Zero Lot Line Design.
3. The following development standards shall apply to all mobile home parks:
  - a. No entrance to or exit from a mobile home park shall discharge traffic onto any local residential street. Direct access from any lot to an abutting public street shall not be permitted.
  - b. The requirements in Chapter 7, Section 804, Section 811, Section 821, Section 823, Section 824, Section 830, and the applicable standards in Appendix A.
  - c. Recreation area equal to a minimum of 500 square feet per dwelling unit shall be provided, exclusive of perimeter buffer yards, easements, drainage retention areas, and preservation areas. Recreation areas shall be accessible to all residents within the park. In no case shall a recreation area be less than 10,000 square feet in area.
  - d. The maximum density of a mobile home park shall not exceed the applicable district standard in Table 2.2 (in the RS Future Land Use districts, lot sizes smaller than five acres may only be achieved through a Planned Development). Minimum lot sizes shall be as follows:

Land Use District	Minimum Lot Size Square Feet
A/RR	21,780
RCC-R	10,890
RS	21,780
RS (SPD*)	10,890
RL-I	8,000

RL-2	5,000
RL-3	4,500
RL-4	4,000
RM	4,000
RH	4,000

e. Minimum lot widths shall be 35 feet for single wide mobile home lots, and 50 feet for all other lots.

f. The minimum setbacks for mobile homes from lot lines shall be as follows:

Lot line	Distance
Front, side, and rear setback from park streets	15 feet
Interior side	5 feet
Interior rear	10 feet

g. Park management offices, coin operated laundry facilities, and other accessory park uses may be permitted subject to the same requirements as accessory uses as provided in Section 206 of this Code.

h. Areas must be designated for all appropriate utility service lines, including, but not limited to, water, sewer, gas, electric, telephone, and cable to provide access to serve each lot and make necessary repairs. Such easements may utilize street right-of-way, open space, and buffer areas as agreeable to the owner and the utility provider.

4. The operation of a mobile home park and the issuance of individual set-up permits within mobile home parks shall require registration of the park and issuance of an annual Operating Permit.

5. The following street development standards shall apply to all mobile home parks:

a. All streets within a mobile home park shall be privately owned and maintained. Roads shall be designed and constructed in accordance with the standards for private roads in Chapter 7 and 8, and Appendix A (Technical Standards Manual).

- b. Access to mobile home parks shall be provided by an entrance road connected to a collector or arterial road.
- c. Entrance roads shall provide a minimum of 50 feet of right-of-way for the first 100 feet and provide not less than 20 feet of pavement with a 50 foot minimum turn-off apron.
- d. Access to individual lots shall be provided by local streets. Dead end streets shall be no longer than 1,000 feet and be constructed with a cul-de-sac having a minimum diameter of 60 feet.

## **Section 716 Used Mobile Homes**

The following requirements go into effect on October 1, 2000.

### *A. Pre-inspection Required*

- 1. All used mobile homes and park trailers more than three years old as counted from the date of manufacture shall require payment of a fee and pre-inspection for compliance with the standards listed in Sections B through F, below, before being placed on site.
- 2. No set up permit shall be issued for units requiring pre-inspection until the pre-inspection is completed. If the County inspector determines that only minor repairs or corrections are required, the set up permit may be issued prior to the completion of those corrections or repairs and they will be checked at set up inspection.
- 3. If the County inspector determines that major corrections or repairs are required, the appropriate permits shall be obtained, and the repairs completed, inspected and approved prior to issue of a set up permit.
- 4. If the estimated cost of repair exceeds the current market value of unit, no set up permit shall be issued.
- 5. As an alternative to pre-inspection by the County, State licensed mobile home dealers and Florida registered architects or engineers may certify that a unit meets standards. Such certification shall be subject to verification by the County inspector at set up inspection.

6. Documentation abuse of this certification alternative by a provider may result in certifications no longer being accepted from that provider.

*B. Fire Safety*

1. Approved, listed smoke detectors shall be properly located and installed, according to manufacturer's instructions, outside of each sleeping area.
2. All homes manufactured after 1975 shall have an operable egress window or exterior door located in each sleeping area with a minimum opening dimension of 22 inches.

*C. Construction*

1. All floor, wall and roof systems shall be structurally sound, properly secured, free of holes and intact.
2. Exterior doors, including sliding glass, shall be in good working order and have operable

**Manufactured homes in Flood Hazard Area**

All manufactured homes and park model trailers placed or substantially improved, together with all mechanical and electrical equipment, on individual lots or parcels, in expansions to existing manufactured home parks or subdivisions, or in substantially improved manufactured home parks or subdivisions, must meet all the requirements for new residential construction contained in this Section, including elevation, and anchoring.

1. Any additions to manufactured homes subject to provisions of this Section shall also be considered "new construction" since they must be supported by an independent foundation system. "Additions" must therefore comply with the provisions contained in this Section, including elevation. This may necessitate elevating an existing manufactured home to match the required elevation of the "addition."
2. All manufactured homes placed, or substantially improved, in an existing manufactured home park or subdivision must be elevated so that either;
  - a. The lowest floor of the manufactured home is at or above one foot above the base flood elevation, or

- b. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequate foundation system to resist flotation, collapse, and lateral movement.
- c. In an existing manufactured home park or subdivision lot in which a manufactured home has incurred "substantial damage" as the result of a flood, any manufactured home placed or substantially improved must meet the standards of this Section.
- d. Any additions to manufactured homes subject to provisions of this Section shall be considered "new construction" subject to the provisions contained in this Section including installation on permanent foundation systems, elevation, and anchoring.

#### *W. Recreational Vehicles*

All recreational vehicles shall:

- 1. Be on the site for fewer than 180 days, and be fully licensed and ready for highway use. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices and has no permanently attached structures, and meet the following definition:
  - a. Built on a single chassis;
  - b. 400 square feet or less when measured at the largest horizontal projection;
  - c. Designed to be self propelled or permanently towable and;

**Table 2 2 Density and Dimensional Regulations for Standard Districts (Rev.**

7/25/01 - Ord. 01-57)

	AIRR	RCC-R	RS	RL-1	RL-2	RL-3	RL-4	RM	RH	RCC
RESIDENTIAL GROSS DENSITY(I)(2): MAXIMUM / MINIMUM	25/15	2 du/ac N/A	1 du/5 ac(2) NIA	1 du/ac WA	2 du/ac N/A	3 du/ac N/A	4 du/ac N/A	7 du/ac N/A	10 du/ac NIA	N/A NIA
MIN. RESIDENTIAL LOT AREA-	AC 5	20,000 sf	5 AC	40,000 sf	15,000 sf	10,000 Sf	6,000 sf	6,000 sf	5,000 sf	N/A
MAX. NON-RESIDENTIAL IMPERVIOUS SURFACE	0.50	0.50	0.60	0.65	0.65	0.70	0.70	0.70	0.70	0.50
MAX. NON-RESIDENTIAL FLOOR AREA RATIO	0.25	0.30	0.25	0.25	0.25	0.25	0.25	0.26	0.25	0.20
MIN. SETBACKS:(ROAD RNV / C/L) m) m) (jo) (13) IMITED ACCESS	100 / NA	100/NA	100/NA	100/NA	100 / NA	100 / NA	100 / NA	100/N A	100 / NA	100 / NA
ARTERIAL	65/125	651125	651125	65/125	65/125	65/125	651 '125	65/125	65/125	65/125
PRINCIPAL MINOR URBAN	50190	50/90	50190	50/90	50/90	50/90	50/90	50/90	50/90	50/90
URBAN COLLECTOR	35/65	35/65	35/65	35/65	35/65	35/65	35/65	35165	35165	35165
RURAL MAJOR COLLECTOR	35/65	35/65	35/65	35/65	35/65	36/95	35/95	35/65	35/65	35/65
RURAL MINOR COLLECTOR	35/65	35/65	35/65	35/65	35/65	35/65	35/65	35165	35/65	35/65
LOCAL, 60'R/W, or greater	25/55	25/55	20/50	15145	15/45	15/45	15/45	15/45	15/45	15/45
LOCAL, 41- 6V R/W	25/50	25150	20/45	15/40	15/40	16/40	'15 / 40	15/40	15/40	15/40
LOCAL, 40'RIW	25/45	25/45	20/40	15/35	15/35	15/35	15/35	15/35	15/35	15/35
MIN. SETBACKS: 1 INTERIOR SIDE (PRINCIPAL / ACCESSORY)	15/15	15/15	10/10	10/10	715	7/5	7/5	7/5	7/5	7/5
MIN. SETBACKS: INTERIOR REAR	30/10	30/10	20/10	20/10	20/5	20/5	2015	1515	15/5	15/5

2-12

Revised 7/25/01

## Davenport

### Sec. 19-82. MH-1, Mobile home park district

- a) *Purpose.* The purpose of this section is to provide that mobile home parks may be permitted in specified areas of the city, under regulations provided herein, and only after plans are submitted to and approved by the city council. It is recognized that the city elects to maintain and promote its present traditional, conventional single-family land use pattern by the prevention of the undesirable effects of permitting mobile home structures to mix in areas of traditional residential structures. This section proposes to protect present value patterns of harmonious development, and still make provision to permit mobile home development at locations and according to standards that will be an asset to the community as a whole. It is intended that mobile homes shall be prohibited in the city, except that they may be installed in approved mobile home parks.
- b) *Application.* Any application for the use of a parcel of land for a mobile home park shall be submitted to the city council for consideration. Such application shall show:
  - 1) The legal description of the land proposed to be used
  - 2) A drawing of the site made to scale, showing intended uses and location of existing characteristics, and drives, drainage, utilities, owner's name and address; and
  - 3) That all provisions of this section are complied with. The city council may at the same meeting approve or deny such application as submitted, or may grant approval conditioned on alterations to conform to specific development requirements or city land use objectives as established in this chapter.
- e) *Conditions for permission.* Mobile home parks may be permitted in any MH district legally established by the city council provided:
  - 1) Land area shall have a width of at least two hundred (200) feet, and a net area of nine (9) acres or more, developed to a density of not more than eight (8) units per net acre.
  - 2) All internal drives or streets shall be named and marked, paved to a width of at least eighteen (18) feet, with approved paved surfacing. All such streets shall be private drives, and no such street or drive shall be or become a maintenance responsibility of the city; however, any such street or drive may be dedicated as a public or private utility easement.

- 3) The developer shall be responsible for the provision of all utilities. Each mobile home lot shall be provided with connections to a potable water supply approved by the city council, and to a sanitary sewer system approved by the state and county; both systems shall be installed in accordance with the city plumbing code. Any metered city-owned utility shall be served by not more than one (1) meter.
- 4) Electrical installations shall provide connections for energy to each mobile home lot and be installed according to the city electrical code.
- 5) All wired utilities shall be installed by way of underground lines, and no overhead or aerial wiring shall be permitted. Each mobile home park shall be served by central television antennae system.
- 6) Garbage and waste facilities shall be provided, either by covered containers not to exceed thirty-gallon capacity for each mobile home; or the owner may provide for mechanical or centralized collectors adequate to serve several or all mobile homes. Such central collectors shall meet all requirements of the city or franchised refuse collection system.
- 7) All park plumbing, including toilets, showers, sinks, laundry equipment or other, shall be installed according to the city plumbing code. Every mobile home shall be equipped with a toilet and bathing facilities.
- 8) Every mobile home park development shall provide a laundry building which contains laundry equipment and a sufficient number of mechanical dryers to adequately serve all units. Drying yards or swimming pools shall be concealed from all public streets and adjoining property, and located at least fifty (50) feet from any property line.
- 9) Every mobile home park shall provide a yard area of not less than twenty (20) feet between any structure and right-of-way line or property line.
- 10) A masonry or wood fence, or planting shield, shall be provided and maintained between any mobile home park and any adjacent property or public right-of-way. Any required fence or planting shield shall be at least five (5) feet high, but not more than eight (8) feet high within one (1) year from installation, and shall be of such density to materially break off direct view horizontally through it.
- 11) Every mobile home park shall be equipped with a fire hydrant located within three hundred (300) feet of every mobile home, or fire extinguishers in good working order of types, number and location as required by the fire chief of the city.

- 12) In order to provide safety, each mobile home in a mobile home park shall be firmly fastened to the ground with no less than four (4) anchors of the screw auger type having five-eighths inch of rod diameter, and four (4) feet of length, or of an arrowhead type, deadman type or equivalent, with a horizontal area of at least twenty-eight (28) square inches not less than thirty-eight (38) inches below finish grade. Each mobile home shall be placed on a foundation that shall consist of concrete or metal blocks, or piers on concrete pads with a bearing surface of at least one hundred forty-four (144) square inches. Such bearing pads shall be spaced not more than fifteen (15) feet apart in all directions beneath the mobile home.

### **Sec. 8-78. Floodways**

Located within areas of special flood hazard established in section 8-6 are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of floodwaters which carry debris, potential projectiles and has erosion potential, the following provisions shall apply:

- 4) Prohibit the placement of manufactured homes (mobile homes), except in an existing manufactured homes (mobile homes) park or subdivision. A replacement manufactured home may be placed on a lot in an existing manufactured homes park or subdivision provided the anchoring standards of subsection 8-76(1)b. and the elevation standards of subsection 8-77(1) are met.

## Dundee

### **Sec. 30-26. Location of mobile homes in parks**

All mobile homes in use as residences in the town shall be located in an approved mobile home park. All mobile homes not located in approved mobile home parks on the effective date of the ordinance from which this section is derived which were legally excepted from operation of any prior mobile home ordinance are excepted from this section.

#### **7.07.04. Nonconforming mobile home parks**

Existing mobile home parks which are nonconforming by use shall not be redesigned, expanded in area, or modified to accommodate additional mobile homes. Replacement of existing mobile homes in such parks shall be prohibited.

1. Overall density of the park will not exceed the allowable density established in the comprehensive plan and the appropriate section of this code.
2. An area comprising 20 percent of the development site or five acres, whichever is less, shall be set aside as common open space as defined in article 9.
3. No new mobile home will be placed within 20 feet of any property line
4. Where possible, all development standards of the zoning district have been met, or the degree of nonconformity reduced. In no case shall the degree of nonconformity of any design aspect be increased.
5. A redesign proposal which does not include the addition of new mobile home spaces shall not be subject to conditions 1. and 2. above.

#### *2.02.02.06. RMH1 mobile home subdivision*

(A) *FLUM designation: Low-density residential*

(B) *Purpose: To establish locations suitable for mobile home development on platted lots; to designate those uses and activities which are appropriate for and compatible with such areas; and to establish standards and provisions necessary to ensure proper development and public safety in a mobile home residential environment.*

2.02.02.07. RMH2 mobile home park

- (A) FLUM designation: Medium-density residential
- (B) Purpose: The purpose of this district is to establish locations suitable for mobile home development on undivided property, along with open space and other amenities for the common use of residents; to designate those uses and activities which are appropriate for and compatible with such areas; and to establish standards and provisions necessary to ensure proper development and public safety in a mobile home park setting.
- (C) Permitted principal uses and structures: Mobile home parks
- (D) Carports, porches, and awnings which are physically attached to mobile homes. Such structures shall not exceed a cumulative total of 35 percent of the lot area.
- (E) Storage area for boats, recreational vehicles, and other types of vehicles which exceed 30 feet in length. Storage area is for the use of park residents only, and shall be fenced and landscaped. Storage of these units shall be prohibited on individual mobile home sites or on park roads.

## **Eagle Lake**

### **Sec. 17.3.14. Mobile/manufactured homes**

17.3.14.1. These standards shall be used to assure safe and livable housing conditions for mobile/manufactured homes. Repair and remodeling of mobile/manufactured homes may use material and design equivalent to the original construction....

17.3.14.2. Electrical repair of mobile/manufactured homes shall be in accordance with this Chapter and the Electrical Code.

17.3.14.3. The sanitary sewer and water systems serving each mobile/manufactured home shall be in accordance with the Standard Building Code.

17.3.14.4. Mobile/manufactured homes shall be tied down and blocked in accordance with the minimum requirements of Section 320.8325, Florida Statutes, or other applicable general laws of the State of Florida, and rules and regulations promulgated pursuant thereto; and the Standard Building Code.

### **Sec. 6.3.1. Manufactured housing definitions, types, developments**

6.3.1.1.1. Manufactured home. A structure, built to be transported to its site in one or more sections, which, in the delivery mode, is 8 body feet or more in width or 40 body feet or more in length, or, when erected on site, is 320 or more square feet in floor area. Such structures are built on a permanent chassis and designed to be used as a dwelling with or without a permanent foundation when connected to the required utilities, and includes the plumbing, heating, cooling and electrical systems contained therein and further are constructed to and certified as meeting current standards of the Department of Housing and Urban Development in compliance with the Housing and Community Development Act of 1980.

6.3.1.1.2. [Types.] Manufactured homes are divided into two types as follows

6.3.1.1.2.1. Residential design manufactured homes, hereinafter referred to as RDMH, are new manufactured homes approved as meeting "residential design" standards contained herein and constructed after July 1, 1985.

6.3.1.1.2.2. Standard design manufactured homes, hereinafter referred to as SDMH, are manufactured homes certified as meeting the HUD standards or manufactured homes certified as meeting prior codes, and found on inspection to be in excellent condition and safe and fit for continued residential occupancy, but in both cases not approved as meeting "residential design" standards contained herein.

6.3.1.1.3. Foundation. The site built supporting parts upon which the manufactured home is placed, whether constructed to encompass the perimeter of the home or in the form of piers and including all exterior materials required to physically screen, veneer or shield from view such supports, extending at minimum from the ground surface to the bottom portion of the exterior wall surfaces of the home.

6.3.1.1.4. Manufactured housing development. Any land area planned and improved for the placement of manufactured homes. Manufactured housing developments include the following:

6.3.1.1.4.1. A parcel of land under unified ownership or management utilized for the siting of manufactured homes for use as single family residences, including any land, buildings or facilities used by residential occupants and referred to as a park.

6.3.1.1.4.2. A parcel of land improved for the siting of manufactured homes for use as single family residences on lots as defined herein, platted and all applicable improvements provided according to the Land Development Regulations, offered for sale and referred to as a subdivision.

### **6.3.1.2. Residential Design Manufactured Home (RDMH), intent: effect of approval procedures**

6.3.1.2.2. Effect of approval of RDMH, limitations. Manufactured homes approved as RDMH, either individually or by specific model, shall be permitted in residential districts in which similar residential occupancy is permitted, subject to requirements and limitations applying generally to such residential use in the districts, including minimum lot, yard and building spacing, percentage of lot coverage, off-street parking requirements and subject to the following additional requirements and limitations:

6.3.1.2.2.1. Approved foundations required in residential districts. Where approval of homes or model plans does not also include approval of type of foundation, no RDMH shall be placed or occupied for residential use on a site in a residential district until such foundation plans have been submitted to and approved by the Administrative Official. Such approval shall be based upon the appearance and durability of the proposed foundation and its being acceptably similar or compatible in appearance to foundations of residences built or located on adjacent or nearby sites.

6.3.1.2.3. Determination by administrative official

6.3.1.2.3.1. Applications for approval of manufactured homes as RDMH shall be submitted to the Administrative Official in such form as may reasonably be required to make determinations. In particular, in addition to such information as is generally required for permits and as is necessary for administrative purposes, such applications shall include all information necessary to make determinations as to conformity with the standards below, including elevations or photographs of all sides of the manufactured home, exterior dimensions, roof pitch, exterior finish, and related features.

6.3.1.2.3.2. Where there has been prior general approval of foundations proposed to be used, as provided in the standards below, detailed specifications or descriptions of such foundations shall not be required. Where it is proposed to use foundations not previously approved, specifications or descriptions shall be supplied in sufficient detail for determinations as provided in the standards below. Where type of foundation to be used is unknown at the time of application for RDMH determinations for models or individual manufactured homes, approval as RDMH may be granted if otherwise appropriate, but locations and use for residential purposes shall be subject to limitations in 6.3.1.2. above.

6.3.1.2.5. Standards for determinations of similarity in exterior appearance, RDMH. The following standards shall be used in determinations of similarity in appearance between RDMH homes, with foundations approved as provided in the subsection, and compatible in appearance with site built housing which has been constructed in adjacent or nearby locations. In addition to meeting the following specific standards, no manufactured home to be approved as RDMH shall have windows or other features, or use exterior colors or color combinations, which would be incompatible in the general residential neighborhood in which it is to be located.

6.3.1.2.5.1. *Minimum width of main body.* Minimum width of the main body of the RDMH as located on the site shall not be less than twenty feet, as measured across the narrowest portion. This is not intended to prohibit the offsetting of portions of the home.

6.3.1.2.5.2. *Minimum roof pitch; minimum roof overhang; roofing materials.* Minimum pitch of the main roof shall be not less than 2.5 feet to rise for each 12 feet of horizontal run and minimum roof overhang shall be one foot. In cases where site built housing generally has been constructed in adjacent or nearby locations with roof pitches less than 1:3 and/or roof overhangs are less than one foot, then the RDMH may have less roof pitch and roof overhang similar to the site built houses. In general, any roofing

material, other than a built up composition roof, may be used which is generally used for site built houses in adjacent or nearby locations.

6.3.1.2.5.3. *Exterior finish; light reflection.* Any material may be used for exterior finish which is generally acceptable for site built housing which has been constructed in adjacent or nearby locations, provided however that reflection for such exterior shall not be greater than from siding coated with clean white gloss exterior enamel.

6.3.1.2.5.5. *Site orientation of the manufactured home.* RDMH shall be placed on lots in such a manner as to be compatible with and reasonably similar in orientation to the site built housing which has been constructed in adjacent or nearby locations.

6.3.1.2.5.6. *Garages, carports.* In residential neighborhoods where adjacent to nearby site built homes, garages and/or carports are included, an RDMH shall be required to be provided with a garage and/or carport compatible with the RDMH and the site built garages and/or carports constructed in adjacent or nearby locations.

6.3.1.2.5.7. *Minimum floor area.* RDMH shall be required to meet the minimum required floor area for the district in which it is located.

### **6.3.1.3. *Standard design manufactured homes (SDMH), general***

6.3.1.3.1. Standard design manufactured (SDMH) homes shall be placed only in parks, subdivisions, condominiums or residential planned unit developments, except as provided otherwise in this chapter.

6.3.1.4. *Parks, condominiums; design requirements.* In any district where manufactured home parks or condominiums are permitted the following minimum standards shall apply:

6.3.1.4.1. Minimum parcel area for park, or condominiums, 8 acres; minimum width for portions used for entrances and exits, 100 feet; minimum width for portions used for residential purposes 200 feet.

6.3.1.4.2. Minimum number of sites completed at time of first occupancy, 25. Developer shall submit plans for a minimum of 48 sites at time of first plan review. Final layout, water, sewer, streets, drainage, health, and other applicable plans for a minimum of 48 sites shall be submitted to the Administrative Official at the time of request for certificate of occupancy for the initial 25 spaces. These plans shall be approved by City staff and the agencies responsible for inspection prior to issuance of said occupancy certificate.

6.3.1.4.3. Maximum density of sites per gross acre, 6.

6.3.1.4.4. Minimum area for individual manufactured home site shall be as follows: for single section, 4,500 sq. ft., for double section, 5,000 sq. ft.

6.3.1.4.5. Minimum lot width shall be as follows: for single section, 45 feet wide; for double section 50 feet wide.

6.3.1.4.6. Manufactured homes shall be so located as to maintain a 14 foot minimum spacing between all homes and structural improvements regardless of the orientation. A 10 foot minimum rear yard and/or service area shall be maintained between the lot line and the manufactured home and other structural improvements. A 15 foot minimum yard shall be maintained between all streets, curbs and the manufactured home and other structural improvements. Required yards at the edges of the park development shall be 20 feet, contain no accessory buildings and be treated as front yards for the district.

6.3.1.4.7. All residential lots on the perimeter of the development shall contain only RDMH meeting all residential design standards in accordance with this Article; except, where a boundary of the proposed development abuts a boundary of another manufactured home park or condominium, or where a boundary abuts lands with no existing residential land uses, in which case the provisions contained in this paragraph shall not apply at the property lines of the bordering development. If the developer chooses, a 50 foot landscaped and structurally open buffer from the property line may be provided in lieu of RDMH. Such space may be vehicular oriented in character, such as a perimeter road or off-street parking. A third option available to the developer is a solid screening material such as a wood fence, or block wall, each of which shall be 6 feet in height, and placed 10 feet back from the property line. The 10 foot setback area between the property line and solid screening shall be grassed and landscaped and maintained in good condition at all times. Such areas shall be undeveloped other than landscaping, contain no accessory buildings and treated as front yards for the district.

6.3.1.4.8.1. Entrance or access streets or drives shall have a minimum of 24 feet wide driving surface with curbing as necessary for drainage control. If a median is provided for landscaping, lighting or general beautification, it shall be a minimum of 10 feet wide and there shall be not less than 2 one-way lanes, each with a minimum of 12 feet wide paved driving surface with curbing as necessary for drainage control for a total of a minimum 34 foot section.

6.3.1.4.8.2. Major thoroughfares shall be provided as follows:

1. 6.3.1.4.8.2.1. For parks designed to accommodate 300 sites or more: 24 feet wide paved driving surface with curbing as necessary.

6.3.1.4.8.2.2. For parks designed to accommodate between 48 and 299 sites: 22 feet wide paved driving surface with curbing as necessary.

6.3.1.4.9. Minor streets shall be those streets serving a minimum number of sites, clusters of sites, cul-de-sacs, parking bays, or similarly arranged manufactured homes within the overall plan. Minor streets shall be provided as follows with on street parking prohibited:

6.3.1.4.9.1. Streets serving between 13 and 40 sites: 20 feet wide paved driving surface with curbing as necessary.

6.3.1.4.9.2. Streets serving 12 or less sites: 18 feet wide paved driving surface with curbing as necessary.

6.3.1.4.9.3. One-way streets serving less than 20 units: 12 feet wide paved driving surface with curbing as necessary.

6.3.1.4.9.4. One-way street serving 21 or more sites: 14 feet wide paved driving surface with curbing as necessary.

6.3.1.4.13. Automotive parking shall all be off-street and in parking stalls or bays of 10 feet by 20 feet minimum. Two off-street parking spaces shall be provided for each manufactured home. One such parking space shall be provided at each site. The second space may be located in parking bays not more than 150 feet from the site.

6.3.1.4.14. Not less than 10% of the gross site area shall be devoted to recreational facilities, including space for community buildings and community use facilities, such as guest parking, adult recreation and child play areas and swimming pools.

6.3.1.5. *Subdivisions; design requirements.* In any district where manufactured home subdivisions are permitted, the following minimum standards shall apply:

6.3.1.5.1. Minimum parcel area for a subdivision, 4 acres; minimum width for portions used for entrances and exits and for residential purposes, 200 feet.

6.3.1.5.3. Maximum density of lots per gross acre, 6. Minimum area for individual home lot, 5,000 square feet. Minimum lot width, 50 feet.

6.3.1.5.4. Required yards at the edge or boundary of the subdivision shall be 25 feet, contain no accessory buildings and be treated as front yards for the district.

6.3.1.5.6. All residential lots on the perimeter of the development shall contain only RDMH meeting all residential design standards in accordance with all applicable provisions of this Article, except where the development borders another manufactured home subdivision, in which case the provisions contained in this paragraph shall not apply at the property lines of the bordering development. If the developer chooses, a 50 foot landscaped and structurally open setback from the property line may be provided in lieu of RDMH. Such space may be vehicular oriented in character, such as a perimeter road or off street parking. A third option available to the developer is a solid screening material such as a wood fence or block wall each of which shall be a minimum height of 6 feet.

6.3.1.5.7. All manufactured homes located within the subdivision shall be required to be supported with foundations according to manufacturers instructions and local requirements, and if applicable all wheels, axles and towing hitches shall be removed. No certificate of occupancy shall be issued by the Administrative Official until compliance with these regulations. In addition to meeting the above requirements and conforming to other regulations of the City, County and State, the subdivision shall also conform to the applicable requirements as set out in Chapter 13 of the LDR.

6.3.1.5.8. Anchor systems shall be provided according to State laws and Chapter 18 of the LDR.

## **Lake Wales**

### **Sec. 23-252. Mobile home park planned-development projects**

*Permitted uses.* The premises of a mobile home park planned-development project shall be used for only those buildings and uses specifically listed as permitted uses in this section.

*Special exception uses.* Only those uses specifically listed as special exception uses may be permitted in a mobile home park planned-development project, and only if the special exception use is specifically approved along with the final plat of the planned-development project.

- d. *Compatibility.* The tract of land for which the project is being proposed must be suitable for mobile home park planned-development by virtue of its location, shape, topography and the nature of surrounding development.
- e. *Required conditions*
  - (1) *Land area.* The minimum land area required in a mobile home park planned-development project shall be three hundred forty-eight thousand, four hundred eighty (348,480) square feet.
  - (2) A minimum of twenty-five (25) mobile home lots shall be required
  - (3) The overall density of the project shall not exceed eight (8) mobile homes or mobile home lots per gross acre.
  - (4) *Distance between project access points.* The minimum distance required between project access points shall be one hundred fifty (150) feet. The governing body shall require wider spacing between access points and intersecting dedicated public street right-of-way lines when the project has more than the minimum required frontage on a dedicated public street. All access points shall be specifically approved by the planning and zoning board.
  - (5) All dead-end roads within the project shall be designed to enable mobile homes to reverse direction without having to back more than one (1) mobile home length.
  - (6) *Setbacks.*
    - (A) *Project property lines.* The minimum required building setback from all project property lines shall be thirty-five (35) feet.

- (B) *Lot lines.* No mobile home shall be located closer than ten (10) feet to any mobile home lot line and no accessory building shall be located closer than five (5) feet to any mobile home lot line.
- (C) *Building height.* The maximum building height shall be two (2) stories. Height regulations apply to buildings and portions of buildings occupied regularly by human beings and do not apply to structures or portions of buildings which are not regularly occupied except for maintenance.
- (D) *Landscaped separation strip.* A properly maintained landscaped separation strip of ten (10) feet in width shall be provided along all property lines and dedicated public streets serving the project. The planning and zoning board may also require that the project be permanently screened from adjoining and contiguous properties by a wall, fence, evergreen hedge or other approved enclosures. Such screening, if required, shall be located within the required separation strip and shall have a minimum height of eight (8) feet.
- (E) *off-street parking.* A minimum of one (1.0) parking space shall be provided for each mobile home lot. In addition, one (1) automobile parking space shall be provided in visitor common parking areas for every three (3) mobile home lots provided in the mobile home park planned-development project. Parking area shall be provided as required in section 23-233, Off-street parking and access standards. Off-street parking space for buildings and uses specifically permitted as special exception uses shall be provided as required in section 23-80, Minimum off-street parking space requirements for commercial establishments.

<i>Type of Planned-Development Project</i>	<i>Min. Land Area Req. (sq. ft.)</i>	<i>Min. Req. Project Frontage On a Street (feet)</i>	<i>Min. Dist. Req. From Intersection of any Street R-O-W Lines (feet)</i>	<i>Minimum Dist. Req. Between Project Access Points (feet)</i>	<i>From All Project Property Lines (feet)</i>	<i>From All Street R-O-W Lines<sup>2</sup> (feet)</i>	<i>Max. Bldg. Hgt. Permitted (stories)</i>	<i>Required Width of Landscaped Separation Strip<sup>4</sup> (feet)</i>
Residential	<sup>7</sup>	150	100	100	25	25 <sup>3</sup>	<sup>9</sup>	10
<b>Mobile</b> home park	348,480	250	150	150	35	50	2	10
Neighborhood commercial	40,000	250	175	150	35	50	2	10
General commercial	120,000	400	250	200	50	75	<sup>4</sup> <sup>8</sup>	15
Industrial	435,600	600	400	400	50 <sup>6</sup>	50 <sup>6</sup>	<sup>3</sup> <sup>8</sup>	25 <sup>5</sup>
Medical	120,000	400	250	200	50	75	<sup>4</sup> <sup>8</sup>	15
Professional	120,000	400	250	200	50	75	<sup>4</sup> <sup>8</sup>	15

## **Lakeland**

### ***Municipal Code***

#### **Sec. 66-7. Parking regulations**

- (a) It shall be unlawful for any person to park any mobile home, motor home, boat or trailer on any street, alley or highway, or other public place, or on any tract, lot, piece or parcel of land within the city, except as provided in this chapter.
- (b) Parking of mobile homes shall be permitted in properly zoned and licensed mobile home parks or mobile home subdivisions.
- (c) Parking of motor homes, boats, or trailers shall be permitted within properly zoned and licensed mobile home parks, mobile home subdivisions, and travel trailer parks as specified in the R-MH mobile home residence district in the revised zoning code of the city, and in accordance with the regulations of this chapter.

### ***Development Code***

**13.03.00.0 DEVELOPMENT REGULATIONS APPLICABLE TO  
13.03.01.0 MOBILE HOME PARKS, MOBILE  
HOME SUBDIVISIONS AND RECREATIONAL VEHICLE PARKS  
13.03.01.00 PERIMETER SETBACK REQUIREMENTS**

Mobile home sites, mobile home lots and recreational vehicle sites shall be set back from the perimeter of mobile home parks, mobile home subdivisions and recreational vehicle parks as follows:

Minimum perimeter setback .....	20 feet
Minimum perimeter setback from local street .....	25 feet
Minimum perimeter setback from collector street .....	40 feet
Minimum perimeter setback from arterial street .....	55 feet

13.03.02.00

## PERIMETER LANDSCAPED BUFFER

A landscaped buffer not less than fifteen (15) feet in depth shall be provided around the entire perimeter of each mobile home park, mobile home subdivision and recreational vehicle park. The landscaped buffer shall be interrupted only where necessary to provide for vehicular and pedestrian access. It shall contain a visual screen consisting of berms and vegetation which have a minimum opacity of seventy-five (75) percent to a height of not less than six (6) feet. It shall be landscaped as set forth in Section 33.05.03.00. Masonry or wooden fences meeting the requirements of Section 30.03.08.00 may be substituted along common property lines other than street right-of-way lines.

13-03.03.00

## RECREATION SPACE REQUIREMENTS

Minimum percent of total mobile home park, mobile home subdivision or recreational vehicle park devoted to recreation space ..... 7 percent  
Maximum percent of total recreation space devoted to recreationally used water bodies ..... 30 percent  
Minimum size of any single recreation area .. 5,000 square feet  
Minimum dimension of any single recreation area on one side ..... 60 feet  
Minimum separation of active recreation area from any mobile home site ..... 30 feet

Developers of new mobile home parks, mobile home subdivisions or recreational vehicle parks shall provide an onsite structure(s) to shelter the developments projected hurricane season population. Such shelters may include, but not be limited to, clubhouses and recreation centers.

13.03.04.00 UNDERGROUND PLACEMENT OF UTILITIES REQUIRED

All utilities distribution and collection systems, including water supply, sewage disposal, electricity, gas, telephone and television cable, shall be placed underground.

13.03.05.00 CONNECTION TO PUBLIC WATER AND SEWER FACILITIES

All water supply and sewage disposal systems shall be connected to public facilities.

## **13.04.00.00 DEVELOPMENT REGULATIONS SPECIFIC TO MOBILE HOME PARKS AND MOBILE HOME SUBDIVISIONS**

### 13.04.01.00 DEVELOPMENT AREA REGULATIONS

#### 13.04.01.01 Size And Density Regulations

Minimum development area ..... 20 acres

Maximum number of mobile home dwelling units  
per gross acre ..... 7 units

#### 13.04.01.02 Access Requirements

#### 13.04.01.03 Internal Street Construction Requirements

Internal streets which are dedicated to public use shall be constructed according to the City of Lakeland Subdivision Regulations. Internal streets which are reserved for private use shall be constructed with subgrade, base and surface combinations meeting minimal structural requirements established by the Department of Public Works.

#### 13.04.01.04 Internal Street Width Requirements

Right-of-way and pavement widths for internal streets which are dedicated to public use shall be determined according to the standards contained in the city's subdivision regulations (see Article 37).

Right-of-way and pavement widths for internal streets which are reserved for private use shall be determined according to function, anticipated traffic volume and subject to site plan approval, provided that no right-of-way or pavement shall be less than as follows:

Minimum right-of-way width for private interior streets ..... 30 feet

Minimum pavement width of private access drives,  
excluding curbs ..... 20 feet

Minimum pavement width of private collector streets,  
excluding curbs ..... 24 feet

Minimum pavement width of one-way lanes divided  
by landscaped median, excluding curbs ..... 12 feet

#### 13.04.01.05 Common Area Maintenance Provisions For Mobile Home Subdivisions

The Planning and Zoning Board shall approve a final plat for a mobile home subdivision only after making a determination that there is a feasible program for the full maintenance and operation of common areas, common improvements and common facilities included in the plat consistent with the common area maintenance provisions contained in Section 37.04.02.04.

13.04.02.00 INDIVIDUAL SITE REGULATIONS

13.04.02.01 Mobile Home Site Area And Width Requirements

Minimum lot area ..... 4,000 square feet  
Minimum lot width ..... 40 feet

13.04.02.02 Mobile Home Unit Setback Requirements

Minimum front and street side setback from pavement ..... 15 feet  
Minimum interior side setback ..... 5 feet  
Minimum rear setback ..... 10 feet

13.04.02.03 Mobile Home Unit Parking Requirements

Minimum number of paved on-site parking spaces per  
mobile home site ..... 1 space

13.04.03.00 SITE PLAN REVIEW

Applications for a permit to construct a mobile home park shall be processed in a manner similar to the procedures established in Section 37.03.00.00. A site plan and construction plans shall be submitted in accordance with Sections 37.03.03.00 and 37.03.04.00. A final plat of record is not required.

Applications for a permit to construct a mobile home subdivision shall be processed in accordance with the platting procedures outlined in Sections 37.03.00.00 and 37.04.00.00.

**13-05.00.0 DEVELOPMENT REGULATIONS SPECIFIC TO LEGAL**

**13-05.01.0 NONCONFORMING MOBILE  
HOME PARKS AND MOBILE HOME SUBDIVISIONS**

13.05.01-00 PLACEMENT AND REPLACEMENT OF UNITS PERMITTED

Units may be placed or replaced within legally non-conforming mobile home park developments which were existing or approved prior to November 20, 1972, provided the resulting density does not exceed that originally approved, or seven (7) units per acre, whichever is greater.

13.05.02.00      ALTERATIONS TO MEET SITE IMPROVEMENT REQUIREMENTS  
PERMITTED

Alterations or development site area expansions which increase conformance with site improvement requirements are permitted, in accordance with Section 42.05.02.01. All regulations pertaining to use non-conformities as set forth in Section 42.05.00.00 shall apply to non-conformities, within MH Districts.

13.05.03.0    SEPARATION AND SETBACK REQUIREMENTS FOR NEW OR  
13.05.04.0    REPLACED UNITS

Minimum separation between side of one mobile home and side or end of another mobile home measured perpendicular to each side or side and end .....	10 feet
Minimum end-to-end and corner-to-corner separation between mobile homes .....	6 feet
Minimum separation between noncombustible appurtenances (such as screen rooms, awnings, carports and accessory storage buildings) measured perpendicularly to sides and ends .....	3 feet
Minimum setback of permanent buildings and mobile home units from perimeter boundaries .....	5 feet*

An existing mobile home located closer than 5 feet to a perimeter boundary may be replaced with another unit at the same location.

*Comprehensive Plan*

Policy 1c. Residential sites mapped on the future land use map will permit diversity of housing types, including conventional homes, mobile homes, manufactured housing....

Policy 1l. The City of Lakeland will provide for the placement of mobile homes and manufactured housing consistent with section 320.8285 in section 553.38

## **Polk City**

### **Sec. 22-314. Mobile Homes**

(d) This section shall be used to ensure safe and livable housing conditions for mobile and manufactured homes within the town. Materials and designs equivalent to the original construction shall be used when a mobile or manufactured home is repaired or remodeled.

(e) Any individual or entity who intends to construct a new structure, install a mobile home or enlarge, alter, move, demolish or repair a presently existing building, structure or mobile home shall first obtain a building permit therefor. A building permit shall not be issued for a mobile home which is not intended to be skirted within 30 days of the installation of such mobile home.

## **Winter Haven**

### **Sec. 21-223. Development standards**

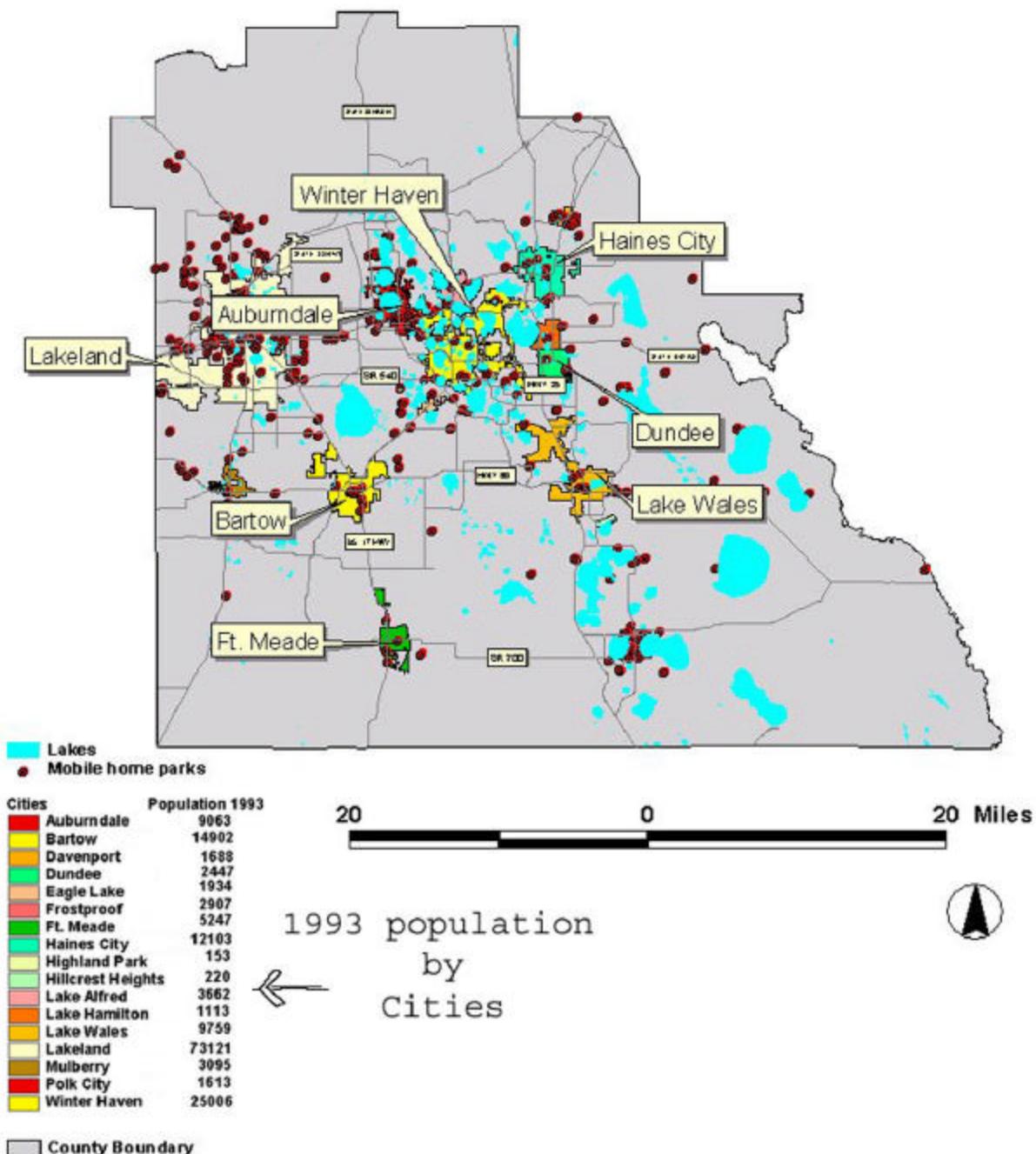
- (a) Once a nonconforming manufactured home is removed from its location, no other manufactured home shall be substituted in its place. The exception is a manufactured home replacement in an existing manufactured home park zoned to allow manufactured homes.
- (b) The replacement of an existing manufactured home on property that is not designated for manufactured home use on the official zoning map shall be prohibited.

The manufactured home park shall be designed and constructed in accordance with the following requirements:

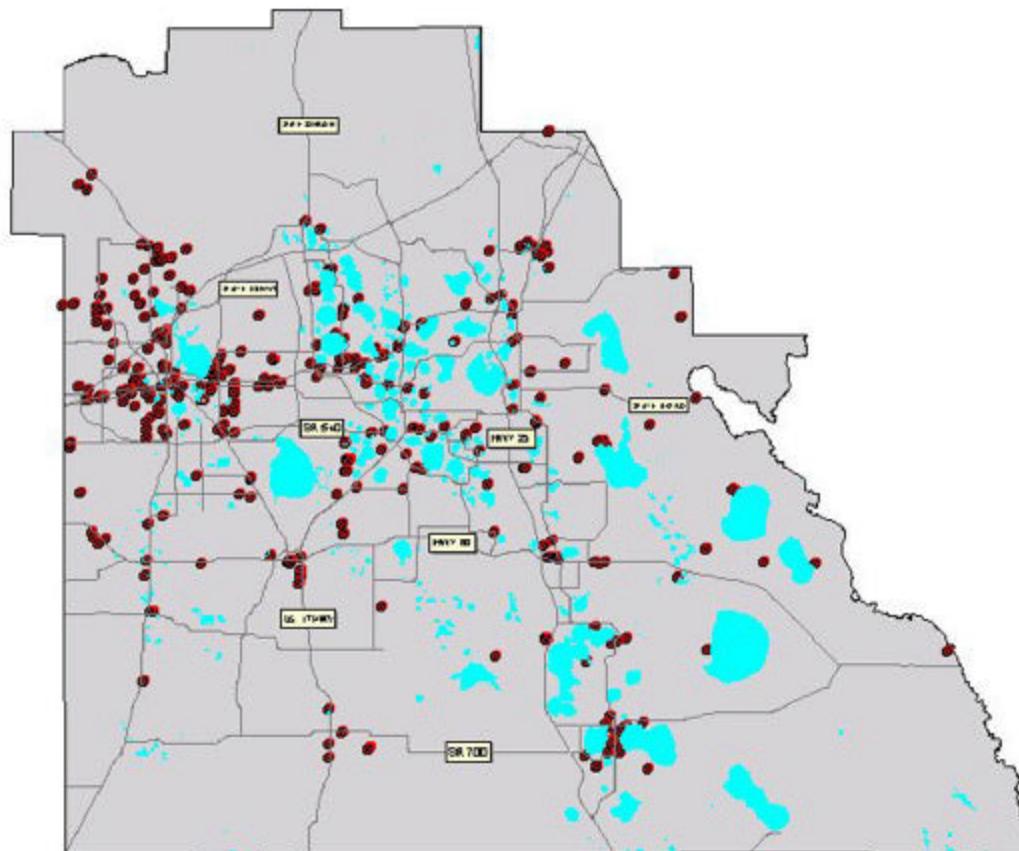
- (a) The minimum area allowable for a park shall be ten (10) acres and the maximum density of manufactured homes within the park shall be eight (8) manufactured homes or eight (8) travel trailers per gross acre. (Gross acreage includes all area within the approved manufactured home park boundaries.)
  - (1) *Minimum size for development site:* Ten (10) acres, with a width of not less than one hundred fifty (150) feet and a depth of not less than two hundred (200) feet.
  - (2) *Minimum size for manufactured home site:* Four thousand (4,000) s.f., with a width of not less than forty (40) feet.
  - (3) *Minimum size for manufactured home unit:* 14 X 60 feet
  - (4) *Maximum building height:* Thirty-five (35) feet
  - (5) *Minimum yard requirements*
    - a. No manufactured home or structure shall be placed less than twenty-five (25) feet from the front lot line or ten (10) feet from other lot lines. No carport or other appurtenant structure may be installed on a manufactured home less than ten (10) feet from another manufactured home or appurtenant structure. This distance shall be measured between the closest points of the units.
    - b. Manufactured homes and structures shall be placed at least twenty-five (25) feet from the pavement edge of private park roads.

## **Appendix B**

## Geographic distribution of Licensed Mobile Home Parks and Cities in Polk County



## Geographic distribution of Licensed Mobile Home Parks and lakes in Polk County

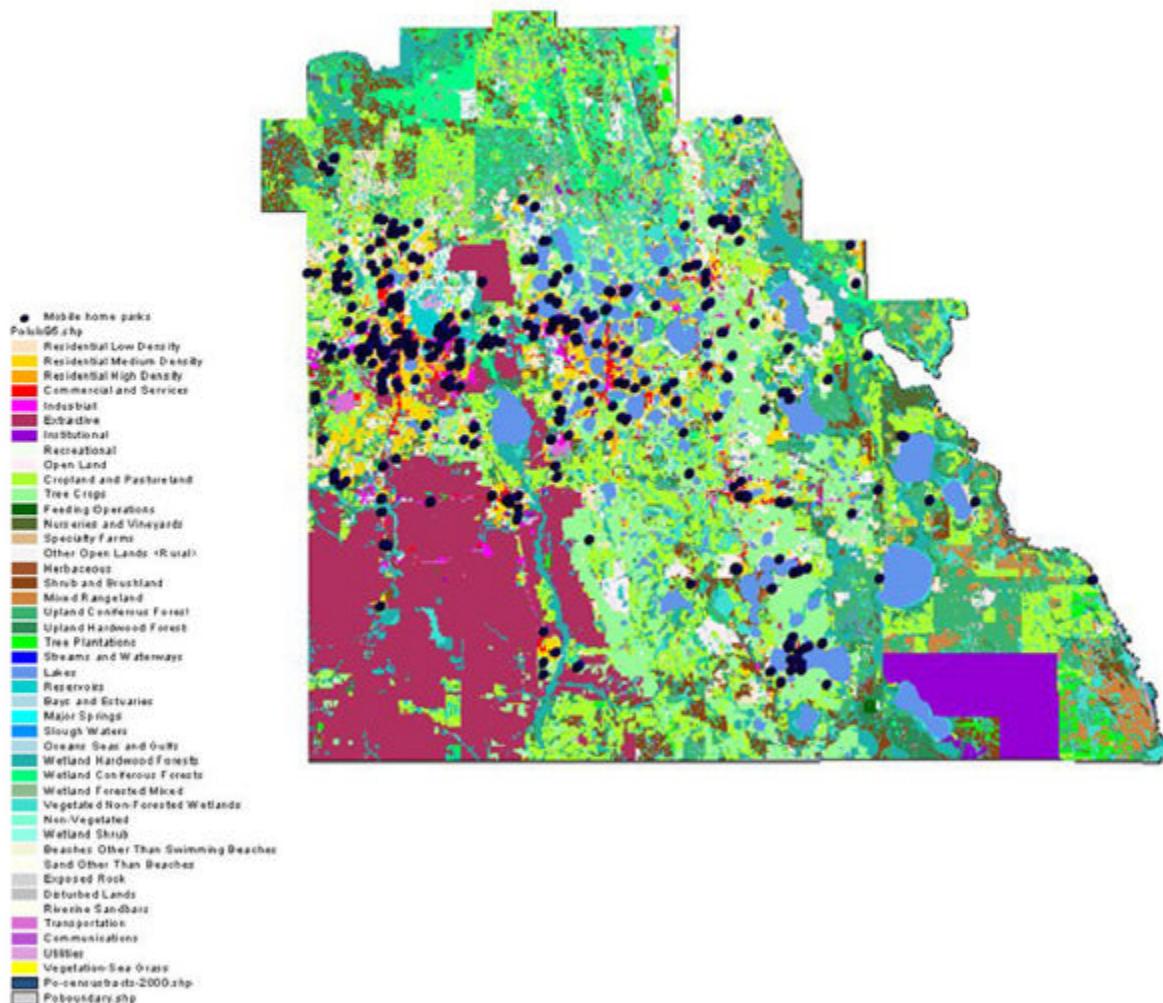


20                    0                    20                    40 Miles

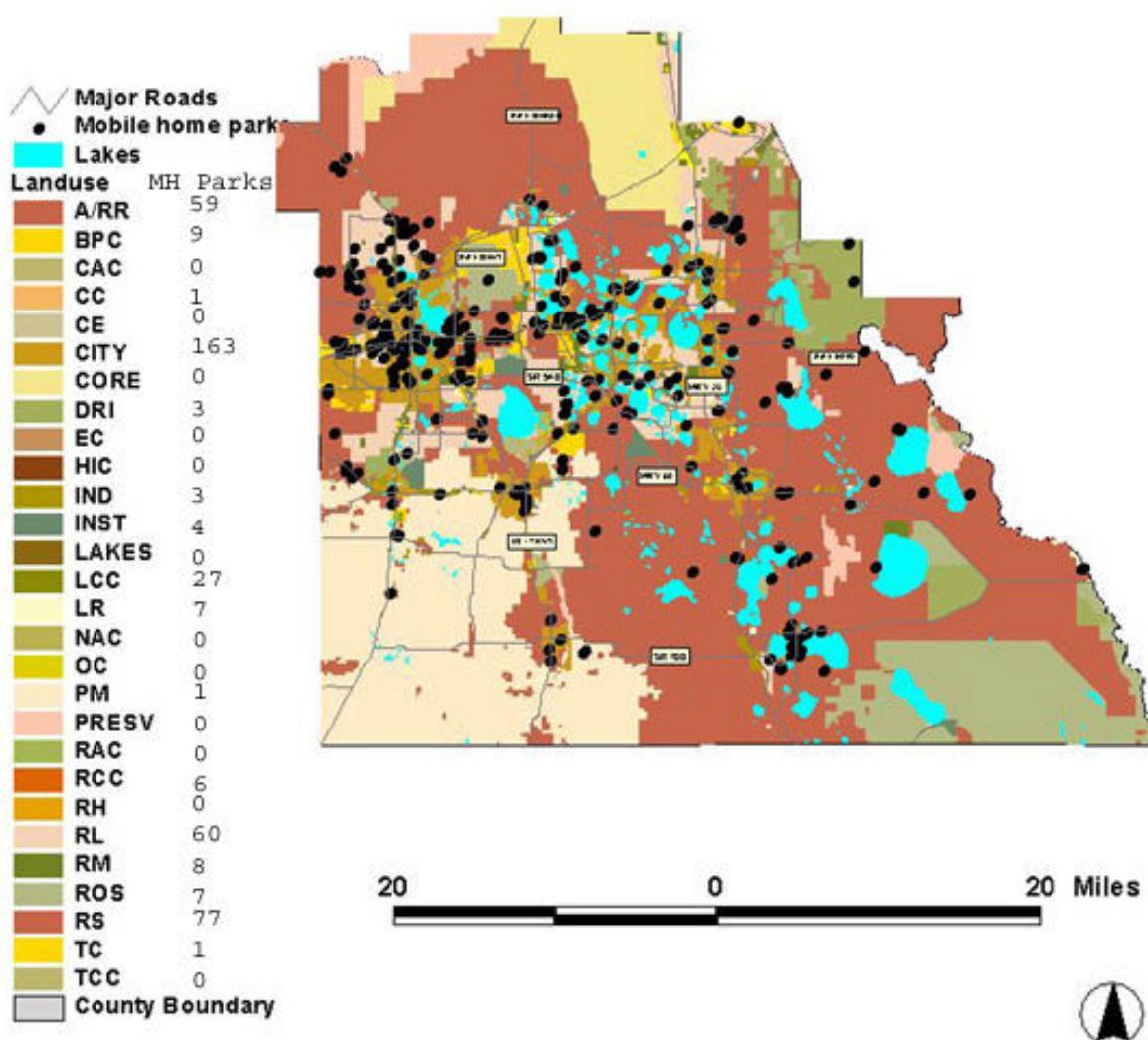
- Lakes
- Mobile home parks
- County Boundary



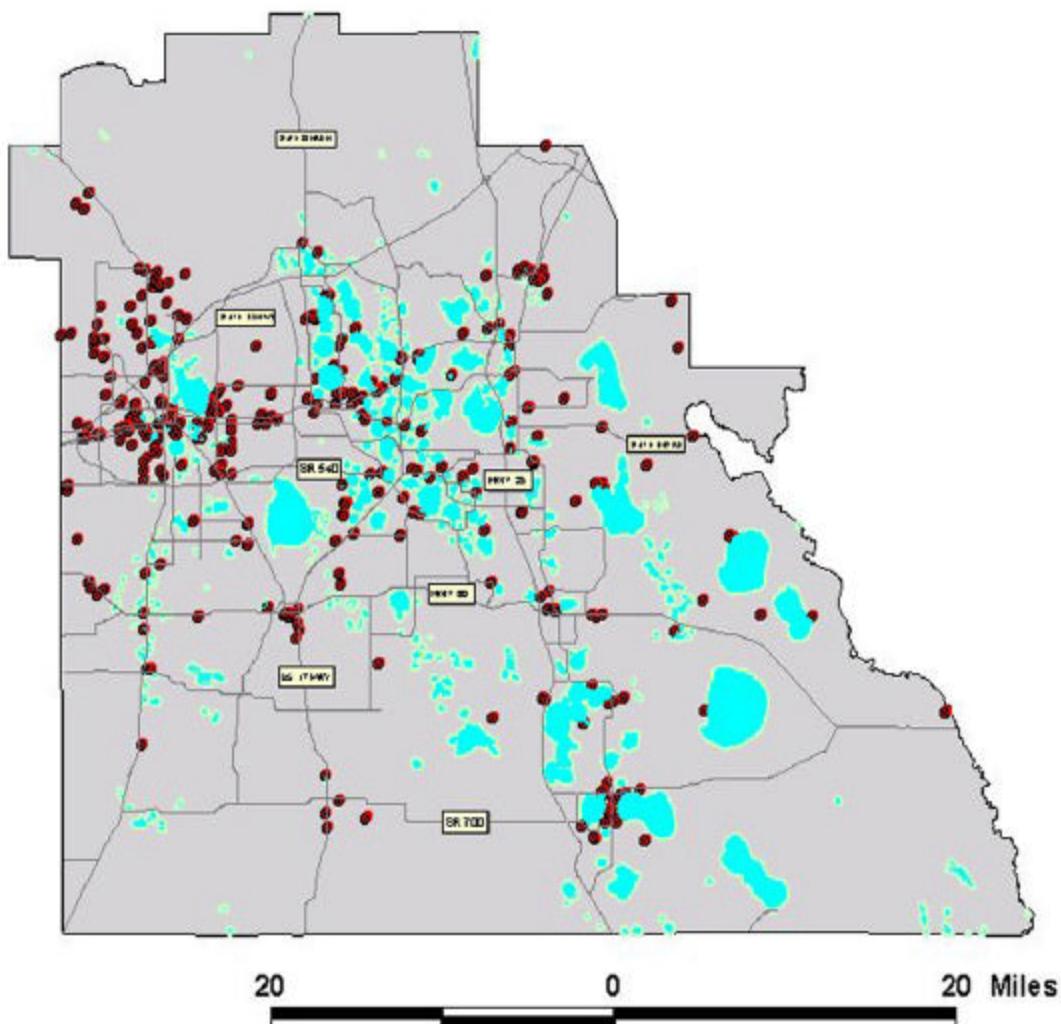
## Polk County Environmental Landuses and Licensed Mobile Home Parks



## Geographic distribution of Licensed Mobile Home Parks and Landuses in Polk County

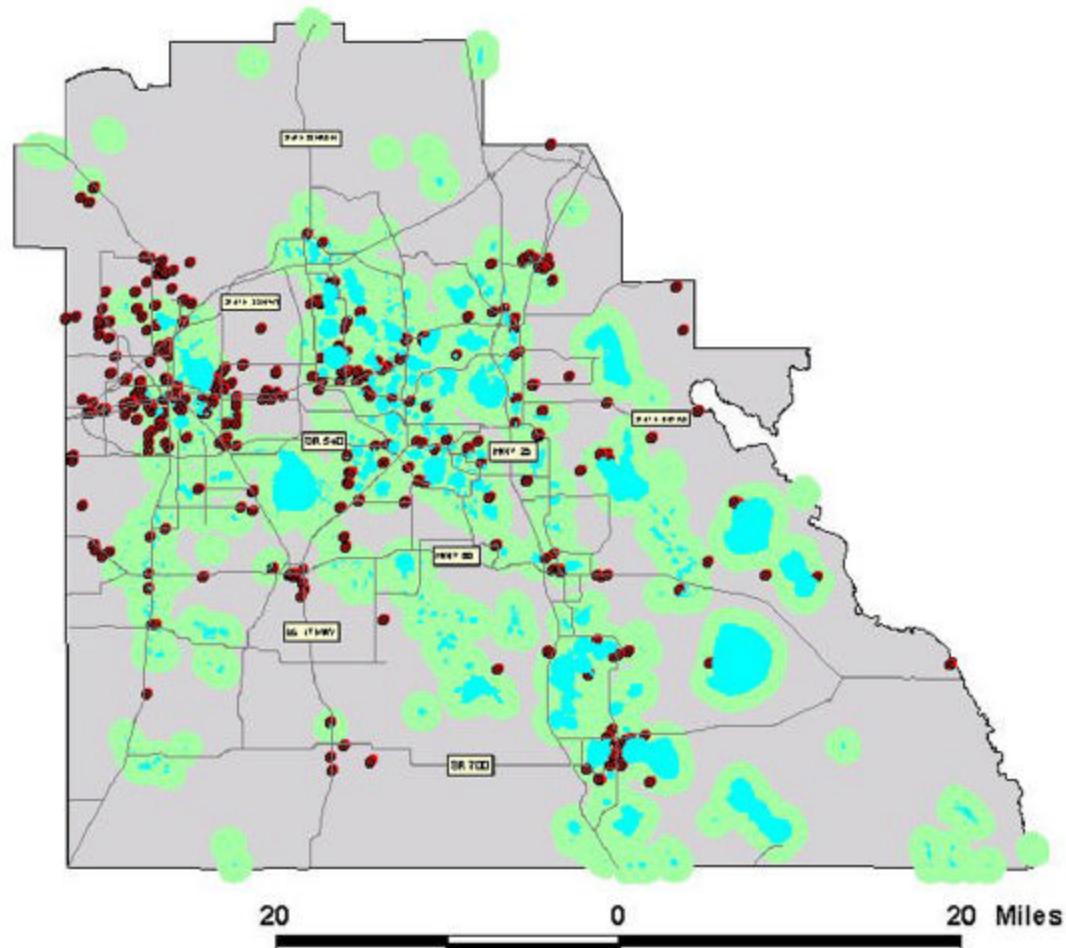


**Number of Licensed Mobile Home Parks  
within a 1000 feet of lakes  
109 out of a total of 503 in Polk County**



- Major Roads
- Lakes
- Mobile home parks
- Buffer 1000 feet
- County Boundary

**Number of Licensed Mobile Home Parks  
within a 5000 feet of lakes  
303 out of a total of 503 in Polk County**



- ▲ Major Roads
- Lakes
- Mobile home parks
- Buffer 5000 feet
- County Boundary



## **Appendix C**

## CASE STUDY REPORT I

Name of Park: Sunshine Village Mobile Home Community

Address of Park: 1234 Reynolds Road, Lakeland, FL 33801

Date Established: Not known.

Number of Living Units in Park: 303

General Description of Living Units: The park has a variety of mobile homes. About 60% of the homes are single wide and the rest are double wide. Some homes have attached carports. Some of the houses also have screened balconies and free standing storage sheds.

Site Size: 12.11 acres

Unit Density: Medium.

Prevalent Dwelling Orientation: 90% of the homes are oriented north-south with the remaining 10% in the east-west direction.

Discernable Site Design: The park is designed on a grid. There are a number of parallel roads, with loops in the center, which run between two major roads. The lots are placed along these roads. The site design doesn't show much respect to the existing lake other than placing the recreational facilities and the amenities close to it.

Sense of Community: Yes. There is a community center with a clubhouse, pool, kid's pool and a Laundromat. There is also a playground and a tennis court. There is a recreational area near the lake where is ideal for picnics and fishing, which increases the interaction between the residents.

Effective Emergency Access and On-Site Communication System(s): The layout of the streets is on a grid, which facilitates the access and navigation of the emergency equipments. There are no dead ends.

Park Demographics: There is a mix of inhabitants in this park. Most of the residents are families with young children. There are also a few retirees and a few elderly singles.

Located in a Flood Hazard Area: Near lake

Typical Floor Height Above Grade: The homes are typically 24-30" above grade.

Park Amenities: The park has laundry facilities, a club house, swimming pools, playground and tennis courts. They also have mail boxes and provide garbage pick ups, water and natural gas.

Existing Buffers: There are almost no effective existing buffers.

Surrounding Context: It is in a very rural area. There are vacant lots on either side of the park. Reynolds road, on which the park is situated, does not carry heavy traffic. There are a lot of lakes around the site. Overall the park setting has a country look.

Level of Maintenance in Park and Surrounding Context: The homes are maintained in a good condition, but they have poorly constructed additions. The roads are well shaded with mature vegetation. A few houses have well maintained front yards.

Outward Signs of Economic Level of Inhabitants and Context: The inhabitants of this park appear to be of moderate income. The homes are well maintained and there is no trash and debris piled up in front of the homes. Only some of the homes have attached carports. A few homes have well tended landscape.

Date of Visit: May 12, 2002



Sunshine Village MHP: Entrance



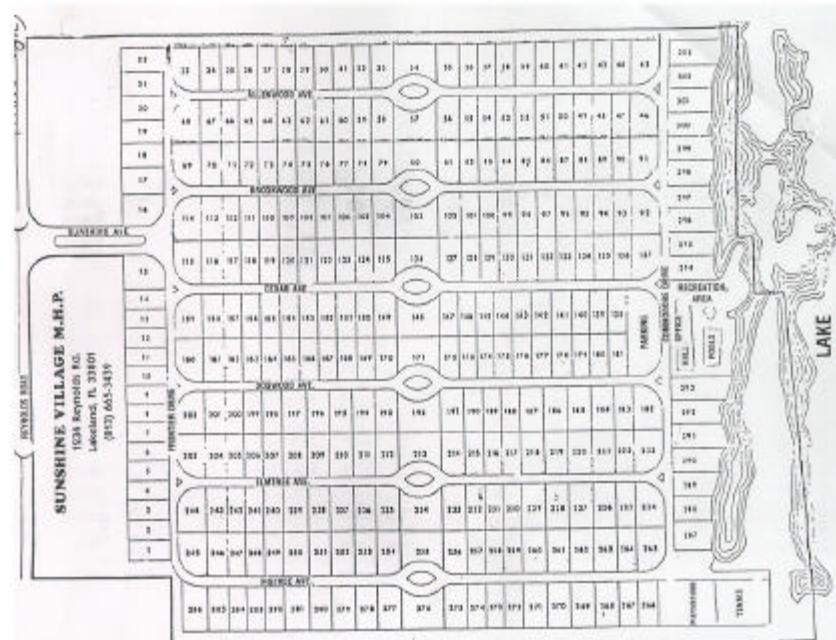
Sunshine Village MHP: Freestanding storage shed



Sunshine Village MHP: Home in poor condition



Sunshine Village MHP: Screened Balcony



Sunshine Village MHP: Layout

## CASE STUDY REPORT II

Name of Park: The Village Lakeland

Address of Park: 448 Oak Ridge Road, Lakeland, FL 33801

Date Established: The first phase was established in 1985, but the fourth phase is relatively new and is established in 2001.

Number of Living Units in Park: 80

General Description of Living Units: Most of the mobile home sin this park are single wide. Almost all the homes have carports. A few of them have screened porches or decks.

Site Size: 11.77 acres

Unit Density: Medium. Wide dwelling lots decrease the density.

Prevalent Dwelling Orientation: Most of the mobile homes are oriented in the east-west direction. A few are oriented north-south.

Discernable Site Design: the park is designed around a single winding road. Hence it is difficult to move through the park. This also divides the park in two sections with each around a loop road. The club house and pool is located in one section and hence more lots are sold from this section. In the other section the lots that are farthest from the club house have trouble being sold.

Sense of Community: Yes. There is a community center with a clubhouse and a pool which helps to increase the interaction between the residents. The importance of this space can be clearly identified by the fact that the lots around this space were the first ones to be sold.

Effective Emergency Access and On-Site Communication System(s): Every home has easy access to the main road. There is no guard gate and the streets are wide enough of the emergency equipments to navigate.

Park Demographics: Approximately 90% are retirees with the rest being young families with children.

Located in a Flood Hazard Area: No

Typical Floor Height Above Grade: The homes are typically 24-30" above grade.

Park Amenities: The park has a club house and a pool.

Existing Buffers: There is a chain link fence on the north, east and west side. There are a few large trees on these sides as well. On the south side there is no buffer and the homes are directly along the Barrington Avenue.

Surrounding Context: The park is located in a rural setting. But there is a lot of development to the south of the park, where the University of South Florida and the Polk County College are located.

Level of Maintenance in Park and Surrounding Context: The level of maintenance in the park is very good. This might due to the fact that the lots are owned by the home owners and are not rented. Hence the homes are taken good care of. The individual yards are well maintained and landscaped. The roads also have a lot of vegetation running along the center.

Outward Signs of Economic Level of Inhabitants and Context: The inhabitants of this park appear to be of moderate income. The families seem to do well as almost all homes have covered carports with drive ways. The cars also seem to be pretty new and well maintained. Most of the homes are well maintained and a few have well tended landscapes areas in their front yards.

Date of Visit: May 12, 2002



Village Lakeland MHP: Entrance



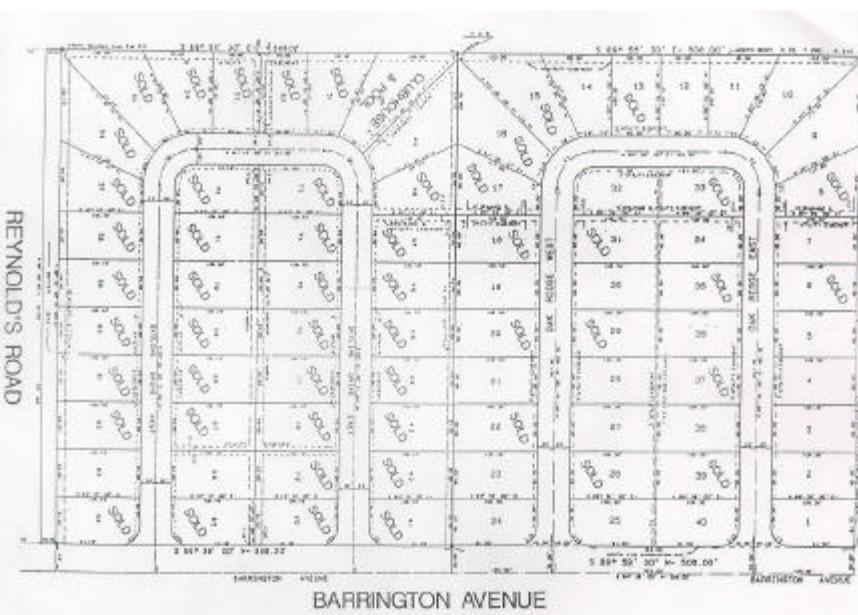
Village Lakeland MHP: Skirting



Village Lakeland MHP: poorly attached awning



Village Lakeland MHP: Buffer on the west side



Village Lakeland MHP: Layout

## CASE STUDY REPORT III

Name of Park: Tower Manor Mobile Home Community

Address of Park: 2604 Saddle Creek Road, Auburndale, FL 33823

Date Established: Not known.

Number of Living Units in Park: 124

General Description of Living Units: All the mobile homes are single wide with poorly constructed attachments. Some homes have attached carports.

Site Size: 6.5 acres

Unit Density: Medium. The units are fairly dense but the open areas of the pond and the water plant reduce the density.

Prevalent Dwelling Orientation: Almost all the units except for a few are oriented in the east-west direction.

Discernable Site Design: Rectilinear. All the units are placed around a loop road.

Sense of Community: There are no common spaces and hence there is no sense of community.

Effective Emergency Access and On-Site Communication System(s): Major roads on the east and west of the park and the rectilinear layout make emergency access easy.

Park Demographics: There are a few retirees and the others are generally young sized families with children.

Located in a Flood Hazard Area: Near lake

Typical Floor Height Above Grade: Typically above 24-30" above grade. The homes near the pond are also at the same height above grade.

Park Amenities: There are no park amenities provided. The central pond could have been developed as a community space, but it is not utilized to its maximum potential.

Existing Buffers: The site has roads on the north and south side. There is a three feet high wooden fencing on all sides of the site. There is mature vegetation along the site boundary. There is no buffer on the east side of the property.

Surrounding Context: Predominantly rural. The park is located in a quiet setting with schools and churches nearby. It is only 2 ½ miles away from the Auburndale city beach.

Level of Maintenance in Park and Surrounding Context: Overall, the level of maintenance appears good. Some units though, show neglect as their skirting is falling apart and the roofs on some need repair. A few older homes are in a very bad shape.

Outward Signs of Economic Level of Inhabitants and Context: The inhabitants of this park appear to be mostly of low to moderate income. There are some newer homes which are well maintained. These homes have attached carports and fairly new, well maintained cars. There are also some homes which show neglect and need repair.

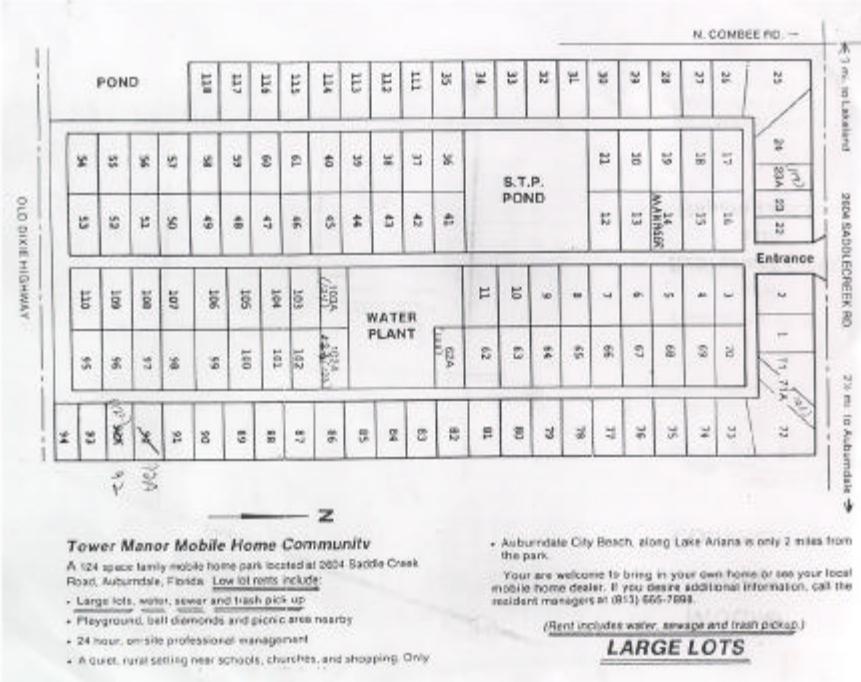
Date of Visit: May 12, 2002



Tower Manor MHP: Entrance



Tower Manor MHP: Large lots provide ample open space



## Tower Manor: Layout



Tower Manor MHP: Poorly constructed awnings and carports



Tower Manor MHP: Mature vegetation acting as a buffer



Tower Manor MHP: Dilapidated skirting



Tower Manor MHP: Skirting in poor condition



Tower Manor MHP: Not many on-site additions



Tower Manor MHP: Home ready to be installed

## **Appendix D**

## **Appendix D**

### **A REVIEW OF MANUFACTURED HOME PARKS CURRENTLY LISTED FOR SALE IN LOCAL PUBLICATIONS (MAY 2002)**

**Chauncey Clearwater Trailer Court**  
2143 Gulf-to-Bay Boulevard  
Clearwater, FL



Age: 1944  
Size: 124,440 sq. ft. (2.85 acres)  
No. of Units: 34  
Price: \$1,375,000

## Newspaper Listings – Tampa/St. Petersburg

OF Apartment Houses		Flow Buy One or All Harper Rity 813-679-2106
<b>'16/24 APTS</b> 06K, 16-\$565K, 24- 10K, 5% fin, 20% ret. Key ERA Rity 376-4075		<b>813-988-8277</b> CLASSIFIED WORKS
<b>e Park/Palma Cela,</b> 16 Units L/1's & (8) very large 7's, totally renovated its, excellent historic occupancy & high rents. Just see inside to fully appreciate. Price re- duced to \$1,195,000		<b>190I</b> Mobile Home Parks For Sale
<b>Rollwood Ar, 132 Units</b> 5 block construction, excellent condition, shed roofs, electronic es, assume w/30% DOWN, \$6300.000 <b>Marcus &amp; Millichap</b> Investment Brokerage Co. (813) 287-9777		<b>190L</b> Warehouses Sale
<b>HYDE PARK-TAMPA</b> Own homes \$400K sants Pay all Utilities Bedrooms, 1½ Bath <b>JME AMERICA REALTY</b> Bekempis CCIM 813-588-8277		Near TIA 50K Sq. Ft. Warehouse on fenced 2.9 acres, A/C, freezer, cooler, distribution. Owner: 229-7951, brks protected. Sale/Lease
		Classified Ads + Prices well within sight. A selection that's just right!
<b>TAMPA</b> 30 space, \$420K-pads, 23-\$300K W/Trailers 28-\$675K W/Trailers • Harvey, ERA Rity 813-376-4075		<b>190M</b> Automotive Real Estate Sale
<b>THONOTOSASSA</b> Well maintained 15 spc. mobile hm pk. Stable tenants, good cash flow. Jack @ 986-3053 Thonotosassa Realty.		AUTO SALES W/3-BAY GARAGE + Shop accessories, Real Estate included 1797 W. Hills Ave. J. Norton, Mark-It Realty 813-988-7200, 610-5344
		<b>1900</b> Retail Stores & Strip Ctrs Sale
		Former Steak&Ale \$1.35M Corner Del Mabry/Waters Hager Noll 813 253-2444 172/173 Coldwell Banker Commercial

SPTimes May 5, 2002

30 Units	\$420,000	Pads
23 Units	\$500,000	Trailers and Pads
28 Units	\$675,000	Trailers and Pads
36 Units	\$900,000	
17 Acres	\$495,000	
24 Units	\$500,000	Location: Valrico

St. Petersburg      41 Units  
                       87,240 sq. ft. (2 acres)  
                       \$1,250,000

St. Petersburg      60 Units  
                       102,000 sq. ft. (2.3 acres)  
                       Age: 1948  
                       \$850,000

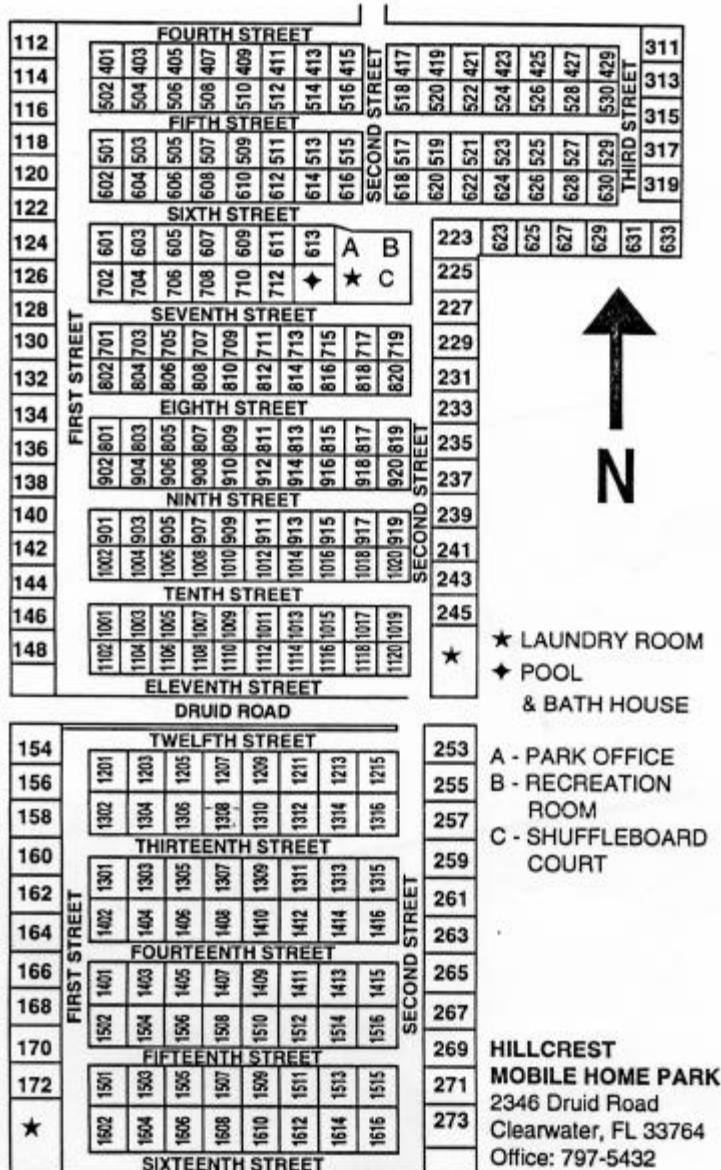
## **Appendix E**

## PARKS VISITED - PINELLAS COUNTY

### SITE I

Hillcrest Mobile Home Park  
2346 Druid St  
Clearwater, FL

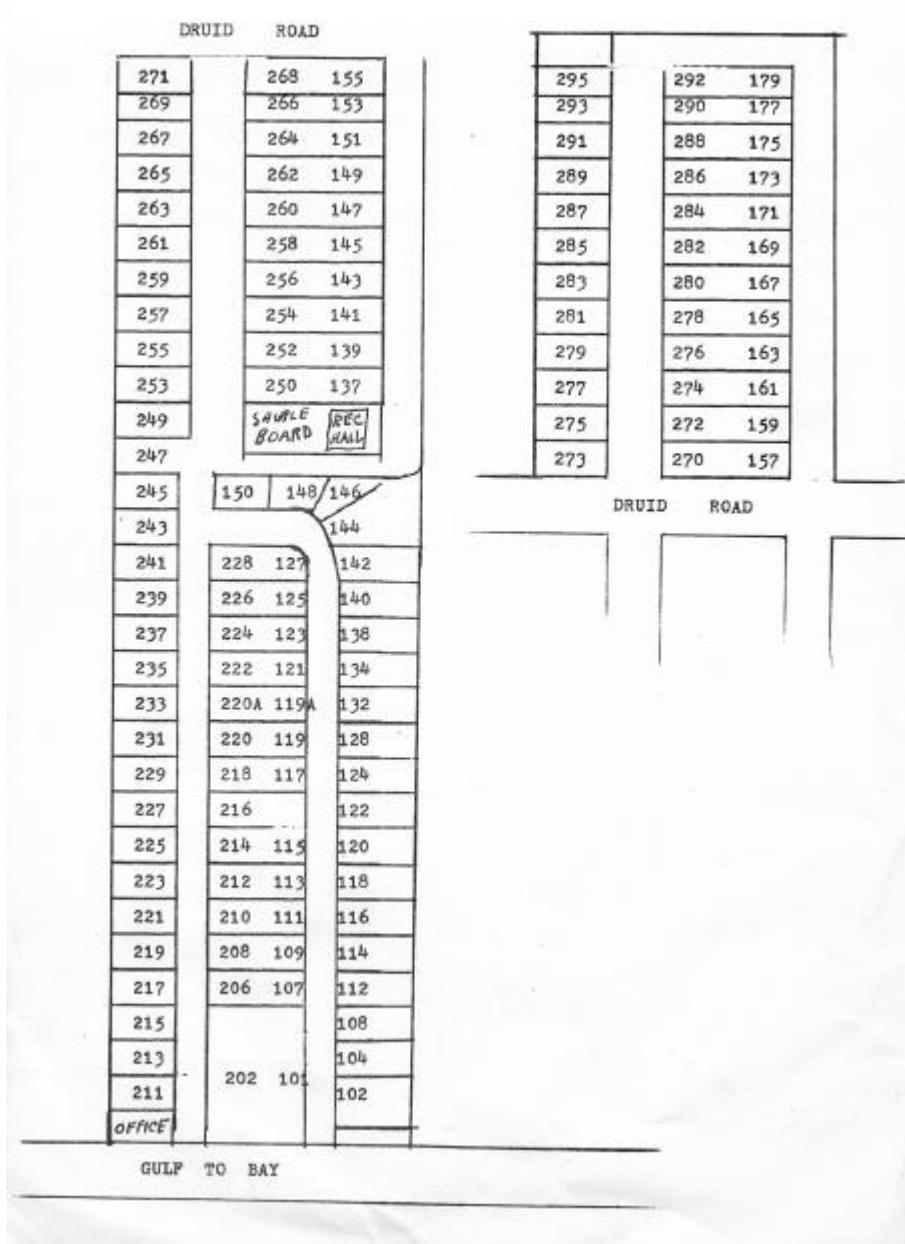
Park Size: 280 Units  
Layout: Grid Format  
Lot Size: 40' X 56'  
Age: circa 1950



**SITE II**

Sunny Grove Mobile Home Park  
2463 Gulf-to-Bay Blvd  
Clearwater, FL

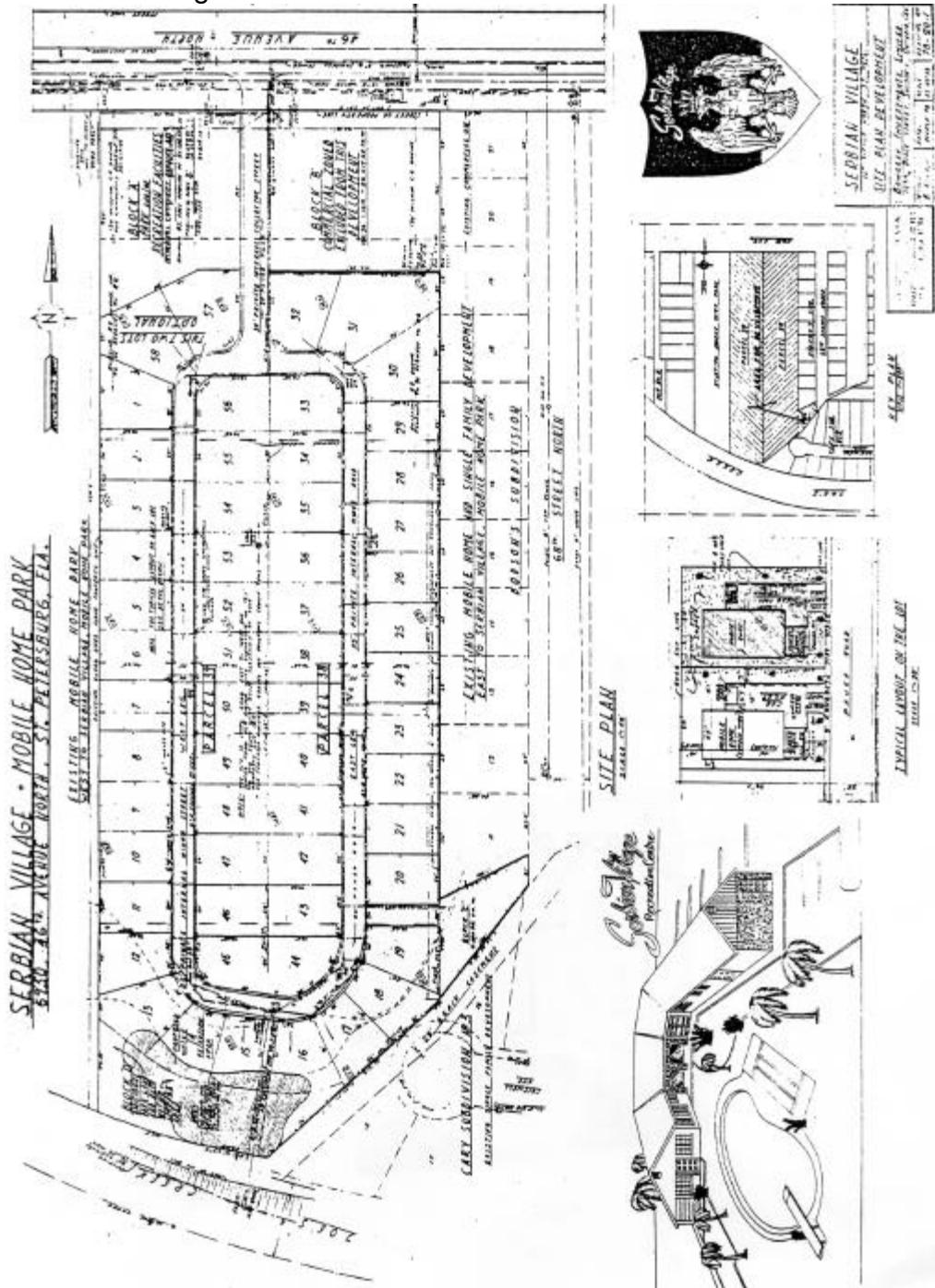
Park Size: 135 (zoned), 110 (available)  
Layout: Grid Format  
Lot Size: 48' x 70'  
Age: 1940's



### SITE III

Serbian Village  
6950 46<sup>th</sup> Ave No.  
St. Petersburg, FL

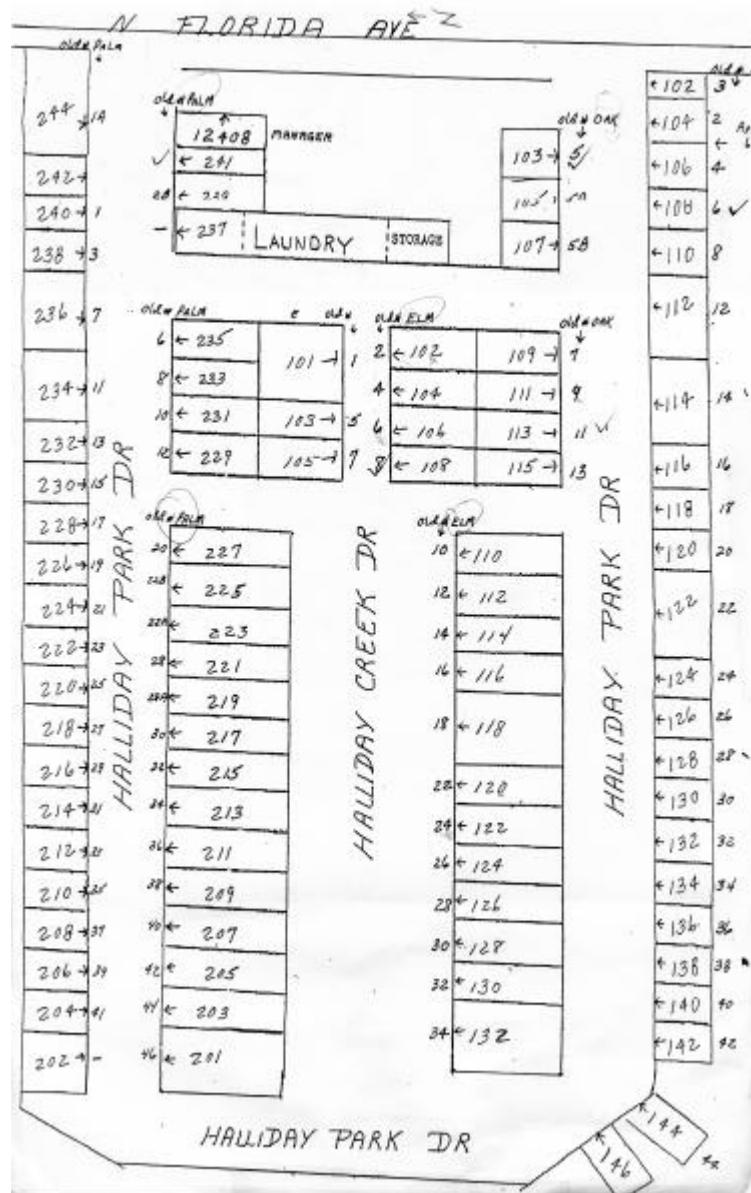
Park Size: 58 Units  
Layout: Single Access with Loop  
Lot Size: 50' X 70'  
Age: 1978



## PARKS VISITED - HILLSBOROUGH COUNTY

**SITE I** Halliday Mobile Home Park  
239 Halliday Park Drive  
Tampa, FL

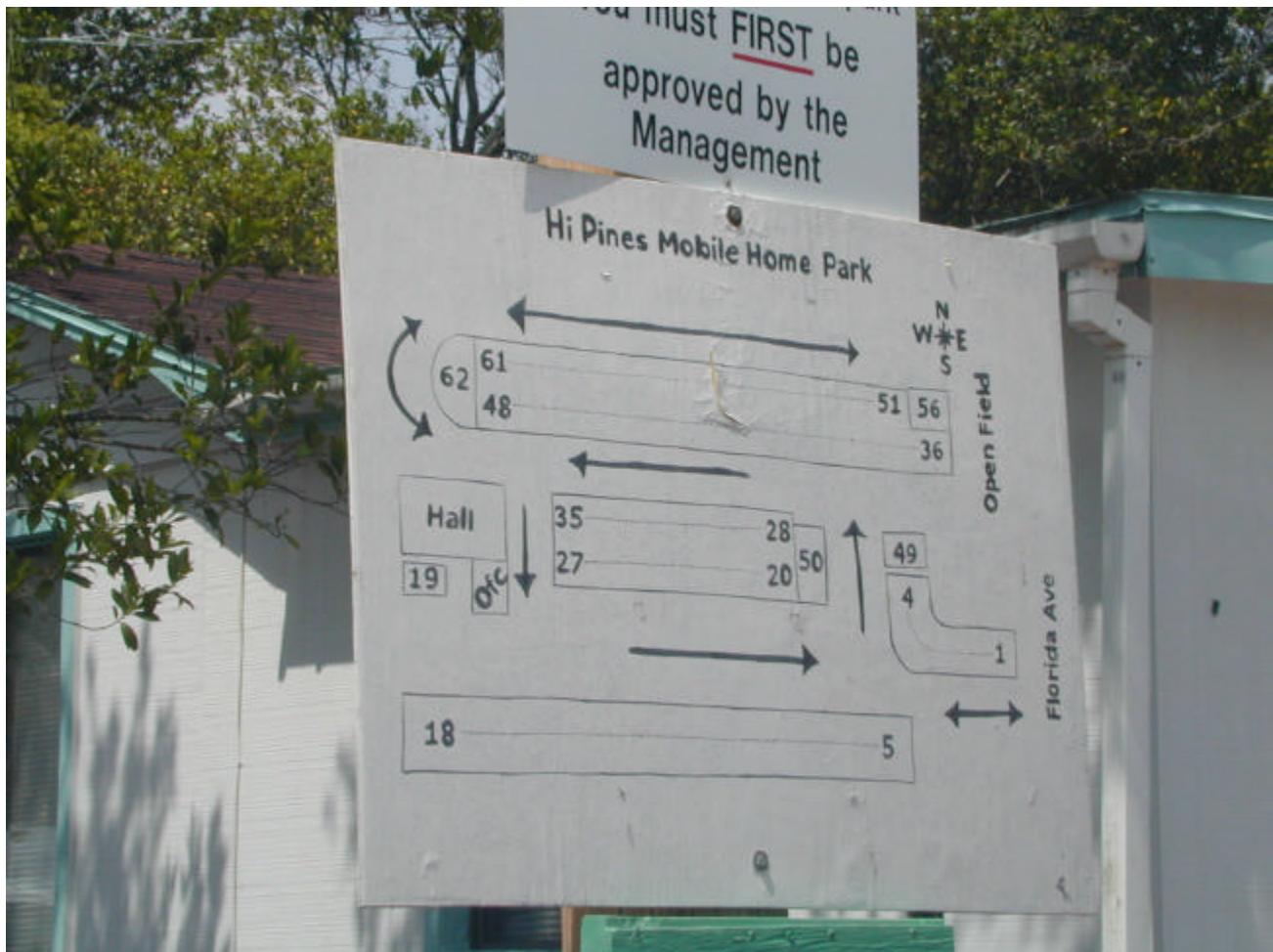
Park Size: 90 Units  
Lot Size: Varies  
Layout: U-Shaped with Grid  
Age: circa 1960



**SITE II**

Hi-Pines Mobile Home Park  
12224 N. Florida Ave  
Tampa, FL

Park Size: 62 Units  
Lot Size: Varies  
Layout: Single Access with Loop  
Age: 1950



### SITE III

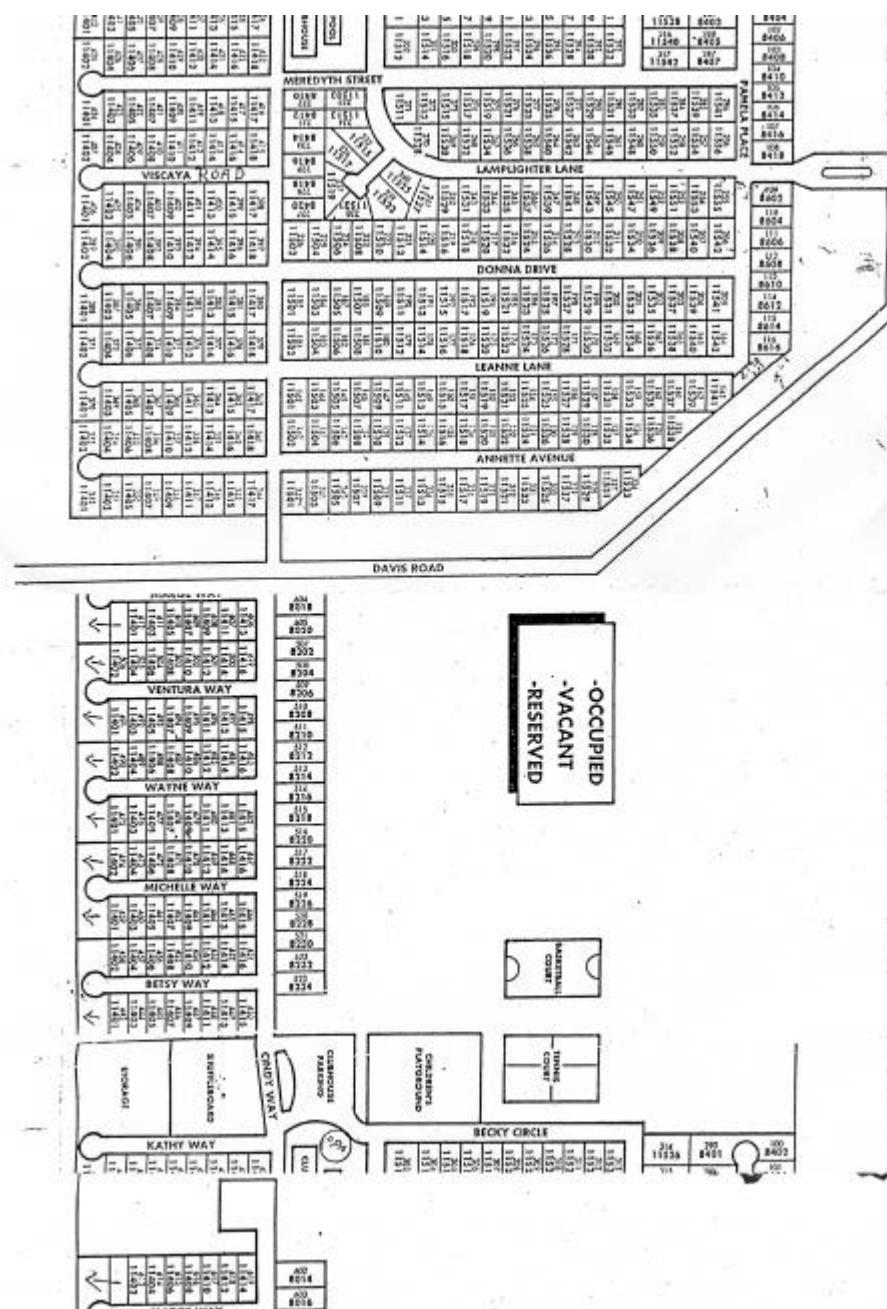
Lamplighter on the River (Figure 13)  
8415 E. Fowler Ave  
Tampa, FL

Park Size: 465 Units

Lot Size: 50' X 90'

## Layout: Arterial with Cul de Sac

Age: 1970

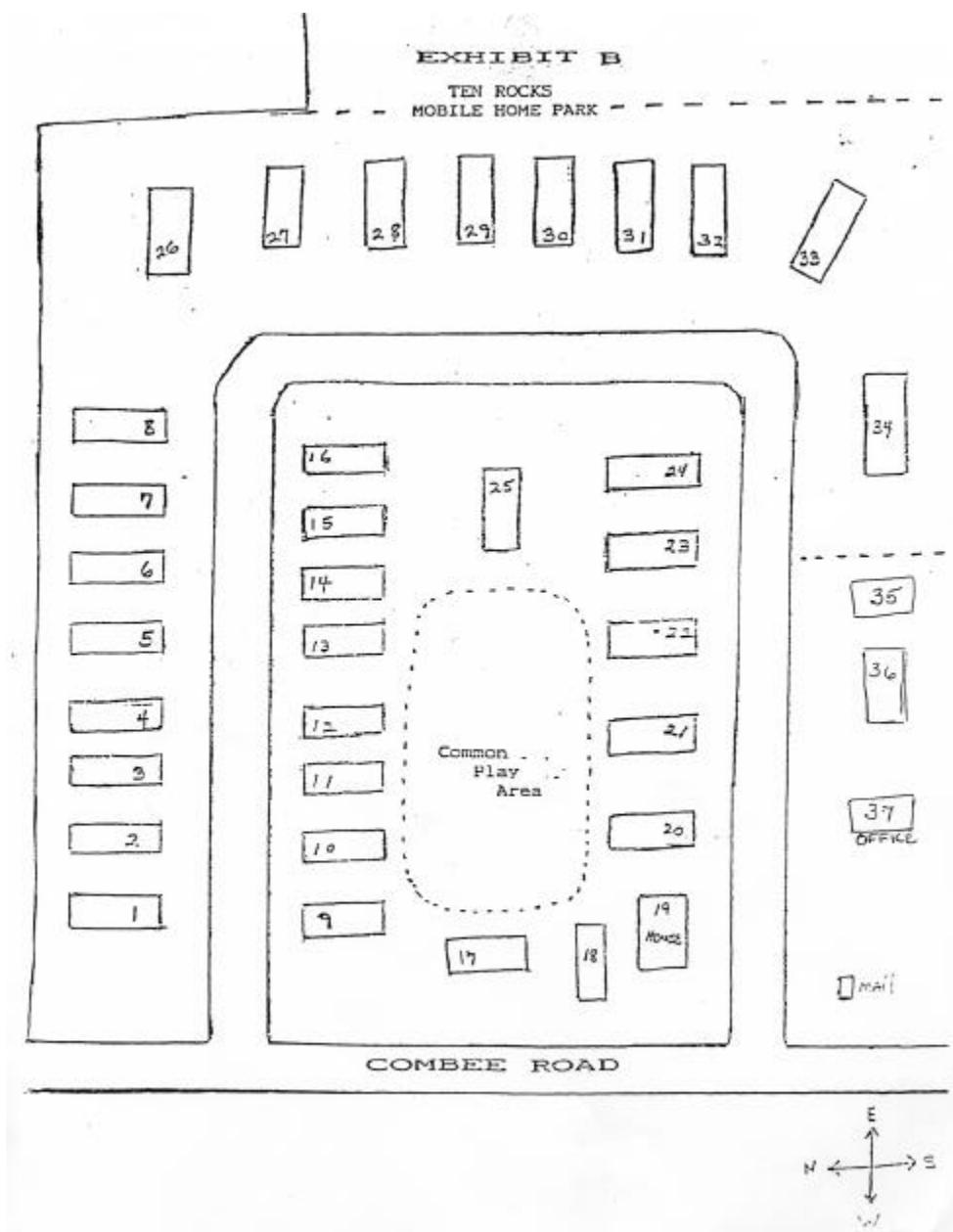


## PARKS VISITED – POLK COUNTY

### SITE I

Ten Rocks Mobile Home Park (Figure 14)  
Combee Road  
Lakeland, Florida

Park Size: 37 Units  
Lot Size: Varies  
Layout: Dual access U-Shaped  
Age: circa 1970



## SITE II

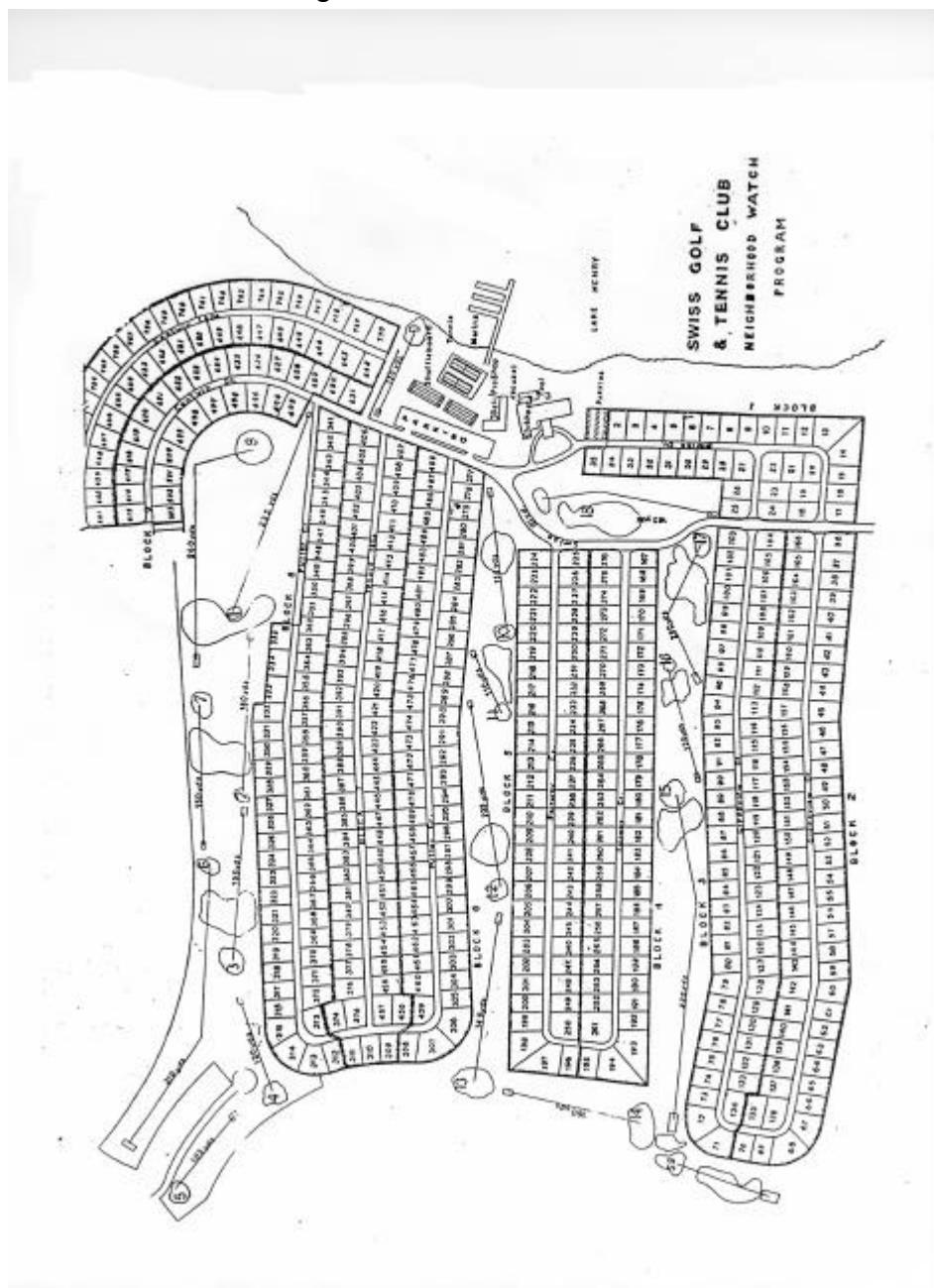
Swiss Golf and Tennis Club  
Swiss Blvd.  
Winter Haven, FL

Park Size: approx. 500 Units

Lot Size: average 50'x90'

**Layout:** Single access with three loops and a crescent; golf course

Age: circa 1980



## **SITE III**

## Central Park of Haines City (Figure 16)

1501 Commerce Av

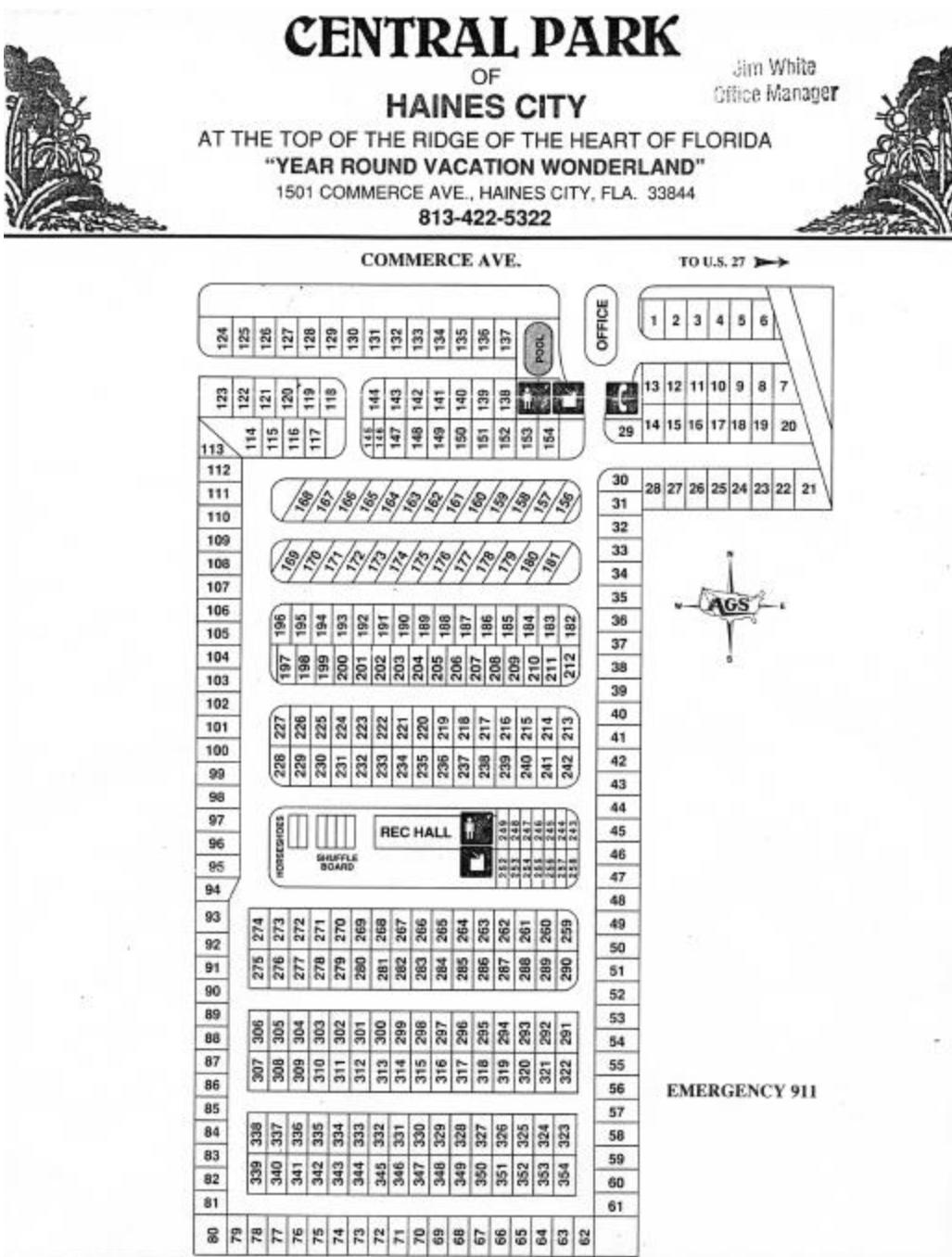
Haines City, FL 33844

Park Size: 354 Units

Lot Size: 50' X 90

## Layout: Grid

Age: 1965



## **Appendix F**

## **INTERVIEW SUMMARY I**

New Ranch Mobile Home Park  
2291 Gulf-to-Bay Blvd  
Clearwater, FL

- ◆ empty lots cannot be used again because they are too small
- ◆ manufactured home dealers arrange the installations and perform the site preparation for new homes – they need to ensure that the manufacturer meets the local building codes and they get the permits, etc.
- ◆ units are placed end-to and crossways-to the lane ways depending on the personal preference of the original resident at the time the home was installed
- ◆ minimal financing is available for manufactured homes. Their purchase is similar to that of a motor vehicle. Ownership transfers are recorded at the Department of Motor Vehicles, not the Land Titles office
- ◆ double-wide units sell much faster than single-wide
- ◆ a dwelling unit price of \$20,000 is much too high for most unit purchasers
- ◆ people would resist joined (attached) units in a duplex or quadruplex configuration – they like their detached proximity to their neighbors
- ◆ if the number of units in a park were increased, the laneways would not be adequate to support the additional traffic and the extra space required for laneway widening would offset any increased density of units themselves by reducing the number of available lots for occupancy
- ◆ increasing density would also result in extra costs for water, sewer, power, cable, and telephone installation

## INTERVIEW SUMMARY II

Sunny Grove Mobile Home Park  
2463 Gulf-to-Bay Blvd  
Clearwater, FL

- ◆ this was a recreational vehicle (RV) park at first, in the 1940's, then converted to a manufactured home park
- ◆ standard lot size is 48' by 70'
- ◆ it is in the City of Clearwater which has a required spacing between units of 10 feet – if it were in Pinellas County (the county in which Clearwater is located) the required spacing between units would be 5 feet
- ◆ for example, a 26' double wide with a 12' carport would be 36' wide, adding for 2 five foot setbacks on each side, the required space (46')is close to the lot width of 48'
- ◆ Clearwater does not allow any RV's in city controlled parks
- ◆ this park has experienced a significant drop off in the past few years due to a decrease in the amount of 'snow birds' from Canada. 5 years ago, the park had a 37% occupancy by Canadians. Now, due to the adverse exchange rate, it has an 8% occupancy. Canadians sold their units when they stopped coming and this put a downward pressure on unit values along with the increased vacancy
- ◆ this park has acquired a number of units by buying owners out or foreclosing on them
- ◆ the park has 300 feet of frontage on the very commercial Gulf-to-Bay Boulevard and it tries to keep ownership of those units itself so as to allow for the sale of the front portion of its property to some other commercial use
- ◆ newer laws have made it easier to eliminate manufacture home parks. The subject park is currently zoned as Residential Low – Medium which would allow it to be rebuilt as a garden apartment complex or easily converted to Commercial Retail
- ◆ the interviewee estimated the value of the park at \$2,500,000 indicating that it generated approximately \$400,000 per annum in gross revenue [This implies a lot rent of approximately \$450 per month per occupied lot]
- ◆ a new 24' by 44' unit to fit on an existing lot would cost \$40,000
- ◆ increasing the density of lots on this park would not be beneficial since there are already vacancies – the park is zoned to allow up to 135 units, there are 110 units and only 75 of these are occupied

- ◆ many homes in this park have market values of \$2,500 - \$7,500
- ◆ the interviewee offered the example of lot #202 which had a double-wide unit on which the interviewee had spent \$8,000 in upgrades in addition to 6 weeks of personal labor. It is currently listed for sale and has not sold (see below)



- ◆ it would not be effective to put in one upgraded \$40,000 unit beside or amongst \$5,000 units, Therefore, the park owner would need to acquire 20 or 30 units at a cost of \$200,000 and replace these with 30 new homes (at \$40,000 each) for a cost of \$1,200,000, and then try to sell these new units in the "improved" neighborhood
- ◆ increasing the density of units would have no appreciable effect on water and sewer costs. The grid layout makes it easy to run additional water lines and extra sewer lines would likely not be necessary

### **INTERVIEW SUMMARY III**

Hillcrest Mobile Home Park  
2346 Druid Road  
Clearwater, FL

- ◆ this park is corporate owned by Chicago-based Manufactured Homes Communities, Inc, a Real Estate Investment Trust (REIT) which owns over 145 communities in the United States, controlling 51,000 individual home sites
- ◆ they were promoting new double-wide units as replacements and had a sales office and model units on site (Figure 18)



- ◆ a new home was observed in the delivery stage (see above)
- ◆ the lot size was measured to be 40' by 56' deep
- ◆ lot services included water, sewer, electric, phone, cable

## **INTERVIEW SUMMARY IV**

Halliday Mobile Home Park, Inc.  
239 Halliday Park Drive  
Tampa, FL

- ◆ age was estimated to by 16 years
- ◆ all lots were rentals, some homes were owned, some were rented
- ◆ standard home width was 14 feet
- ◆ it was observed to be a family park including many young children
- ◆ many homes appeared in a state of poor repair and maintenance
- ◆ one Park Model home was observed on site (Figure 19)



## **INTERVIEW SUMMARY V**

Hi-Pines Mobile Home Park  
12224 N. Florida Ave  
Tampa, FL

- ◆ delivery cost of a different manufactured home was \$3,500
- ◆ units in this park are replaced with newer used units, no brand new units
- ◆ one needed a newer park (e.g. 10 – 15 years old) to be able to financially justify the expense of putting a brand new unit on a lot
- ◆ it is not possible to increase the number of units per park since there are maximums set at the time the park was established
- ◆ there is a bigger market for parks that cater to all ages, but not for smaller units
- ◆ the subject park had 62 units, the value of the average home was estimated to be \$5,000 - \$6,000. The lot rent averaged \$215 per month
- ◆ older people are preferred tenants since they are more stable and keep up the maintenance and landscaping better
- ◆ the interviewee offered the example of a resident who was 90 years old and could still live in the park on her own because of the community feel and the proximity of neighbors. If she had moved to an apartment complex, she would no longer be able to be on her own because of the isolating effect of apartment living
- ◆ seasonal dwellers prefer parks because they know that their assets are being looked after even while they are away

## **INTERVIEW SUMMARY VI**

Lamplighter on the River  
8415 E. Fowler Ave  
Tampa, FL

- ◆ standard lot size was 50' by 90'
- ◆ zoning laws prohibit increasing density unless the park itself gets larger
- ◆ in upscale parks, residents are more willing to change out and upgrade their units
- ◆ the older unit is usually traded in. In essence, the resident moves to a new unit on a new lot in the same park and leaves the old unit on the old lot as a trade-in

## **INTERVIEW SUMMARY VII**

Realtor: Rainbow Mobile Home Sales  
36227 US 19  
Palm harbor, FL

- ◆ interviewee lives on a 60' by 90' freehold lot in a deed-restricted community. Therefore there is no risk of the manufactured home being replaced by permanent single family structure (see below)



- ◆ people in that park will readily change out their units for newer ones (see below))



**Figure 20**

- ◆ as an agent, the interviewee would only handle sales of manufactured homes in parks built in the 1970's and newer because of the larger lot sizes
- ◆ garden apartments are not a substitute for manufactured home housing because there is a completely different quality to the living experience
- ◆ the agent felt that it may be time for the older parks in south Pinellas county to close and change out to different business uses

## **Field Study: Information Dispersal by County Officials – Installation of Mobile Homes**

The goal of this field study was to ascertain pertinent information on procedures that persons would follow when pursuing a residential installation of a mobile home into a mobile park or on a private residential lot.

As a first step, the municipalities in each county were determined. Once a list was developed for each county, a variety of methodologies were used to determine which municipalities allowed mobile homes within their city limits. First, using <http://www.municode.com>, online municipal codes were analyzed. When the municipal code online was not available, municipalities were faxed information requests. If the municipality did not furnish the information after the fax, phone calls were made to the municipality.

Miami-Dade County has 27 municipalities. In addition, large residential areas are also in unincorporated locations. Of the 27 municipalities, 17 do not allow mobile homes in their municipality. Of the ten municipalities that do accept mobile homes, five appear to allow mobile homes in both mobile home parks and on private lots. The remaining five only allow mobile homes in existing mobile home parks or subdivisions. (See appendix for examples of municipal codes allowing and not allowing mobile homes within municipality.) In addition to the 10 municipalities that allow mobile homes, the area considered unincorporated Miami-Dade also allows mobile homes in both parks and on private lots.

The majority of municipalities in Broward County appear to allow mobile homes. Of the 30 municipalities, we have found only one that does not allow mobile homes. Of the remaining, 12 allow mobile homes only in existing mobile home parks or subdivisions. None allow mobile homes on private lots. Information for the remaining eight municipalities was not readily available. (Examples of municipal code for Broward County municipalities can be found in the Appendix)

For those municipalities that did not have their municipal code online, phone calls were made to ascertain the status of mobile homes in the city. On calling the building department to find out what the status of mobile homes in the municipality, researchers tended to be transferred from the building department to the zoning section. Information from the phone calls and municipal codes establish that municipalities in these counties have tangible guidelines that govern areas that accept mobile homes.

Once it was established which municipalities accept mobile homes, researchers attempted to ascertain municipal installation guidelines. To do this, researchers posed as mobile home owners who wished to install a mobile home in a specific community, and called city building departments to determine what the guidelines were to do so in that municipality.

On the whole, when posing as a potential mobile home resident in the municipality, researchers tended to get confusing and unclear information. In many municipalities no one was quite sure which department would have the information. Considerable time was spent being switched from one department to the next.

Below are some examples of responses:

- Not sure of the mobile home requirements
- Referred the interviewer to the South Florida Building Code
- General contractor will know that to do
- Need a general contractor to install
- Mobile park operator will give the necessary information for installation

The most common responses were to make reference to the South Florida Building Code or defer to a general contractor. Those who referred to a general contractor did not make mention that the contractor needs to be certified to install mobile homes. Because most mobile homes are in mobile home parks, it appears that municipalities

feel comfortable deferring to the parks. Often the suggestion was that the person who wants to install a mobile home in the community should contact the park in which they would like to live to find out any pertinent information. While it may be accurate that the park would have most of the information, it was troubling that the municipalities, on the whole, were not prepared to furnish appropriate information to the public. On a positive note, some municipalities have taken a very proactive approach in regards to installation. But this seems to be more the exception than the rule.

**ANALYSIS OF  
MIAMI-DADE COUNTY  
MOBILE HOME POLICIES  
BY  
MUNICIPALITY**

<b>Municipalities</b>				<b>DO NOT Allow</b>	<b>LEGAL BASIS</b>
	<b>Allow</b>	Park	Individual	Both	
Dade county			X		Chapter 19 Dade Ordiances
City of Aventura				X	Sec. 30-167 (2)
Bal Harbour Village				X	Sec.19-5 CODE OF ORDINACES
Bay Harbor Islands				X	Sec.19-32 CODE OF ORDINACES
Biscayne Park				X	Sec. 3.4. (a) FLD
Coral Gables				X	Sec. 21-1 Z.C.
Village of El Portal			X		Chapter 12 - Z.C.
Florida City	X *				Sec. 34.67 (c) Z.C.
Golden Beach	X *				Sec. 62-67(c) Z.C.
Hialeah	X				Sec. 58-68 Z.C.
Hialeah Gardens	X *				Sec. 42-26 Z.C.
Homestead	X *				Sec. 6- 305 (b)( c) /
Indian Creek Village				X	DOES NOT HAVE RESIDENTIAL MOBILE HOME IN ITS CODE. - " SMALL ISLAND"
Key Biscayne				X	Sec.30-100 (4)(10)/ Sec. 30-113.
Medley		X			Sec. 38-56 Z.C.
Miami City			X		Sec. 920:1 Z.C.
Miami Beach			X		Sec.54-92 (1)(2)(3) Z.C.
Miami Shores			X		DOES NOT HAVE RESIDENTIAL MOBILE HOME IN ITS CODE.
Miami Springs			X		Sec. 150.009 - Z.C.
North Bay Village			X		not clearly found
North Miami Beach				X	Sec. 29-15(a)/ (e)(1) - Z.C.
Opa-Locka			X		Sec. 5.7 (a)(b) Z.C.
Pinecrest			X		Sec. 30-82 Z.C.
South Miami			X		DOES NOT HAVE RESIDENTIAL MOBILE HOME IN ITS CODE.
Sunny Isles Beach			X		DOES NOT HAVE RESIDENTIAL MOBILE HOME IN ITS CODE.
Surfside			X		DOES NOT HAVE RESIDENTIAL MOBILE HOME IN ITS CODE.
Sweetwater			X		2.04.07 LDC
Virginia Gardens			X		Sec. 8.5-5 (4)
unincorporated Miami Dade			X		REGULATED BY DADE COUNTY

\* - only in existing manufactured ( mobile) home parks or subdivision.

**MIAMI-DADE COUNTY**  
**Examples of Mobile Home Related**  
**Municipal Code**

Miami-Dade County

**PART III CODE OF ORDINANCES**

Chapter 11C DEVELOPMENT WITHIN FLOOD HAZARD DISTRICTS\*

Sec. 11C-5. Development within Special Flood Hazard (SFH) Areas.

- a) No new construction or substantial improvement of any residential structure or manufactured home shall be permitted in SFH Areas, and no building permit referred to in Section 11C-3 of this chapter shall be issued therefore, unless said new construction or substantial improvement has the lowest floor (including basement) elevated to or above the level of the regulatory flood (100-year flood). Electrical, plumbing and other attendant utilities are prohibited below the base flood elevation.
- b)
- c) All manufactured homes placed, or substantially improved, on individual lots or parcels, in expansions to existing manufactured home parks or subdivisions, and in new manufactured home parks, shall meet all of the requirements for new construction, including elevation and anchoring.
- d) All manufactured homes placed or substantially improved in an existing manufactured home park or subdivision shall be elevated so that:
  - 1) The lowest floor of the manufactured home is elevated no lower than the level of the base flood elevation; or
  - 2) The manufactured home chassis is supported by reinforced piers or other foundation elements of at least an equivalent strength, of no less than thirty-six (36) inches in height above grade.
  - 3) The manufactured home shall be securely anchored to the adequately anchored foundation system to resist flotation, collapse and lateral movement.
  - 4) In an existing manufactured home park or subdivision in which a manufactured home has incurred "substantial damage" as the result of a flood, any manufactured home placed or substantially improved shall meet the standards of Section 11C-5(d)(1) and (3).
- g) Floodways. Located within areas of special flood hazard are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of floodwaters which carry debris and potential projectiles and has erosion potential, the following provisions shall apply:
  - 3) Prohibit the placement of manufactured homes (mobile homes), except in an existing manufactured home (mobile home) park or subdivision. A replacement manufactured home may be placed on a lot in an existing manufactured home park or subdivision provided the anchoring standards of Section 11C-5(c) and (d) and the elevation standards of Section 11C-5(a) are met.

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Aventura

**PART II CODE OF ORDINANCES**

Chapter 30 ENVIRONMENT\*

ARTICLE IV. FLOODS

DIVISION 2. FLOOD DAMAGE PREVENTION

Sec. 30-164. Definitions.

Manufactured home (trailer) shall mean a structure, transportable in one or more sections, which is built on a permanent chassis and designed to be used with or without a permanent foundation when connected to the required utilities. The term

manufactured home does not include a recreational vehicle; however, park trailers, travel trailers, and similar transportable structures placed on a site for 180 consecutive days or longer shall be regulated as manufactured homes.

New manufactured home park or new manufactured home subdivision shall mean a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of this division.

Sec. 30-167. Provisions for flood hazard reduction.

Residential construction. New construction or substantial improvement of any residential building (or manufactured home) shall have the lowest floor, together with all mechanical and electrical equipment, including duct work, and including any basement, elevated no lower than the base flood elevation. Should solid foundation perimeter walls be used to elevate a structure, openings sufficient to facilitate the unimpeded movements of flood waters shall be provided in accordance with standards of section 30-167(b)(3). The floor of an attached garage may be placed below the base flood elevation, provided the openings required in section 30-167(b)(3) are installed and all mechanical and electrical equipment, including laundry facilities and food freezers, are elevated above the base flood elevation.

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**SURVEY REONSE- THE CITY OF AVENTURA DOES NOT HAVE RESIDENTIAL MOBILE HOME  
(TRAILLERS) INSTALLATION REQUIREMENTS IN THE CODE.**

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Bal Harbour

**PART II CODE OF ORDINANCES**

**Chapter 19 TRAFFIC AND MOTOR VEHICLES\***

Sec. 19-5. Parking and storage of campers, *trailers*, boats.

The parking, storage or keeping of any bus, camp car, camper, motor home, house trailer, hearse, or any vehicle or part of a vehicle designed or adapted for human habitation, by whatever name known, whether such vehicle is moved by its own power or power supplied by a separate unit, or of any boat or watercraft of any kind, or boat trailer, for a period of more than four hours, upon any public or private property within the residential districts of the Village shall be deemed a nuisance; provided, however, that boats or boat trailers not exceeding 22 feet in length may be kept if they are fully enclosed within the confines of a garage or if they are parked within the rear yard area of an improved lot and fully screened from view from the adjoining properties.

(Code 1974, § 12-23)

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**Bay Harbor Islands**

FLORIDA Codified through Ord. No. 668, enacted Aug. 14, 2000. (Supplement No. 2

**PART II CODE OF ORDINANCES**

**Chapter 19 TRAFFIC\***

**ARTICLE II. PARKING\***

**DIVISION 2. TRUCKS, TRAILERS, COMMERCIAL VEHICLES, EYESORE VEHICLES, BOATS, MOBILE HOMES, STRETCHED-OUT VEHICLES, BUSES AND TR**

Sec. 19-32. Time limit for trailers, mobile homes, stretched-out vehicles and buses.

It shall be unlawful for any person to park any trailer, mobile home, stretched-out vehicle, or bus at any place in the town at any time with the following exceptions:

- (b) A boat trailer, a house trailer, or a mobile home may be parked for any period of time, providing the entire trailer together with boat, or house trailer, or mobile home does not exceed ten (10) feet in height from the ground and does not exceed thirty (30) feet in length, providing it is not parked on any public thoroughfare or property owned by the town, and providing it is enclosed in such a manner so that it is not visible from adjoining property or any public thoroughfare in the town.
- 

### Coral Gables

FLORIDA Codified through Ord. No. 3489, adopted Sept. 26, 2000. (Supplement No. 4)

#### ARTICLE 21. MISCELLANEOUS STANDARDS, REQUIREMENTS AND RESTRICTIONS.

Sec. 21-1. Exterior walls--Material and color.

All exterior walls of buildings shall be constructed of concrete, glass block, poured concrete, stone, hollow tile, coral rock or clay brick providing, however, that in areas zoned for C and M-Uses porcelain enamel panels, metal panels, pebble-faced block, pebble-faced panels, precast panels and architectural concrete may also be used for exterior walls of buildings designed and used for commercial purposes with the express condition that such materials are approved by the Board of Architects, the Building Official and Structural Engineer. All exterior masonry surfaces shall be stuccoed and painted excepting those of coral rock, stone, glass, clay brick, slump brick, pebble-faced block, pebble-faced panels, precast panels, and architectural concrete. Sunscreens on commercial buildings may be constructed of masonry, metal, glass or plastic where such materials are located in a metal or masonry frame providing that such sunscreens shall be subject to approval by the Board of Architects for architectural design. All exterior coloring shall be approved by the Board of Architects.

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### Florida City

#### PART II CODE OF ORDINANCES

Chapter 34 FLOODS

#### ARTICLE II. FLOOD DAMAGE PREVENTION\*

#### DIVISION 3. FLOOD HAZARD REDUCTION

Sec. 34-67. Specific standards.

c. Prohibit the placement of manufactured homes (mobile homes), except in existing manufactured homes (mobile homes) parks or subdivisions. A replacement manufactured home may be placed on a lot in an existing manufactured home park or subdivision, provided the anchoring standards of section 34-66(2), and the elevation standards of section 34-67(1) and the encroachment standards of subsection (b)(5)a. of this section are met.

#### PART II CODE OF ORDINANCES

Chapter 62 ZONING\*

#### ARTICLE II. ADMINISTRATION

#### DIVISION 3. USES

Sec. 62-66. Nonconforming uses.

- (e) Damage. Any building which does not conform in use, occupancy or construction, or in some other way, with the provisions of this chapter (such structure, use or occupancy, having existed prior to the adoption of these regulations) which becomes damaged as to roof and/or structure

to an extent of 50 percent or more of its reasonable market value at the time of the damage, by fire, flood, explosion, wind, war, riot or any other act of God or man, shall not be reconstructed or used or occupied as before such damage, but, if damaged to an extent of less than 50 percent of the reasonable market value at the time of the damage, the building may be reconstructed or used as before, provided such reconstruction is completed or such use is started within six months of the date of such damage. It is specifically provided that mobile home parks in which more than one-half of the actual structure, i.e., mobile home, are destroyed as to roof and/or structure to an extent of 50 percent or more of the reasonable value of the structures at the time of the damage, shall not be reconstructed or used or occupied as before such damage.

## PART II CODE OF ORDINANCES

### Chapter 62 ZONING\*

#### ARTICLE III. DISTRICT REGULATIONS

##### DIVISION 2. RESIDENTIAL DISTRICTS

Sec. 62-149. RT, residential mobile home/recreation vehicle district.

Sec. 62-149. RT, residential mobile home/recreation vehicle district.

- (a) Purpose and intent. The purpose and intent of this RT, residential mobile home/recreation vehicle district is to provide suitable sites for the development of well-planned, environmentally compatible mobile home and recreation vehicle parks in areas consistent with the city's adopted comprehensive development master plan.
- (b) Uses permitted. Permitted uses are as follows:
  - (1) Mobile home residential parks
  - (4) Mobile home and recreation vehicle park accessory uses; and
  - (5) Family day care and after school care for children subject to the conditions and requirements enumerated in section 62-274 and located only in residential mobile home parks or permanent residential dwellings.
- (c) Site development standards. Site development standards are as follows:
  - (1) Maximum density, ten dwelling units per net acre.
  - (2) Minimum site area, ten acres.
  - (3) Minimum site width, 300 feet.
  - (4) Minimum yard setbacks:
    - (1) Maximum building height, two stories or 25 feet.
    - (2) All mobile home and recreation vehicle park site plans shall be approved by the city commission, after public hearing, pursuant to section 62-69.

(Ord. No. 80-14, § 8, 11-25-80; Ord. No. 90-09, § 8, 11-27-90; Ord. No. 98-03, 11-10-98)

#### ARTICLE IV. SUPPLEMENTARY DISTRICT REGULATIONS\*

##### DIVISION 2. USES

Sec. 62-273. Mobile homes and commercial vehicles.

Sec. 62-273. Mobile homes and commercial vehicles.

- a) Any area in which mobile homes are parked shall require a license from the city and from the state. The parking of mobile homes used for sleeping quarters shall not be permitted in any except an R-T, residential mobile home/recreation vehicle zone.
- b) Commercial vehicles shall not be parked overnight in any R residential zone.

(Ord. No. 80-14, § 20, 11-25-80)

Sec. 34-66. General standards.

- (5) Manufactured homes shall be anchored to prevent flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-

top or frame ties to ground anchors. This standard shall be in addition to and consistent with applicable state requirements for resisting wind forces.

Sec. 34-67. Specific standards.

- (4) Standards for manufactured homes and recreational vehicles. Standards for manufactured homes and recreational vehicles shall be as follows:
  - a. All manufactured homes placed, or substantially improved, on individual lots or parcels, in expansions to existing manufactured home parks or subdivisions, or in substantially improved manufactured home parks or subdivisions, must meet all the requirements for new construction, including elevation and anchoring.
  - b. All manufactured homes placed or substantially improved in an existing manufactured home park or subdivision must be elevated so that:
    1. The lowest floor of the manufactured home is elevated no lower than nine feet above the level of the base flood elevation.
    2. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least an equivalent strength, of no less than 36 inches in height above grade.
    3. The manufactured home must be securely anchored to the adequately anchored foundation system to resist flotation, collapse and lateral movement.
    4. In an existing manufactured home park or subdivision on which a manufactured home has incurred substantial damage as the result of a flood, any manufactured home placed or substantially improved must meet the standards of subsection (4)b.1 and (4)b.2 of this section.

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**Golden Beach**

PART II CODE OF ORDINANCES

Chapter 62 FLOODS

ARTICLE II. FLOOD DAMAGE PREVENTION\*

DIVISION 3. FLOOD HAZARD REDUCTION

Sec. 62-67. Specific standards.

- c. Prohibit the placement of Manufactured Homes (mobile homes), except in an Existing Manufactured Homes (mobile homes) Park or Subdivision. A replacement Manufactured Home may be placed on a lot in an Existing Manufactured Home Park or Subdivision provided the anchoring standards of section 62-66(2), and the elevation standards of subsection (1) of this section and the encroachment standards of subsection (5)a of this section are met.

Sec. 62-66. General standards.

In all Areas of Special Flood Hazard the following provisions are required:

- (6) Manufactured Homes shall be anchored to prevent flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This standard shall be in addition to and consistent with applicable State requirements for resisting wind forces;
- 4) Standards for Manufactured Homes and Recreational Vehicles
  - a. All Manufactured Homes placed, or Substantially Improved, on individual lots or parcels, in expansions to existing Manufactured Home Parks or Subdivisions, or in Substantially Improved Manufactured Home Parks or Subdivisions, must meet all the requirements for New Construction, including elevation and anchoring.

- b. All Manufactured Homes placed or substantially improved in an Existing Manufactured Home Park or Subdivision must be elevated so that:
- i. The lowest Floor of the Manufactured Home is elevated no lower than the Base Flood elevation shown on the Flood Insurance Rate Map.
  - ii. The Manufactured Home chassis is supported by reinforced piers or other foundation elements of at least an equivalent strength, of no less than 36 inches in height above grade.
  - iii. The Manufactured Home must be securely anchored to the adequately anchored foundation system to resist flotation, collapse and lateral movement.
  - iv. In an Existing Manufactured Home Park or Subdivision on which a Manufactured Home has incurred Substantial Damage as the result of a Flood, any Manufactured Home placed or substantially Improved must meet the standards of subsections (4)b.1. and b.2. of this section.
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### **Hialeah Gardens**

#### **PART II CODE OF ORDINANCES**

#### **Chapter 58 BUILDINGS AND BUILDING REGULATIONS**

#### **ARTICLE II. CONSTRUCTION STANDARDS**

##### **Sec. 58-39. Conditions for obtaining building permits.**

- 5) Plans are presented to the city setting forth with specificity the location of areas which will be kept free of parked vehicles in order to facilitate access to buildings by authorized emergency vehicles, as defined by F.S. § 316.033, together with appropriate entrances to the property and appropriate fire lanes and emergency parking areas when property is used as a shopping mall, parking lot, parking garage, planned unit development, mobile home park, industrial or warehouse park or business district or multifamily residential complex or other use which provides for a concentration of buildings within an area of restricted vehicular access. The number of authorized emergency vehicle parking areas and fire access lanes shall be subject to approval by the building inspector and the chief of police taking into consideration the following factors:
  - a. The number of people who are estimated to frequent the property.
  - b. The accessibility of the property by authorized emergency vehicles, including entrance.
  - c. The frequency of calls for emergency services anticipated at the property.
  - d. The need for accessibility to buildings by tenants, vendors, and persons making deliveries to the property.
  - e. Official acts of the county that relate to the particular use of the property as designated by the applicant.

#### **ARTICLE III. MOBILE HOMES AND MANUFACTURED BUILDINGS** Sec. 58-68

##### **Parking of mobile homes.**

No mobile home shall be parked or allowed to remain in the city for a period of time in excess of 24 hours unless the mobile home shall have been shipped to a properly licensed agency, for sale or for lease to a person or corporation outside of the city limits or within the city limits subject to this article.

(Code 1985, § 153.03

##### **Sec. 58-69. Exclusions**

A home otherwise designated as a mobile home, so-called, may be removed from such category when properly made stationary with full electrical, sewage, and water facilities, with a permanent base within a designated mobile home park, as may be approved by the building department and any other

interested departments of the city. All other mobile homes shall be barred within the city by this article.

**Sec. 70-82. Specific standards**

In all areas of special flood hazard where base flood elevation data have been provided, as set forth in section 70-37 or section 70-64(9), the following provisions are required:

- 1) Residential construction. New construction or substantial improvement of any residential building or manufactured home shall have the lowest floor, including basement, elevated no lower than one foot above the base flood elevation. Should solid foundation perimeter walls be used to elevate a structure, openings sufficient to facilitate the unimpeded movements of floodwaters shall be provided in accordance with the standards of subsection (3) of this section.
- 4) Standards for manufactured homes and recreational vehicles.
  - a. All manufactured homes placed, or substantially improved, on individual lots or parcels, in expansions to existing manufactured home parks or subdivisions, or in substantially improved manufactured home parks or subdivisions, must meet all the requirements of this article for new construction, including elevation and anchoring.
  - b. Manufactured homes placed or substantially improved in an existing manufactured home park or subdivision must be elevated so that:
    1. The lowest floor of the manufactured home is elevated no lower than one foot above the level of the base flood elevation; or
    2. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least an equivalent strength, of no less than 36 inches in height above grade;
    3. The manufactured home must be securely anchored to the adequately anchored foundation system to resist flotation, collapse and lateral movement;
    4. In an existing manufactured home park or subdivision on which a manufactured home has incurred substantial damage as the result of a flood, any manufactured home placed or substantially improved must meet the standards of subsections (4)b.1 and (4)b.3 of this section.

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**Hialeah**

**Chapter 98 ZONING\***

**ARTICLE VIII. PARK, RECREATION AND OPEN SPACE IMPACT FEE\***

**Sec. 98-2522. Definitions.**

Building permit means an official document or certificate issued by the planning and development department, authorizing the construction of any building. For purposes of this article, the term "building permit" shall also include tie-down permits for those structures or buildings, such as mobile home dwelling units, that do not require a building permit in order to be occupied.

**PART II CODE OF ORDINANCES**

**Chapter 42 FLOODS AND WATER MANAGEMENT\***

**ARTICLE II. FLOOD DAMAGE PREVENTION**

## DIVISION 1. GENERALLY

### Sec. 42-26. Definitions.

Existing manufactured home park or subdivision means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed, including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads, is completed before June 18, 1974 (the effective date of the county's adoption of floodplain management regulations).

Expansion to an existing manufactured home park or subdivision means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed, including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads.

## DIVISION 3. STANDARDS

### Sec. 42-97. Standards for development within special flood hazard areas.

- a) No new construction or substantial improvement of any residential structure or manufactured home shall be permitted in special flood hazard areas, and no development permit referred to in section 42-96 shall be issued therefor unless such new construction or substantial improvement has the lowest floor, including basement, elevated to or above the level of the regulatory flood (100-year flood). For all residential uses, the floor elevation shall be a minimum of eight inches above the elevation established by the flood insurance rate map or the elevation of the highest crown of the road or street abutting such building site, whichever is higher, or, if the road has no crown, the highest edge of cross section of the road shall apply. Electrical, plumbing and other attendant utilities are prohibited below the base flood elevation.
- d) All manufactured homes placed or substantially improved on individual lots or parcels, in expansions to existing manufactured home parks or subdivisions, in new manufactured home parks, in substantially improved manufactured home parks shall meet all of the requirements for new construction, including elevation and anchoring as found in subsection (a) of this section.
- e) All manufactured homes placed or substantially improved in an existing manufactured home park or subdivision shall be elevated so that
  - 1) The lowest floor of the manufactured home is elevated no lower than the level of the base flood elevation; or
  - 2) The manufactured home chassis is supported by reinforced piers or other foundation elements of at least an equivalent strength, of no less than 36 inches in height above grade;
  - 3) The manufactured home shall be securely anchored to the adequately anchored foundation system to resist flotation, collapse and lateral movement;
  - 4) In an existing manufactured home park or subdivision in which a manufactured home has incurred substantial damage as the result of a flood, any manufactured home placed or substantially improved shall meet the standards of subsection (a) of this section.

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## **Homestead**

### **PART II CODE OF THE CITY**

#### **Chapter 6 BUILDINGS AND BUILDING REGULATIONS\***

##### **ARTICLE VIII. FLOOD DAMAGE PREVENTION\***

Sec. 6-305. Provisions for flood hazard reduction.

- b) Specific standards
- c) Prohibit the placement of manufactured homes (mobile homes), except in an existing manufactured homes (mobile homes) park or subdivision. A replacement manufactured home may be placed on a lot in an existing manufactured home park or subdivision provided the anchoring standards of section 6-305(a)(2), and the elevation standards of section 6-305(b)(1)  
and the encroachment standards of section 6-305(b)(5)a., are met.

Sec. 27-92. Tie-downs required

Mobile homes shall be tied down based upon the requirements and specifications as set forth in chapter 15C of the Rules of Department of Highway Safety and Motor Vehicles Division of Motor Vehicles, a copy of which is attached to Ordinance No. 93-11-106 and made a part hereof as though fully incorporated and set forth herein.

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## **Medley**

FLORIDA Codified through Ord. No. C-280, adopted June 1, 1998. (OC, Correction)

### **PART II MUNICIPAL CODE**

#### **Chapter 38 MANUFACTURED HOMES AND TRAILERS\***

Sec. 38-56. Zoning, lot requirements

- a) A mobile home or house trailer, for residential use only, may be placed, constructed, erected or located upon any land situated in the town if such land is specifically and only zoned for residential purposes and for no other purposes; provided, however, that any lot upon which such mobile home or house trailer is placed shall be of dimensions no less than 50 feet by 100 feet.
- b) A residential lot used for this purpose facing N.W. South River Drive in the town shall have not less than 100 feet frontage on N.W. South River Drive and a depth equal to not less than a distance between the front line of the residential lot on N.W. South River Drive and the southwest line of the Miami Canal where such southwest line parallels to the front line.

- c) Any mobile home or house trailer placed on a lot located on N.W. South River Drive designated for such purpose shall be placed parallel to the property line along N.W. South River Drive with an equal number of feet between each end of such mobile home or house trailer and the side property lines of said property.
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Miami Beach

Chapter 54 FLOODS\*

ARTICLE II. FLOODPLAIN MANAGEMENT  
DIVISION 3. FLOOD HAZARD REDUCTION  
Sec. 54-92. Specific standards.

- a) Provision of base flood elevation data. In all areas of special flood hazard where base flood elevation data have been provided, as set forth in section 54-37, the provisions of subsections (b)--(h) of this section are required.
  - e) Standards for manufactured homes and recreational vehicles
    - 1) All manufactured homes placed or substantially improved on individual lots or parcels, in expansions to existing manufactured home parks or subdivisions, or in new manufactured home parks or subdivisions must meet all the requirements for new construction, including elevation and anchoring.
    - 2) All manufactured homes placed or substantially improved in an existing manufactured home park or subdivision must be elevated so that:
      - b. The lowest floor of the manufactured home is elevated no lower than zero feet above the level of the base flood elevation.
      - c. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least an equivalent strength, no less than 36 inches in height above grade.c. The manufactured home must be securely anchored to the adequately anchored foundation system to resist flotation, collapse and lateral movement.In an existing manufactured home park or subdivision on which a manufactured home has incurred substantial damage as the result of a flood, any manufactured home placed or substantially improved must meet the standards of subsections (e)(2)a. and (e)(2)c. of this section.
    - (3) Prohibit the placement of manufactured homes (mobile homes), except in an existing manufactured homes (mobile homes) park or subdivision. A replacement manufactured home may be placed on a lot in an existing manufactured home park or subdivision provided the anchoring standards of section 54-91(c) and the encroachment standards of subsection (f)(1) of this section are met.
    - 12) Prohibit the placement of manufactured homes (mobile homes), except in an existing manufactured homes (mobile homes) park or subdivision. A replacement manufactured home may be placed on a lot in an existing manufactured home park or subdivision provided the anchoring standards of subsection (g)(5) of this section and the elevation standards of subsection (g)(2) of this section are met.
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Virginia Gardens

FLORIDA Codified through Ord. No. 305, adopted January 21, 1999. (Supplement No. 5)

PART II CODE

PART II CODE OF ORDINANCES

Chapter 8.5 FLOOD DAMAGE PREVENTION ORDINANCE\*

ARTICLE III. FLOOD DAMAGE PREVENTION PROVISIONS

### DIVISION 3. PROVISIONS FOR FLOOD HAZARD REDUCTION

#### Sec. 8.5-52. Specific standards.

- c) Prohibit the placement of manufactured homes (mobile homes), except in an existing manufactured homes (mobile homes) park or subdivision, except where otherwise required by law and required by the city's comprehensive land use master plan. A replacement manufactured home may be placed on a lot in an existing manufactured home park or subdivision provided the anchoring standards of section 8.5-51(2), and the elevation standards of section 8.5-52(1) and the encroachment standards of section 8.5-52(5)(a), are met.

#### Section 29-15. Parking and storage of commercial and recreational vehicles

- a) Intent and purpose. The following provisions are intended to provide for the storage, maintenance and/or parking of trucks, mobile homes, boats and/or recreational vehicles where appropriate in the various zones and defined in this appendix. A recreational vehicle, as distinguished from a mobile home, truck, or the like, is considered a transportation structure, self-propelled or capable of being towed by a passenger car, station wagon or small pickup truck of such size and weight as not to require any special highway movement permits, and primarily designed or constructed to provide temporary, movable living quarters for recreational, camping or travel use, or to carry such equipment, but not for profit nor commercial use. Included as recreational vehicles, but not to the exclusion of any other types not mentioned herein are: Trailers, trailer coaches; camping trailers; motor homes; pickup (slide-in) campers; chassis mounts; converted vans; chopped vans; minimotor homes; fifth-wheel trailers or recreational vehicle construction; design and intent (as opposed to commercial fifth-wheel trailers); boat trailers (mounted or unmounted) and truck caps.
- b) (10) Mobile home park. Any property or properties under the same ownership or under individual, separate ownership where ten (10) or more mobile homes are parked within five hundred (500) feet from one another, the primary purpose of which is to rent space or keep space for rent to any person for a charge or fee, paid or to be paid, for the rental or use of facilities or to offer space in connection with securing the trade or patronage of such person. A mobile home park shall have all electrical and sanitation facilities as are required for residential development.
- e) Prohibited parking and/or storage
  - 1) No recreational vehicle, truck, van, or bus as defined herein shall be occupied or used for human habitation including but not limited to sleeping, eating or resting, in any zone of the city.

### Chapter 8.5 FLOOD DAMAGE PREVENTION

#### Sec. 8.5-5. Provisions for flood hazard reduction.

#### Specific standards.

Residential construction. New construction or substantial improvement of any residential building (or manufactured home) shall have the lowest floor, including basement elevated no lower than one (1) foot above the base flood elevation. Should solid foundation perimeter walls be used to elevate a structure, openings sufficient to facilitate the unimpeded movements of floodwaters shall be provided in accordance with standards of section 8.5-5(b)(3).

- 4) Standards for manufactured homes and recreational vehicles.
- a. All manufactured homes placed, or substantially improved, on individual lots or parcels, in expansions to existing manufactured home parks or subdivisions, or in substantially improved manufactured home parks or subdivisions, must meet all the requirements for new construction, including elevation and anchoring.
- b. All manufactured homes placed or substantially improved in an existing manufactured home park or subdivision must be elevated so that:
1. The lowest floor of the manufactured home is elevated no lower than one (1) foot above the level of the base flood elevation, or
  2. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least an equivalent strength, of no less than thirty-six (36) inches in height above grade.
  3. The manufactured home must be securely anchored to the adequately anchored foundation system to resist flotation, collapse and lateral movement.
  4. In an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood, any manufactured home placed or substantially improved must meet the standards of subsection (b)(4)b.i. and iii. above.;
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## **Pinecrest**

VOLUME II  
Chapter 30 LAND DEVELOPMENT REGULATIONS\*  
ARTICLE VI. GENERAL REGULATIONS  
Sec. 30-82. Nuisances.

- 4) Tractor-trailers, tractor-trucks, semi-trailers, mobile homes, trailers, and portable dwelling units shall not be stored on any parcel of land within the village. Tractor-trailers may be permitted for purposes of loading and unloading. Port-a-potties shall not be placed on swales and must be located 15 feet from the property line. A construction trailer may be approved by the village for development of subdivisions (two or more lots) in residential districts or for a commercial/multi-family construction project, provided it is hooked up to a sanitary disposal system and used for an office on the site. A construction trailer permit is required and may only be issued in conjunction with a permit to develop a site. Construction trailers are to be utilized as offices only and may not be occupied overnight by employees, night watchman or security personnel, and may not be utilized as a construction equipment storage container. Upon completion of the work, and prior to the issuance of a certificate of occupancy, a temporary certificate of occupancy or a certificate of completion, all trailers and port-a-potties shall be removed from the site.

ARTICLE XI. FLOOD DAMAGE PREVENTION AND STORMWATER UTILITY  
Sec. 30-116. Provisions for flood hazard reduction.

- 1) Residential construction. New construction or substantial improvement of any residential structure (or manufactured home) shall have the lowest floor, including basement elevated no

lower than the base flood elevation. Should solid foundation perimeter walls be used to elevate a structure, openings sufficient to facilitate the unimpeded movements of floodwaters shall be provided in accordance with standards of the code. Structures in AE zones shall be at least elevated to ten feet or 0.67 feet above the average crown of the road, whichever is greater. Structures in X zones shall be elevated to 0.67 feet above the crown of the road.

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ANALYSIS OF  
BROWARD COUNTY  
MOBILE HOME POLICIES  
BY  
MUNICIPALITY

Municipalities	Allow			DO NOT Allow	LEGAL BASIS
	Park	Individual	Both		
Coconut Creek	X				Sec. 10-52
Cooper City	---	Unknown	---		
Coral Springs	---	Unknown	---		
Dania	X**				Chapter 8 Art. 4 (a)
Davie	X**				Sec. 47-5.2
Deerfield Beach	X				Unknown
Ft. Lauderdale	X**				Sec. 47-5.2
Hallandale	X**				Sec 17-2
Hillsborough Beach	X**				Sec. 3.06.02 (d) (7)(d)(2)
Hollywood	X				Unknown
Lauderdale-by-the-Sea	X				Unknown
Lauderdale Lakes	X**				Sec. 30.8.2.5.3
Lauderhill	---	Unknown	---		
Lazy Lake	---	Unknown	---		
Lighthouse Point	X**				Sec. 38-82
Margate	X**				Sec. 93/8-16 (4) (C )
Miramar	X				with exception Sec. 21-200
North Lauderdale	---	Unknown	---		with exception Sec. 90-66
Oakland Park	X**				
Parkland				X	Sec. 22-35
Pembroke Park	X**				Sec. 28-262
Pembroke Pines	X				Unknown
Plantation	X**				Sec 9-42-C
Pompano Beach	---	Unknown	---		
Sea Ranch Lakes	X**				Sec. 4.03.04
Southwest Ranch	---	Unknown	---		
Sunrise	X**				Sec. 28-262
Tamarac	X**				Ch. 24 Art 3 Div12
Weston	---	Unknown	---		
Wilton Manors	X				with exception Sec. 9-86 (2)
Broward County	X**				Sec. 131/2-6.

\* Source = 1990 Census of Population and housing, STF1B.

\*\* - only in existing manufactured ( mobile) home parks or subdivision.

BROWARD COUNTY  
Examples of Mobile Home Related  
Municipal Code

## Coconut Creek

### PART II CODE OF ORDINANCES

#### Chapter 10 FLOOD PREVENTION AND PROTECTION

##### ARTICLE I. IN GENERAL

###### Sec. 10-4. Definitions.

Expansion to an existing mobile home park or mobile home subdivision means the preparation of additional sites by the construction of facilities servicing the lots on which the mobile homes are to be affixed, including the installation of utilities, either final site grading or pouring of concrete pads, or the construction of streets.

Mobile home means a structure, transportable in one (1) or more sections, which is built on a permanent chassis and designed to be used with or without a permanent foundation when connected to the required utilities. It does not include recreational vehicles or travel trailers.

Mobile home park or mobile home subdivision means a parcel, or contiguous parcels, of land divided into two (2) or more mobile home lots for rent or sale for which the construction of facilities for servicing the lot on which the mobile home is to be affixed, including, at a minimum, the installation of utilities, either final site grading or the pouring of concrete pads, and the construction of streets, is completed.

##### ARTICLE III. STANDARDS FOR FLOOD HAZARD REDUCTION

###### Sec. 10-52. Specific standards.

a. No mobile home shall be placed in a floodway or coastal high hazard area, except in an existing mobile home park or existing mobile home subdivision.

1. Over-the-top ties shall be provided at each end of the mobile home, with one (1) additional tie per side at an intermediate location on mobile homes of less than fifty (50) feet and one (1) additional tie per side for mobile homes of fifty (50) feet or more.

2. Frame ties shall be provided at each corner of the home with four (4) additional ties per side at intermediate points for mobile homes less than fifty (50) feet long and one (1) additional tie for mobile homes of fifty (50) feet or longer.

3. All components of the anchoring system shall be capable of carrying a force of four thousand eight hundred (4,800) pounds

4. Any additions to the mobile home shall be similarly anchored.

c. For new mobile homes parks and subdivisions; for expansions to existing mobile

home parks and subdivisions; for existing mobile home parks and subdivisions

where the repair, reconstruction or improvement of the streets, utilities and pads

equals or exceeds fifty (50) percent of the value of the streets, utilities and pads

before the repair, reconstruction or improvement has commenced; and, for mobile

homes not placed in a mobile home park or subdivision the following are required:

1. Stands or lots elevated on compacted fill or on pilings, so that the lowest floor of the mobile home will be at or above the base flood level

2. Adequate surface drainage and access for a hauler; and
  - 3- In the instance of elevation pilings:
    - i. Lots large enough to permit steps
    - ii. Piling foundations placed in stable soil no more than ten (10) feet apart; andReinforcement provided for pilings more than six (6) feet above the ground level;
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## Dania Beach

### PART II CODE OF ORDINANCES

#### Chapter 8 BUILDINGS\*

##### ARTICLE I. IN GENERAL

Sec. 8-9. Vacant multiple living units to be secured.

Apartment buildings, hotels, motels, mobile home parks or other housing complexes located within the corporate limits of the City of Dania that remain closed and unoccupied for a period of more than thirty (30) days shall be completely secured by:

- (1) The installation of shutters for all the first floor windows and doors

#### Chapter 25 TRAFFIC\*

##### ARTICLE III. PARKING, STOPPING AND STANDING\*

##### DIVISION 6. COMMERCIAL AND RECREATIONAL VEHICLES\*

Sec. 25-125. Parking of recreational vehicles in residential areas.

g) No vehicle or trailer commonly known as a "mobile home" shall be permitted to be parked or stored in a residential area or district. For the purposes of this section, a "mobile home" is defined to be a vehicular portable structure built on a chassis and designed to be used and capable of being used without a permanent foundation as a dwelling when connected with utilities. This definition does not include a vehicular structure equipped for the road and use as a temporary dwelling during travel, recreation or vacation.

#### Chapter 28 ZONING\*

##### ARTICLE 3. ESTABLISHMENT AND DEFINITION OF DISTRICTS

3.10. Establishment of districts.

RMH = Mobile Home District

### **ARTICLE 4. DISTRICT REGULATIONS**

Except as hereinafter provided:

(See Schedules of Regulations)

- a) No building shall be erected, added on to, reconstructed or structurally altered, nor shall any building or land be used which does not comply with all the district regulations established by this chapter for the district in which the building or land is located.

CITY OF DANIA BEACH

DISTRICT	PURPOSE	PERMITTED USES	ACCESSORY USES	SPECIALEXCEPTION USES
RMH	To provide a suitable living environment in mobile home developments and to insure the compatibility of mobile home parks with adjoining developments.		1. Recreational facilities related to approved special exception uses.	1 .Mobile homes 2.. Related permanent structures.

LOT	YARD				BULK			SIDE ST.		
	MINIMUM		MAXIMUM		MINIMUM		MAXIMUM			
	Area (Sq. Ft.)	Width (Ft.)	Depth (Ft.)	Density (DU's/Gross Acre)	Front (Ft.)	Both/One (Ft.)	Rear (Ft.)	Height (Stories/Ft.)	Coverage (Percent)	(Ft.)
RMH (Mobile Home)	400,000	500	500	17.00	50	100/50	40	1/16	50/50	50

ARTICLE 5. SUPPLEMENTARY LOT REGULATIONS

5.30. Yard regulations.

5.37. SEPARATION BETWEEN ANY MOBILE HOME OR TRAVEL TRAILER USE. No part of any mobile home or travel trailer, or any addition or appurtenance thereto shall be placed within ten (10) feet of any other mobile home or travel trailer, addition or appurtenance thereto, in any existing or new mobile home or travel trailer park use located within the City of Dania. No part of any mobile home or travel trailer, or addition or appurtenance thereto, shall be located within twenty-five (25) feet of any accessory or service building or structure used in connection with a mobile home park.

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## Hallandale

### PART II CODE OF ORDINANCES

#### Chapter 17 MOBILE HOMES AND MOBILE HOME PARKS\*

##### **Sec. 17-1. Definitions.**

The following words, terms and phrases, when used in this chapter, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Cabana (mobile home cabana) or screened porch means an area enclosed on three sides by temporary construction with a fourth side being a part of the mobile home and such enclosed area becoming a part of the living quarters of the mobile home to which it is attached.

Mobile home means, generally, any mobile home, travel trailer or motor home used or capable of being used as sleeping or living quarters mounted on wheels and propelled either by its own power or by other power-driven vehicle to which it may be attached; or alternately defined, for purposes of the blocking and

anchoring requirements, as any vehicular portable structure built on a chassis and designed to be used and capable of being used without a permanent foundation as a dwelling when connected to utilities.

Mobile home park or park means a plot of land properly planned and subdivided particularly for the use and accommodation of mobile homes, where spaces are provided for three or more mobile homes used as living or sleeping quarters, parking spaces being maintained for rent or without rent by any person.

Travel trailer, for purposes of blocking and anchoring requirements, means a vehicular portable structure built on a chassis equipped for the road and used as a temporary dwelling during travel, recreation or vacation.

Unit, lot or site means a section of ground in any mobile home park, and being not less than 25 feet by 35 feet in dimension or an equivalent area, designated as the location for only one mobile home, but not to accommodate more than one family.

(Code 1980, § 17-1)

**Sec. 17-2. *Mobile homes required to be in mobile home parks.***

No mobile home shall be parked or placed in the city except in a regularly licensed mobile home park; however, such vehicles may be parked in a duly licensed garage for repairs, in a warehouse or garage for storage, or in or on a sales room or sales lot for mobile homes and/or motor vehicles, and when so parked for repairs, storage or for sale shall not be occupied for any purpose.

**Sec. 17-3. *Wheels and tires.***

The wheels of a mobile home may be removed, and/or ground may be removed from under the wheels to permit lowering of a mobile home. Mobile homes shall at no time be permitted to be mounted upon permanent foundations.

**Sec. 17-4. *Blocking, securing and anchoring required.***

- a) Mobile homes shall be blocked properly, secured and anchored against the force of hurricane winds, in accordance with the provisions of sections 17-5 and 17-6.
- b) Such sections do not apply to boat trailers or luggage trailers and travel trailers that are not permanent year-to-year residences. A building permit is not required for blocking and anchoring for these vehicles.

**Sec. 17-5. *Blocking.***

In order that a safe mounting for a mobile home may be provided, the minimum requirements for blocking shall be in accordance with the provisions of this section. This does not apply to mobile homes previously blocked.

- 1) Where the supporting ground is capable of carrying 2,500 pounds per square foot or more in bearing (the 2,500 number is undisturbed sand and gravel), base foundations for masonry piers shall be not less than 16 inches square, nor less than eight inches deep, and shall be of solid masonry (two 8 X 8 X 16 blocks), not open core block
- 2) Where the supporting ground carries less than 2,500 pounds per square foot in bearing, the enforcing official shall require a larger proportionate base surface for the piers.
- 3) Pier foundations shall be installed under the mobile home a maximum of ten feet on centers on each side of the mobile home frame.

- 4) If celled masonry blocks (8 X 8 X 16) are used for piers, blocks must be placed parallel to the main frame members with open cores placed vertically, on the 16-inch by 16-inch base.
- 5) If cast-in-place concrete piers are used for foundations, minimum steel in the base of the pier shall be two number 3 bars in each direction and the minimum depth of the base shall be eight inches.
- 6) Hardwood shims or shingles used in house construction shall be used over-the-top of the piers. Shims shall be fitted tightly to prevent rocking of the unit under the action of wind gusts.

**Sec. 17-6. Anchoring.**

- a) Generally. Each mobile home shall be provided with anchors and tie-downs, as described in this section, by the owners of the mobile homes and shall be of such number and type that the largest exposed surface area of the mobile home shall be capable of withstanding a static wind pressure, whose velocity pressure shall be in accordance with the South Florida Building Code. Such anchors or tie-downs shall be attached to the frame and/or over the top of the mobile home. Mobile homes more than 60 feet long shall have three sets of anchors.
- b) *Ties*
  - 1) Ties passing over the mobile home shall be snug to the coach body at both top corners and installed not more than 12 inches outside a perpendicular line to the ground and secure to the main frame members and from there to ground anchors.
  - 2) Ties passing over the mobile home shall be at least three-eighths-inch-diameter wire rope, or a material possessing a minimum of 7,000 pounds' breaking strength.
  - 3) Ties shall be attached to the main steel framing members and made snug by connecting to one-half-inch dropped-forged turnbuckles connected to ground anchors with three-eighths-inch wire rope, or a material possessing a minimum of 7,000 pounds' breaking strength
- c) *Anchors*. At least one anchor shall be placed near each front and rear corner of the mobile home. All anchors shall be installed in a straight line of pull with the tie.
  - B) *Type A screw auger*. A screw auger of minimum auger diameter of six inches with a minimum five-eighths-inch-diameter rod installed at a minimum depth below the ground surface of four feet; an eight-inch-size arrowhead anchor installed at a minimum depth of four feet below the ground surface.
  - C) *Type B screw auger*. An expanding prefabricated deadman of six-inch minimum size or a minimum six-inch diameter poured in place concrete deadman at least two feet in length. The bottom of each hole shall be a minimum of five feet beneath the ground surface. Backfill must be well tamped. Minimum rod diameter shall be five-eighths inch.
  - D) *Type C screw auger*. A precast concrete block, a steel or cast iron cone or plate of a minimum least dimension of six inches. The bottom of each hole shall be a minimum of five feet beneath the ground surface. Backfill must be tamped. Minimum rod diameter shall be five-eighths inch.

Where the mobile home is shorter than the patio, an anchor may be installed through the patio by drilling a hole  $1\frac{1}{2}$  inches in diameter not less than six inches from the outside edge of the patio. An "I" bolt of not less than one-half-inch diameter and long enough to reach below the patio at least two inches with a nut or flange at least twice the size of the "I" bolt; installed by removing a portion of the earth below the patio in order to form a cone-shaped chamber into which the bonding material and "I" bolt can be placed.)

**Sec. 17-7. Porches attached to *mobile home*; distances between *mobile homes*; materials.**

It shall be unlawful to attach any porch to any mobile home trailers unless and until the following conditions are complied with:

- 1) The owner or person in charge of such mobile home shall first procure written permission from the mobile home park owner or operator to construct such porch.
- 2) No porches shall be permitted unless the mobile home park owner or operator allots a space of not less than 25 by 35 feet for the parking of each such mobile home and construction of a porch. Such space shall be marked with permanent markings on each corner. A distance of not less than ten feet shall be allowed between such porch and any other mobile home, between such porch and any other porch and between any mobile home and any other mobile home.
- 3) No such porch shall be larger than ten feet wide, and the length of the mobile home in size and the long side of the porch shall be parallel with the long side of the mobile home.
- 4) Before any such porch is erected, application shall be made and a permit for the building of such a porch shall be procured and the appropriate fees paid.
- 5) To secure such permit, an applicant shall first submit a letter from the mobile home park owner granting permission to erect such a porch; and there shall be submitted a drawing or plan showing the location of the mobile home in the park and showing the location of the porch in the park; and the plan for such proposed porch shall be submitted in duplicate. If the plan shows a structure that complies with the provisions of this section and is safe and is approved by the building official, a permit for the erection of the porch shall be issued; however, prior to issuing the permit, the building official shall inspect the site of the proposed porch and ascertain that all conditions as set forth in this section have been fully complied with. After the porch has been erected, the building official shall also inspect the finished porch to ascertain that it has been constructed in accordance with the plans and specifications submitted and according to all the provisions and conditions of this section; and if it has been ascertained that the provisions of this section have not been complied with in full and the porch has not been erected in accordance with the plans submitted at the time of procuring such permit, the porch shall be subject to its immediate removal.

**Sec. 17-8. Concrete slab patios.**

All owners and operators of mobile home parks within the city are permitted to place concrete slabs in front of the entrance of mobile homes parked in such parks, such slabs to be of such dimensions as shall be prescribed by the park owner or operator.

**Sec. 17-9. Awnings attached to *mobile home*; materials; removal during hurricane alert.**

With permission from the owner of a mobile home park, awnings may be attached to one side only of such mobile homes parked in such parks, such awnings not to be longer than the mobile home to which it is attached; and such awnings shall be supported on metal rods or pipes. Railings or other fixtures cannot be attached to the awnings or supports.

Aluminum awnings which can be dismantled within a short period of time shall be permitted for use on mobile homes. Every mobile home owner using such awnings, together with the mobile home park owner who permits its use, is held responsible for the removal of such awnings within one hour from a hurricane alert. Any person responsible for the removal of such awnings upon an alert's being sounded who fails or refuses to remove such awnings within the allotted time shall be in violation of this chapter.

This provision pertaining to awnings shall apply only in mobile home parks and shall in no way affect any provision of the building code other than as specifically stated in this chapter.

**Sec. 17-10. Park plan.**

Any person applying for a permit and/or license to establish and operate a mobile home park must first file in duplicate with the approving authority a copy of the plan of the proposed park. This plan with the legal description of the property shown shall be drawn to scale and must show clearly the extent and area

to be used for park purposes. All proposed roadways and/or driveways shall be shown, together with each proposed location or site for mobile homes, location and size of all concrete slabs, proposed utilities, sanitary conveniences, laundry buildings, toilets, washrooms, slop sinks, the proposed method of sewage disposal or removal, the plan for water supply and lighting, and all other improvements. Before any permit or license shall be granted, these plans must first be fully approved by the building department.

**Sec. 17-11. Proper zoning for parks.**

Mobile home parks shall be permitted only in the areas of the city zoned as specified in the comprehensive zoning ordinance.

**Sec. 17-12. Health permit for operation of parks.**

It shall be unlawful for any person to establish, maintain or operate within the city or its jurisdiction any mobile home park, including any location or plot of ground for use of travel trailers or motor homes of transients by the day, week, month or season, whether or not a charge is made, who does not possess a permit from the health authorities.

**Sec. 17-13. Freedom from heavy vegetation; drainage of land**

**Sec. 17-14. Water supply to lots.** All land used as a mobile home park shall be located on well-drained sites of ample size, free from heavy or dense growth of brush or weeds; the land shall be free from marsh and shall be graded to ensure rapid drainage during and following rain.

Each unit in a mobile home park shall be provided with an ample and adequate supply of water of safe, sanitary quality

**Sec. 17-15. Garbage and sewage disposal**

Each mobile home park shall be provided with safe and adequate provision for the collection and removal of waste and garbage and shall provide a proper and acceptable sewer system either by connection to the city sewer system where such is available, or to approved septic tanks, all of which shall comply fully with all laws, ordinances and regulations prescribed by the city health authority and the state division of health

**Sec. 17-16. Compliance with construction codes and sanitary rules and regulations**

All buildings and structures erected within mobile home parks shall comply with the building code, plumbing code, electrical code, and any other such codes and all sanitary rules and regulations of the city

**Sec. 17-17. Minimum unit size; corner markers; freedom from rocks and weeds**

Each unit or site in any mobile home park upon which a mobile home is placed shall be not less than 25 feet by 35 feet in area, clearly defined by markers at each corner. The site shall be level and free from rocks and weeds

**Sec. 17-18. Unit drainage; height of *mobile home* floor**

Each unit or site shall be well drained, and the floor of each mobile home shall be not less than four inches above ground level for ventilation.

**Sec. 17-19. Distance between *mobile home* and building**

No mobile home shall be placed upon any site at any less distance than ten feet from any building

**Sec. 17-20. Setbacks.**

No building in a mobile home park site shall be placed or erected within less than five feet of the property line separating the park from adjoining property, measuring from the nearest point of the cottage site or location.

No building in the mobile home park abutting on any public street, avenue, boulevard, terrace, court or public way shall be located beyond the established setback line and in no case closer than 20 feet to any street, avenue, boulevard, terrace, court or public way.

No mobile home or any part or portion of such home shall be placed closer than one foot from a public street, avenue, boulevard, terrace, court, alley or other public way or to the lot line of property adjoining the trailer park where the adjoining property is zoned for business; but if the adjoining property is zoned an R classification, the setback shall be five feet.

A mobile home having an attached unenclosed awning must maintain the same setback requirement for such awning as is set forth in subsection (c) of this section.

Where there is an attached enclosed porch, cabana or enclosed awning on a mobile home, the setback of such enclosed area shall be five feet from any public street, avenue, boulevard, terrace, court, alley or other public way, or to the lot line of property adjoining the trailer park where the adjoining property is zoned for business; but if the adjoining property is zoned an R classification, the setback shall be five feet; and also there shall be a five-foot setback from such attached enclosed porch, cabana or enclosed awning and any other mobile home or attached enclosed porch, cabana or awning.

**Sec. 17-21. Roadways or driveways; marking of exits and entrances.**

Hard-surfaced roadways or driveways shall be provided not less than 18 feet in width, well marked in the daytime and well lighted at night, such roadways or driveways to be so located that each unit of the park is easily accessible. All entrances and exits from the park shall be well marked and so arranged that they will be easily controlled and supervised.

**Sec. 17-22. Enforcing use of entrances and exits.**

The use of entrances and exits of mobile home parks shall be enforced. Where it is established by complaint of adjoining property owners that their property is being trespassed upon by occupants of or visitors to any park, it shall be the duty of the owner, manager or other person responsible to provide a fence or other effective barrier to ensure such owners of adjoining property protection against trespassing.

**Sec. 17-23. Park management; manager required.**

Each mobile home park shall be under the direct management of the owner or licensee or his agent or representative for whose acts he shall be fully responsible.

The name of the person entrusted with the direct management of the park shall be filed for reference with the police department. Such person must be of good reputation and character and shall satisfy the public

authority of his experience and capacity to supervise, manage, regulate, control and maintain good order in the camp.

**Sec. 17-24. Office.**

Each mobile home park shall be provided with a building to be known as the office in which shall be kept copies of all records pertaining to the management or supervision of the park, such records to be available for inspection by the health authority and by the police department.

**Sec. 17-25. Manufactured homes.**

a- No manufactured home shall be placed in a coastal high-hazard area, except in an existing manufactured home park or existing manufactured home subdivision.

b- All manufactured homes shall be anchored to resist flotation, collapse or lateral movement by providing over-the-top and frame ties to ground anchors. Specific requirements shall be that:

- 1- Over-the-top ties be provided at each end of the manufactured home, with one additional tie per side at an intermediate location on manufactured homes of less than 50 feet and one additional tie per side for manufactured homes of 50 feet or more;
- 2- Frame ties be provided at each corner of the home with four additional ties per side at intermediate points for manufactured homes less than 50 feet long and one additional tie for manufactured homes of 50 feet or longer;
- 3- All components of the anchoring system be capable of carrying a force of 4,800 pounds; and
- 4- Any additions to the manufactured home be similarly anchored.

c- New manufactured home parks and subdivisions; expansions to existing manufactured home parks and subdivisions; existing manufactured home parks and subdivisions where the repair, reconstruction or improvements of the streets, utilities and pads equals or exceeds 50 percent of value of the streets, utilities and pads before the repair, reconstruction or improvement has commenced; and manufactured homes not placed in a manufactured home park or subdivision require:

- 1- Stands or lots elevated on compacted fill or on pilings so that the lowest floor of the manufactured home will be at or above the base flood level;
- 2- Provision of adequate surface drainage and access for a hauler; and
- 3- In the instance of elevation on pilings:
  - a- Lots large enough to permit steps;
  - b- Piling foundations placed in stable soil no more than ten feet apart; and
  - c- Reinforcement provided for pilings more than six feet above ground level.

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**Plantation**

**PART II CODE OF ORDINANCES**

**Chapter 9 FLOOD PREVENTION\***

**ARTICLE III. PROVISIONS FOR FLOOD HAZARD REDUCTION**

**Sec. 9-41. For all areas of special flood hazard.**

In all areas of special flood hazard, the following provisions are required

2- Manufactured homes shall be anchored to prevent flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This standard shall be in addition to and consistent with applicable state requirements for resisting wind forces;

**Sec. 9-42. For areas where base flood elevation is provided**

In all areas of special flood hazard where base flood elevation data have been provided, as set forth in section 9-7 or subsection 9-27(11), the following provisions are required:

*Residential construction.* New construction or substantial improvement of any residential structure shall have the lowest floor, including basement, elevated no lower than the higher elevation between: six (6) inches above the base flood elevation, or eighteen (18) inches above the crown of the lowest adjacent road giving access to said residential construction. Should solid foundation perimeter walls be used to elevate a structure, openings sufficient to facilitate the unimpeded movements of floodwaters shall be provided in accordance with standards of subsection 9-42(3).

c- Prohibit the placement of manufactured homes (mobile homes), except in an existing manufactured home (mobile home) park or subdivision. A replacement manufactured home may be placed on a lot in an existing manufactured home park or subdivision provided the anchoring standards of subsection 9-41(2) and the elevation standards of subsection 9-42(1) are met.

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**Davie**

PART II CODE OF ORDINANCES

Chapter 12 LAND DEVELOPMENT CODE\*

ARTICLE II. ESTABLISHMENT OF ZONING DISTRICTS AND LAND USES.

**Sec. 12-21. Zoning districts.**

**Mobile Home.**

MH-1 **Mobile Home** Residential District.

MH-3 **Mobile Home** Residential District.

MH-5 **Mobile Home** Residential District.

MH-8 **Mobile Home** Residential District.

MH-10 **Mobile Home** Residential District.

Fort Lauderdale

UNIFIED LAND DEVELOPMENT REGULATIONS

Chapter 47 UNIFIED LAND DEVELOPMENT REGULATIONS

ARTICLE II. ZONING DISTRICT REQUIREMENTS

SECTION 47-5. RESIDENTIAL ZONING DISTRICTS AND RESIDENTIAL OFFICE ZONING DISTRICTS

Sec. 47-5.2. Intent and purpose of each district

MHP district is intended for the establishment of residential mobile home parks which are or will be convenient to major traffic arterials. Mobile home parks may be located in areas of the city that are west of the Seaboard Coast Line Railroad, at a maximum density of twenty-five (25) dwelling units per net acre, consistent with the residential medium high category of the city's comprehensive plan.

Sec. 47-5.39. Table of dimensional requirements for the MHP district. (Note A)

Requirements	<b>Mobile Home Park</b>
Maximum density (du/net acre)	25
Minimum lot size	<b>Mobile home</b> park: 10 acres Each <b>mobile home</b> site: 2,400 sq. ft.
Maximum height of structure (ft.)	Accessory structures: 30 ft. or 2 stories
Maximum length of structure (ft.)	None
Minimum lot width (ft.)	None
Minimum floor area (sq. ft.)	None
Minimum front yard (ft.)	20 ft. in depth on all streets abutting the park and any abutting residentially zoned property 20 ft. when abutting a waterway
Minimum corner yard (ft.)	20 ft. in depth on all streets abutting the park and any abutting residentially zoned property 20 ft. when abutting a waterway
Minimum side yard (ft.)	20 ft. in depth on all streets abutting the park and any abutting residentially zoned property 20 ft. when abutting a waterway
Minimum rear yard (ft.)	20 ft. in depth on all streets abutting the park and any abutting residentially zoned property 20 ft. when abutting a waterway

Note A: Dimensional requirements may be subject to additional regulations, see Section 47-25, Development Review Criteria, and Sec. 47-5.50, Mobile Home Park Requirements.

**Sec. 47-5.50. *Mobile home* park requirements**

- a- Mobile home parks may be located in areas of the city that are west of the Seaboard Coast Line Railroad.
- b- The land may be used only for rental of mobile home sites for occupancy for living quarters where the park is operated as a unit, and for accessory uses and structures not involving the conduct of business.
- c- The mobility of the homes shall be maintained at all times. Any attached accessory structures, such as porches and screened enclosures shall be securely attached to the mobile home and be in compliance with all applicable provisions of the building code or, if they are of a collapsible type, must be approved by the building inspector. The maximum allowable width of any accessory structure shall not exceed ten (10) feet nor be longer than eighty percent (80%) of the length of the mobile home, and can be constructed only on one (1) side of the mobile home. No accessory structures shall be placed in the required yards.
- d- All mobile home sites shall be accessible from an unobstructed driveway at least thirty (30) feet in width and have a hard surfaced driveway at least twenty (20) feet in width.
  - d- A wall or fence shall be required to be constructed in accordance with the requirements of Sec. 47-19.5, Fences, Walls and Hedges, which shall be erected on all property lines of the park.

## **Hillsborough**

LAND DEVELOPMENT CODE County of HILLSBOROUGH, FLORIDA Codified through Ord. No. 01-26, enacted Sept. 12, 2001. (Supplement No. 7)

### **ARTICLE II ZONING DISTRICTS AND SPECIAL USES**

#### **PART 2.01.00 STANDARD ZONING DISTRICTS**

##### **Sec. 2.01.02. Establishment of Zoning Districts**

MH Residential, Single-Family *Mobile Home Overlay*

### **ARTICLE III SPECIAL DISTRICTS**

#### **PART 3.06.00 FLOOD DAMAGE CONTROL REGULATIONS**

##### **Sec. 3.06.02. Standards and Criteria.**

#### **D. Specific Standards.**

3. All manufactured homes to be placed or substantially improved within Zones A1-30, AH and AE on sites which are, (1) outside of a manufactured home park/subdivision; (2) in a new manufactured home park/subdivision; (3) in an expansion to an existing manufactured home park/subdivision, or (4) in an existing manufactured home park/subdivision on which a manufactured home has incurred substantial damage as a result of a flood, shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is at or above the base flood elevation, and be securely anchored to an adequately anchored foundation system in accordance with the provisions of the specific requirements as listed below within the standards for the anchoring of manufactured homes.
  4. All manufactured homes to be placed or substantially improved on sites in an existing manufactured home park/subdivision within Zones A1-30, AH, and AE, and which are not subject to the provisions of 3 above, shall be elevated so that either:
    - a. the lowest floor of the manufactured home is at or above the base flood elevation; or
    - b. the manufactured *home* chassis is supported by reinforced piers or other load bearing devices that are no less than 36 inches in height above grade, and which are designed and constructed to evenly distribute the load as stated in Appendix "H" of the Hillsborough County Building Code for "*Mobile Home Tie Down Standards*."
- 6- All manufactured homes shall be anchored to resist flotation, collapse, or lateral movement by providing over-the-top and frame ties to ground anchors. Specific requirements shall be that:
- a-** Over-the-top ties be provided at each of the four corners of the manufactured home, with two additional ties per side at intermediate locations. Manufactured homes less than 50 feet long only require one additional tie per side.
  - b-** Frame ties are to be provided at each corner of the home with five additional ties per side at intermediate points. Manufactured homes less than 50 feet long only require four additional ties.
  - c-** All components of the anchoring system be capable of carrying a force of 4,800 pounds. Additions to the manufactured home must be similarly anchored.
- 7- New manufactured home parks/subdivisions, and expansions to existing parks/subdivisions (where the repair, reconstruction or improvement of the streets, utilities and pads equal or exceed 50 percent of the value before

improvement commenced) and existing manufactured homes not placed in a manufactured park/subdivision require:

- a- Stands or lots are elevated on compacted fill or on pilings so that the lowest floor of the *mobile home* will be at or above the base flood level;
- b- Adequate surface drainage and access for a hauler are provided; and
- c- In the instance of elevation on pilings; (1) lots are large enough to permit steps, (2) piling foundations are placed in stable soil no more than ten feet apart, and (3) reinforcement is provided for pilings more than six feet above the ground level.
- d- Floodways: When floodways are designated within areas of special flood hazard, additional criteria will be met. Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles, and erosion potential, notwithstanding any of the above, the following provisions shall apply:

1- Encroachment is prohibited, including fill, new construction, substantial improvements, and other improvements unless certification with supporting technical data is submitted by a professional registered engineer is provided demonstrating that encroachment shall not result in any increase of flood levels during the occurrence of the base flood discharge.

2-The placement of any manufactured homes, except in an existing manufactured (*mobile home*) park or existing manufactured *home* subdivision is prohibited.

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## Lauderdale Lakes

### DEVELOPMENTAL CODE

#### ARTICLE IV. PARKING MOTOR VEHICLES, TRAILERS, BOATS AND BOAT TRAILERS\*

Section 4.3. Parking of motor vehicles, recreational vehicles, trailers, boats or boat trailers on or across swale areas, sidewalks and/or fire lanes; prohibition.

4.3.6. Use any motor vehicle, recreational vehicle, trailer, boat or boat trailer for living or sleeping purposes while parked in any commercial, community facility, industrial or residentially zoned area, except a residential area in an RP-10 zoning district and then only in an established *mobile home* park having operational sanitary sewer facilities and potable running water; or

4.3.7. Park or cause to be parked any boat, boat trailer, recreational vehicle or trailer in any residential or residentially zoned area unless the same is parked to the rear of the front building line, and no part of such boat, boat trailer, recreational vehicle or trailer extends into the area between the front building line of the building structure existing on the property and the public right-of-way, except in a residential area in an RP-10 zoning district, and then a boat, boat trailer, recreational vehicle or trailer may be parked only in an established *mobile home* park having operational sanitary sewer facilities and running potable water; provided, that for the purposes of the application of this regulation to multifamily residential complexes, the term "front building line" shall include the lines of all buildings facing any public thoroughfare; provided, furthermore, that where the front building line is near and generally parallel to a street, such vehicles shall be screened from such street by an opaque wall or hedge; or

### ARTICLE VIII. ZONING DISTRICTS

#### Section 8.1. Classes and symbols.

8.1.1.5. RP-10 *Mobile Home* District.

**ARTICLE XVI. MOBILE HOME RP-10 DISTRICT**

Section 16.1. Purpose of district.

The RP-10 *Mobile Home* Park District is intended to apply to areas to be used for the parking or placement of *mobile homes* and travel trailers for occupancy as living quarters, wherein the park is owned or operated as a unit and individual spaces are occupied on a rental basis.

Section 16.2. Uses permitted.

No building or structure, or part thereof, shall be erected, altered or used, or land or water used, in whole or in part, for other than one (1) or more of the following specified uses:

16.2.1. *Mobile home* parks for rental of sites for occupancy by *mobile homes* and/or travel trailers as living quarters, wherein the *mobile home* park is owned and/or operated as a unit.

16.2.2. Accessory uses and structures, not including the conduct of any business, occupation or profession, except as permitted under Section 16.3 below.

16.2.3. The sale, but their owner or licensed dealer, of used *mobile homes* or travel trailers on sites presently or previously occupied by the owner of such *mobile home* or travel trailer. The sale of the new display models by licensed dealers in preparation for occupancy on that site.

16.2.4. Storage or parking of *mobile homes* or travel trailers on sites preparatory to occupancy or between periods of occupancy on the site.

16.2.5. Uses accessory to any of the above uses not involving the conduct of any business, trade, occupation or profession, except as permitted under Section 16.3 below, if first approved as a conditional use:

16.2.5.1. Radio and television antennae of a height exceeding twenty (20) feet, measured from the nearest crown of the road, and a width exceeding six (6) inches, measured from the widest point of the vertical supporting structure of the applicable antenna.

16.2.5.2. Satellite television antenna or satellite dish.

Section 16.3. Special accessory uses

A *mobile home* park providing space for forty (40) or more *mobile homes* or travel trailers may have retail stores and personal service shops for the care or treatment of the occupants or their clothing, subject to the following limitations and requirements:

16.3.1. Such uses are wholly conducted within a completely enclosed building

16.3.2. There are no signs or displays visible from any public street, indicating such uses.

16.3.3. Such uses are conducted for the convenience of occupants of the *mobile home* park and not normally made available to other persons.

Section 16.4. Prohibited uses

The permissible uses enumerated in Section 16.2 and 16.3 shall not be construed to include, either as a principal or accessory use, any of the following which are listed for emphasis:

16.4.1. Display or sale of used *mobile homes* or travel trailers, except an occupied *mobile home* or an unoccupied *mobile home* or travel trailer previously occupied on the same site, may be sold on that site by its owner or licensed dealer.

16.4.2. Any service station, service or repair garage.

16.4.3. No secondhand or used merchandise shall be offered for sale, displayed or stored on the premises except as incidental to the bona fide sale of a *mobile home* or travel trailer.

16.4.4. No animals, reptiles, insects, poultry or fowl shall be raised or kept in any *mobile home* park, except where a park has special facilities to take care of not more than one (1) domestic animal per *mobile home* or travel trailer.

16.4.5. Dwelling units or living quarters except in a *mobile home* or travel trailer or as an accessory use.

16.4.6. Occupancy of a site by a *mobile home* or travel trailer for living quarters except on a rental basis.

16.4.7. A separate utility building on any *mobile home* site, except for a demountable, code-approved storage closet.

16.4.8. No cooking or sanitary facilities shall be installed or maintained on any *mobile home* or travel trailer site in any building or structure other than in the *mobile home* or travel trailer.

16.4.9. Storage or parking of *mobile homes* or travel trailers except when a *mobile home* or travel trailer is located on a site preparatory to occupancy or between periods of occupancy.

#### Section 16.5. Plot size.

Every plot shall not be less than one hundred (100) feet in width and one-half acre in area. The required 100-foot minimum width need not be measured at a street line if the plot extends to a street by means of a strip at least fifty (50) feet in width.

#### Section 16.6. Height.

No building or structure, or part thereof, shall be erected or altered to a height exceeding two (2) stories or thirty (30) feet, whichever is less.

#### Section 16.7. Minimum site requirements.

16.7.1. A *mobile home* consisting of one (1) or more units designed as a single dwelling shall be placed upon a site not less than three thousand two hundred (3,200) square feet in area and not less than forty (40) feet in average width.

16.7.2. A travel trailer shall be placed upon a site not less than one thousand two hundred (1,200) square feet in area and not less than thirty (30) feet in average width.

#### Section 16.8. Yard setbacks.

Every plot used for *mobile home* park purposes shall provide yards as follows:

16.8.1. *Trafficways*. Notwithstanding anything to the contrary contained herein, a setback of a depth of fifty (50) feet from the right-of-way of any trafficway, as depicted on the Broward County Trafficways Plan, as the same may exist from time to time, shall be required.

16.8.2. *Front yard*. Every plot shall have a front yard not less than twenty-five (25) feet in depth, and this minimum depth of yard shall be provided on all streets upon which the plot abuts.

16.8.3. *Side yards*. Each side of every plot shall have a side yard not less than ten (10) feet in width.

16.8.4. *Corner plots*. Upon corner plots there shall be a front yard as hereinbefore specified, and also a side yard at least twenty-five (25) feet in width on the side of the plot abutting on the side street, provided in every event that there shall be a setback of a depth of fifty (50) feet from the right-of-way of any trafficway as depicted on the Broward County Trafficways Plan, as the same may exist from time to time, with respect to the front and side yards of a corner lot.

16.8.5. *Rear yard*. Every plot shall have a rear yard not less than fifteen (15) feet in depth.

16.8.6. *Accessory building or structures*. No accessory building or structure shall be placed in any required yard space.

#### Section 16.9. Density.

Except as may be otherwise provided herein with respect to the allowance for "reserved units," the density shall not exceed ten (10) units per gross acre.

Section 16.10. Separation.

No part of any *mobile home* or travel trailer or any addition or appurtenance thereto shall be placed within ten (10) feet of any other *mobile home* or travel trailer, addition or appurtenance thereto. No part of any *mobile home* or travel trailer or addition or appurtenance thereto shall be located within twenty-five (25) feet of any accessory or service building or structure used in connection with a *mobile home* park.

Section 16.11. Access to sites.

Each site shall abut upon a driveway or unobstructed space not less than thirty (30) feet in width, which space shall have unobstructed access to a public street. Such driveway or space shall have a hard-surfaced roadway not less than twenty-two (22) feet in width and shall be adequately lighted.

Section 16.12. Porches and additions.

16.12.1. Structures of a permanent nature shall not be added or attached to a *mobile home* or travel trailer unless such *mobile home* or travel trailer is placed upon a site conforming to the minimum requirements for a *mobile home*.

16.12.2. Structures of a permanent nature added or attached to a *mobile home* or travel trailer such as enclosed porches, screened enclosures, storage closets and carports shall conform to all applicable provisions of the South Florida Building Code, Broward Edition. The total combined area of all such additions or attachments shall not exceed the gross area of the *mobile home* or travel trailer itself. Carports are not included in the above area limitations, if the width of the site is adequate for separation requirements.

16.12.3. All portable or demountable awnings, roofs or appurtenances which do not meet the requirements of subsection 16.12.2 above shall be dismantled and stored either within the *mobile home* or travel trailer or in some permanent building during the following circumstances:

16.12.3.1. Within one (1) hour after all hurricane alerts by the U.S. Weather Bureau.

16.12.3.2. If the *mobile home* or travel trailer is not to be occupied for a period of thirty (30) days or more.

Section 16.13. Health and sanitation.

16.13.1. *Water supply*. Potable freshwater and sanitary sewer services shall be available on each site.

16.13.2. *Toilets*. No dependent travel trailer site shall be more than two hundred (200) feet from approved toilet facilities.

16.13.3. *Garbage removal*. Provisions shall be made for the semiweekly removal of all garbage, trash and refuse from the *mobile home* park.

16.13.4. *Occupancy*. The number of occupants of a trailer and its porch or additions shall be limited to the sleeping accommodations for which the trailer was designed.

16.13.5. *Fixtures*. The sanitary regulations of the state and county shall be complied with as to all fixtures installed or maintained.

Section 30.8. Provisions for flood hazard reduction.

30.8.2. *Specific standards*. In all areas of special flood hazard where base flood elevation data have been provided as set forth in subsection 30.6.3. or subsection 30.7.3. the following provisions are required:

Section 30.8.2.3. Mobile Homes:

30.8.2.3.1. All mobile homes shall be anchored to resist flotation, collapse or lateral movement by providing over-the-top and frame ties to ground anchors. Specific requirements shall be that:

30.8.2.3.1.1. Over-the-top ties shall be provided at each end of the *mobile home* with one (1) additional tie per side at an intermediate location on *mobile homes* of less than fifty (50) feet, and one (1) additional tie per side for *mobile homes* of fifty (50) feet or more.

30.8.2.3.1.2. Frame ties shall be provided at each corner of the *home* with four (4) additional ties per side at intermediate points for *mobile homes* less than fifty (50) feet long, and one (1) additional tie for *mobile homes* of fifty (50) feet or longer.

30.8.2.3.1.3. All components of the anchoring system shall be capable of carrying a force of four thousand eight hundred (4,800) pounds.

30.8.2.3.1.4. Any additions to the *mobile home* shall be similarly anchored.

30.8.2.3.2. For new *mobile home* parks and subdivisions; for expansions to existing *mobile home* parks and subdivisions; for existing *mobile home* parks and subdivisions where the repair, reconstruction or improvement of the streets, utilities and pads equals or exceeds fifty (50) percent of the value of the streets, utilities and pads before the repair, reconstruction or improvement has commences; and for *mobile homes* not placed in a *mobile home* park or subdivision the requirements shall be:

30.8.2.3.2.1. Stands or lots are elevated on compacted fill or on pilings so that the lowest floor of the *mobile home* will be at or above the base flood level.

30.8.2.5.3. Prohibition of manufactured homes (*mobile homes*) except in an existing manufactured *home* (*mobile home*) park or subdivision. A replacement manufactured *home* may be placed on a lot in an existing manufactured *home* park or subdivision provided the anchoring standards of subsection 30.8.1.2. and the elevation standards of subsection 30.8.2.1. are met.

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## Lighthouse Point

### PART II CITY CODE

#### Chapter 38 FLOODS\*

##### ARTICLE II. FLOOD HAZARD PROTECTION

###### DIVISION 3. FLOOD HAZARD REDUCTION

###### Sec. 38-82. Specific standards.

c- Prohibit the placement of manufactured homes (*mobile homes*), except in an existing manufactured homes (*mobile homes*) park or subdivision. A replacement manufactured *home* may be placed on a lot in an existing manufactured *home* park or subdivision provided the anchoring standards of subsection 38-81(2) and the elevation standards of subsection 38-82(1) are met.

- i- Prohibit the placement of manufactured homes (*mobile homes*), except in an existing manufactured *home* (*mobile home*) park or subdivision. A replacement manufactured *home* may be placed on a lot in an existing manufactured *home* park or subdivision provided the anchoring standards of subsection 38-81(2) and the elevation of standards of subsection 38-82(1) are met.
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## **Margate**

### **CODE OF ORDINANCES City of Margate, FLORIDA Codified through Ord. No. 1500.471, enacted July 12, 2000. (Supplement No. 119)**

#### **PART II CODE OF ORDINANCES\***

##### **Chapter 6 BUILDINGS\***

###### **ARTICLE III. TRAILER AND MOBILE HOME MOUNTINGS\***

Sec. 6-33. Adoption of standards.

In order that safe mountings and anchorings for mobile homes and trailers may be provided, the standards for blocking, mounting and anchoring the mobile homes and trailers shall be in accordance with the specifications hereinafter provided in section 6-40

Sec. 6-37. Hurricanes; re-inspection required

In the event a hurricane or hurricane force winds are encountered or strike within the city limits of the City of Margate, Florida and within the boundaries of any trailer or *mobile home* park, then the re-inspection called for under this article shall automatically be deemed necessary and performed within sixty (60) days on all trailer and *mobile home* mountings within the affected trailer or *mobile home* park. The re-inspection hereinbefore then referred to shall be performed on a new biannual cycle following such post hurricane re-inspection.

Sec. 6-40. *Mobile Home Anchoring Code.*

- a) This article applies to mobile homes, house trailers, or vehicular portable structures designed or capable of being used with or without a permanent foundation, as a dwelling or residential accommodation for one or more persons, in the incorporated areas of the City of Margate whether such facilities may be construed under other laws as motor vehicles for taxation or other purposes and whether such facilities are uninhabited, used intermittently, or used only temporarily for housing during recreation or vacations. This article shall apply to all such facilities or vehicles whether or not such facilities are self-contained and do not require supplemental construction to be used as living accommodations, and also applies to self-propelled vehicles used for living accommodations. This article does not apply to boat trailers or luggage trailers.
- b) In this article, the following words and phrases shall have the following meanings:
  - 1) "South Florida Building Code" shall mean the South Florida Building Code as adopted by section 6-7.
  - 2) "*Mobile home*" shall mean any vehicular portable structure built on a chassis and designed to be used and capable of being used without a permanent foundation as a dwelling when connected to utilities
  - 3) "Travel trailer" shall mean a vehicular portable structure built on a chassis equipped for the road and used as a temporary dwelling during travel, recreation or vacation.
  - 4) "Code" shall mean the "City of Margate *Mobile Home Anchoring Code.*"
- c) All mobile homes, house trailers, travel trailers and vehicular portable structures which will be present within the incorporated areas of the City of Margate shall be blocked properly and secured and anchored against the force of hurricane winds, in accordance with the provisions of this article.
  - c) The following standards are adopted as part of this article, but do not supersede the specific requirements set forth herein:
    - 1) "Final Report, Wind Forces on Mobile Homes," College of Engineering, Department of Civil Engineering, University of Michigan, June, 1962.
    - 2) "Building Code Requirements for Reinforced Concrete," ACI 318-63, as adopted by the American Concrete Institute.
    - 3) Deformed Billet Steel Bars for Concrete Reinforcing with 40,000 psi Minimum Yield Point," ASTM A15-58 of the American Society for Testing and Materials.

- 4) "Wire rope" shall be in accordance with "Wire Rope Simplified Practice Recommendation," R-198-43 U.S. Department of Commerce, National Bureau of Standards, February 15, 1944.
  - 5) "Synthetic fibers" for use as webbing or rope shall be in accordance with MII-R, April 30, 1963.
  - 6) "Manila rope" shall be in accordance with FS TR 605A.
- e) The following materials shall conform to the following standards as set forth in the indicated sections of the South Florida Building Code
- 1) Portland cement shall comply with the standards in subsection 2504.1
  - 2) Concrete aggregates shall comply with the standards in subsection 2504.2.
  - 3) Structural steel shall comply with the standards in subsection 2801.3
  - 4) Masonry block shall comply with the requirements of subsection 2702.5 for Class "A" block.
- f) In order that a safe mounting for the *mobile home* may be provided, the minimum requirements for blocking shall be in accordance with the provisions of this section.
- 1) Where the supporting ground is capable of carrying two thousand five hundred (2,500) pounds per square foot or more bearing, base foundation for masonry piers shall be not less than sixteen (16) inches square, nor less than four (4) inches deep, and shall be of solid masonry, not open core block
  - 2) Where the supporting ground carries less than two thousand five hundred (2,500) pounds per square foot in bearing, the enforcing official shall require a large proportionate base surface for the piers.
  - 3) Pier foundations shall be installed under the *mobile home* a maximum of ten (10) feet on centers on each side of the *mobile home* frame.
  - 4) If celled masonry blocks are used for piers, blocks must comply with subsection (e)(4) above and shall be placed across.
  - 5) In cast-in-place concrete piers are used for foundations, the requirements as set forth in the two (2) sentences of subsection 2702.8 of the South Florida Building Code shall apply. Minimum steel in the base of the pier shall be twp #3 bars in each direction, and the minimum depth of the base shall be six (6) inches.
  - 6) Hardwood shims shall be used over the tops of the piers, and such shim materials shall be treated in accordance with subsection 2907.2(a) of the South Florida Building Code. Shims shall be fitted tightly to prevent rocking of the unit under the action of wind gusts
  - 7) The wheels of the *mobile home* shall not be removed except in paved areas, but ground may be removed from under wheels to permit lowering of *mobile home*.
- g) Each *mobile home* shall be provided with anchors and tie downs as described herein, and shall be of such number and type that the largest exposed surface area of the *mobile home* shall be capable of withstanding a static wind pressure, whose velocity pressure shall be in accordance with Table 23-B of the South Florida Building Code and the shape factors shall be in accordance with subsection 2306.4(b) of said building code. Such anchors or tie downs shall be attached either to the frame and/or over the top of the *mobile home*.
- h) Ties passing over the *mobile home* shall be at least one-quarter ( $\frac{1}{4}$ ) inch diameter wire rope, one-half ( $\frac{1}{2}$ ) inch diameter manila rope, three-eighths ( $\frac{3}{8}$ ) inch diameter nylon rope, webbed straps, or as approved by the Board of Rules and Appeals of Broward County, and in accordance with the following standards:
- 1) Ties shall be able to sustain a minimum breaking load of three thousand seven hundred fifty (3,750) pounds for anchor spacing of ten (10) feet. Ties shall be of increased capacity for greater anchor spacing.
  - 2) Ties passing over the *mobile home* shall be snug to the coach body at both top corners and installed perpendicular to the ground and secure to the main frame members and

- from there to ground anchors. Spacing of ties on protected locations shall be a maximum of twenty (20) feet; and spacing in exposed locations shall be a maximum of ten (10) feet.
- 3) Ties shall be attached to the main steel framing members and made snug by connecting to one-half ( $\frac{1}{2}$ ) inch dropped-forged turnbuckles connected to ground anchors with three-eighths ( $\frac{3}{8}$ ) inch wire rope, or as approved by the Board of Rules and Appeals of Broward County.
    - i) This article shall be known and cited as the "City of Margate Mobile Home Anchoring Code."

## Chapter 93/8 FLOODPLAIN MANAGEMENT

Sec. 9 $\frac{3}{8}$ -16. Specific requirements for construction and improvements in special flood hazard areas.

In all areas of special flood hazard where base flood elevation data has been provided as set forth in section 9 $\frac{3}{8}$ -6(b) or section 9 $\frac{3}{8}$ -12(b)(9), the following provisions are required:

c) Prohibit the placement of manufactured homes (*mobile homes*), except in an existing manufactured homes (*mobile homes*) park or subdivision. A replacement manufactured *home* may be placed on a lot in an existing manufactured *home* park or subdivision provided the anchoring standards of section 9 $\frac{3}{8}$ -15(2), and the elevation standards of section 9 $\frac{3}{8}$ -16(A) are met.

### 5) *Mobile homes*

- a) No *mobile home* shall be placed in a floodway or coastal high hazard area, except in an existing *mobile home* park or existing *mobile home* subdivision
- b) All *mobile homes* shall be anchored to resist flotation, collapse or lateral movement, by the providing of over-the-top and frame ties to ground anchors. Specific requirements shall be that:
  1. Over-the-top ties be provided at each of the four (4) corners of the *mobile home* with two (2) additional ties per side at intermediate locations (*mobile homes* less than fifty (50) feet long requiring one additional tie per side);
  2. Frame ties be provided at each corner of the *home* with five (5) additional ties per side at intermediate points (*mobile homes* less than fifty (50) feet long requiring four (4) additional ties per side);
  3. All components of the anchoring system be capable of carrying a force of four thousand eight hundred (4,800) pounds; and
  4. Any additions to the *mobile home* be similarly anchored
- c) For new *mobile home* parks and subdivisions, for expansions to existing *mobile home* parks and subdivisions, for existing *mobile home* parks and subdivisions where the repair, reconstruction or improvement of the streets, utilities and pads equals or exceeds fifty (50) percent of the value of the streets, utilities and pads before the repair, reconstruction or improvement has commenced, and for *mobile homes* not placed in a *mobile home* park or subdivision [specific requirements shall be that
  1. Stands or lots are elevated on compacted fill or on pilings so that the lowest floor of the *mobile home* will be at or above the base flood level;
  2. Adequate surface drainage and access for a hauler are provided; and
  3. In the instance of elevation on pilings:
    - a. Lots are large enough to permit steps;

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- b. Piling foundations are placed in stable soil no more than ten (10) feet apart; and
  - c. Reinforcement is provided for pilings more than six (6) feet above the ground level
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## Miramar

### SUBPART A. ADMINISTRATIVE REGULATIONS

#### Chapter 21 UTILITIES\*

##### ARTICLE V. WATER AND SEWER IMPACT FEES

Sec. 21-200. Exemption.

- c) The installation of a replacement *mobile home* on a lot or other such site where a water and/or sewer impact fee for such *mobile home* site has been previously paid.
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## North Lauderdale

### PART II CODE OF ORDINANCES

#### Chapter 90 FLOODPLAIN MANAGEMENT\*

##### ARTICLE II. FLOOD DAMAGE PREVENTION

###### DIVISION 3. PROVISIONS FOR FLOOD HAZARD REDUCTION

Sec. 90-66. General standards.

- 1) All new construction and substantial improvements including *manufactured homes* shall be anchored to prevent flotation, collapse or lateral movement of the structure.
- 2) All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.
- 3) All new construction or substantial improvements including *manufactured homes* shall be constructed by methods and practices that minimize flood damage.

Sec. 90-67. Elevation requirements.

- a) New construction or substantial improvement of any residential structure including *manufactured homes* shall have the lowest floor, including basement, elevated to or above base flood elevation.
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## Oakland Park

### PART II CODE OF ORDINANCES

#### Chapter 46 MANUFACTURED HOMES AND TRAILERS\*

Sec. 46-31. Definitions.

The following words, terms and phrases, when used in this article, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

*Mobile home* means a residential structure that is transportable in one or more sections, which structure is eight body feet (2.4 meters) or more in width, over 35 feet in length with the hitch, built on an integral chassis, and designed to be used as a dwelling when connected to the required utilities, and includes the

plumbing, heating, air conditioning and electrical systems contained in the structure and constructed to the United States Department of Housing and Urban Development standards. A *mobile home* shall be a detached residential dwelling unit in one or more sections designed for transportation after fabrication on its own wheels and arriving at the site where it is to be occupied as a dwelling unit complete with necessary service connections and ready for occupancy, except for unpacking and assembly operations, including but not limited to location on jacks or other temporary or permanent foundation, and connection to utilities with the possible addition of movable furnishings. A *mobile home* consisting of two sections historically has been called a double-wide *mobile home*. A *mobile home* has either a dealer tag or its own tag as defined and issued by the state department of motor vehicles affixed to it during movement.

Sec. 46-32. Location

- b) Mobile homes shall be located, occupied or used only as provided in this article.
- c) Mobile homes may be located in an R-T district and only on individual lots in other districts except as provided in section 46-37.

Sec. 46-35. R-T *mobile home* park district.

- a) The R-T *mobile home* park district is composed of certain lands suitable for the development of a low-, medium- and high-density residential area under single ownership consisting of rental *mobile home* spaces
- b) The following regulations shall apply to each R-T district:
  - 1) Only *mobile home* parks and their customary accessory uses shall be permitted in R-T districts. A customary accessory use may include, among other things, the sale of *mobile homes* on the following conditions:
    - a. The *mobile home* must have all of the facilities and utility connections for use as a dwelling.
    - b. The buyer of a new *mobile home* purchased from a *mobile home* park owner or operator must be offered a six months' lease with an option to renew for six months for the *mobile home* space on which the *mobile home* is located at the time of purchase.
    - c. The seller and buyer of a new *mobile home* must intend that the buyer live in the *mobile home* on the space where it is situated at the time of the sale.
    - d. The number of *mobile homes* for sale shall not exceed ten percent of the total number of approved *mobile home* spaces in a *mobile home* park at any one time.
    - e. *Mobile homes* for sale shall be located only on *mobile home* spaces in the *mobile home* park and subject to the same setbacks and yard requirements as occupied *mobile homes*.
  - 2) A land use permit shall be required to establish a *mobile home* park before building permits are issued. A land use permit application shall include a site plan drawn to scale showing property lines, rights-of-way, locations of buildings, parking areas, curb cuts, driveways, cross section of pavement, a landscape plan, streetlights, fire hydrants and fire extinguishers. In addition, the following requirement shall be incorporated:
    - a. Each *mobile home* park shall contain at least five acres, shall be limited to seven *mobile home* spaces per gross acre, and shall have not less than ten *mobile home* spaces completed and available at first occupancy. The park shall have unobstructed access to a publicly maintained street or road.
    - b. No *mobile home* space shall contain less than 3,000 square feet in area
    - c. Minimum separation between *mobile homes* shall be 15 feet. Certain additions to *mobile homes* are permitted provided minimum separation between the addition and any other *mobile home* or addition shall be ten feet. Such additions are limited to screened rooms, carports, accessory buildings to store personal items and gardening equipment. Any other addition shall provide a minimum of 15 feet of separation.

- d. Landscaping, buffering and open space requirements shall be as provided for in Ordinance number 95-25.
- e. All porches, rooms and additions to a *mobile home* shall comply with this article and the town building department's codes and regulations.
- f. A recreation area shall be provided equivalent to 200 square feet of area for each *mobile home* space; however, in no case shall such recreation area be less than 10,000 square feet in area. Such recreation area shall be no longer than twice its width. This area shall remain in a clean and presentable condition and shall be adequately lighted. Such recreation area shall not be located in an area where such use will adversely affect surrounding property.
- g. Each *mobile home* space shall have a minimum of 15 feet of frontage on a street or lane within the boundary of the park. Such streets or lanes shall have an unobstructed right-of-way of 30 feet in width and a hard surface of not less than 12 feet in width for one-way drives. Hard surfacing shall consist of a base at least six inches thick of lime rock or soil cement or an equivalent material and a top at least one inch thick made of asphaltic concrete or an equivalent material. Such streets shall be lighted by a system that consists of a 200-watt incandescent light for every 120 linear feet of roadway or shall with some other system supply 0.2 lumen per square foot of roadway.
- h. There shall be a minimum of two off-street parking spaces for each *mobile home* space. Each *mobile home* space shall be equipped with at least one paved parking space; the remainder of the required spaces may be located either on *mobile home* spaces or in common parking lots.
- i. Paved driveways shall be provided to each parking space on each individual *mobile home* space. Driveways shall be at least nine feet wide. Common driveways may be used to serve more than one *mobile home* space but shall serve no more than four *mobile home* spaces.
- j. Common walks shall be provided around recreation, management and service areas. Common walks shall be at least four feet wide except where such walks are adjacent to an arterial street; then such walks shall be at least five feet wide. No required walk shall be used as a drainageway.
- k. Each *mobile home* space shall be provided with a concrete patio at least eight feet wide and ten feet long. Such patio shall conform to the separation provisions outlined in subsection (2)c. Double-wide *mobile homes* need not have a patio. Each *mobile home* space shall be landscaped with turf, shrubs, trees or other plantings.
- l. Each *mobile home* space shall be connected with a water system and sewage treatment and disposal system approved by the county and state department of health.
- m. It shall be unlawful for any person to maintain or operate a *mobile home* park within the town without a license.

Sec. 46-37. R-T-1 *mobile home* subdivision district.

The R-T-1 *mobile home* subdivision district is composed of certain lands where it is desirable to attain a low-, medium-density residential area consisting of *mobile homes* and single-family dwellings on single lots under individual ownership. The following regulations shall apply to each R-T-1 district:

- 1) *Uses permitted.* The following uses are permitted:
  - a. Mobile homes used as single-family dwelling units on individual lots and their customary accessory uses, including room additions
  - b. Single-family dwellings and their customary accessory uses, including room additions.
- 2) *Special exceptions.* Special exceptions are the same as for an R-1 single-family dwelling district, including customary accessory uses
- 3) *Dimensions.* Lot size and setback requirements shall be the same as those established for the R-2 single-family dwelling districts
- 4) *Parking.* There shall be a minimum of two off-street parking spaces for each lot.

Sec. 46-38. Mobile homes and recreational vehicles on individual lots exclusive of an R-T district

- a. Mobile homes and recreational vehicles may be permitted on individual lots in residential, commercial or industrial districts, subject to the following:
    - 1) A *mobile home* or recreational vehicle may be temporarily parked and occupied on a lot in a residential district after a public hearing before the board of zoning adjustment and appeals during the construction of a permanent residence on the lot
    - 2) *mobile home* or recreational vehicle may be temporarily parked and occupied on a specific tract of land in commercial or industrial districts, to be used for offices, storage or security purposes, during the construction of a permanent building on the tract of land.
    - 3) A temporary permit for use in subsections (1) and (2) will be issued only after a building permit has been secured for the permanent building. The *mobile home* or recreational vehicle shall be removed within 180 days or within ten days after completion of the permanent building, whichever comes first.
    - 4) A *mobile home* or recreational vehicle may be used as a field office and tool shed accessory to the development of a subdivision
    - 5) *Mobile* homes used as offices shall be permitted as a permanent use when accessory to a *mobile home* sales lot.
    - 6) In commercial and industrial districts, a *mobile home* or recreational vehicle may be used as quarters for night watchmen for a maximum period of two years when approved as a special exception by the board of zoning adjustment and appeals.
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## Parkland

### PART II CODE OF ORDINANCES

#### Chapter 22 ZONING\*

##### ARTICLE II. DISTRICTS

###### DIVISION 2. AE-1 CLASSIFICATION AND RESTRICTIONS

###### Sec. 22-35. Prohibited uses.

- a) No *mobile home*, being defined as a vehicle which would bear an MH series tag if licensed, shall be permitted on any lot or parcel; and no recreational vehicle or trailer shall be occupied at any time nor used for sleeping, eating or other living purposes within the city at any time, except that, upon registration with the building department and payment of a fee to said department, temporary occupancy of a recreational vehicle may be permitted for no longer than two (2) weeks out of any year. No temporary structure of any kind whatsoever shall be used as a residence, temporary or otherwise.
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## Pembroke Park

### PART II CODE OF ORDINANCES

#### Chapter 28 ZONING\*

##### ARTICLE III. DISTRICT REGULATIONS\*

###### DIVISION 8. T-1 MOBILE HOME PARK DISTRICT\*

###### Sec. 28-256. Intent.

The T-1 *Mobile Home Park* District is intended to apply to areas used for the parking or placement of *mobile* homes and/or recreational vehicles for occupancy as living quarters, wherein the *mobile home*

park is owned or operated as a unit and individual spaces are occupied on a rental basis for periods not in excess of one (1) year

Sec. 28-258. Permitted uses.

No building or structure or part thereof shall be erected, altered or used, or land or water used, in whole or in part, in the T-1 *Mobile Home* Park District for other than one (1) or more of the following specified uses

- 1) *Mobile home* parks for the rental of *mobile home* or recreational vehicle sites for occupancy by *mobile homes* and/or recreational vehicles as living quarters where the *mobile home* park is owned and/or operated as a unit;
- 2) Accessory uses and structures, not including the conduct of any business, occupation or profession except as permitted in this division;
- 3) Home occupations as defined in section 15-38 of this Code.

Sec. 28-260. Prohibited uses

The permitted uses enumerated in the preceding section for the T-1 *Mobile Home* Park District shall not be construed to include, either as principal or accessory use, any of the following which are listed for emphasis:

- 1) Storage or parking of *mobile homes* or recreational vehicles except when a *mobile home* or recreational vehicle is located on a site preparatory to occupancy or between periods of occupancy;
- 2) Any gasoline service station, vehicle service or repair garage
- 3) Any second-hand or used merchandise offered for sale, displayed or stored on the premises except as incidental to the bona fide sale of a *mobile home*;
- 4) Dwelling units or living quarters, except in a *mobile home*, recreational vehicle, or as a permitted accessory use;
- 5) Occupancy of a *mobile home* site by a *mobile home*, recreational vehicle or living quarters except on a rental basis for periods not in excess of one (1) year;
- 6) No second kitchen facility shall be permitted on any *mobile home* or recreational vehicle site
- 7) No sanitary facilities shall be installed or maintained on any *mobile home* site in any building or structure thereon, other than in the *mobile home* or recreational vehicle itself or in an approved addition thereto;
- 8) The occupancy of any *mobile home* or recreational vehicle and/or addition thereto by more than one (1) family; or
- 9) Placement, construction or location of a modular home for use as a dwelling unit or living quarters.

(Ord. No. 63-5-1, § 15(d), 5-1-63; Ord. No. 91-5-2, § 1, 1-9-91; Ord. No. 00-4-4, § 5, 4-26-00)

Sec. 28-261. Minimum plot size

Every plot in the T-1 *Mobile Home* Park District shall be not less than one-hundred fifty (150) feet in width and one (1) acre in area. The required one-hundred fifty (150) foot minimum width need not be measured at a street line if the plot extends to a street by means of a strip at least fifty (50) feet in width.

Sec. 28-262. Locating mobile homes outside parks.

It shall be unlawful for any person to park, locate or place or cause to be parked, located or placed, a *mobile home* or recreational vehicle within the town except in a duly licensed and designated *mobile home* park

Sec. 28-263. *Mobile home* lot dimensions

Every *mobile home* in the T-1 *Mobile Home* Park District shall be placed on a *mobile home* lot for such *mobile home* and its appurtenances having minimum average dimensions of forty (40) feet by sixty (60) feet, and shall contain a minimum of two thousand four hundred (2,400) square feet of land.

Sec. 28-265. Height of structures

No building or structure, or part thereof, located in the T-1 *Mobile Home* Park District shall be erected or altered to a building height exceeding two (2) stories or thirty (30) feet. Two (2) story *mobile homes* are prohibited

Sec. 28-266. Required yards

Every plot used for *mobile home* park purposes in the T-1 *Mobile Home* Park District shall provide yards as follows

- 1) Every plot shall have a front yard not less than twenty-five (25) feet in depth, and the minimum depth of a yard on all streets upon which the plot abuts other than front shall be not less than ten (10) feet, except when the plot abuts Hallandale Beach Boulevard, Pembroke Road or Park Road, wherein the minimum depth per yard shall be not less than twenty-five (25) feet.
- 2) Each side of every plot shall have a side yard not less than ten (10) feet in width
- 3) Every plot shall have a rear yard not less than ten (10) feet in depth
- 4) No accessory building or structure shall be placed in any required yard space.
- 5) Requirements for plot yards contained in this section do not apply to the placement of recreational vehicles in a *mobile home* park.

Sec. 28-267. Distance between structures

- a) No part of any living area within a *mobile home* or recreational vehicle may be placed, constructed or maintained within ten (10) feet of any other living area of an adjacent *mobile home* or recreational vehicle.
- b) No noncombustible accessory structure may be placed, constructed or maintained within three (3) feet of a *mobile home*, recreational vehicle or accessory structure located on an adjacent *mobile home* lot or recreational vehicle lot
- c) No combustible accessory structure may be placed, constructed or maintained within five (5) feet of a *mobile home*, recreational vehicle, or accessory structure located on an adjacent *mobile home* lot or recreational vehicle lot.
- d) No part of any living area within a *mobile home* or recreational vehicle shall be located within ten (10) feet of any service building or structure used in connection with the operation or maintenance of a *mobile home* park.
- e) No noncombustible accessory structures shall be located within three (3) feet of any service building or structure used in connection with the operation or maintenance of a *mobile home* park.
- f) No combustible accessory structure shall be located within five (5) feet of any service building or structure used in connection with the operation or maintenance of a *mobile home* park.

Sec. 28-268. Driveways

Each *mobile home* site in the T-1 *Mobile Home* Park District shall abut upon a driveway or obstructed space not less than thirty (30) feet in width, which space shall have unobstructed access to a street. Such driveway or space shall have a hard-surfaced roadway not less than twenty (20) feet in width and shall be adequately lighted

Sec. 28-269. Porches, additions, appurtenances

All permitted structures of a permanent nature, such as enclosed porches, screened enclosures, and other additions to *mobile homes* in the T-1 *Mobile Home* Park District shall conform to all applicable provisions of this section and to the Town Building Code

Sec. 28-270. Conditions for removal, demountable roofs, porches, etc

All canvas, portable or demountable roofs, porches or appurtenances, shall be dismantled and stored either within the *mobile home* or in some permanent building during the following circumstances:

- 1) Within one (1) hour after any hurricane alert issued by the United States Weather Bureau; or
- 2) If the *mobile home* is not occupied for a period of thirty (30) days or more

Sec. 28-271. Water supply

Fresh water supply shall be available in the T-1 *Mobile Home* Park District within one hundred (100) feet of every *mobile home* lot or recreational vehicle lot.

Sec. 28-272. Number of occupants per *mobile home* or recreational vehicle

- a) The number of occupants of a *mobile home* or recreational vehicle, shall be limited to the sleeping accommodations for which the *mobile home* or recreational vehicle was designated
- b) No *mobile home* or recreational vehicle shall be occupied by persons other than the members of one (1) family.

Sec. 28-285. Attachment of structures, additions, appurtenances to recreational vehicle prohibited.

- a) It shall be unlawful to attach any structure, addition or appurtenance to any recreational vehicle located with the Town
- b) There shall be no addition or attachment to recreational vehicles located on recreational vehicle lot or nonpermanent *mobile home* lots except for a demountable canvas awning.
- c) The provisions of subsection (a) shall not apply to any recreational vehicle when said recreational vehicle is parked or located on a full size *mobile home* lot in a *mobile home* park and is tied down in the method required by this Code and Florida Statutes as same applies to *mobile homes*, and is attached to the water distribution system, wastewater collection system, and electrical distribution system as required for *mobile homes* under this Code and Florida Statutes.

Sec. 28-285.3. Minimum space between vehicles

There must be maintained a separation of at least ten (10) feet between all recreational vehicles parked or located within the Town either on permanent or nonpermanent sites.\

Sec. 28-285.5. Tie-down requirements for permanent location status vehicles.

Any recreational vehicle granted permanent location status shall be tied down in accordance with the standards applicable to *mobile homes* for such purposes.

## **Sea Ranch Lakes**

### **APPENDIX A LAND DEVELOPMENT CODE\***

#### **ARTICLE IV. RESOURCE PROTECTION STANDARDS**

##### **4.03.00. FLOODPLAIN MANAGEMENT**

###### **4.03.04. Provision for Flood Hazard Reduction.**

- I) Prohibit the placement of manufactured homes (*mobile homes*) except in an existing manufactured homes (*mobile homes*) park or subdivision. A replacement manufactured *home* may be placed on a lot in an existing manufactured *home* park or subdivision provided the standards of Sec. 4.03.04, a2 and the elevation standards of Sec. 4.02.04, b1 are met.
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## **Sunrise**

### **SUBPART B. LAND DEVELOPMENT CODE**

#### **Chapter 16 CITY OF SUNRISE LAND DEVELOPMENT CODE\***

##### **ARTICLE V. DISTRICT REGULATIONS**

###### **Sec. 16-74. RP-10 Mobile Home Park District.**

###### **Sec. 16-74. RP-10 *Mobile Home* Park District.**

- a) *Purpose.* The RP-10 *Mobile Home* Park District is intended to apply to areas to be used for the placement of *mobile homes* for occupancy as living quarters, wherein the park is owned or operated as a unit and individual spaces are occupied on a rental basis; recreational vehicles are not permitted.
- b) *Uses permitted*
  - 1) *Mobile home* parks for rental of site for occupancy by *mobile homes* as living quarters, wherein the *mobile home* park is owned and/or operated as a unit.
  - 2) Accessory uses and structures, not including the conduct of any business, occupation or profession. These may include a storage closet at each home side and an administration and/or maintenance building.
- c) *Plot size.* Not be less than two hundred (200) feet in width and one (1) acre in area. The required two hundred-foot minimum width need not be measured at a street line if the plot extends to a street by means of a strip at least sixty (60) feet in width.
- d) *Height.* Not to exceed one (1) story or fifteen (15) feet, whichever is less.
- e) *Minimum site requirements.* A *mobile home* shall be placed upon a site not less than three thousand two hundred (3,200) square feet in area and not less than forty (40) feet in average width.
- f) *Yard setbacks.* Every plot used for a *mobile home* park purposes shall provide yards as follows:
  - 1) *County traffic way (any yard):* At least fifty (50) feet from the right-of-way of any traffic way shown on the county traffic way plan.
  - 2) *Front yards:* Not less than twenty-five (25) feet in depth, and this minimum depth of yard shall be provided on all streets upon which the plot abuts.
  - 3) *Side yards:* Not less than ten (10) feet in width.
  - 4) *Corner plots:* Upon corner plots there shall be a front yard as hereinbefore specified, and also a side yard at least twenty-five (25) feet in width on the side of the plot abutting on the side street.
  - 5) *Rear yards:* Not less than fifteen (15) feet in depth, except that there shall be twenty (20)feet setback when abutting a waterway.
  - 6) No accessory building or structure shall be placed in any required yard space

- g) *Density.* Except as may be otherwise provided herein with respect to the allowance for "reserve units," the density shall not exceed ten (10) units per gross acre or the maximum density permitted by the Sunrise Land Use Plan, whichever is less.
  - h) *Separation.* No part of any *mobile home* shall be placed within ten (10) feet of any other *mobile home*. No part of *mobile home* shall be located within twenty-five (25) feet of any accessory or service building or structure used in connection with a *mobile home* park. *Access to sites.* Each site shall abut upon a driveway or unobstructed space not less than thirty (30) feet in width, which space shall have unobstructed access to a public street. Such driveway or space shall have a hard surfaced roadway not less than twenty-two (22) feet in width and shall be adequately lighted. *Porches and additions* Structures of a permanent nature added or attached to a *mobile home* conform to the separation distances in (h) above and such as enclosed porches, screened enclosures, storage closets and carports shall conform to all applicable provisions of the South Florida Building Code, Broward Edition. The total combined area of all such additions or attachments shall not exceed the gross area of the *mobile home* or travel trailer itself. Carports are not included in the above area limitations, if the width of the site is adequate for separation requirements.
- 2) All portable or demountable awnings, roofs, or appurtenances which do not meet the requirements of (1) above shall be dismantled and stored either within the *mobile home* or in some permanent building during the following circumstances: within one (1) hour after all hurricane alerts by the U.S. Weather Bureau. If the *mobile home* or travel trailer is not to be occupied for a period of thirty (30) days or more.

## Tamarac

### PART II CODE

#### Chapter 14 MOTOR VEHICLES AND TRAFFIC\*

##### ARTICLE II. STOPPING, STANDING AND PARKING\*

Sec. 14-30. Parking or storage of commercial or recreational vehicles, boats and boat trailers.

- (3) *Mobile home* means a structure which is transportable in one (1) or more sections, which is eight (8) body feet or more in width and is thirty-two (32) body feet or more in length, which is built on a permanent chassis, and which is designed to be used as a dwelling with or without a permanent foundation when connected to the required utilities. (F.S. section 513.01)

#### Chapter 24 ZONING\*

##### ARTICLE III. DISTRICT REGULATIONS\*

###### DIVISION 12. T-1 TRAILER PARK DISTRICT

Sec. 24-281. Scope

The regulations contained in this division shall apply in all T-1 districts

Sec. 24-282. Purpose

The T-1 *mobile home* park district is intended to apply to areas to be used for the parking or placement of *mobile homes* and travel trailers for occupancy as living quarters, where the park is owned or operated as a unit and individual spaces are occupied on a rental basis.

Sec. 24-283. Permitted uses

In T-1 districts, no building or structure or part thereof shall be erected, altered or used, or land or water used, in whole or in part, for other than one (1) or more of the following specified uses:

- 1) *Mobile home* parks for rental of sites for occupancy by *mobile homes* or travel trailers as living quarters, where the *mobile home* park is owned or operated as a unit;
- 2) Accessory uses and structures, not including the conduct of any business, occupation or profession, except as permitted under section 24-284;
- 3) The sale by their owners or licensed dealers of used *mobile homes* or travel trailers on sites presently or previously occupied by the owner of such *mobile home* or travel trailer; the sale of new display models by licensed dealers, preparatory to occupancy on that site;
- 4) Storage or parking of *mobile homes* or travel trailers on sites, preparatory to occupancy or between periods of occupancy.

#### Sec. 24-284. Special accessory uses

A *mobile home* park providing space for forty (40) or more *mobile homes* or travel trailers may have retail stores and personal service shops for the care or treatment of the occupants or their clothing, subject to the following limitations and requirements:

- 1) Such uses shall be wholly conducted within a completely enclosed building
- 2) There shall be no signs or display visible from any street indicating such uses
- 3) Such uses shall be conducted for the convenience of occupants of the *mobile home* park and not normally made available to other persons.

#### Sec. 24-285. Prohibited uses

The permissible uses enumerated in sections 24-283 and 24-284 shall not be construed to include, either as a principal or accessory use, any of the following:

- 1) Display or sale of used *mobile homes* or travel trailers; except, that an occupied *mobile home*, or an unoccupied *mobile home* or travel trailer previously occupied on the same site, may be sold on that site by its owner or licensed dealer;
- 2) Any service station, or service or repair garage
- 3) No secondhand or used merchandise shall be offered for sale, displayed or stored on the premises, except as incidental to the bona fide sale of a *mobile home* or travel trailer;
- 4) No animals, reptiles, insects, poultry or fowl shall be raised or kept in any *mobile home* park, except where a park has special facilities to take care of not more than one (1) domestic animal per *mobile home* or travel trailer;
- 5) Dwelling units or living quarters, except in a *mobile home* or travel trailer or as an accessory use
- 6) Occupancy of a site by a *mobile home* or travel trailer for living quarters, except on a rental basis;
- 7) A separate utility building on any *mobile home* site, except for a demountable, code approved storage closet;
- 8) No cooking or sanitary facilities shall be installed or maintained on any *mobile home* or travel site in any building or structure, other than in the *mobile home* or travel trailer;
- 9) Storage or parking of *mobile homes* or travel trailers, except when a *mobile home* or travel trailer is located on a site preparatory to occupancy or between periods of occupancy.

#### Sec. 24-286. Plot size

Every plot in a T-1 district shall not be less than one hundred (100) feet in width and one-half acre in area. The required one-hundred-foot minimum width need not be measured at a street line if the plot extends to a street by means of a strip at least fifty (50) feet in width.

#### Sec. 24-287. Minimum site size.

- a) A *mobile home* consisting of one (1) or more units designed as a single dwelling shall be placed upon a site not less than two thousand four hundred (2,400) square feet in area and not less than forty (40) feet in average width.

- b) A travel trailer shall be placed upon a site not less than one thousand (1,000) square feet in area and not less than thirty (30) feet in average width.

Sec. 24-288. Height of buildings or structures

In T-1 districts, no building or structure or part thereof shall be erected or altered to a height exceeding two (2) stories or thirty (30) feet.

Sec. 24-289. Yards.

Every plot used for *mobile home* park purposes shall provide yards as follows:

- 1) *Front yard.* Every plot shall have a front yard not less than twenty-five (25) feet in depth, and this minimum depth of yard shall be provided on all streets upon which the plot abuts.
- 2) *Side yards.* Each side of every plot shall have a side yard not less than ten (10) feet in width
- 3) *Rear yard.* Every plot shall have a rear yard not less than fifteen (15) feet in depth
- 4) *Accessory buildings in yards.* No accessory building or structure shall be placed in any required yard space.

Sec. 24-290. Separation of mobile homes, accessory buildings, etc

No part of any *mobile home* or travel trailer, or any addition or appurtenance thereto, shall be placed within ten (10) feet of any other *mobile home* or travel trailer, addition or appurtenance thereto. No part of any *mobile home* or travel trailer, or addition or appurtenance thereto, shall be located within twenty-five (25) feet of any accessory or service building or structure used in connection with a *mobile home* park.

Sec. 24-291. Access to sites

Each site in a T-1 district shall abut upon a driveway or unobstructed space not less than thirty (30) feet in width, which space shall have unobstructed access to a street. Such driveway or space shall have a hard-surfaced roadway not less than twenty (20) feet in width and shall be adequately lighted.

Sec. 24-292. Porches and additions

- a) In T-1 districts, structures of a permanent nature shall not be added or attached to a *mobile home* or travel trailer, unless such *mobile home* or travel trailer is placed upon a site conforming to the minimum requirements for a *mobile home*.
- b) On travel trailer sites there shall be no addition or attachment, except a demountable canvas awning.
- c) Structures of a permanent nature added or attached to a *mobile home* or travel trailer, such as enclosed porches, screened enclosures, storage closets and carports, shall conform to all applicable provisions of the building code adopted in section 5-26. The total combined area of all such additions or attachments shall not exceed the gross area of the *mobile home* or travel trailer itself. Carports shall not be included in the above limitation of area, if the width of the site is adequate for separation requirements.
- d) All portable or demountable awnings, roofs or appurtenances which do not meet the requirements of subsection (c) shall be dismantled and stored, either within the *mobile home* or travel trailer or in some permanent building, during the following circumstances:
  - a. Within one (1) hour after all hurricane alerts by the United States Weather Bureau
  - b. If the *mobile home* or travel trailer is not to be occupied for a period of thirty (30) days or more.

## **Wilton Manors**

### **PART II CODE OF ORDINANCES**

#### **Chapter 9 FLOOD PREVENTION AND PROTECTION\***

##### **ARTICLE III. FLOOD HAZARD REDUCTION**

###### **DIVISION 2. STANDARDS**

Sec. 9-86. General.

2) *Manufactured homes* shall be anchored to prevent flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This standard shall be in addition to and consistent with applicable state requirements for resisting wind forces.

### **APPENDIX A ZONING\***

#### **ARTICLE 3. DEFINITIONS**

Sec. 3-2. Terms defined.

All such metal or prefabricated buildings shall be in accordance with the South Florida Building Code or have the Metropolitan Dade County-approved kit to *tie down* for hurricane protection

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## **Unincorporated Broward County**

### **PART II CODE OF ORDINANCES**

#### **Chapter 131/2 FLOODPLAIN MANAGEMENT\***

Sec. 131/2-6. Standards.

- I. Prohibit the placement of manufactured homes (mobile homes), except in an existing manufactured home (mobile homes) park or subdivision after meeting all the requirements for new construction, including the anchoring standards of paragraph (a)2 and elevation standards of paragraph (b)1 of this subsection (1); a replacement manufactured home may be placed on a lot in an existing subdivision provided the anchoring standards of paragraph (a)2 and the elevation standards of paragraph (b)1 of this subsection (1) are met; and

### **Chapter 22 MOBILE HOMES AND MOBILE HOME PARKS**

Sec. 22-1. Authority of county to adopt code pertaining to protection and anchoring of mobile homes. The Board of County Commissioners of Broward County is hereby authorized to adopt and enforce a code of rules and regulations relating to the proper protection and anchoring of mobile homes, house trailers, or vehicular portable structures designed or capable of being used with or without a permanent foundation, as a dwelling or residential accommodation for one or more persons, in the unincorporated areas of the county, to protect such facilities or vehicles and lives of occupants from the elements of winds, hurricanes or other disasters.

### **Chapter 39 ZONING\***

#### **ARTICLE XIX. MOBILE HOME DISTRICTS**

Sec. 39-320. *Mobile home* zoning districts

The following shall constitute *Mobile Home* zoning districts within the unincorporated areas of Broward County, Florida:

**Sec. 39-321. Purpose of districts**

- a) The T-1 *Mobile Home* (Un-subdivided Lots) District is intended to apply to existing *mobile home* developments wherein *home* sites are not subdivided by a plat of record and are rented or leased by the occupants thereof for a period of one year or more.
- b) The R-1T *Mobile Home* (Subdivided Lots) District is intended to apply to *mobile home* developments wherein the *home* sites have been subdivided by a plat of record.

**Sec. 39-322. General provisions**

- a) *Commercial vehicles.* Residents may park or store one (1) commercial vehicle weighing five thousand (5,000) pounds or less within a carport or enclosed building.
- b) *Easements.* No permanent structure except a wood or chain link fence shall encroach upon or into any easement of record. No structure or use shall encroach upon or obstruct access through any easement specifically granted for ingress or egress purposes except that a security gate may be erected at the entrance of a *mobile home* community.
- c) *Fences and hedges.* Fences and hedges may be erected or maintained along any plot line or around an individual *mobile home* site to a maximum height of six (6) feet above the ground, except that on a corner, no fence or hedge other than chain link fences shall be erected or maintained to a height exceeding thirty (30) inches above the crown of the street within fifteen (15) feet of the intersection of the front and side *home* site or plot lines.
- d) *Household pets.* Livestock such as horses, cattle, sheep, goats, hogs, pigs and poultry shall not be permitted as pets.
- e) *Landscaping.* Installation and maintenance of landscaping shall be subject to compliance with Article VIII, "Functional Landscaping and Xeriscaping," of this Code.

**Sec. 39-326. Plot size.**

No *mobile home* community shall be developed on less than five (5) contiguous acres

**Sec. 39327. Lot requirements.**

Each lot or site for placement of a dwelling unit shall be at least forty (40) feet in width along the street line and eighty (80) feet in depth.

**Sec. 39-328. Plot coverage**

- a) Maximum lot coverage by buildings and roofed structures for each individual *mobile home* lot or site shall be sixty percent (60%).
- b) Maximum coverage by buildings and roofed structures for the entire plot occupied by the *mobile home* development shall be forty percent (40%).

**Sec. 39-329. Height**

No building or structure shall be erected or altered to more than one story in height.

**Sec. 39-330. Yards and separations**

- a) Each lot in a platted subdivision shall provide yards as follows:
  - 1) A front yard of at least six (6) feet in depth
  - 2) A side yard on each side adjacent to another lot of at least four (4) feet, except that a roofed carport, without enclosure of side walls, may be located not closer than two (2) feet to any interior side plot line.
  - 3) A rear yard of at least eight (8) feet in depth
  - 4) A street side yard of at least six (6) feet in depth.
- b) No part of any *mobile* in an un-subdivided *mobile home* community shall be placed closer than ten (10) feet side-to-side, eight (8) feet end-to-side or six (6) feet end-to-end horizontally of any other *mobile home* or appurtenance thereto. No part of any *mobile home* shall be located within twenty-five (25) feet of any service building or structure used in connection with the *mobile home* community.
- c) All *mobile home* developments shall provide a perimeter yard at least twenty-five (25) feet in depth adjacent to the street which provides primary access to the community. Such yard shall

be landscaped in accordance with Article VIII, "Functional Landscaping and Xeriscaping," of this Code.

Sec. 39-331. Special accessory uses.

- a) *Mobile home* communities providing for fifty (50) or more residential dwelling units may provide retail and personal service facilities to residents subject to the following:
  - 1) Such facilities shall:
    - i. Be located on the interior of the *mobile home* development;
    - ii. Shall not have any signs visible from the exterior of the development;
    - iii. Shall only be for the convenience of the residents of the development; and
    - iv. Shall be conducted from an enclosed building with no outside display or storage.
- b) A permanent, detached one-family dwelling a maximum of one thousand five hundred (1,500) square feet may be constructed for the residing property manager and immediate family.
- c) Nonprofit neighborhood recreational and social centers to serve the development shall be permitted on a minimum ten thousand (10,000) square foot site within the community.
- d) Permanent additions and accessory buildings shall be permitted on each *mobile home* site or lot subject to the following:
  - 1) Storage closets erected inside a carport shall only require the same setback as the carport.
  - 2) Utility buildings or other detached accessory buildings not located inside a carport shall not be located less than ten (10) feet from any other detached accessory building on an adjacent lot or site or less than five (5) feet from any platted lot line.
  - 3) Unroofed, raised wood decks and unroofed, raised concrete patios shall not be less than six (6) feet from a street line and not less than two (2) feet from a side or rear lot line. Such structures may only be enclosed with open mesh screening.

**Research and Develop a Program for the  
Recycling of Existing Older Mobile Homes**

**Volume 2  
Chapter 2**

## **Recycling Program for the State of Florida**

### **The Issue**

During the first year of this project, research emphasized that Florida has an aging mobile home stock with about a third of all mobile homes from the pre-1976 generation. What is significant about these units is that they were manufactured before HUD became involved in their design. Without any guidelines, units were built to individual manufacturer standards without any federal oversight for wind or fire resistance. In 1976, HUD developed federal standards for manufacturing. Since 1976, all mobile homes manufactured in the United States are built to these federal standards. As Hurricane Andrew made abundantly clear, these original standards did not go far enough in requiring wind resistance.

To counter what was seen as a major deficit in manufacturing designs, in 1994 HUD updated manufacturing standards to include greater wind resistance particularly for mobile homes that will be at greatest risk to experience the effects of high wind events. As a result, three distinct mobile home generations exist with differing levels of vulnerability to hurricanes: first generation mobile homes built before 1976 at the greatest risk to hurricanes; second generation mobile homes built between 1976 and 1994; and third generation mobile homes built after 1994 with the lowest level of risk of the three generations. In fact, some argue that third generation mobile homes are built as well as light frame site built structures. (See the Final Report for Year 1 of this project for more information.)

Florida, then, has a large proportion of aging manufactured housing units, and a high level of exposure to losses. Because of the higher frequency and intensity of expected hurricanes, risks for widespread wind damage of manufactured homes are significantly higher in Florida than in other states. Some 338,000 pre-1976 mobile homes, and in excess of 643,000 manufactured housing unit sections built between the middle of 1976 and the middle of 1994 are still registered with the Florida Department of Motor Vehicles.

The next time a major hurricane with fastest-mile wind speeds exceeding 100 to 120 mph (peak gust winds of 115 to 140 mph) strikes Florida, many of the manufactured housing units in its path will be significantly damaged or destroyed [1]. Consequently, the issue of recycling mobile homes or manufactured housing units takes on a different urgency in the State of Florida than in any other state. In Florida, it is not just a question of finding a means for removing abandoned homes or eyesores as it is in many other

states. In Florida, an effective recycling program could serve as an effective loss reduction measure by removing the weakest housing units from the housing population, and thereby reducing the losses when the next major hurricane strikes.

The idea of a recycling program in Florida, however, needs to be seen as not only a technical concept (the actual components that could be salvaged or recycled), but also as a mitigation concept. While the technical issues lay an important foundation for any program, it is merely one part of a much more complex issue. The mitigation concept where the goal is to reduce losses revolves around the ability to use a recycling program as a means to move households from an increasingly vulnerable housing to a less vulnerable situation.

It is clear from a review of programs in other states that a recycling program is not cost neutral. Average up front costs for deconstruction of a mobile home, above the salvage value of fixtures and materials, is on the order of \$750 per unit plus transport costs [2]. In addition, there will undoubtedly be costs associated with providing affordable replacement housing since the most vulnerable homes are also likely to be inhabited by those who can least afford rent or payments on a newer more expensive home. Ultimately the costs associated with response and recovery must be weighed against the investment in preventive measures.

Florida's approach to the issue is clearly a unique one. Investigation has found no other State addressing recycling as a mitigation option. How does Florida reduce not only their exposure, but also the federal government's exposure, while simultaneously meeting the needs of its citizens, particularly those who might be the most financially marginal.

### **Research Areas**

To answer these questions and more, the International Hurricane Center set upon a very ambitious Year Two research agenda. Research concentrated on both the technical and social issues involved in developing and proposing a recycling program for the state of Florida. Particular emphasis is on the oldest, most vulnerable generation of mobile homes – those manufactured prior to 1976.

The research agenda proposed at the start of Year 2 focused on four key phases where each phase lays the foundation for subsequent phases. Moving from one phase to the next would require the prior phase to be completed or at least near completion. The project phases are as follows:

#### A. Phase I

Research will be conducted to identify and assess the following issues:

- a. Technical details and costs relating to the logistics for removal, disassembly, transportation, recycling and dumping of manufactured housing units.
- b. Costs-benefits associated with the above technical issues.
- c. Regulatory issues pertinent to promoting the recycling of manufactured housing units.
- d. Support and incentives from the various sectors that may benefit from a recycling program. This will be a key step in developing a prototype program for Florida. Without support from key sectors, it will be impossible to implement a program.
- e. Sources of funding to implement an eventual program in Florida. This is a key step in the development of a program. Without support from the industry, the state and HUD any program will fail to address the needs of the poorest, most vulnerable households.

#### B. Phase II

Based on the findings from Phase I of this research, a prototype-recycling program will be designed to address both the technical and social dimensions of the issue. Once such a prototype is developed, various methodologies such as focus groups, telephone interviews and mail surveys will be employed to get feedback from stakeholders including but not limited to homeowners, industry representatives and government agencies. Based on this feedback, the program will be fine tuned and finalized.

#### C. Phase III

Once Phase II is completed, and a final program developed *pilot projects* will be used to test the sensitivity of the program, analyze the logistics involved, and develop accurate operating budget figures. These pilot projects could include acquiring pre-1976 manufactured housing units, and following them through the recycling process from removal, transportation, disassembly and recycling. Other pilot projects will be developed as the prototype program is developed.

#### D. Phase IV

Based on the findings from Phases II, III, and I a proposal will be developed as a base for policy consideration by state legislators. Such a proposal will include timelines and budgetary estimates for implementation of a statewide recycling program that would phase-out most of the pre-1976 generation of mobile homes by a given date.

**Findings**  
**Phase I**  
**Technical Issues**

## **EXECUTIVE SUMMARY**

The State of Florida has long been subject to the devastating effects of hurricanes. The infamous Hurricane Andrew of 1992 was notably the most destructive storm in the history of the United States. It was responsible for human fatalities and for catastrophic damage to property that devastated South Florida's residential communities. With over \$30 billion in total financial loss, the mobile home community sustained tremendous damage.

Mobile homes do not perform well in severe storms. They lack the structural integrity to withstand such fury. This is especially evident in mobile homes built before 1976, when no uniform construction standards were in place. It is estimated that nearly 30% of the mobile homes in Florida are characterized as pre-1976. Florida has an urgent need to address the hazards to its citizens that stem from this large and aging mobile home stock.

As such, a statewide mobile home recycling program was proposed, whose goal is to cycle older-generation mobile homes out of the housing stock and replace them with newer and safer units built to the more stringent standards, or with other alternative housing units. This report evaluates the feasibility of such a program from a technical perspective. Major participants, legislation, procedures, and protocols involved in a statewide mobile home recycling program are identified. The costs are estimated from the permitting stage, to demolition, and to the final waste disposal. A macro-scale picture was created to address the total cost, feasibility, and benefits of the program.

The study found that deconstruction contractors, transportation companies, recycling facilities, and waste disposal sites are widespread in Florida. These facilities are capable of handling the demolition service, salvaging, and waste disposal needs of the proposed program.

With over 345 demolition contractors available, an average deconstruction cost is estimated at \$1,200 per mobile home section, including onsite demolition and waste disposal. Transportation of mobile homes to an offsite demolition facility can be performed by 244 moving companies who specialize in mobile home transportation at an additional cost of \$800 per unit. The 37% recyclable weight of a mobile home can generate approximately \$450 in revenues from the sale of salvaged material that includes mainly lumber and ferrous and non-ferrous metals. However, as a common practice, this revenue is an additional gain to the demolition contractor, not a deduction

from the contracted price. Asbestos inspection, which costs approximately \$600 per unit, will be required for older mobile homes. Additional costs of \$2,000-3,000 per unit for abatement are expected if asbestos is found.

The total cost of the statewide recycling program is approximated as \$1.66 billion for the removal of all pre-1976 mobile homes; an additional \$1.34 billion would be required to remove all mobile homes built before 1994, assuming the following:

1. All pre-1976 mobile homes will be inspected for asbestos prior to demolition, and 60% of these mobile homes will require asbestos abatement.
2. Mobile homes built between 1976 and 1994 will be exempted from asbestos inspections.
3. Eighty percent of the mobile homes will be demolished onsite, and the remaining 20% will be transported to offsite demolition facilities.

It is concluded that the proposed recycling program is a viable yet costly alternative for hurricane loss mitigation.

## **1.0 INTRODUCTION**

### **1.1 Background**

Storm developments in the Atlantic and on the Gulf Coast expose Florida to tremendous risk of losses in the event of a catastrophic hurricane. In addition to its unique location, Florida also has a large mobile home population, which is the most vulnerable housing to hurricane damages. According to the 1990 Census Statistical Brief (Census 2000 statistics for mobile home population in each state are not yet available), Florida housed approximately 10% of all mobile homes in the nation, more than any other state [1]. The Florida Department of Motor Vehicles (DMV), which registers mobile home titles, has recorded approximately 1.14 million mobile home units in Florida.<sup>1</sup> It was estimated that over 338,000 of the 1.14 million units were built before 1976 (pre-1976 units) and more than 648,000 built between the middle of 1976 and the middle of 1994 (1976-1994 units). Combined, this sector accounts for 12.8% of the total housing stock and 85.5% of the total mobile home units [2]. The years 1976 and 1994 are significant because prior to 1976, there was no uniform standard for the construction of mobile homes. The U.S. Department of Housing and Urban Development (HUD) promulgated its first federal Manufactured Home Construction and Safety Standards (commonly known as the HUD Code) on June 15, 1976. Another set of more stringent standards went into effect in 1994. The 1994 HUD specifications, which are still being used today, make design accommodations for wind speeds in excess of 110 miles per hour [2].

The tremendous damage, huge casualties, and cost to the state that can arise in the unfortunate event of a severe storm have been the subject of much research and suggested policy that aims to explore effective loss reduction measures. As part of these efforts, the International Hurricane Center (IHC) has embarked on a project that investigates the feasibility of a mobile home recycling program in Florida. This program proposes to demolish and salvage useful material from the older mobile homes and replace them with alternative housing that can sustain stronger storms. Removing the most vulnerable housing units from the state housing population could potentially reduce the loss when the next major hurricane lands in Florida. To this end, the IHC has undertaken the first phase of the project, in collaboration with the Hemispheric Center for Environmental Technology (HCET) at Florida International University (FIU), to study the requirements, conditions, and provisions that must be considered in realizing a program of this magnitude. The critical players, activities, and procedures involved in

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<sup>1</sup> This figure represents the total sections of mobile homes in the state. A "doublewide" mobile home consists of two sections. Such mobile homes are listed twice in the DMV database since each section is required to have its own title.

such a recycling program were evaluated, and the permitting and environmental compliance issues were explored.

This report limits all investigations to the technical aspects of the proposed recycling program. Other issues, including the availability of replacement housing at a reasonable cost, homeowner relocation, incentives for the homeowners, legislative changes required, and potential funding sources, fall beyond the scope of this report.

### **1.2 Objectives**

The objectives of this study are to investigate the technical, legal, and environmental issues entailed in a mobile home recycling program in Florida. It specifically addresses the statewide recycling program by focusing on

- Technical details relating to the logistics for removal, disassembly, transportation, salvaging, and recycling of pre-1994 manufactured housing units
- Costs associated with the above activities
- Environmental compliance issues and/or other regulations that may affect the progression of the program.

## **2.0 Technical Approach**

This section examines the method and approach used to compile data for this study. The factors limiting the precise representation of the research data are also discussed.

### **2.1 Data Sources**

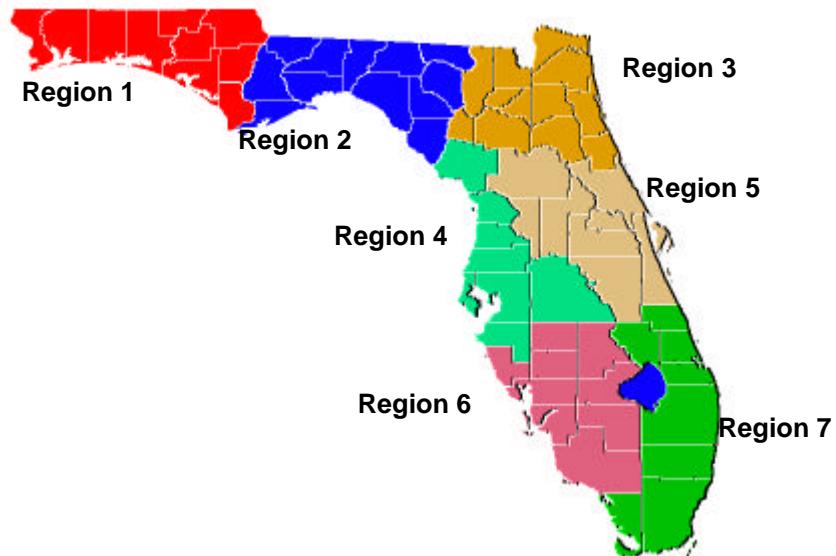
The study began with a review of mobile home recycling programs performed in other states. Telephone surveys, personal interviews, visits to mobile home parks and demolition sites were conducted, and state and local government regulations were reviewed in an effort to collect data.

Key sources of information included a feasibility report on a mobile home recycling project conducted in the state of Vermont in 2000, the Florida Manufactured Housing Association (FMHA), and the Florida Department of Environmental Protection (FDEP). The FMHA is actively involved in the mobile home industry. It provided the directory to navigate key businesses and contractors that are involved in the trade, demolition, and transportation of manufactured housing units. Information pertaining to site locations was derived, and visits and interviews were conducted to get a complete understanding of the climate and personnel that are involved in the industry. The FDEP was the largest single source of information on the solid waste management practices, facilities, and regulations in Florida. Its personnel and website provided names and locations of active landfills and recycling centers, as well as information on the specific laws and regulations governing waste disposal.

Other key players involved in various strata of the Industry were also contacted. Solid Waste or Environmental Management Departments in all 67 Florida Counties, landfill supervisors in Miami-Dade County, demolition contractors and mobile home park operators across the state were contacted to discuss numerous issues related to this project. Technical data and opinions on the feasibility of the proposed recycling endeavor were documented.

### **2.2 Data Representation**

Due to the large land area and the number of mobile homes in Florida, it was necessary to approach the study in terms of regions to achieve an objective statewide perspective on the entire mobile home recycling issue. The researchers at HCET and IHC chose to adopt the regional division as defined by the Florida Department of Community Affairs, Division of Emergency Management [3]. This regional approach was particularly important because it allowed a thorough investigation into the mode of operation of the industry in specific locations. Since county regulations, codes, and statutes change statewide, the choice to study the data according to regions facilitated more accurate representation of the information. The seven regions are illustrated in Figure 1, and counties in each region are listed in Table 1.



**Figure 1. Florida regions.**

**Table 1. Description of Florida regions**

AREA/REGION	REGION NAME	COUNTIES IN REGION
1	West	Escambia, Santa Rosa, Okaloosa, Walton, Holmes, Washington, Bay, Jackson, Calhoun, Gulf
2	Big Bend	Gadsden, Liberty, Franklin, Leon, Wakulla, Jefferson, Madison, Taylor, Hamilton, Suwannee, Lafayette, Dixie
3	Northeast	Columbia, Gilchrist, Baker, Union, Bradford, Alachua, Nassau, Duval, Clay, Putnam, St. John, Flagler
4	West Center	Levy, Citrus, Hernando, Pasco, Pinellas, Hillsborough, Manatee, Polk
5	Central	Marion, Sumter, Lake, Volusia, Seminole, Orange, Osceola, Brevard
6	Southwest	Sarasota, Hardee, DeSoto, Charlotte, Lee, Highlands, Glades, Hendry, Collier
7	Southeast	Okeechobee, Indian River, St. Lucie, Martin, Palm Beach, Broward, Monroe, Miami-Dade

### **2.3 Limitations of the Study**

The information compiled in this document is the best representation of the data extracted from the various individuals who volunteered information and those contractors who willingly collaborated with HCET in providing valuable statistics. The totality and accuracy of the information was, however, affected by the following factors:

1. Few responses were available from county officials on issues relating to the capacity and projected life of the various landfill facilities.
2. HCET had some difficulty in identifying the specific personnel in positions to provide the information necessary. Job titles were somewhat non-specific, and individuals targeted were sometimes not in a position to provide authoritative information.
3. There was inconsistency in the information relayed by some government employees contacted in the various County departments. Information was sometimes conflicting, and in some instances, personnel were not completely aware of the existing and enforceable regulations and permit requirements.
4. The relative percentage of each of the materials that comprise a mobile home was based primarily on the findings of the Vermont study and the interviews conducted at two local contractors: RM Equipment of Miami and Blanchard's Home Removals and Transport, Inc., of Hollywood. Statistics generated from so few contractors and the findings of a study conducted in an alternate geographical region may not best represent mobile homes in Florida.
5. Although information obtained for this study represented the most recent available data, it did not necessarily reflect what exists today. For example, the most recent FDEP report on solid waste management was issued in 2000. As such, the information may not represent current situation.

### **3.0 Summary of The Vermont mobile home recycling Study**

The scope and application of similar recycling programs were explored in states such as Wisconsin, Vermont, Montana, North Carolina, and Michigan. It was concluded that Vermont was the sole state that comprehensively documented their findings, and the report acquired provided much technical insight.

The Vermont study was conducted in the Town of Bristol, Vermont, in 1999. The study examined the materials that constituted a mobile home. Five pre-HUD code mobile home units, which were seriously damaged in a June 1998 flood of the New Haven River, were transported to a demolition facility where they were deconstructed in a controlled systematic manner. The components of each unit were segregated into various categories, and the materials of each were collected and weighed. Based on the condition and quality of the material, each was then recycled, salvaged, burned, or landfilled.

The study examined the procedures involved in performing an offsite demolition and performed a quantitative analysis of the recyclable materials obtained from a mobile home, waste generated, and the labor requirement of the entire deconstruction process. It concluded that for an average trailer that weighed 12,000 pounds, 29% of its total weight was recyclable; an additional 8% constituted clean lumber, and 63% was finally discarded at a landfill. The labor requirement to deconstruct one mobile home was 79-97 person-hours. The average value of the salvaged material was \$147.31 per trailer, and the total demolition cost of a single trailer was \$775.41, excluding transportation costs [4].

## **4.0 MOBILE HOME CHARACTERISTICS**

### **4.1 Physical Properties**

Mobile homes are characterized as *single*-, *double*-, or *triplewide* and are usually a composite cell of one or multiple units. Typically, a single cell unit is between 12-14 feet in width and 50-70 feet in length with a height of 11-13 feet [5,6,7]. One unit standing solely is characterized as being a *singlewide*, and a combination of two or three is referred to as *double*- or *triplewide*, respectively.

A vacant *singlewide* mobile home unit, free of furniture, and consisting of only the regular housing fixtures such as bathroom and kitchen installations weighs an average of 12,000 lbs but can weigh as much as 17,000 lbs, depending on the construction material and fixtures inside [4,5,6,7].

According to the *Atlas Mobile Home Directory*, government studies indicated that the average life span of a mobile home is 55.8 years. Its condition at any given time is dependent on the care and maintenance applied to the units [8].

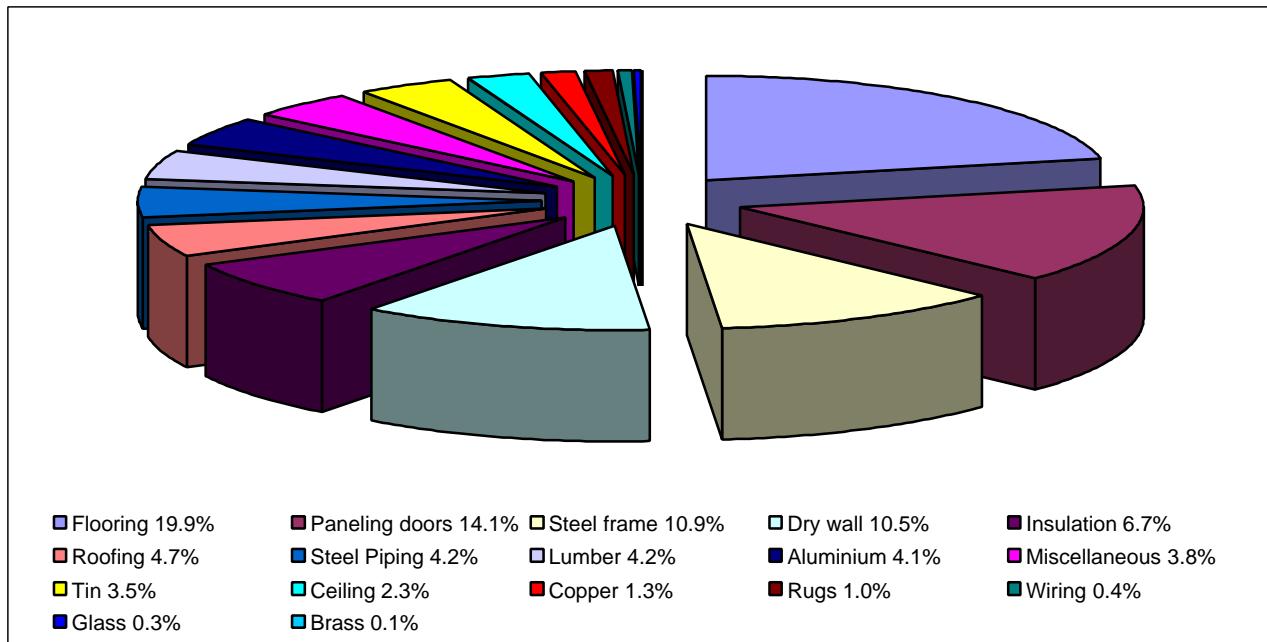
### **4.2 Materials of Construction**

The construction material of manufactured housing units usually includes ferrous and non-ferrous metals such as galvanized steel, stainless steel, aluminum, copper, lead, and brass. The metals are used in the structural frame, pipe, ducts, and studs. Other prevalent cosmetic material includes wood, gypsum, paper, cardboard, bricks, carpet, padding, and insulation. These materials constitute the interior and exterior walls and roofing of the housing units. Electrical boxes, iron furnaces, and metal exterior doors are also quite common. Usually, in average market condition, all of the metals are salvageable, and fixtures, if in fair condition, are also desirable. Wood products are the least desired since they exhibit the weakest resistance to the effects of weathering [4,5,6,7].

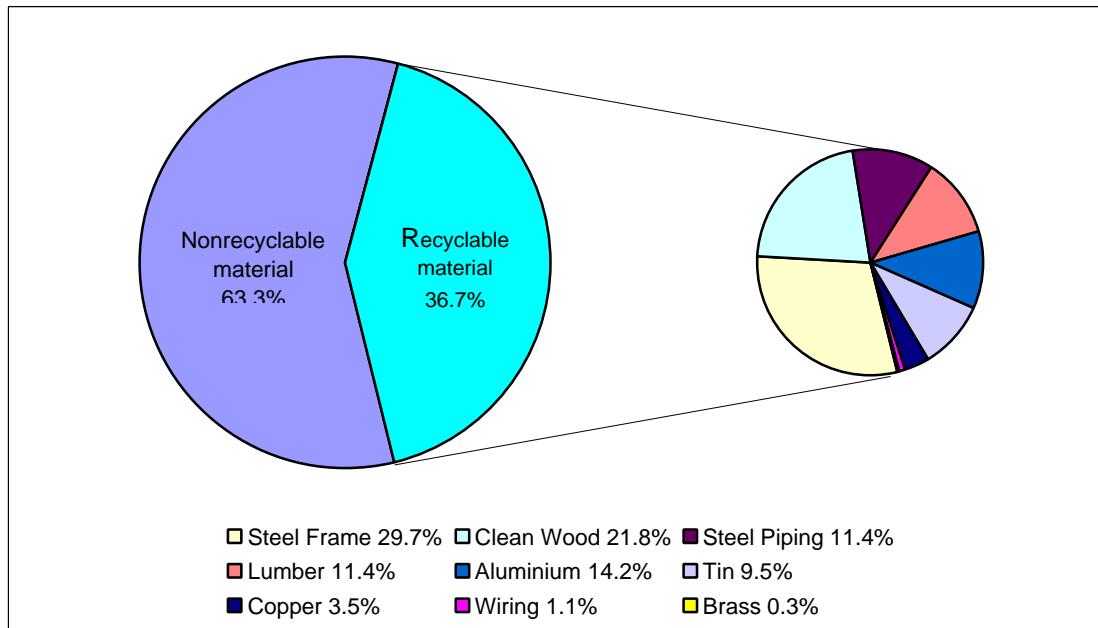
The results of site investigations hosted by RM Equipment operating in Miami-Dade and Broward Counties suggested that metal piping, struts, and aluminum sheets accounted for at least 2,000 lbs of the total weight, and a large percentage of construction material is comprised of wood and cardboard. Table 2 summarizes the components contained in the five mobile homes used in the Vermont study and their corresponding weight [4]. Figure 2 illustrates the materials and their relative contribution to the total weight of a typical mobile home. Figure 3 displays the relative percentage of recyclable materials.

**Table 2. Mobile home components and weight**

Material	Weight of Components					Average Weight (lb)	Relative Percentage (%)
	Trailer 1	Trailer 2	Trailer 3	Trailer 4	Trailer 5		
<b>Solid Waste</b>							
Flooring	3325	800	3255	3335	1320	2407	19.9
Paneling doors	2160	1675	1360	1690	1645	1706	14.1
Dry wall	1700	0	0	2055	2630	1277	10.5
Insulation	1140	360	615	900	1025	808	6.7
Roofing	0	725	400	1705	0	566	4.7
Miscellaneous	680	0	785	0	860	465	3.8
Ceiling	0	1401	0	0	0	280.2	2.3
Rugs	0	0	600	0	0	120	1.0
Glass	0	110	80	0	0	38	0.3
<b>Total solid waste</b>	<b>10225</b>	<b>6101</b>	<b>7495</b>	<b>10575</b>	<b>8805</b>	<b>8640.2</b>	<b>63.3</b>
<b>Recyclable, Reusable and/or Salvageable Materials</b>							
Steel frame	800	1630	480	1833	1835	1315.6	10.9
Clean wood	1220	1030	400	890	1325	973	8.0
Steel piping	700	300	82	40	1440	512.4	4.2
Lumber	616	770	261	650	261	511.6	4.2
Aluminum	586	351	345	626	570	495.6	4.1
Tin	50	380	440	1220	56	429.2	3.5
Copper	24	32	2	10	710	155.6	1.3
Wiring	52	52	48	66	0	43.6	0.4
Brass	8	4	5	6	12	7	0.1
<b>Total salvage</b>	<b>2836</b>	<b>3519</b>	<b>1663</b>	<b>4451</b>	<b>4884</b>	<b>3470.6</b>	<b>36.7</b>
<b>TOTAL</b>	<b>13061</b>	<b>9620</b>	<b>9158</b>	<b>15026</b>	<b>13689</b>	<b>12110.8</b>	<b>100.0</b>



**Figure 2. Mobile home construction materials and their contribution.**



**Figure 3. Relative contribution of each material to the total recyclable/salvageable content of mobile homes.**

#### **4.3 Potential Hazardous Material**

Mobile homes, especially those built before 1980, may contain asbestos, a material that can cause serious health problems if not handled properly. Asbestos is a mineral fiber found in rocks. It was an extremely popular construction material between 1900 and 1972 due to its excellent fire resistance, insulating ability, and durability. In the early 1970s, it was discovered that airborne asbestos fibers once inhaled could cause a number of types of cancer and a severe degenerative lung disease called asbestosis. The Occupational Safety and Health Administration (OSHA) first issued an asbestos regulation in 1972. However, it was not until 1979 that stricter regulations were issued that eventually prohibited the use of asbestos in construction. Structures built prior to these dates, therefore, have a much greater chance of having asbestos products in them. Asbestos containing materials were extensively used in pipe and duct insulation, vinyl floor tiles, sidings, roofing shingles and felt, spray-on insulation, acoustical ceiling tiles, fuse boxes, window putty, air duct lining, light fixture insulation, etc. The exact percentage of the homes that contain asbestos is unclear, but given the extensive use of asbestos in various construction materials prior to the 1980s, the percentage is expected to be very high for pre-1976 mobile homes.

Another significant health hazard associated with mobile homes is lead-based paint (LBP). LBP is toxic and can cause serious health problems and can adversely affect mental development in children. In 1977 the United States issued regulations that prohibited the use of lead ingredients in paint. However, the use of lead-based paint was not outlawed until 1980. Structures that were built or renovated between 1940 and 1980, therefore, are more likely to contain LBP. HUD guidelines suggest that 90% of houses built prior to 1940, 80% of those built between 1940 and 1959, and 62% of those built between 1960 and 1979 used lead-based paint [9].

Because asbestos and LBP can expose workers to toxic substances, environmental assessments that identify their presence may be necessary, and provisions must be made for their safe handling and disposal. These issues will be discussed in detail in the Environmental Compliance section of this report.

Urea-Formaldehyde Foam Insulation (UFFI) is another potential health hazard. It is a thermal insulation material that is pumped into spaces between the walls of a structure. The main concern about UFFI is that formaldehyde gas released from the UFFI may cause health problems for residents. Such problems range from irritation to eyes and the respiratory tract and to cancer. UFFI was widely used between 1970 and 1982. Because the mobile home recycling program does not intend to reuse the older homes for residence, the impact of UFFI on this project is considered minimal.

#### 4.4 Distribution of Mobile Homes in Florida

Table 3 displays the distribution of mobile homes in the state of Florida. It gives an estimated count of the number of mobile home sections in each region and identifies the area where the mobile home stock is greatest. The relative percentage of mobile home population for each region was calculated based on number of mobile homes registered in mobile home parks. These records are maintained by the Florida Department of Health (FDOH) [10]. The total number of mobile home sections in Florida was derived from the registration record at the Florida Department of Motor Vehicles.<sup>2</sup> Region 4 (West Center) has more mobile homes than any other region, with an estimated 432,000 mobile home units. Region 5 (Central) ranks second with 223,521 units, just over half of that of Region 4. By comparison, fewer mobile homes are located in Northern Florida (Regions 1, 2, and 3).

**Table 3. Mobile home distribution in Florida**

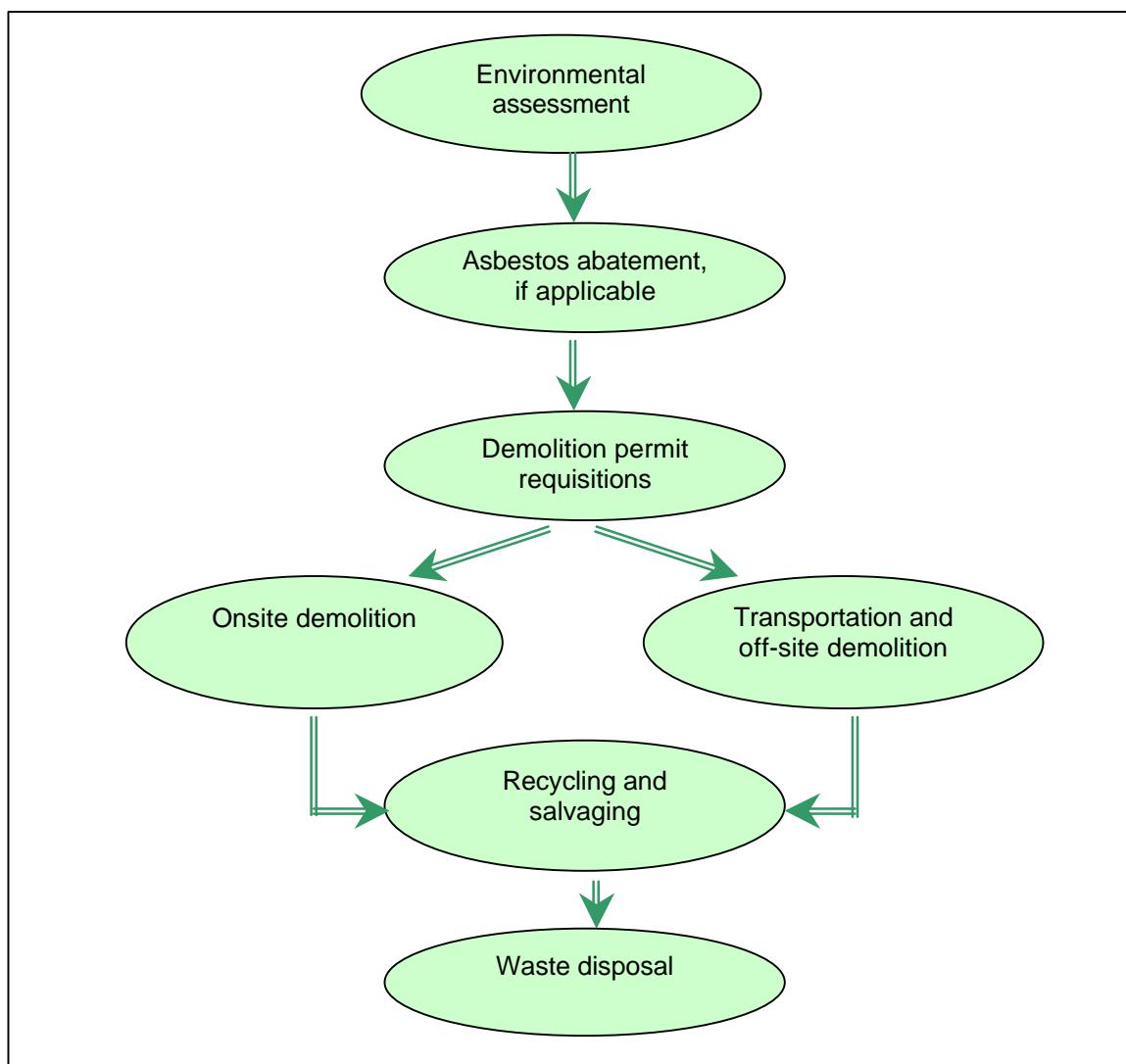
<b>Region</b>	<b>Region Name</b>	<b>State Rank</b>	<b>Percentage Of Total Mobile Home Stock</b>	<b>Estimated Mobile Home Units</b>
1	West	6	3.6%	40,933
2	Big Bend	7	1.5%	16,637
3	North East	5	5.3%	60,116
4	West Center	1	37.9%	431,954
5	Central	2	19.6%	223,521
6	South West	4	13.9%	157,937
7	South East	3	18.3%	208,903
<b>STATE TOTAL</b>				<b>1,140,000</b>

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<sup>2</sup> Both FDOH and DMV databases were used to complete this analysis because the FDOH database provides the addresses of all mobile home parks in Florida and the number of mobile home spaces in each mobile home park (most parks are at or very close to full capacity), but does not contain records of mobile homes that are not located within the parks. The DMV mobile home registration record is the most complete database of all mobile homes registered in Florida. However, the DMV database only lists the addresses of the mobile home owners, which may or may not be the actual addresses of the mobile homes.

## 5.0 Overview of technical aspects of a mobile home recycling program

A mobile home recycling program entails the active involvement of state and local building departments, environmental agencies, demolition contractors, transportation and hauling contractors, recycling facilities, and landfill operators. The endeavor requires the collaboration of all the participants to ensure the smooth transition of the recycling process from permitting, to demolition, to recycling, followed by waste disposal. Figure 4 displays the technical elements involved in a mobile home recycling program. Sections 6-12 will discuss in detail all the activities involved, and the roles of the partners and the environmental considerations. The potential cost in realizing such a program will also be discussed.



**Figure 4. Technical elements of mobile home recycling program.**

## **6.0 PERMITTING AND REGULATIONS**

The regulations governing the issuance of demolition, transportation, and hazardous waste disposal permits were examined, and the findings are presented in this section.

### **6.1 Environmental Health and Safety Compliance**

Inquiries on regulations associated with mobile home demolition were sent to various county agencies across the state. Officials in Pinellas, Sarasota, Miami-Dade, Leon, and Alachua Counties were the only ones that responded to the request for information. It is expected that although the permit requirements vary in every county, there are common procedures and regulations that apply to all.

As discussed previously in Section 4, older mobile homes are subject to asbestos and lead-based paint contamination. Since a demolition operation will disturb any asbestos on the interior and exterior of the mobile home, various federal, state, and local regulations may apply. The National Emission Standard for Hazardous Air Pollutants (NESHAP) 40 CFR, Part 61-subpart M, promulgated by the US-EPA and enforced by the Florida Department of Environmental Protection, is a regulation that monitors the levels and use of asbestos. It requires that thorough written asbestos inspections, written notification, proper removal and disposal practices be engaged when handling regulated asbestos containing material (RACM).

The Construction Industry Asbestos Standard 29CFR 1926.1101 and the general industry asbestos standard 29CFR 1910.1001 are enforced by the Occupational Safety and Health Act (OSHA). The standards make provision for employees who are exposed to the hazards of working with asbestos. They mandate that employers provide information, proper respiratory protection, personnel and medical monitoring, proper training, and record keeping for all employees that handle materials that contain asbestos.

Florida Statute 469 stipulates that licensed asbestos contractors should perform all removal or handling of asbestos-containing materials. Workers must be properly trained, certified, and comply with OSHA asbestos regulations. Over 130 asbestos detection and abatement companies were identified through Florida Yellow Pages.

A complete assessment of a singlewide 12 ft x 60 ft mobile home unit requires a minimum of eight samples. This entails wall and floor borings. The assessor documents the findings in a formal report, which is often attached to the demolition permit application [11]. If asbestos is discovered, abatement must be performed prior to

demolition. The removed asbestos will be disposed of according to state and local regulations. Details regarding waste disposal are discussed further in a later section.

Lead-based paint (LBP) is another health hazard associated with mobile homes. The federal regulations governing its use include EPA's Toxic Substance Control Act (TSCA), Sec 402-404, HUD's Lead Safe Housing Regulation, OSHA Lead Standards for General Industry (29CFR 1910.1025), and Construction (29CFR 1926.62). The TSCA established the criteria for identifying hazards in interior and exterior LBP, lead-contaminated dust (generated by normal oxidation of the paint), and lead-contaminated soil. Under these standards, lead is considered a hazard if there is greater than 40 micrograms of dust per square foot on the floor, 250 micrograms of lead in the dust per unit square foot on window sills, and 1,200 ppm average for a yard. If these limits are exceeded, OSHA regulations make provisions for training and protective equipment that must be provided to the workers who operate in exposed environments. The HUD regulation was created to protect young children from LBP hazards. It is designed to reduce LBP aggressively in federally owned residential property and housing receiving federal assistance. It applies only to housing built before 1978 and where children currently reside or will reside in the future [12].

HUD regulations do not apply to mobile homes because they will ultimately be demolished and will no longer serve as residences. No federal regulations have been identified that mandate that lead inspections or abatements are compulsory. However, given the scope and magnitude of the mobile home recycling program, it is recommended that LBP inspections on pre-1976 units be performed better to protect and minimize the hazardous exposure of the workers. This provision will increase the cost of the project considerably since the services of certified lead inspectors or lead risk assessors will have to be employed. A LBP inspection can cost \$300-\$400 per mobile home unit.

## **6.2 Demolition Permit**

Prior to executing a demolition job, contractors are required to apply for a full demolition permit, which is normally issued by the local county building department. An electrical, plumbing, and gas disconnect permit may also be required to clear the property of any utilities that may pose a threat of fire during a demolition process.

Under Florida Statute 553.79, it is a requirement that the Department of Environmental Protection be notified in writing before a local building permit is granted for any building demolition or renovation that would disturb asbestos material. The notification must contain the starting and completion date of the work, the site location, names of operators or asbestos removal contractors, and the method of removal being engaged.

### **6.3 Transportation Permit**

Mobile home transporters are required to obtain a transportation permit issued by the Florida Department of Transportation. This permit allows high tonnage vehicles to transport wide loads (14 feet width or greater) on the federal highway. The permits are issued per registered vehicle (per truck) and can be renewed on an annual basis.

There are several safety measures to be taken for the transportation of mobile home units [13]:

1. Checks must be conducted for overloads and poorly balanced weight to ensure that weight of the mobile home unit does not exceed gross weight and axle weight limits.
2. The mobile home and its securing devices should be inspected prior to departure and within 25 miles after beginning a trip.
3. Blocking should be used in the front, back, and/or sides of the unit to keep it from sliding. Blocking is shaped to fit snugly against cargo. It is secured to the cargo deck to prevent cargo movement.
4. The unit should also be braced to prevent movement. Bracing goes from the upper part of the cargo to the floor and/or walls of the mobile home unit.
5. On flatbed trailers or trailers without sides, the mobile home unit must be secured to keep it from shifting and falling off.
6. Tie-downs should be used to prevent cargo shifting that may affect the handling of the vehicle. Tie-downs must be of the proper type and strength. The combined strength of all cargo tie-downs must be strong enough to lift one-and-one-half times the weight of the piece of mobile home unit.
7. Proper tie-down equipment must be used, including ropes, straps, chains, and tensioning devices (winches, ratchets, clinching components). Tie-downs must be attached to the vehicle correctly (hook, bolt, rails, rings).
8. The mobile home unit should have at least one tie-down for each 10 feet of cargo. No matter how small the cargo is, it should have at least two tie-downs holding it.
9. Front-end header boards ("headache racks") protect the driver from the cargo in case of a collision. Make sure the front-end structure is in good condition. The front-end structure should block the forward movement of the cargo.

#### **6.4 Waste Disposal**

Waste generated during mobile home demolition may be disposed of at a Class I, II, or III landfill or a C&D disposal facility (see Section 11.0 for details). In the event that asbestos is identified in the mobile home unit, a certified asbestos contractor must be employed. The collected asbestos-containing waste must be wet adequately before it is collected for disposal. It should be transported in covered vehicles and emit no visible emissions to the outside atmosphere.

Only selected landfills accept asbestos. A permit is required for its disposal. The permit is granted for a pre-determined volume or tonnage of asbestos. The contractor must first contact the landfill to inform the operators of the date and time that the asbestos will be dropped off. The facilities require advance notification to prepare for the anticipated waste. The landfill operators prepare a pit or cell with the dimensions necessary to accommodate the declared amount of asbestos. These procedures are stringent and are enforced to ensure that the asbestos is covered immediately after placement in the fill and that performance standards (water quality and air criteria), monitored by the FDEP and local agencies, are not violated [14]. The state average for the disposal of regulated asbestos is \$117.04 per ton.

As for waste containing LBP, the EPA permits residents and residential contractors to dispose of LBP waste as household waste. It is therefore managed as regular trash at municipal landfills according to state and local regulations [15].

## **7.0 DEMOLITION PROCEDURES AND ACTIVITIES**

The procedures and activities involved in the demolition of mobile homes were examined. The procedures are methodical and only vary slightly depending on site location and size of the unit. Two options for a demolition project exist: onsite demolition and offsite demolition.

**Onsite demolition** refers to demolition that is performed on the site where the mobile home is located. The mobile home is systematically broken down into pieces. Materials are segregated depending on whether they are recyclable or salvageable. Waste is collected in 30- or 40-cubic yard waste containers and transported to a nearby landfill by waste management contractors.

**Onsite demolition is usually encouraged if the working conditions are ideal. The location must be free of utility wires, poles, or neighboring settlements. The main requirement is adequate workspace with a clearance distance of 16 feet between the mobile home unit and the heavy equipment. Any obstructions that can impede the performance of the equipment and the labor force must be absent [5,6,7]. Onsite demolition may be the only choice when a mobile home is in such poor condition that it is not roadworthy.**

**Offsite demolition** occurs when the mobile home is transported to a centralized demolition facility where it undergoes a deconstruction procedure similar to the onsite demolition. It is preferred when there are congested housing settlements and where utility wires inhibit the operation of heavy machinery. It is also recommended in cases where site assessments reveal a substantial risk of fire or bodily injury that can arise as a result of rupture to gas or utility lines. Some park operators insist on offsite demolition to indemnify themselves of any personal injury liability or property damage that may occur during an onsite demolition process.

### **7.1 Tools and Labor**

A demolition project usually entails the use of a variety of tools and equipment whose use is dependent on the complexity of the job. Commonly used tools and equipment include the following:

1.      **Back Hoe:** used to demolish the general structure of the home.
2.      **Rotary Saw:** used to cut metal bars and aluminum sidings.
3.      **Hammers:** used to dislodge nails and other undesired material.

4.       ***Blowtorches***: used to cut high-density steel or iron bars that comprise the bed of the mobile home.
5.       ***Machete***: used to clear the land of foliage.

Separation is performed primarily by manual labor. They provide the effort associated with selectively removing material and depositing it in specific containers or dumpsters. Laborers require no technical training other than the ability to identify salvageable materials visually. They perform their tasks wearing the required personal protective equipment that includes steel-tipped shoes, goggles, and dusk mask as suggested by OSHA.

## 7.2 Deconstruction Site Activities

The general deconstruction activities associated with a demolition job are outlined below:

1.       Prior to demolition, all basic fixtures such as bathroom and kitchen furnishings, which include toilets, sinks, doors, breaker boxes, furnaces, washers, and dryers, are removed in preparation for demolition.
2.       A backhoe is mounted approximately 16 feet away from the mobile home unit. This provides adequate workspace to maneuver the bucket of the tractor, which is essentially the primary tool used in demolition activities.
3.       The backhoe is used to skin the exterior wall surface of the mobile home to remove all the aluminum sheets on the outer walls (Figure 5).
4.       The removed sheets are lifted and situated in a pile to be compressed with the front-end loader of the backhoe and/or the backhoe hydraulic mounts (Figure 6). During this process, the groundsmen collect all aluminum sidings and frames that were separated from the exterior walls.
5.       The area of the exposed wooden insulated wall (stripped of aluminum) between the main structural frames of the mobile home (Figure 7) is then collapsed with the roof remaining intact.
6.       The backhoe is then placed in a central location and is used to strip the roof of its sheeting, which may be either tin or aluminum. Half of the roof is then collapsed onto the floor of the mobile home (Figure 8). Hired hands screen all debris for salvageable material to ensure that valuable materials are not discarded.
7.       The debris is then swept from the floor of the mobile home onto the ground where it is compressed and crushed into smaller pieces. This is important in reducing the volume of waste, making it less bulky and more manageable for disposal.

8. The second half of the roof is then collapsed, and the same process of collection and separation is repeated.
9. The remaining iron bed that forms the base of the mobile home (Figure 9) is then cut into manageable lengths (approximately 8 feet) with a blowtorch (Figure 10).
10. The waste material is collected and discarded in a dumpster (Figures 11 and 12). The salvageable materials are collected and sold to a scrap metal or material recovery facility.

It should be noted that operators prefer to work in one-third, one-half, or one-quarter sections of the mobile home. This ensures that a manageable volume of waste is generated. Laborers also work more efficiently in small sections where they can properly screen the debris for all salvageable material.



**Figure 5. Backhoe in the process of shearing off the exterior aluminum sheets from the walls of a mobile home.**



**Figure 6. Scrap metals segregated from demolished mobile home.**



**Figure 7. Insulation and lumber beams exposed after aluminum sheet was stripped from the exterior walls.**



**Figure 8. Backhoe collapsing the roof of the mobile home.**



**Figure 9. Iron chassis remains after all walls, roofing, and floor were removed.**



**Figure 10. Chassis being cut into 8-ft lengths with a blowtorch.**



**Figure 11. Waste generated from mobile home demolition.**



**Figure 12. Waste collected in dumpster for disposal.**

### 7.3 Offsite Demolition

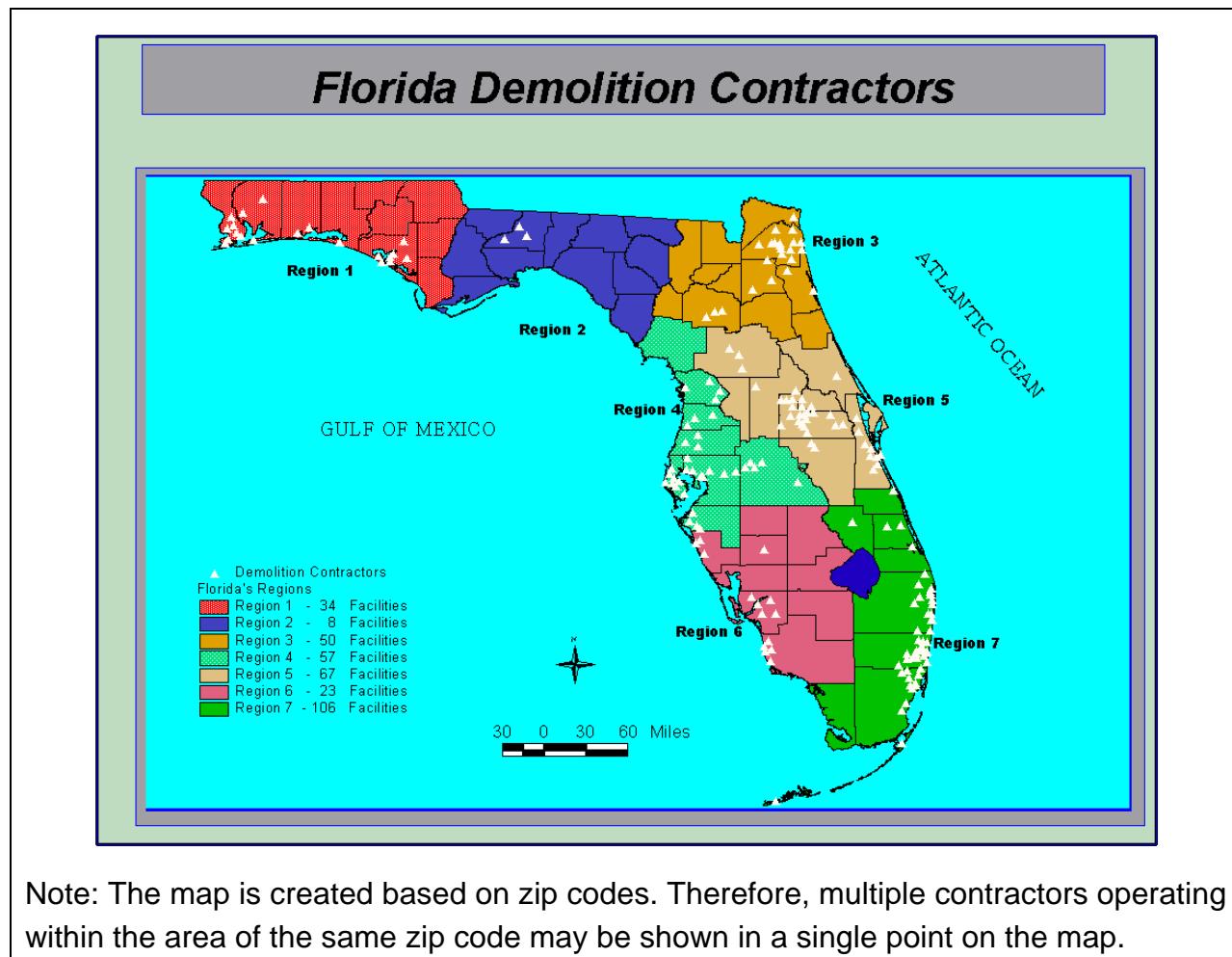
Offsite demolition procedures are somewhat similar to onsite demolition. The difference in the two lies in the transportation of the mobile home to an offsite facility. Despite the name, mobile homes are actually quite immobile. The design of a mobile home requires its placement on a permanent foundation. The temporary wheels and axles that were attached to the chassis for delivery are removed once the mobile home is installed. The mobile homes are expected to remain at the same location throughout their lifetimes [16]. Several preparation procedures for transport apply:

1. State law mandates that only a licensed trucking company can transport mobile homes [5,6]. These contractors are identified as mobile home movers. They are permitted to transport wide loads, i.e., loads that exceed 14 feet in width on a federal highway. The trucks or rigs with a towing capacity in excess of 20,000 lbs are used.
2. Since 90% of all mobile home units are mounted on concrete blocks and secured by aluminum stay wire, they lack the essential transportation devices such as axles, rims, and wheels necessary to make the units roadworthy [6]. Double or triple axles have to be mounted to the base of the unit. The selection of the axle is dependent on the size and stability of the structure. Rims and tires are then added to the axle.
3. If a doublewide or triplewide mobile home needs to be moved, the home is broken down into two or three parts, as originally delivered, and transported to the offsite demolition facility.
4. A tongue is welded onto the anterior face of the mobile home, giving the unit the ability to be hitched to a transportation vehicle.
5. The unit must be inspected prior to removal to ensure that the structure is sound enough and does not pose threat or hazard to other highway travelers.

## 8.0 DEMOLITION CONTRACTORS

### 8.1 Demolition Contractor Availability

HCET has identified 345 demolition/wrecking and salvaging contractors who are currently involved or could potentially perform mobile home demolition or deconstruction services. These contractors are licensed general contractors with a wealth of experience in the demolition business. They are all registered in the Florida Yellow Pages directory [17]. Though some may not necessarily specialize in the demolition of mobile homes, they perceive all demolition projects as being essentially the same and concur that their services can be tailored to suit this application. Figure 13 illustrates the distribution of contractors in their respective geographical regions, and Appendix A displays the names, locations, and contact information of these contractors.



**Figure 13. Demolition contractors in Florida.**

Figure 13 indicates that most of the demolition contractors are currently operating in Regions 5 and 7 of Florida. The two regions account for 50% of the total licensed general contractors operating within the state. This is significant because these two regions are ranked 2<sup>nd</sup> and 3<sup>rd</sup>, respectively, in terms of the size of mobile home stock and account for 38% of Florida's total mobile home population (see Table 3). This confirms that the demolition contractual services are adequately available to satisfy the demolition needs of these two regions.

Regions 1 and 2 have the fewest registered contractors. This figure coincides with the low number of mobile homes located in that area. In spite of the apparent discrepancies that may exist in the availability of contractors versus the number of mobile homes inherent to other regions, particularly in Region 4, which has the highest mobile home population, the contractors concede that they are prepared to mobilize their equipment and services to locations where most project opportunities exist. An interview with a Miami-Dade contractor revealed his willingness to engage in contracts that encompass the Southeast and Southwest regions. Blanchard Mobile Home Demolition and Transport, Inc., also agreed and claimed that with the increasing demand for demolition contractors, this company is in the process of acquiring properties in strategic locations that will enable them to perform deconstruction in Central and South Florida (Regions 4, 5, 6, and 7). The willingness to mobilize as expressed by these contractors is shared by many and confirms that contractors are enthusiastic about moving equipment and services to regions where deficiencies exist.

## **8.2 Contract Conditions**

Prior to accepting a contract, the prospective contractor performs a site inspection to examine the location and evaluate site conditions. Contractors prefer sites that are free of utility poles, wire, or gas lines and that have adequate space to maneuver heavy machinery. Projects where site conditions are otherwise are usually rejected due to complexity or are assessed higher charges. The concern for fire and human causality was identified as being a critical factor in accepting or tendering a bid for a contract since liability insurance is quite expensive. Contractors are more attracted to projects that involve multiple units in close proximity to each other.

## **9.0 MOBILE HOME TRANSPORT**

There are 244 companies operating in the state that are currently involved in the transportation of mobile home units to offsite facilities. These companies are characterized as mobile home movers and are comprised of skilled drivers and heavy trucks with towing capacities in excess of 20,000 pounds. The Florida Manufactured Housing Association [18] along with the Florida State Yellow Pages [17] has provided the names, locations, and contact information of 244 trucking companies that specialize in this service. The fleet of trucks involved in this sector require specific permits issued by the Department of Transportation (DOT) that allow them to transport wide loads.

Mobile home movers provide an array of services that range from installing axles, tires, and wheels to welding metal tongues to the anterior end of the mobile home unit. All these transportation devices are necessary to ensure that the transfer to a demolition site is smooth and without incidents of casualty or injury.

Fifty-three percent of the mobile home moving companies are registered in Region 1 and Region 3, while only 14% are in Region 5. Since Region 5 has the second largest proportion of mobile homes but fewer transportation companies, it is apparent that there will be deficiencies in the availability of transportation services if a demolition program is undertaken. Service of moving companies that operate in other regions can be secured normally at a higher cost.

Figure 14 presents the map displaying the statewide distribution of the Trucking and Hauling Companies that have the capacity to transport mobile homes. A complete list of mobile home movers and contact information is available in Appendix B.

## **Florida Mobile Home Movers**



Note: This map is created based on zip codes. Therefore, multiple companies operating within the area of the same zip code may be shown in a single point on the map.

**Figure 14. Mobile home movers in Florida.**

## **10.0 RECYCLING AND SALVAGING**

### **10.1 Recycling and Salvaging Methods**

Two basic approaches are involved in recycling and salvaging materials from a mobile home:

- Separating the materials at the point of demolition and transporting them directly to the market or a scrap facility
- Sorting the mixed construction and demolition debris at a central material recovery facility.

#### **Separation at the demolition site**

As discussed previously, approximately 37% of a singlewide mobile home unit is recyclable. This equates to approximately 4,400 pounds of material. These materials are usually manually collected and separated by laborers employed by the demolition contractors and placed in specific piles to be transported to their destination market. The remaining unwanted material is landfilled. The success of this technique depends on a laborer's ability to identify material visually that may have a potential value.

#### **Sorting at the material recovery facilities**

This process entails the separation of the key reusable materials at a special facility referred to as a material recovery facility or an MRF. The target materials are those that are large and may prove incompatible with the processing equipment or those materials that have good market values. Large pieces of lumber free of embedded rebar are separated, and loads that consist primarily of one material are rerouted to a specific facility. The materials are size reduced by heavy equipment, which includes crushers, impactors, or dozers, and processed through a series of screen magnets and other separation devices. Reducing the size of the material makes it easy to employ conveyors and other separation equipment. At some facilities, a picking line of laborers is utilized to remove the materials selectively and deposit them in specific containers [19].

### **10.2 Markets for Reusable Materials**

The recyclable material obtained from a mobile home consists primarily of various metals such as aluminum, tin, copper, brass, and galvanized steel. Metal and wooden doors, furnaces, and breaker boxes are some additional household fixtures that have a potential salvage value. Our research indicates that although the current market for scrap metals is the lowest that it has been in 10 years, traders are optimistic that it will rebound [20].

Active Scrap Metal facilities operating in Miami-Dade County were contacted to determine the scope of their business and the price and condition under which they accept metals. General Metal Corp., East Coast Scrap Metals, River Recycling Co., Svinga Brothers Corp., and Arrow Recycling expressed a willingness to purchase metals in any quantity provided that they were clean and free of wooden or glass attachments. The average quotes are summarized in Table 4. Based on these quotes, it was estimated that, on average, a contractor could earn approximately \$450 in revenue from salvaging per singlewide mobile home unit (see Section 12.4 for details), although some contractors do not think it is worthwhile to practice recycling at all.

**Table 4. The scrap value of various metals**

Salvageable Material	Scrap value, \$/lb
Aluminum sheets	0.36
Extruded aluminum	0.44
Copper #1	0.52
Copper #2	0.43
Sheathed copper wire	0.17
Brass	0.50
Cables	0.05
Galvanized steel	0.10
Tin	0.0075

The practice of recycling lumber to be used as structural forms or parts in new construction is not a very popular engagement in Florida. Despite that, studies have demonstrated that the quality of old lumber is comparable to new because it was from old-growth trees, while new lumber usually comes from younger trees. Demolition wood is less desirable due to the lack of standardized grading procedures and the potential risk of contamination in used wood. Used wood is sometimes recycled into chipboard, mulch, or fertilizer, but more often it is used as fuel for combustion for \$10 per ton or less [21, 22]. One of the companies involved in this operation in Miami-Dade County is LOPEFRA. The company purchases the salvageable lumber, shreds it to a dust and sells it to a local sugar mill, which uses the wood for energy to heat the boilers.

White goods such as doors, furnaces, breaker boxes, sinks, and tubs are usually brought to recycling facilities for free or donated to places such as the Habitat for Humanity.

### 10.3 Recycling Facilities

Recycling facilities are those that extract material of fair market value from the demolition waste before all the excess, unwanted materials are discarded as municipal solid waste at a landfill. The classification of these facilities is dependent on the material that they accept. They are managed by licensed operators and are regulated by the codes enforced by the Florida Department of Environmental Protection. Most recycling facilities process one or more of the following materials: paper including newspaper, magazines, and office paper; corrugated containers, glass bottles, aluminum cans, plastic bottles, other plastics, steel cans, white goods, scrap metals, tires, yard trash, and construction and demolition (C&D) materials. C&D, scrap metal, and white goods recycling facilities are the most relevant to the scope of this study. Therefore, these three types of facilities are discussed below. Table 5 summarizes the distribution of the existing or proposed C&D, scrap metal, and white goods recycling facilities within the state of Florida as of September 30, 2000.

**Table 5. Recycling facility distribution in Florida**

Region	Construction and Demolition Facilities	Scrap Metal Facilities	White Goods Facilities
West	1	29	20
Big Bend	4	46	50
Northeast	19	37	28
West Center	13	60	18
Central	6	36	16
Southwest	9	25	19
Southeast	13	73	15
<b>Statewide</b>	<b>65</b>	<b>306</b>	<b>166</b>

**Construction and demolition debris (CDR) recycling facilities** recover materials such as wood, paper, cardboard, and concrete from C&D waste streams for the purpose of recycling, but they do not dispose of materials on site. These facilities employ a combination of manual and mechanical separation techniques. The equipment utilized at these facilities can be quite costly, with prices ranging from \$10,000-\$700,000. Such equipment includes compactors, pulverizers, loading cranes, separation systems, horizontal balers, granulators, tub grinders, trommels, hauling trucks, and trailers [19]. Figure 15 displays the facilities that have the capacity to perform C&D recycling services. A complete list of C&D recycling facilities was

extracted from the FDEP's Solid Waste Management Annual Report 2000 [23] and is presented in Appendix C.

The distribution of C&D recycling facilities in Florida is somewhat widespread with no indication that such facilities are centralized in any specific region. This demonstrates that all regions have an equal and excellent capacity to engage in C&D recycling associated with a mobile home recycling program.

Additionally, investigations into the versatility of shredded C&D waste debris have revealed a potential application of C&D waste as a daily landfill cover. The C&D converted landfill cover has been proven effective in controlling fire, erosion, and odor and in reducing scavengers at landfills. It is made on site at a landfill or transfer station by first removing hazardous materials such as batteries, medical waste, or asbestos. A shredder compacts and shreds the waste, and water and other fluids are added. The final product is one-third fibrous, one-third moisture, and one-third inert. The process has demonstrated success in recycling 25% of construction and demolition waste, and its application is viewed as an alternative solution to the growing landfill space problem. This technology has been used with tremendous success in Rhode Island and has had reported operation in Maryland, Virginia, Pennsylvania, Wisconsin, and Florida [24, 25]. Unfortunately, the location of the Florida facility reportedly using this technology cannot be verified. According to our interviews with Miami-Dade County landfill operators, this technology has not been used in Miami-Dade County because it is not on the list of approved landfill cover material issued by DERM [14].

## Florida C&D Recycling Facilities

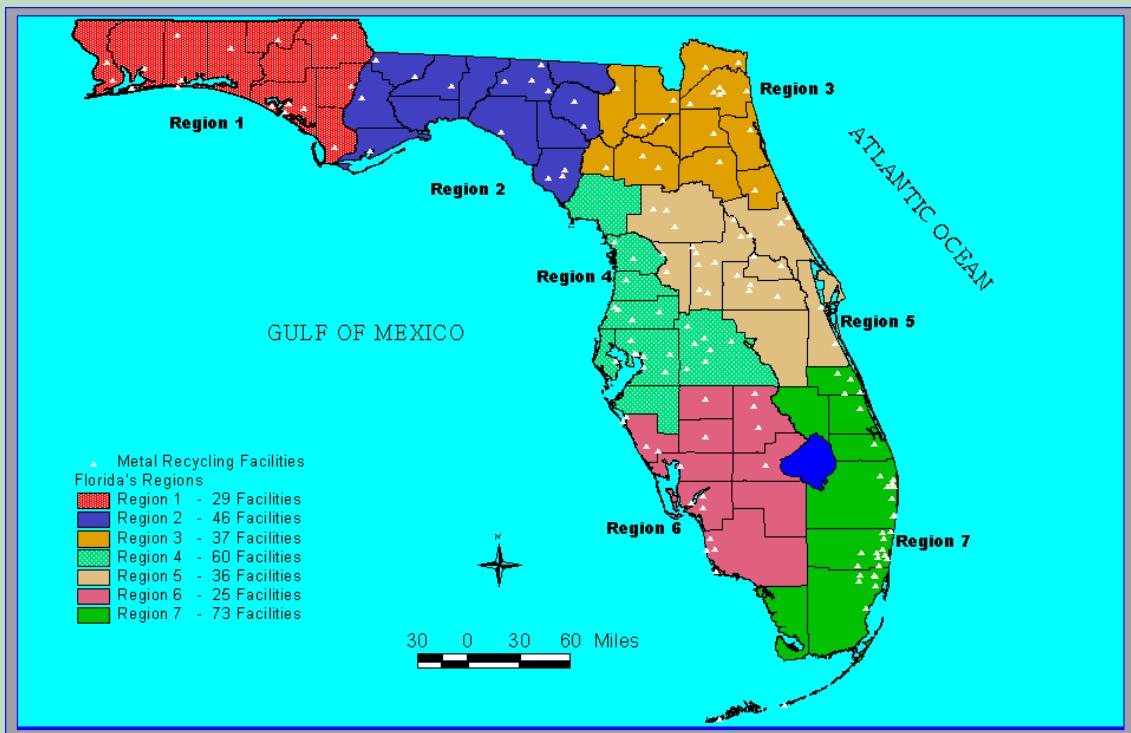


Note: This map is created based on zip codes. Therefore, multiple facilities operating within the area of the same zip code may be shown in a single point on the map.

**Figure 15. C&D recycling facilities in Florida.**

**Scrap metal facilities** recycle ferrous and nonferrous metal. They do not dispose of the materials but rather function as a transfer station that purchases sorted materials directly from sellers with the intention of reselling the materials on the local or international market. There were just over 300 such licensed facilities in Florida as of September 30, 2000 [18]. These establishments buy clean metals at prices that are comparable to the daily publicly traded quote. The facilities compact, compress, or size reduce the low density, lightweight metals and prepare them for transport to prospective buyers. As shown in Figure 16, the locations of these facilities are widespread across the state. A complete list of all scrap metal recycling operators in the state is included in Appendix D.

## Florida Scrap Metal Recycling Facilities



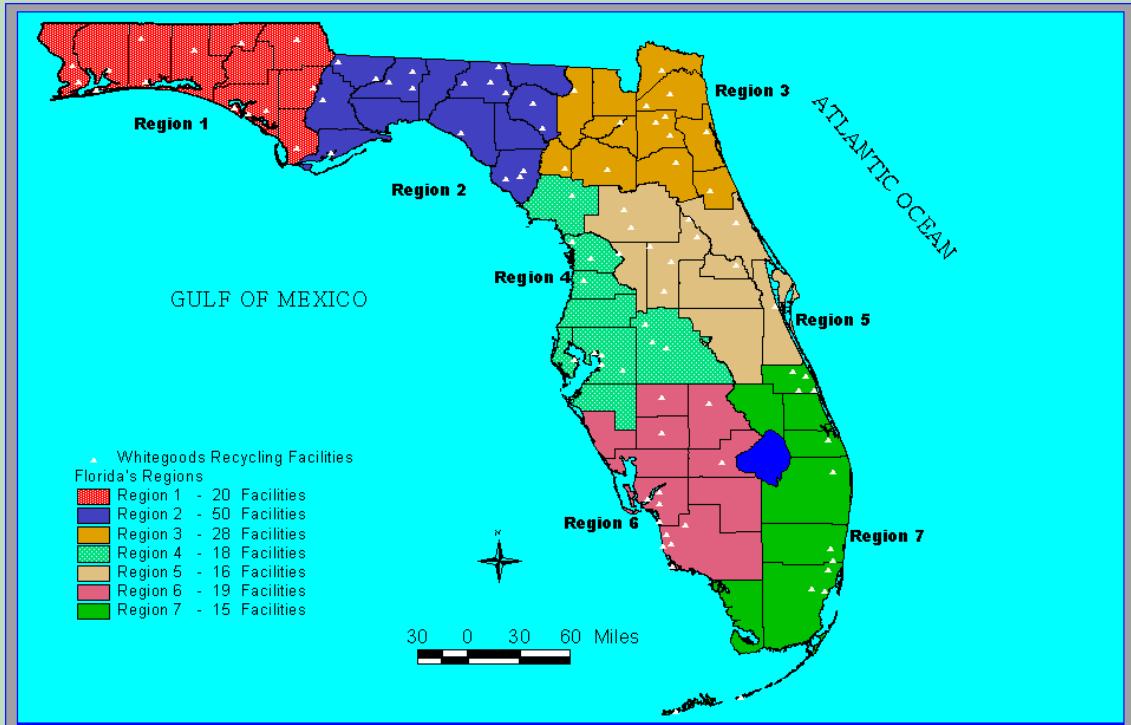
Note: This map is created based on zip codes. Therefore, multiple facilities operating within the area of the same zip code may be shown in a single point on the map.

**Figure 16. Scrap metal recycling facilities in Florida.**

**White goods facilities** are those that accept larger household fixtures that cannot be compressed, compacted, or discarded at a landfill. These recyclable materials include toilets, basins, bathtubs, washers, dryers, and other bulky household furnishings or fixtures. FDEP records revealed that there were 166 such facilities in Florida that were fully operational or awaiting permits between October 1, 1999, and September 30, 2000.

Distribution of these facilities is displayed in Figure 17. A complete list of white goods recycling facilities is available in Appendix E.

## **Florida White Goods Recycling Facilities**



Note: This map is created based on zip codes. Therefore, multiple facilities operating within the area of the same zip code may be shown in a single point on the map.

**Figure 17. White goods recycling facilities in Florida.**

## **11.0 WASTE MANAGEMENT**

Extensive research was conducted to determine the final destination of the unwanted non-recyclable/non-reusable waste generated during the demolition of a mobile home. The discarded waste usually consists of lumber, cardboard, gypsum, paper, or concrete bricks. These materials are classified as C&D waste and are usually disposed of at landfill facilities.

### **11.1 Class I, II, and III Landfills**

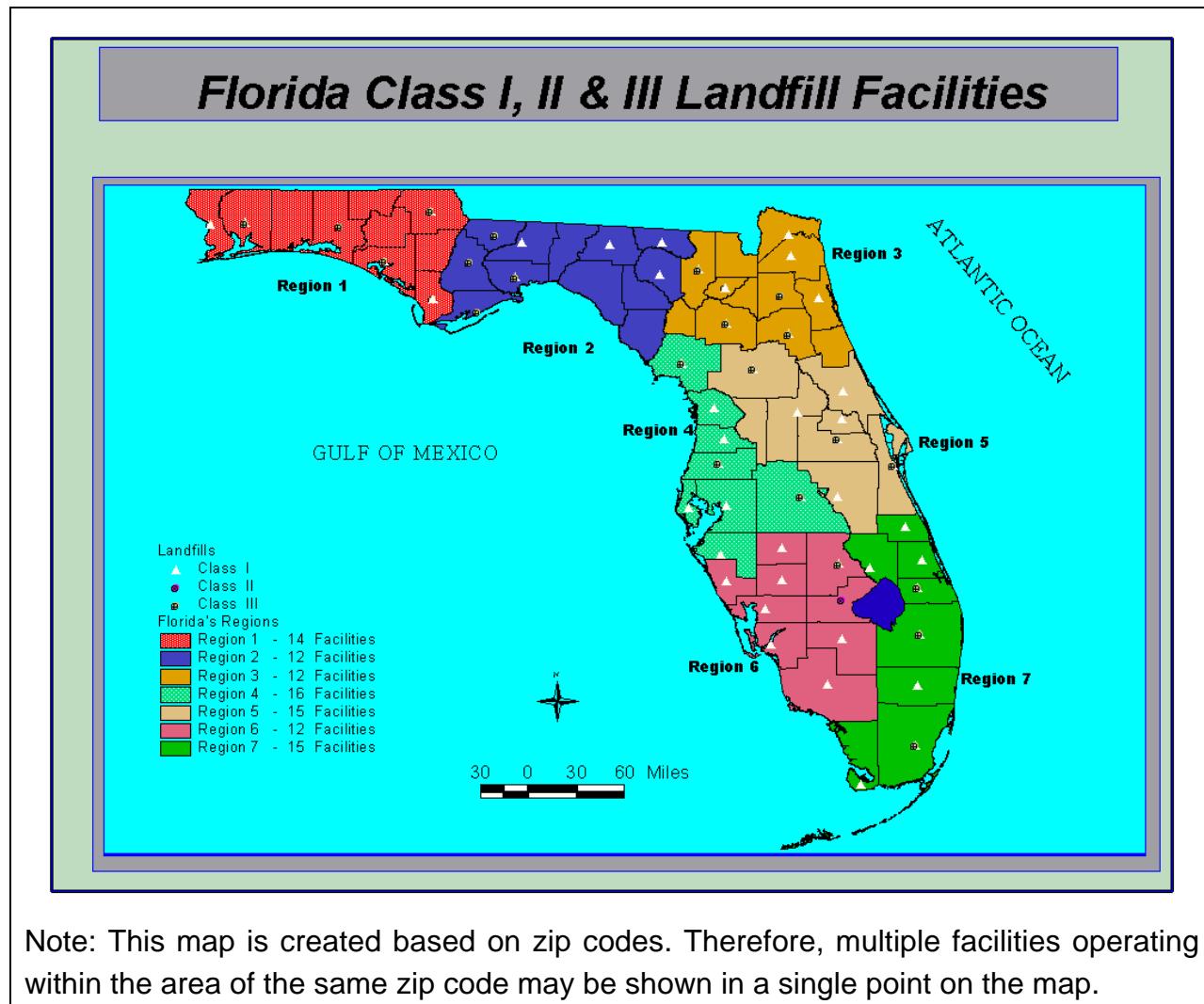
The Florida Administrative Code Rule 62-701.340(3) classifies landfill facilities based on the type, nature, and quantity of solid waste they accept. There are three classes of landfills [23]:

- **Class I** landfills receive an average of 20 tons or more of solid waste per day. They accept general, non-hazardous household, commercial, industrial, and agricultural waste.
- **Class II** landfills receive the same types of material as the Class I landfills, but their capacities are at an average of less than 20 tons of municipal waste per day.
- **Class III** landfills receive yard trash, construction and demolition debris, waste tires, carpet, cardboard, paper, glass, plastic, furniture and household appliances that are not expected to produce leachate and do not pose a direct threat to public health or the environment. Some Class III facilities are authorized to accept asbestos or asbestos-containing materials but are restricted from putrescible household waste.

Landfill facilities operated in Florida are monitored and regulated by the FDEP, which issues permits that are renewable every five years. Permits issued by local government agencies may also be required depending on the locations of the landfills. The landfill construction requirements are such that all Class I and II facilities require the installation of composite or double liners and a leachate collection system. Class III landfills may be exempted from the liner requirements, leachate controls, and water quality monitoring, if the FDEP determines that no significant threat to the environment can result from the exemption [23]. The state encourages the disposal of construction and demolition waste at Class III facilities but permits Class I facilities to accept Class III material as well. The tipping fees and disposal cost are structured in such a way that it is more costly to dispose the same construction waste at a Class I facility.

The most recent FDEP database indicates that Florida has 96 active Class I, II, and III landfills [23]. Of those facilities, 61 are Class I, 1 is Class II, and 34 are Class III (Figure 18). A limited number of counties responded to our survey on the existing landfill capacities. All indications suggested that Florida landfills have adequate landfill space

and lifetime. A complete list of all the landfills operating in each of the seven geographical regions has been compiled based on the FDEP database and is available in Appendix F. The appendix includes location, class type, and operator information of each facility.



**Figure 18. Florida class I, class II, and class III landfill facilities.**

## 11.2 C&D Debris Disposal Facilities

In addition to the 96 landfills, there are 158 C&D debris disposal facilities operating within the state that also serve as the final destinations of C&D waste. Many of these facilities are privately owned. Of these, there are 92 active C&D disposal facilities and 69 land-clearing debris facilities, which accept rocks, soils, tree remains, and other vegetative matter. Three of 158 facilities are both C&D disposal and land-clearing debris

facilities. The materials generally accepted by a C&D debris disposal facility include treated wood, shingles, sheet rock, plant-mixed asphalt, PVC piping, plastic buckets, brick, and concrete. Asbestos, metal, liquids, cardboard, paper, and household garbage are usually rejected [23]. The distribution of the C&D debris disposal facilities in Florida is displayed in Figure 19, and a complete list of the 158 C&D facilities is included in Appendix G.



**Figure 19. C&D debris disposal facilities in Florida.**

### **11.3 Impact of Mobile Home Recycling Program on Landfill Operations**

A statewide evaluation of the impact of the waste generated by a broad-scale mobile home recycling program was examined. An estimate of the total waste to be generated from such a program was performed, taking into consideration the waste reduction from recycling and salvaging. The total waste to be generated was then compared to the current total tonnage of municipal solid waste (MSW) disposed of at landfills statewide. The MSW includes everything from newspaper, glass, aluminum cans, and plastic bottles, to C&D debris, yard trash, white goods, and tires. The amount of MSW collected, landfilled, and recycled was reported in FDEP's annual reports on solid waste management [23]. This analysis was conducted for three scenarios. The first two scenarios assumed that all pre-1976 mobile home units and all pre-1994 units would be recycled in a 10-year time frame, respectively. A 10-year project life is a realistic assumption, given the massive number of mobile homes involved in such a program and the relatively limited number of the existing demolition contractors. The last scenario assumed a shorter project life of five years for the removal of all pre-1976 units (removal of all pre-1994 units in five years is not feasible). The calculation spreadsheet is presented in Appendix H.

The results of this analysis indicate that the waste generated from the statewide demolition of mobile homes will have a minimal impact on current landfill operations statewide. The investigation revealed that if all pre-1976 units were to be recycled within five years, the waste generated would contribute a 4.2% increase in C&D waste and a 1.5% increase in the total MSW that will end up in landfills, assuming that municipal solid waste will be generated at its current rate for these five years. Since the amount of waste generated is likely to increase every year due to population growth, the impact is expected to be even smaller. For a 10-year project life, the annual waste generated from all pre-1976 units will increase the C&D waste disposed of at landfills by 2.1% and the total MSW waste by 0.77%. Similarly, the waste from the demolition of all pre-1994 units in 10 years will increase the C&D waste and total MSW landfilled by 6.1 and 2.3%, respectively.

As already discussed in Section 4, the distribution of mobile homes in Florida varies greatly from region to region. The vast majority of the mobile home stock is located in central Florida in Regions 4 and 5 with Region 4 having the largest proportion of mobile homes in the state. An analysis of this crucial geographical region was therefore conducted to assess the impact of the waste generated from the mobile home recycling program on this region's landfill operation. The analysis revealed that if the project were to be orchestrated over a 10-year period, the pre-1976 and pre-1994 demolished units would account for a 3.0% and 8.6% increase in C&D waste and a 1.4% and 3.9%

increase in the MSW landfilled in that region. The results of the analysis suggest that in spite of the large mobile home population, the project's impact on landfill operations will be insignificant. Details of the analysis are illustrated in Appendix I. The impact may be further reduced if the waste generated from the recycling program is strategically transported to disposal facilities that have greater capacities and longer lifetimes.

## **12.0 COST Analysis**

Cost associated with the technical aspects of a mobile home recycling program can be broken down into site preparation, demolition, transportation, and waste management. Each of these cost categories is discussed in this section.

### **12.1 Site Preparation Cost**

Site preparation cost is money expended prior to the actual demolition job, including permitting and yard clearing costs. Cost for each demolition permit application varies significantly from county to county, ranging from \$5 to \$135, with an average cost of \$67. Additional cost for plumbing, sewer, and electrical disconnection may also apply depending on the nature of the connection and is assessed based on whether the utilities are connected to a public or private system and the number of fixtures involved [26].

Site preparation cost also includes the costs incurred in performing asbestos and LBP assessments of mobile home units. Certified asbestos and lead detection companies were contacted to obtain quotes. Lead paint inspection generally costs \$300 per mobile home unit, and asbestos surveys range from \$600 to \$1,000 per home. This covers the survey, formal report, mobilization of the specialists, and cost of wall or floor boring required by an asbestos survey (normally, \$15-\$30 per sample).

If asbestos is found, asbestos abatement must be performed prior to demolition. It is important to note that the cost associated with asbestos removal can vary depending on the size of the project, the complexity of the project, the amount of asbestos being removed, and the time required to perform removal. The costs include mobilization of the crew, asbestos removal, air quality sampling, and waste disposal. Asbestos removal companies quoted an average rate at \$1.65 per square ft for wood or plywood floors, \$1.50 per square ft for drywall walls, \$1.50 for ceiling surfaces, plus a 20% markup on the waste disposal. It is difficult to estimate the abatement cost without knowing how much asbestos is present in a mobile home, but the cost can easily run up to \$2,000-\$3,000 per mobile home unit.

### **12.2 Demolition Cost**

The cost of demolishing a mobile home and the crucial factors that govern the cost were investigated via a telephone survey of selected contractors operating in various regions in Florida. The contractors contacted included RM Heavy Equipment Inc., Blanchard's Mobile Home Removals and Transport Inc., Anu Way Contractors and Recycling, L&L Salvage Sales, Disposal Depot Inc., and Goodings Goodies Inc.

Demolition contractors all concede that the cost of a project is dependent on the size and complexity of the job and the number of units to be deconstructed. The contractors gave quotations ranging from \$1,500 to \$6,000 per mobile home including waste disposal. The average cost of demolishing a vacant singlewide unit is \$1,600. It is apparent that if multiple units within the same vicinity are involved, the cost is significantly reduced. The contractors agreed that if the contract entails 10 or more units, the cost could be adjusted to \$1,000-1,400 per unit.

The individual activities that contributed to the demolition cost are operation cost and insurance cost. Operation cost is the cost borne by the contractor in performing the routine activities required by a demolition project. If the heavy equipment is contractor-owned, it typically costs approximately \$84 per day to operate. This figure includes the monthly installments, fuel, and maintenance cost of the equipment. The initial capital cost of the heavy equipment (usually a backhoe) is normally over \$30,000. A licensed operator of the equipment is generally secured at \$150 per day, and the hired hands who segregate the debris usually cost \$7 per hour. Insurance cost is the cost of having casualty, property damage, and workers' liability and compensation coverage in the event or occurrence of some unforeseen accident during a demolition project. Usually contractors obtain \$300,000 of workers' liability coverage at a cost of \$5,000 per year. For state-funded projects, contractors are required to have at least \$1,000,000 coverage, which usually costs \$15,000 per year. In cases where the project is of a shorter duration, contractors can secure a bond that is equal to the required amount [5].

### **12.3 Transportation Cost**

Transportation cost is the trucking and hauling fees that are assessed for the transportation of the mobile home units to an offsite facility. Quotations obtained for this study indicated that on an average, there is a flat rate of \$800 for the first 50 miles and 0.75 cents for every additional mile. This cost also includes the mounting of a tongue @ \$150 per tongue, axles at \$75 per axle, and tires and rims at a \$40-50 each. A DOT license required for the transportation of wide loads is obtained at \$500 per year per vehicle.

### **12.4 Waste Management Cost**

Waste management cost is that involved with collecting, storing, and disposing of the demolition waste. Waste disposal is often part of the demolition contract; therefore, the demolition cost discussed in the last section already included the waste management cost. This section simply provides an insight into what waste management costs entail.

A 30-cubic-yard dumpster delivered to the demolition site costs approximately \$275, and a 40-cubic-yard receptacle was quoted at \$375. These quotes include waste disposal fee. The state average for the disposal of C&D waste at county-operated facilities is \$31.88 per ton; white goods are disposed at \$33.61 per ton; yard trash at \$30.28 per ton, and regulated asbestos at \$117.04 per ton [23].

It was observed that disposal cost of C&D waste at C&D Debris Disposal Facilities is 25% less than that of the Class I landfills, ranging from \$18 to \$29.50 per ton for in-county residents, with the state average being \$24.00 per ton. The average out-county rate for C&D waste disposal at these facilities is \$27.50 per ton. The fees are structured such that concessions encourage generated waste to be disposed at local facilities and minimize out-county waste by assessing higher waste disposal fees.

Some waste disposal facilities also accept intact mobile homes. The tipping fee for a typical 12 x 60 ft mobile home unit ranges from \$130 to \$750. Interestingly, if a mobile home is landfilled without demolition, no asbestos surveys are required since the health hazards associated with asbestos only develop when asbestos-containing materials are disturbed by renovation or demolition. Therefore, the costs associated with this approach are transportation to the landfill facility (approximately \$600-\$800) and the tipping fee at the landfill. Although the savings derived from this approach are significant, the act of simply dumping an intact mobile home at a landfill is environmentally irresponsible as landfill space is not infinite.

The cost breakdown associated with a mobile home recycling program is shown in Table 6.

**Table 6. Cost breakdown for technical aspects of mobile home recycling program**

ACTIVITY	COST
<b>Site Preparation</b>	
Plumbing and sewer disconnect permit	Dependent on square footage and number of fixtures
Electrical disconnect	Dependent on square footage and number of fixtures
Full demolition permit	\$67 per mobile home
Lead-based paint inspection services (recommended but not mandatory)	\$300 per mobile home
Asbestos inspection services	\$600 per mobile home
Asbestos abatement services (including waste disposal)	\$2,000-3,000 per mobile home <sup>a</sup>
<b>Demolition</b>	
Tractor and backhoe	\$84 per day if owned by contractor
Liability insurance	\$300,000 @ \$5,000 per year premium  \$1,000,000 @ \$15,000 per year premium (as required for state projects)
Heavy equipment operator	\$150 per day
Labor (for manual removal of debris and waste segregation)	\$7 per hour
Waste management	\$375 per 40 cu. yd. dumpster including tipping fee: \$31.88 per ton (state average for C&D waste at Class I landfills) \$24.00 per ton (average in-county tipping fee for C&D waste at C&D Debris Disposal Facilities) \$27.50 per ton (average out-county tipping fee for C&D waste at C&D Debris Disposal Facilities)
<b>Transportation</b>	
Transportation to offsite demolition facilities	\$800 per trailer

<sup>a</sup>: Asbestos abatement cost varies depending on the complexity of the project. Quotations are normally given on a square footage basis. It is difficult to estimate the abatement cost without knowing how much asbestos is present in a mobile home, but the cost can easily run up to \$2,000-\$3,000 per mobile home.

## 12.5 Recycling Revenue

The majority of the revenue derived from the demolition of a mobile home unit is obtained via the sale of salvaged materials. These materials consist primarily of scrap metals, namely, the steel frame, tin, steel piping, aluminum, brass, copper, wiring, and clean lumber. The trade value of these materials is dependent on the open market demand, which fluctuates daily. The average revenue derived from all salvaged materials from a singlewide mobile home is approximately \$450 (see Table 7). The revenue derived from the salvaged material is, however, an additional gain to the demolition contractor, not a deduction from the contracted price. The following table lists the recyclable materials, weight, and the revenues to be received from their sale. It applies to a typical singlewide mobile home.

**Table 7. Estimated revenue from salvaging materials from a typical singlewide mobile home**

Material	Weight, lbs	Salvage value, \$/lb	Revenue, \$
Steel frame	1316	0.10	131.56
Tin	429	0.01	3.22
Steel piping	512	0.10	51.24
Copper	156	0.48	74.69
Wiring	44	0.17	7.41
Aluminum	496	0.36	178.42
Brass	7	0.50	3.50
Lumber	512	0.0046	2.35
<b>TOTAL REVENUE</b>			<b>\$452</b>

## 12.6 Project Cost Assessment

The total cost associated with the technical aspects of the mobile home recycling program was estimated, and the results are shown in Table 8. In addition to the research data already presented in this report, the following assumptions were made to complete the calculation:

1. As previously discussed, asbestos abatement cost varies depending on the complexity of the project. Quotations are normally given on a square footage basis. It is difficult to estimate accurately the abatement cost without knowing how much asbestos is present in a mobile home. Since the cost can easily run up to \$2,000-\$3,000 per singlewide mobile home, an average cost of \$2,500 per unit was assumed for the calculation.
2. All pre-1976 mobile homes require asbestos inspection prior to demolition. It was conservatively assumed that asbestos would be found in approximately 60% of these mobile homes. These homes will subsequently require asbestos abatement.
3. Because mobile homes built after 1980 are much less likely to contain asbestos, it was assumed that no asbestos inspection or abatement would be performed for mobile homes built between 1976 and 1994.
4. Since onsite demolitions prove to be a cheaper approach compared to offsite demolitions, it was assumed that 80% of the mobile homes would be removed onsite. This is an optimistic assumption. Most mobile home park operators prefer offsite demolition to protect themselves from potential personal injury liability or property damage.
5. The only discrepancy in costs between the onsite demolition and offsite demolition is the transportation cost at \$800 per unit.
6. As discussed earlier in the report, lead-based paint (LBP) inspection is recommended as a precautionary measure to protect workers. However, such inspections are not mandatory. The cost of LBP inspections is not included in this calculation.
7. Administrative cost is not included.

**Table 8. Total projected program cost (technical aspects)**

	Pre-1976	1976-1994
Asbestos inspection per unit <sup>1</sup>	\$600	Not applicable
Asbestos abatement per unit <sup>1</sup>	\$2,500	Not applicable
Demolition contract per unit <sup>1,2</sup>	\$1,200	\$1,200
Direct cost per unit <sup>1</sup> free of asbestos	\$1,800	\$1,200
Direct cost per unit <sup>1</sup> if asbestos abatement is required	\$4,300	Not applicable
Transportation cost per unit <sup>1</sup>	\$800	\$800
Estimated number of units <sup>1</sup> in Florida	338,000	643,000
<b>Total Cost</b>	<b>\$1,656,200,000</b>	<b>\$1,337,440,000</b>

1: One unit = one mobile home section. A doublewide unit will cost twice as much.

2: The contract includes permit application, demolition, and waste disposal.

As can be seen from Table 8, the cost for removing all pre-1976 mobile homes is around \$1.66 billion. An additional \$1.34 billion will be needed to remove all pre-1994 units. Once again, the costs presented here are associated with the technical aspects of this program. The costs can be increased dramatically once social factors, such as finding replacement housing, homeowner relocation, and incentives for the homeowners, and administrative costs are considered.

### **13.0 BENEFITS OF THE PROGRAM**

It is common knowledge that mobile homes are at a great risk for severe damage in the event of hurricanes. There are numerous studies that reported financial losses during past hurricanes. For example, Hurricane Andrew (1992) reportedly caused over \$30 billion damage. However, the percentage of the loss associated with either the mobile homes themselves or the collateral damages caused by the flying debris derived from damaged mobile homes has not been well documented. Consequently, it is difficult to evaluate the benefits of the mobile home recycling program quantitatively. Qualitatively, the principal benefits of a statewide mobile home recycling program are the following:

1. Reduction in the property losses and casualties that can be sustained by the mobile home community in the event of a catastrophic storm.
2. Potential reduction in payouts from the state to the disaster victims.
3. Often after a hurricane event, damaged homes are dumped into landfills without recycling due to the time constraints associated with the emergency situation. Systematic deconstruction and recycling of mobile homes prevents simple dumping of large volume of waste in a post-hurricane situation, thus preserves landfill space and increases the potential lifespan of landfills.
4. Deconstructing and salvaging contracts provide valuable employment opportunities in economically underutilized areas.
5. Encouraging the reuse of materials in the construction industry. Lumber can be used in casting, shoring, and form work in reinforced concrete buildings.

## **14.0 CONCLUSIONS**

This detailed investigation and research into the technical aspects of a statewide mobile home recycling program has led to the following conclusions:

1. Florida has a large mobile home population, and these mobile homes are at a tremendous risk of great losses in the event of a catastrophic hurricane. The West Central Region (Region 4) of Florida has more mobile homes than any other region, with an estimated 432,000 mobile home units.
2. An average weight of a singlewide mobile home is approximately 12,000 lbs. As much as 37% of it is recyclable or reusable. The recyclable materials are primarily metals, such as aluminum, tin, copper, brass, and galvanized steel. Metal and wooden doors, furnaces, and breaker boxes are some additional salvageable items. The non-recyclable materials include cardboard, drywall, insulation, rugs, and glass. These materials are usually disposed of at landfills.
3. The revenue to be derived from the sale of salvaged metals and other fixtures from a mobile home is approximately \$450. It is however perceived by some contractors that the revenue is too low to justify the efforts involved.
4. A mobile home recycling program entails active involvement of the state and local government, environmental consultants, demolition contractors, transportation companies, recycling facilities, and landfill operators. The program requires the collaboration of all the players to ensure the success of the program.
5. Two demolition approaches exist: onsite and offsite. Onsite demolition is usually encouraged if the working environment is free of utility wires and poles and has adequate workspace for heavy equipment to work around. Offsite is usually engaged when the opposite prevails. Onsite demolition may be the only choice when a mobile home is in such a poor condition that it is not roadworthy. Offsite demolition is more expensive since transportation of mobile homes is required. Many park operators insist on offsite demolition to indemnify themselves of any personal injury or property damage liability.
6. The permit requirements of a mobile home recycling program include a demolition permit, transportation permit for wider loads, and waste disposal permit for asbestos-containing materials. An electrical, plumbing, and gas disconnect permit may also be required to clear the property of any utilities that may pose a threat of fire during a demolition process.
7. Mobile homes built before 1980 are subject to asbestos contamination. Since a demolition operation will disturb asbestos on the interior and exterior of the mobile

home, an asbestos survey must be conducted prior to demolition. An asbestos survey is often a requirement for the issuance of a full demolition permit.

8. Abatement is required prior to demolition if asbestos is detected in a mobile home. Federal and state laws stipulate that abatement be performed by certified environmental contractors.
9. There are over 345 contractors and 244 mobile home movers available statewide that have the facilities to perform the required demolition and transportation tasks.
10. Recycling facilities are widely available across the state that can assist in recycling of the materials obtained from demolished mobile homes. 65 facilities were identified that deal with construction and demolition waste, 306 facilities recycle scrap metals, and 166 facilities accept white goods.
11. Currently, there are 96 Class I, II, and III landfill facilities and 158 construction and demolition debris disposal facilities in Florida that can handle the waste generated by a mobile home recycling program.
12. Investigations demonstrate that the recycling program will have a minimal impact on the current waste handling facilities and will pose no significant threat to the existing capacity and the anticipated lifetime of these facilities.
13. Cost associated with the technical aspects of a mobile home recycling program includes site preparation, demolition, transportation, and waste management. If asbestos inspection is not required, as in the case of mobile homes built after 1980, the cost of onsite demolition and waste management will be approximately \$1,200 per mobile home section. For those mobile homes that will require asbestos inspection, an additional \$600 per unit is needed for inspection, and another \$2,000-3,000 per unit is needed for abatement if asbestos is detected. Offsite demolitions will require an additional \$800 per unit to cover transportation cost.
14. With a number of assumptions (see Section 12), the cost for removing all pre-1976 mobile homes from the Florida housing stock was projected at around \$1.66 billion. An additional \$1.34 billion will be necessary to remove all pre-1994 units. These figures are associated solely with the technical aspects of this program. The costs can be increased drastically once social factors, such as arranging replacement housing, homeowner relocation, and incentives for the homeowners, are considered.

In conclusion, a statewide mobile home recycling program is feasible, but the program can be costly. Costs associated with the social factors mentioned above must be investigated to determine if the program should proceed and how it should be carried out.

## **15.0 Recommendations**

Costs associated with the social factors of a mobile home recycling program must be investigated to determine the total cost of the program. These factors include, but are not limited to, replacement housing arrangements, homeowner relocation, and incentives for the homeowners.

If the recycling program is realized, it is recommended that priority be placed on areas with high mobile home populations and areas where the probability of hurricane strike is greatest. Since all areas of Florida are not equally exposed to hurricane damages, it is important that precedence be given to the high-risk areas.

A mobile home recycling program entails active involvement of the state and local government agencies, environmental consultants, demolition contractors, transportation companies, recycling facilities, and landfill operators. A program of such a scale requires deliberate planning and a well-prepared execution plan.

Our study showed that as much as 37% of material derived from a mobile home can be reused or salvaged. Our interviews with contractors, however, suggested that some contractors do not practice recycling because they do not believe it is cost-effective. To the contrary, the potential revenue from recycling is approximately \$450 per mobile home section, not at all trivial considering the average onsite demolition contract cost is \$1,200 per unit. In order to preserve the limited landfill space, the program, if implemented, must ensure that all contractors hired carry out recycling to the greatest extent possible.

Although our research indicated that the recycling program will have a minimal impact on the capacity and anticipated lifetime of existing landfill facilities, the impact can be further reduced in two ways: 1) Encourage the use of the technology that converts C&D waste to daily landfill covers. This could lead to up to a 25% reduction in waste landfilled; and 2) strategically transport waste to disposal facilities that have greater capacities and longer lifetimes.

If the site conditions allow, onsite demolition should be performed to eliminate transportation costs associated with offsite demolitions. The cost savings can be significant.

## 16.0 References

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## ACRONYMS

<b>DERM</b>	Miami-Dade County Department of Environmental Resource Management
<b>DMV</b>	Florida Department of Motor Vehicles
<b>DOT</b>	Department of Transportation
<b>FDEP</b>	Florida Department of Environmental Protection
<b>FDOH</b>	Florida Department of Health
<b>FIU</b>	Florida International University
<b>FMHA</b>	Florida Manufactured Housing Association
<b>HCET</b>	Hemispheric Center for Environmental Technology at FIU
<b>HUD</b>	U.S. Department of Housing and Urban Development
<b>IHC</b>	International Hurricane Center
<b>LBP</b>	Lead-Based Paint
<b>MRF</b>	Material Recovery Facility
<b>MSW</b>	Municipal Solid Waste
<b>NESHAP</b>	National Emission Standard for Hazardous Air Pollutants
<b>OSHA</b>	Occupational Safety and Health Administration
<b>RACM</b>	Regulated Asbestos-Containing Material

## **APPENDICES**

APPENDIX A: List of Demolition Contractors in Florida

APPENDIX B: List of Mobile Home Movers in Florida

APPENDIX C: C&D Recycling Facilities in Florida

APPENDIX D: Scrap Metal Recycling Facilities in Florida

APPENDIX E: White Goods Recycling Facilities in Florida

APPENDIX F: Class I, II, and III Landfill Facilities in Florida

APPENDIX G: Construction & Demolition Debris Disposal Facilities in Florida

APPENDIX H: Impact of Mobile Home Recycling Program on Landfill Operations  
(Statewide Analysis)

APPENDIX I: Impact of Mobile Home Recycling Program on Landfill Operations (Region 4 Analysis)

## APPENDIX A: DEMOLITION CONTRACTORS IN FLORIDA

Name	Address	Zip code	Telephone
A & A Trucking & Excavating	2080 Northwest 35th Street, Ocala, FL 34475	34475	(352) 351-2042
A & D Enterprises Inc	Jupiter, FL 33458	33458	(561) 744-7135
A C T Inc	7486 Northwest 8th Street, Miami, FL 33126	33126	(305) 265-1119
A Frederico Wrecking CO	Fort Lauderdale, FL 33301	33301	(954) 229-8080
A Frederico Wrecking CO	231 Northwest 18th Avenue, Delray Beach, FL 33444	33444	(561) 276-5008
A J H Recycling	Fort Lauderdale, FL 33301	33301	(954) 581-6298
A Right Way	Inverness, FL 34450	34450	(352) 637-2697
Abbott's Backhoe	5701 Sarah Ave, Sarasota, FL 34233	34233	(941) 922-3215
ABC Cutting Contractors Inc	2001 North Andrews Avenue, Pompano Beach, FL 33069	33069	(954) 979-9017
ABC Cutting Contractors Inc	Boynton Beach, FL 33426	33426	(561) 737-6765
ABC Cutting Contractors Inc	Fort Pierce, FL 34945	34945	(561) 465-4539
ABC Cutting Contractors of JAX	1571 Main Street, Atlantic Beach, FL 32233	32233	(904) 246-1656
Ability Construction	1345 Old Pondella Road, North Fort Myers, FL 33903	33903	(941) 574-8001
Absolute Demolition Inc	Miami, FL 33157	33157	(305) 969-3644
Ac Ventures	3740 Fenner Road, Cocoa, FL 32926	32926	(321) 636-5523
Accurate Concrete Cutting	1345 Old Pondella Road, North Fort Myers, FL 33903	33903	(941) 574-8001
Accurate Excavating Contractors	Key Largo, FL 33037	33037	(305) 853-1000
Adam & Eve Salvage	528 16th Street, West Palm Beach, FL 33407	33407	(561) 655-1022
Advanced Concrete Cutting	Fort Lauderdale, FL 33301	33301	(954) 915-8009
AER Inc	5675 New Tampa Highway, Lakeland, FL 33815	33815	(863) 683-6543
All About Concrete	Tallahassee, FL 32301	32301	(850) 878-1068
All Country Tree & Lawn Service & Demolition	25550 Southwest 142nd Avenue, Homestead, FL 33032	33032	(305) 258-6300
All Phase Environmental, Inc.	215 North Federal Highway, Boca Raton, FL 33432	33432	(561) 620-8222
All Professional Services CO	811 Sawdust Trail, Kissimmee, FL 34744	34744	(407) 847-5822
All Professional Trucking Inc	12737 Us 92 East, Dover, FL 33527	33527	(813) 986-4469
All Site Trucking	23143 Fort Christmas Road, Christmas, FL 32709	32709	(407) 568-1575
Allen & Allen Demolition	1030 North Lincoln Avenue, Lakeland, FL 33805	33805	(863) 683-5898
Allied Mowing Service Inc	1400 Northwest 62nd Avenue, Fort Lauderdale, FL 33313	33313	(954) 791-2255
Almazan Lland Development Inc	357 Kelly Drive, West Palm Beach, FL 33411	33411	(561) 793-1712
Alpha Equipment Inc	Tampa, FL 33602	33602	(813) 986-4469
Alpine Construction	4508 Oak Fair Blvd #100, Tampa, FL 33602	33602	(813) 621-1996
Alternative Driveways	1910 Haines Street, Jacksonville, FL 32206	32206	(904) 353-1400
Ambush Land Clearing and Hauling	497 North 70th Avenue, Pensacola, FL 32506	32506	(850) 457-9111
American Atlas Wrecking Company Inc	745 Northeast 20th Avenue, Fort Lauderdale, FL 33304	33304	(954) 728-8488
American Cutting and Drilling	Miami, FL 33125	33125	(305) 372-8878
American Cutting and Drilling	Boca Raton, FL 33428	33428	(561) 368-3050

## APPENDIX A: DEMOLITION CONTRACTORS IN FLORIDA

<b>American Cutting and Drilling</b>	West Palm Beach, FL 33401	33401	(561) 832-8777
<b>American Cutting and Drilling</b>	Fort Lauderdale, FL 33301	33301	(954) 587-9868
<b>American Cutting and Drilling</b>	2920 Northwest 22nd Terrace, Pompano Beach, FL 33069	33069	(954) 917-0240
<b>American Debris Services</b>	9951 Atlantic Boulevard, Jacksonville, FL 32225	32225	(904) 721-6556
<b>American Disposal Services</b>	671 South Holmes Boulevard, Saint Augustine, FL 32084	32084	(904) 824-6379
<b>American Sand &amp; Asphalt Paving</b>	2911 South Highway 77, Lynn Haven, FL 32444	32444	(850) 763-4300
<b>Anglin Cavallino Construction Company</b>	622 Southeast 2nd Street, Gainesville, FL 32601	32601	(352) 376-4089
<b>Architectural Salvage Allisons</b>	5716 Georgia Avenue, West Palm Beach, FL 33405	33405	(561) 582-2224
<b>Arrow Cutting &amp; Demolition</b>	4901 Tamiami Trail North, Naples, FL 34103	34103	(941) 732-0087
<b>Arrowhead Concrete Pumping</b>	Orange Park, FL 32003	32003	(904) 278-0077
<b>Arter Lynda</b>	961 Cole Road West, Jacksonville, FL 32218	32218	(904) 714-2222
<b>Arwood CO Inc</b>	Saint Augustine, FL 32084	32084	(904) 829-5353
<b>Arwood Recycling</b>	Jacksonville, FL 32202	32202	(904) 751-1628
<b>Arwood Wrecking</b>	13255 Lanier Road, Jacksonville, FL 32226	32226	(904) 751-1628
<b>Ashley Demolition</b>	Stuart, FL 34994	34994	(561) 283-9771
<b>Ashley Land Clearing</b>	11005 West Midway Road, Fort Pierce, FL 34945	94945	(561) 461-4483
<b>Associated Salvage</b>	700 Northwest 21st Terrace, Fort Lauderdale, FL 33311	33311	(954) 791-2844
<b>A-Team Demolition Salvage</b>	State Road 54, Tampa, FL 33602	33602	(813) 909-8888
<b>A-Team Demolition Salvage</b>	Saint Petersburg, FL 33701	33701	(727) 822-5999
<b>B &amp; B Construction</b>	2811 Highland Avenue, Apopka, FL 32712	32712	(407) 889-3800
<b>B C Enterprises of the Keys</b>	300 Atlantic Drive, Key Largo, FL 33037	33037	(305) 451-6424
<b>B P Enterprises</b>	Pensacola, FL 32501	32501	(850) 476-8912
<b>B P Enterprises</b>	1204 Panferio Drive, Gulf Breeze, FL 32561	32561	(850) 934-8303
<b>Barnes Concrete Cutting &amp; Demolition</b>	14552 Halter Road, West Palm Beach, FL 33414	33414	(561) 798-1697
<b>Beasley &amp; Son Inc</b>	4922 North 56th Street, Tampa, FL 33610	33610	(813) 626-0978
<b>Bennett Construction</b>	249 Sunnystown Road, Casselberry, FL 32707	32707	(407) 644-0330
<b>Best Demolition Service</b>	12388 Southwest 52nd Place, Fort Lauderdale, FL 33330	33330	(954) 434-8937
<b>Beta Demolition Inc</b>	4970 Southwest 52nd Street, Fort Lauderdale, FL 33314	33314	(954) 792-2620
<b>Better Than Dirt</b>	Dunedin, FL 34698	34698	(727) 733-3888
<b>Beuten Industries</b>	11602 Tarpon Springs Rd, Odessa, FL 33556	35556	(813) 926-1028
<b>Big Bens Tree Service</b>	2717 Saint Johns Bluff Road, Jacksonville, FL 32246	32246	(904) 287-8733
<b>Big Chief Demolition Inc</b>	5108 Northwest 10th Terrace, Fort Lauderdale, FL 33309	33309	(954) 475-1560
<b>Big Chief Demolition Inc</b>	5108 Northwest 10th Terrace, Fort Lauderdale, FL 33309	33309	(954) 475-1560
<b>Big Concrete Cutting</b>	Fort Myers, FL 33901	33901	(941) 332-1599
<b>Big Concrete Cutting</b>	Pompano Beach, FL 33060	33060	(954) 975-8962
<b>Big Concrete Cutting</b>	Fort Myers, FL 33901	33901	(941) 332-1599
<b>Big T Bobcat</b>	Boynton Beach, FL 33436	33436	(561) 737-4436

## APPENDIX A: DEMOLITION CONTRACTORS IN FLORIDA

<b>Big T Bobcat</b>	5877 Margate Boulevard, Pompano Beach, FL 33063	33063	(954) 975-8962
<b>Big T Concrete Cutting</b>	4420 Mercantile Avenue, Naples, FL 34104	34104	(941) 430-8044
<b>Big T Concrete Cutting</b>	Naples, FL 34102	34102	(941) 732-0024
<b>Big T Equipment</b>	Orlando, FL 32801	32801	(407) 851-0100
<b>Big T Excavating</b>	6191 West Atlantic Boulevard, Pompano Beach, FL 33063	33063	(941) 758-1240
<b>Big UM Land Clearing and Tree Service</b>	Fernandina Beach, FL 32034	32034	(904) 261-5465
<b>Bobs Asphalt &amp; Pving</b>	Bradenton, FL 34201	34201	(941) 371-8743
<b>Bobs Excavating</b>	309 East Pierce Avenue, Orlando, FL 32809	32809	(407) 855-2349
<b>Bontrager Hauling</b>	Sarasota, FL 34231	34231	
<b>Bounty Fisheries Limited</b>	5300 Macdonald Avenue, Key West, FL 33040	33040	(305) 296-2930
<b>Bradanna Inc</b>	4901 Tamiami Trail East, Naples, FL 34113	34113	(941) 455-8891
<b>Brads Tractor Service</b>	Spring Hill, FL 34606	34606	(352) 683-3972
<b>Brian GARD Cutting &amp; Demolition</b>	Jupiter, FL 33458	33458	(561) 744-1740
<b>Browder Jerome B</b>	407 Bayshore Drive, Pensacola, FL 32507	32507	(850) 455-5077
<b>Browder Jerome B Contractor</b>	1250 Mahogany Mill Road, Pensacola, FL 32507	32507	(850) 455-5077
<b>Browns Tree Service</b>	Panama City, FL 32401	32401	(850) 763-7089
<b>Bulldog Demolition</b>	Fort Lauderdale, FL 33301	33301	(954) 763-5473
<b>Burdette Enterprises Inc</b>	Orlando, FL 32801	32801	(407) 282-1525
<b>Burkhalter C V</b>	4412 East Columbus Drive, Tampa, FL 33605	33605	(813) 626-9505
<b>Burkhalter Wrecking Inc</b>	2500 Kings Road, Jacksonville, FL 32209	32209	(904) 354-7813
<b>C C &amp; CO Rent-All</b>	4111 North Highway 441, Zellwood, FL 32798	32798	(352) 383-1945
<b>C C &amp; CO Welding &amp; Fabrication</b>	4111 North Orange Blossom Trail, Mount Dora, FL 32757	32757	(352) 383-1945
<b>C F I Coring &amp; Cutting</b>	3711 Southwest 42nd Avenue, Gainesville, FL 32608	32608	(352) 373-1955
<b>C G Reed Land Clearing</b>	1319 Morningside Drive, Melbourne, FL 32901	32809	(321) 676-5743
<b>C G Reed Landclearing Inc</b>	150 Martesia Way, Satellite Beach, FL 32937	32901	(321) 773-6068
<b>Cadenhead Construction</b>	3994 Mercantile Avenue, Naples, FL 34104	34104	(941) 643-0202
<b>Cantonment Industrial</b>	Cantonment, FL 32533	32937	(850) 968-5561
<b>Carls Concrete Cutting &amp; Drilling Inc</b>	Kissimmee, FL 34741	32533	(407) 344-9889
<b>Cat &amp; I Inc</b>	Winter Garden, FL 34787	34787	(407) 654-7574
<b>Central Environmental Services Inc</b>	3210 Friendly Avenue, Orlando, FL 32808	32808	(407) 295-7005
<b>Central Florida Recyclers</b>	2764 South Washington Avenue, Titusville, FL 32780	32780	(321) 267-1776
<b>Chalk Line Sawing Inc</b>	1089 Atlantic Boulevard, Atlantic Beach, FL 32233	32233	(904) 246-4934
<b>Chapman Demolition Inc</b>	3500 Aloma Avenue, Winter Park, FL 32792	32792	(407) 679-1771
<b>Chapman Demolition Inc</b>	672 North Semoran Boulevard, Winter Park, FL 32792	32792	(407) 679-3006
<b>Christophers Bobcat-N-Hauling Services</b>	Fort Lauderdale, FL 33301	33301	(954) 764-1970
<b>Citrus Sand &amp; Debris Inc</b>	1590 North Quarterback Terrace, Crystal River, FL 34429	34429	(352) 746-7713
<b>Clean Sweep</b>	12167 Orange Boulevard, West Palm Beach, FL 33412	33412	(561) 793-1509

## APPENDIX A: DEMOLITION CONTRACTORS IN FLORIDA

<b>Cobra Demolition</b>	802 Northeast 20th Avenue, Fort Lauderdale, FL 33304	33304	(954) 525-5535
<b>Cochrans Excavating</b>	Ocala, FL 34470	34470	(352) 629-8188
<b>Cochrans Excavating</b>	Winter Park, FL 32789	32789	(407) 629-8188
<b>Commercial Construction of SW Florida Inc</b>			
<b>Commercial Demolition</b>	6141 Hamilton Drive, Fort Myers, FL 33905	33905	(941) 693-1223
<b>Commercial Metals CO</b>	2038 Lane Avenue North, Jacksonville, FL 32254	32254	(904) 786-2771
<b>Concrete Cutting &amp; Breaking Inc</b>	11226 Phillips Parkway Drive, Jacksonville, FL 32256	32256	(904) 262-9985
<b>Concrete Cutting &amp; Breaking Inc</b>	1855 Southwest 4th Avenue, Delray Beach, FL 33444	33444	(561) 278-2700
<b>Concrete Cutting &amp; Repair</b>	6653 Powers Avenue, Jacksonville, FL 32217	32217	(904) 636-7550
<b>Construction Debris Removal Inc</b>	Saint Augustine, FL 32084	32084	(904) 794-3091
<b>Continental Tree Service</b>	Hollywood, FL 33019	33019	(954) 981-7619
<b>Cougar Contracting Specialties Inc</b>	Naples, FL 34102	34102	(941) 591-2717
<b>Cougar Contracting Specialties Inc</b>	13350 Rickenbacker Parkway, Fort Myers, FL 33913	33913	(941) 225-0565
<b>Cougar Cutting Inc</b>	6391 Arc Way, Fort Myers, FL 33912	33912	(941) 275-9334
<b>Cox Land Clearing</b>	Po Box 561108, Rockledge, FL 32956	32956	(321) 631-8521
<b>Crawford Paving &amp; Demolition</b>	Hollywood, FL 33019	33019	(954) 923-2873
<b>Cross Environmental Services Inc</b>	Valparaiso, FL 32580	32580	(850) 729-3100
<b>Crushing Incorporated</b>	1629 Excalibur Drive, Casselberry, FL 32707	32707	(407) 699-7377
<b>Cumbie Concrete Company</b>	4871 Woodlane Circle, Tallahassee, FL 32303	32303	(850) 562-3239
<b>Cushing Demolition CO</b>	8210 8th Road North, West Palm Beach, FL 33411	33411	(561) 793-6173
<b>D &amp; S Demolition</b>	25550 Southwest 142nd Avenue, Homestead, FL 33032	33032	(305) 258-6300
<b>D H C Construction Services</b>	1335 Highland Avenue, Dunedin, FL 34698	34698	(727) 738-4227
<b>D H Griffin Wrecking CO Inc</b>	1312 West 9 Mile Road, Pensacola, FL 32534	32534	(850) 478-1262
<b>Damons Block &amp; Concrete Cutting</b>	West Palm Beach, FL 33401	33401	(561) 252-9132
<b>Davis BROS Contracting Inc</b>	808 Parkway Plaza Boulevard, Kissimmee, FL 34744	34744	(407) 847-5769
<b>Davis Lonnie Fill Shell</b>	2731 Southwest Beard Street, Arcadia, FL 34266	34266	(863) 494-6834
<b>Davis Roy L Ditching &amp; Hoe Service</b>	5579 Southeast Stallings Terrace, Arcadia, FL 34266	34266	(863) 494-5505
<b>DBI</b>	2808 South Harbor City Boulevard, Melbourne, FL 32901	32901	(321) 725-4239
<b>DDS</b>	7101 State Road 21, Keystone Heights, FL 32656	32656	(352) 473-0049
<b>Deans Excavating Service</b>	Jacksonville, FL 32202	32202	(904) 783-0870
<b>Debusk Richard Inc</b>	Inverness, FL 34450	34450	(352) 344-8989
<b>Demolition Masters Inc</b>	122 Madeira Avenue, Miami, FL 33134	33134	(305) 448-7511
<b>DGY Demolition &amp; Contracting, Inc</b>	3308 14th Avenue West, Bradenton, FL 34205	34205	(941) 747-3398
<b>Discount Bounty Trash Removal</b>	5300 Macdonald Avenue, Key West, FL 33040	33040	(305) 296-1717
<b>Disposal Depot Inc</b>	2911 South Highway 77, Lynn Haven, FL 32444	32444	(850) -784-0606
<b>Dump Scumps</b>	Saint Petersburg, FL 33701	33701	(727) 327-3976
<b>Dwain Williams Demolition Services</b>	3391 Northwest 18th Place, Fort Lauderdale, FL 33311	33311	(954) 731-2116
<b>E &amp; H Car Crushing CO Inc</b>	106 Gloucester Street, Orlando, FL 32833	32833	(407) 568-5865

## APPENDIX A: DEMOLITION CONTRACTORS IN FLORIDA

<b>Eagle Companies</b>	Tampa, FL 33602	33602	(813) 677-2555
<b>Eagles Nest Demolition</b>	311 North Pennsylvania Avenue, Winter Park, FL 32789	32789	(407) 645-2180
<b>East Lake Towing Service</b>	10320 East Us Highway 92, Tampa, FL 33610	33610	(813) 626-4437
<b>Economy Contractor</b>	7401 Pelican Drive, Tampa, FL 33635	33635	(813) 598-3358
<b>Econosweep Inc</b>	3110 Desalvo Road, Jacksonville, FL 32246	32246	(904) 642-5475
<b>Eddies Backhoe Service</b>	Jacksonville, FL 32202	32202	(904) 783-0517
<b>Envirnomenders</b>	3657 Westgate Avenue, West Palm Beach, FL 33409	33409	(561) 478-4009
<b>Evergreen Land Services Inc</b>	704 Northwest Buck Hendry Way, Stuart, FL 34994	34994	(561) 692-2040
<b>F G E Inc</b>	1204 Pope Lane, Lake Worth, FL 33460	33460	(561) 588-7724
<b>Fenners Auto Parts &amp; Garage</b>	11115 Hutchison Boulevard, Panama City Beach, FL 32407	32407	(850) 234-5802
<b>Fergusons Contracting</b>	Pinellas Park, FL 33781	33781	(727) 546-1450
<b>Fila Demolition and Trucking, Inc.</b>	Fort Lauderdale, FL 33325	33325	(954) 423-0630
<b>Flave A Williams III Dozer Services Inc</b>	14717 Hays Road, Spring Hill, FL 34610	34610	(727) 856-3765
<b>Florence Landfill</b>	3003 Southeast 15th Street, Gainesville, FL 32641	32641	(352) 375-9919
<b>Florida Drilling &amp; Sawing</b>	1855 Southwest 4th Avenue, Delray Beach, FL 33444	33444	(561) 278-2700
<b>Forristall Enterprises Inc</b>	3404 17th St E, Palmetto, FL 34221	34221	(941) 729-8150
<b>Frank-Lin Excavating Inc</b>	6240 North Us Highway 1, Melbourne, FL 32940	32940	(321) 259-3205
<b>Frederico Equipment</b>	917 Allamanda Drive, Delray Beach, FL 33483	33483	(561) 276-5008
<b>Frederico Equipment CO</b>	Fort Lauderdale, FL 33301	33301	(954) 229-8080
<b>Frederico Equipment CO of FL Inc</b>	231 Northwest 18th Avenue, Delray Beach, FL 33444	33444	(561) 276-5008
<b>G &amp; G Excavation &amp; Construction Inc</b>	Jacksonville, FL 32202	32202	(904) 886-9688
<b>G &amp; R Land Development</b>	Fort Pierce, FL 34945	34945	(561) 464-6445
<b>Gail Hite Landscape Contractors</b>	Safety Harbor, FL 33755	33755	(727) 726-7225
<b>Garys Hauling Inc</b>	Bradenton, FL 34201	34201	(941) 747-2539
<b>GDI Contractors</b>	1204 Pope Lane, Lake Worth, FL 33460	33460	(561) 588-5951
<b>George Youngs Contracting, Inc.</b>	6415 Highway 41 South, Palmetto, FL 34221	34221	(813) 645-0177
<b>Glasbrenner Larry</b>	Land Clrning, Brooksville, FL 34601	34601	(352) 796-7495
<b>Glasbrenner Ron Land Clearing</b>	12032 Bali Avenue, New Port Richey, FL 34654	34654	(727) 856-2206
<b>Glover Excavating</b>	1920 Palomino Road, Melbourne, FL 32934	32934	(321) 254-4955
<b>Goodman Jimmy</b>	Lake Wales, FL 33853	33853	(863) 638-3364
<b>Gotta Go Trucking Inc</b>	Winter Garden, FL 34787	34787	(407) 656-8850
<b>Great Southern Demolition Inc</b>	Tallahassee, FL 32301	32301	(850) 576-4730
<b>Great Southern Demolition Inc</b>	4435 Entrepot Boulevard, Tallahassee, FL 32310	32310	(850) 574-1542
<b>Greens Fill Dirt C &amp; D Land Fill</b>	1340 Wingfoot Way, Pensacola, FL 32505	32505	(850) 477-3554
<b>H B Walker Inc</b>	Tampa, FL 33602	33602	(813) 218-3447
<b>H B Walker Inc</b>	2895 Mercy Drive, Orlando, FL 32808	32808	(407) 299-0264
<b>H B Walker Inc</b>	Lakeland, FL 33801	33801	(863) 686-5667

## APPENDIX A: DEMOLITION CONTRACTORS IN FLORIDA

<b>Halls Lot &amp; Land Clearing</b>	Fort Pierce, FL 34945	34945	(561) 464-6743
<b>Halls Lot &amp; Land Clearing</b>	Sebastian, FL 32958	32958	(561) 581-4477
<b>Hamann Concrete Cutting</b>	Fort Lauderdale, FL 33301	33301	(954) 370-6565
<b>Hancock Robert Trucking</b>	150 Bowness Road, Ocoee, FL 34761	34761	(407) 656-4414
<b>Handyman Hauling</b>	PO Box 555904, Orlando, FL 32855	32855	(407) 299-4126
<b>Handyman Hauling Landscape Contractor</b>	3150 36th Street, Orlando, FL 32839	32839	(407) 246-6363
<b>Hardrock Cutting Contractors</b>	Pensacola, FL 32501	32501	(850) 434-3431
<b>HB Walker Inc</b>	Orlando, FL 32801	32801	
<b>Hercules Demolition Company</b>	2305 Northwest 6th Street, Fort Lauderdale, FL 33311	33311	(954) 327-3335
<b>Howard Hall Electric</b>	West Palm Beach, FL 33401	33401	(561) 842-0380
<b>Howard Jimmies Demolition Contractors Inc</b>	Clearwater, FL 33755	33755	(727) 443-1448
<b>Howards Lawn &amp; Demolition</b>	510 Northwest 34th Avenue, Fort Lauderdale, FL 33311	33311	(954) 587-9491
<b>Hunts Excavating</b>	5541 Bayhead Road, Youngstown, FL 32466	32466	(850) 722-4731
<b>Image One Demolition</b>	315 Fern Street, Jupiter, FL 33458	33458	(561) 575-5753
<b>Image One Landscaping</b>	Jupiter, FL 33458	33458	(561) 575-5753
<b>Innovative Waste Control</b>	2834 Industrial Plaza Drive, Tallahassee, FL 32301	32301	(850) 877-9477
<b>IVS Hydro Inc</b>	3000 Faye Road, Jacksonville, FL 32226	32226	(904) 696-1006
<b>J A C Construction CO</b>	5722 Pinetree Avenue, Panama City, FL 32408	32408	(850) 235-2210
<b>J Hawk Clearing</b>	Brooksville, FL 34601	34601	(352) 799-8303
<b>J Merritt Trucking</b>	1150 Louisiana Avenue, Winter Park, FL 32789	32789	(407) 679-6969
<b>J R Coomes Investments Inc</b>	2922 38th Street, Orlando, FL 32839	32839	(407) 426-6839
<b>Jackson Bradley II</b>	Spring Hill, FL 34606	34606	(352) 683-3972
<b>Janie Baker Mortgage</b>	311 North Pennsylvania Avenue, Winter Park, FL 32789	32789	(407) 645-2180
<b>Jennings Management</b>	2101 West State Road 434, Longwood, FL 32779	32779	(407) 869-8800
<b>Jerrys Concrete Sawing &amp; Core Drilling</b>	224 Cherrywood Drive, Winter Park, FL 32789	32789	(407) 834-1255
<b>John Bridges Demolition &amp; Hauling Service</b>	4027 Glenview Road, Jacksonville, FL 32207	32207	(904) 731-0911
<b>Johnson's Excavation &amp; Services</b>	1706 E Trapnell Rd, Plant City, FL 33566	33566	(813) 752-7097
<b>Joiner Lonnie Fill Dirt Inc</b>	Milton, FL 32570	32570	(850) 623-5062
<b>Josephs Recycling Center</b>	2309 Southwest 2nd Avenue, Fort Lauderdale, FL 33315	33315	(954) 525-0053
<b>K Hamann Jr Corporation</b>	Hollywood, FL 33019	33019	(954) 433-9903
<b>K Hamann Jr Corporation</b>	Fort Lauderdale, FL 33301	33301	(954) 423-1814
<b>K S R Hauling Inc</b>	Winter Park, FL 32789	32789	(407) 331-6651
<b>K S R Hauling Inc</b>	916 North State Road 434, Altamonte Springs, FL 32714	32714	(407) 389-2400
<b>Kufeldt Mike Hauling</b>	Orlando, FL 32801	32801	(407) 855-8553
<b>L &amp; L Salvage Sales</b>	5500 Old Winter Garden Road, Orlando, FL 32811	32811	
<b>LA Rues Clearing &amp; Fill</b>	Jacksonville, FL 32202	32202	(904) 714-3841
<b>Landers Enterprises Inc</b>	Apopka, FL 32703	32703	(407) 886-3029

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<b>Lango Equipment Service Inc</b>	6561 West 12th Avenue, Hialeah, FL 33012	33012	(305) 822-4646
<b>Lango Equipment Service Inc</b>	10653 West Okeechobee Road, Hialeah, FL 33018	33018	(305) 825-4200
<b>Larue House Movers &amp; Sons Inc</b>	315 South Vermont Street, Green Cove Springs, FL 32043	32043	(904) 284-3317
<b>LEB Demolition &amp; Consulting Contractors</b>	4403 Metzger Road, Fort Pierce, FL 34947	34947	(561) 489-6699
<b>Lee Dalton &amp; Ruby</b>	Floral City, FL 34436	34436	(352) 637-6091
<b>Lee Doyle</b>	4281 Luther Fowler Road, Milton, FL 32571	32571	(850) 994-8466
<b>Lesters Trucking</b>	10635 Land O Lakes Boulevard, Land O Lakes, FL 34639	34639	(813) 996-2121
<b>Links Paving Inc</b>	Fort Walton Beach, FL 32547	32547	(850) 863-2585
<b>Load Runner Inc</b>	Jacksonville Beach, FL 32250	32250	(904) 246-5550
<b>Lotts Construction Services Inc</b>	Winter Garden, FL 34787	34787	(407) 656-4527
<b>Mack &amp; Son</b>	921 27th Street, West Palm Beach, FL 33407	33407	(561) 845-0717
<b>Marty Norman &amp; Company Inc</b>	24334 State Road 46, Sorrento, FL 32776	32776	(352) 735-0156
<b>Masters Land Clearing</b>	Saint Augustine, FL 32084	32084	(904) 824-4548
<b>Miami Wrecking CO</b>	2033 West McNab Road, Pompano Beach, FL 33069	33069	(954) 978-6055
<b>Midnight Truck Service</b>	Fruitland Park, FL 34731	34731	(352) 365-1205
<b>Montanye Excavation Inc</b>	Titusville, FL 32780	32780	(321) 383-5064
<b>Mulligan Group</b>	6653 Powers Avenue, Jacksonville, FL 32217	32217	(904) 636-7550
<b>Myers Tractor Service Inc</b>	2424 Russell Road, Fernandina Beach, FL 32034	32034	(904) 261-3902
<b>Nassau Docks and Decks</b>	Fernandina Beach, FL 32034	32034	(904) 261-5465
<b>Nelson J J</b>	961 Cole Road West, Jacksonville, FL 32218	32218	(904) 751-2050
<b>Oakes Demolition</b>	Orlando, FL 32801	32801	(407) 282-4205
<b>O'Brien Michael Tractor Service</b>	Melbourne, FL 32901	32901	(321) 725-7463
<b>O'Connell John</b>	11005 West Midway Road, Fort Pierce, FL 34945	34945	(561) 461-4483
<b>Omega Contracting</b>	221 Northeast 13th Street, Pompano Beach, FL 33060	33060	(954) 941-9900
<b>Palmetto Demolition</b>	1119 19th Avenue East, Palmetto, FL 34221	34221	(941) 729-6540
<b>Palmwood Corporation Inc BLDG Contractor</b>	301 West 11th Street, West Palm Beach, FL 33404	33404	(561) 844-8740
<b>Panama City Disposal Inc</b>	2101 East 9th Street, Panama City, FL 32401	32401	(850) 763-7400
<b>Panama City Toyota Inc</b>	5303 West Highway 98, Panama City, FL 32401	32401	(850) 785-3335
<b>Parker A J Land Clearing &amp; Demolition</b>	Miami, FL 33125	33125	(305) 696-3881
<b>Pece of Mind Disposal Inc</b>	18520 East Colonial Drive, Orlando, FL 32820	32820	(407) 568-3456
<b>Pelican Trash Trailers</b>	2808 South Harbor City Boulevard, Melbourne, FL 32901	32901	(321) 725-4239
<b>Penoyer Robert Demolition</b>	6167 Southeast 118th Place, Belleview, FL 34420	34420	(352) 245-1487
<b>Pensacola Tree Service</b>	7085 Frank Reeder Road, Pensacola, FL 32526	32526	(850) 944-8733
<b>Petes Trucking &amp; Demolition Inc</b>	2375 Southwest 66th Terrace, Fort Lauderdale, FL 33317	33317	(954) 472-7025
<b>Pitts Sand CO</b>	4411 East Highway 390, Panama City, FL 32404	32404	(850) 785-5976
<b>Poe Clifford L Jr</b>	5569 Manfields Place, Jacksonville, FL 32207	32207	(904) 730-9982
<b>Precision Concrete Cutting</b>	Fort Lauderdale, FL 33301	33301	(954) 484-1110

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<b>Precision Concrete Cutting Inc</b>	2924 Northwest 28th Street, Fort Lauderdale, FL 33311	33311	(954) 535-9944
<b>Precision Concrete Services</b>	5820 Yahl Street, Naples, FL 34109	34109	(941) 596-1441
<b>Premium Corporation</b>	8254 Bama Lane, West Palm Beach, FL 33411	33411	(561) 790-0192
<b>Professional Floor Technology</b>	Clearwater, FL 33764	33764	(727) 442-8909
<b>Pyramid Backhoe Service</b>	701 Delano Avenue Northwest, Palm Bay, FL 32907	32907	(321) 729-0050
<b>Quality Industries</b>	Pensacola, FL 32501	32501	(850) 438-9355
<b>Quicks Heavy Equipment</b>	Tallahassee, FL 32301	32301	(850) 878-3603
<b>R &amp; D Tractor Service Inc</b>	272 Juniper Street, Santa Rosa Beach, FL 32459	32459	(850) 231-0333
<b>R J Madden Trucking Inc</b>	Winter Park, FL 32789	32789	(407) 831-4285
<b>Raider Corporation</b>	4970 Southwest 52nd Street, Fort Lauderdale, FL 33314	33314	(954) 791-9913
<b>Ramon Demolition &amp; Land Clearing</b>	3347 Northwest 34th Street, Miami, FL 33142	33142	(305) 634-3234
<b>Randys Electric Inc</b>	3798 131st Avenue North, Clearwater, FL 33762	33762	
<b>RCS Excavation</b>	Okeechobee, FL 34972	34972	(863) 763-3740
<b>Realco Wrecking CO</b>	8707 Somers Road South, Jacksonville, FL 32226	32226	(904) 757-7311
<b>Rees D L Inc</b>	Orlando, FL 32801	32801	(407) 851-8880
<b>Richardson Enterprises of Jacksonville</b>	320 West 22nd Street, Jacksonville, FL 32206	32206	(904) 356-8502
<b>Richardsons Land Clearing</b>	Po Box 53, Lynn Haven, FL 32444	32444	(850) 914-9118
<b>Rick Hamann &amp; Sons Demolition</b>	8775 Southwest 57th Street, Fort Lauderdale, FL 33328	33328	(954) 434-8937
<b>RJ Boutwell Company</b>	Saint Augustine, FL 32084	32084	(904) 824-9746
<b>Robert E Lee Inc</b>	5911 17th Street East, Bradenton, FL 34203	34203	(941) 758-1240
<b>Rons Concrete Construction Inc</b>	Saint Cloud, FL 34769	34769	(407) 892-4869
<b>Ross and Logan Industries</b>	1309 Lane Circle East, Jacksonville, FL 32254	32254	(904) 378-9700
<b>Samuel B Fennell Excavating</b>	116 East Lake Ave, Auburndale, FL 33823	33823	(863) 967-4792
<b>Samurai Construction CO</b>	2834 Industrial Plaza Drive, Tallahassee, FL 32301	32301	(850) 877-9477
<b>Sand Land of Florida Enterprises Inc</b>	5920 North Florida Avenue, Hernando, FL 34442	34442	(352) 489-6930
<b>SCC International Trash Hauling &amp; Demolition</b>	1090 Opa Locka Boulevard, Miami, FL 33168	33168	(305) 687-9888
<b>Seek &amp; Destroy Inc</b>	Fort Lauderdale, FL 33301	33301	(954) 797-0617
<b>SEI Scarpinato Enterprises Inc</b>	Sarasota, FL 34231	34231	(941) 371-7450
<b>Shapells Roll Offs</b>	8565 Stocks Road, Jacksonville, FL 32220	32220	(904) 786-5503
<b>Shark Wrecking Corporation</b>	Miami, FL 33125	33125	(305) 821-7077
<b>Shaun Tractor Service</b>	Floral City, FL 34436	34436	(352) 637-6091
<b>Sims Trucking Inc</b>	Saint Augustine, FL 32084	32084	(904) 824-8851
<b>Six K Associates Inc</b>	5820 Yahl Street, Naples, FL 34109	34109	(941) 596-1441
<b>Smith Development Company</b>	Paxton, FL 32538	32538	(850) 834-2045
<b>South Florida Clearing Inc</b>	7827 Northwest 194th Street, Hialeah, FL 33015	33015	(305) 829-3564
<b>Southeast Concrete Cutting &amp; Demolition</b>	Tallahassee, FL 32301	32301	(850) 656-4595
<b>Southeast Tractor</b>	2816 Choctaw Drive, Melbourne, FL 32935	32935	(321) 259-4794

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<b>Southland Information Destruction</b>	Jacksonville, FL 32202	32202	(904) 354-8107
<b>Southland Recycling Services Inc</b>	2120 North Market Street, Jacksonville, FL 32206	32206	(904) 354-8107
<b>Stratford Landscape Design Inc</b>	14645 Boggy Creek Road, Orlando, FL 32824	32824	(407) 240-2564
<b>Sunrad Group Inc</b>	2010 Mears Parkway, Pompano Beach, FL 33063	33063	(954) 970-8383
<b>Syfrett Development CO</b>	Panama City, FL 32401	32401	(850) 763-2842
<b>Taylors Towing</b>	1520 Florida Avenue, Panama City, FL 32405	32405	(850) 785-3335
<b>Terra Excavating Inc</b>	13400 Pine Street, Largo, FL 33774	33774	(727) 581-1598
<b>Thor Industries</b>	802 Northeast 20th Avenue, Fort Lauderdale, FL 33304	33304	(954) 764-7331
<b>Tomoka Salvage</b>	671 South Holmes Boulevard, Saint Augustine, FL 32084	32084	(904) 824-6379
<b>Toppinos Inc</b>	Key West, FL 33040	33040	(305) 296-5606
<b>Townsend W R Contracting Inc</b>	Jacksonville, FL 32202	32202	(904) 354-9202
<b>Tri County Demolition</b>	Fort Lauderdale, FL 33301	33301	(954) 327-1555
<b>Tri County Demolition</b>	1020 Northwest 185th Avenue, Hollywood, FL 33029	33029	(954) 748-3226
<b>Tri-County Enterprises</b>	Stuart, FL 34994	34994	(561) 288-5006
<b>Tropical Waste</b>	Gainesville, FL 32601	32601	(352) 332-3885
<b>True Line Coring And Cutting</b>	6014 W Waters Ave, Tampa, FL 33634	33634	(813) 885-4401
<b>Ultrabuilt Inc</b>	Bradenton, FL 34201	34201	(941) 758-1240
<b>Vanyo Excavation</b>	Key West, FL 33040	33040	(305) 296-2930
<b>Venice Construction Clean Up</b>	375 Scott Street, Nokomis, FL 34275	34275	(941) 488-9888
<b>Vernons Tractor Service</b>	6676 114th Avenue, Largo, FL 33773	33773	(727) 572-6322
<b>W K Hauling &amp; Demolition Service</b>	Orlando, FL 32801	32801	(407) 721-0954
<b>W R Townsend Contracting Inc</b>	1465 County Road 210 West, Jacksonville, FL 32259	32259	(904) 354-9202
<b>Walker H B Inc</b>	2895 Mercy Drive, Orlando, FL 32808	32808	(407) 299-4126
<b>Wall Busters Inc</b>	1322 Northwest 14th Avenue, Pompano Beach, FL 33069	33069	(954) 974-3350
<b>Weaver Construction</b>	121 Wallace Road, New Smyrna Beach, FL 32168	32168	(386) 427-4673
<b>West Enterprize</b>	5460 West State Road 84, Fort Lauderdale, FL 33314	33314	(954) 316-8560
<b>Whites Bush Hog &amp; Excavating</b>	Melbourne, FL 32901	32901	(321) 724-2262
<b>Whites Wrecker Service</b>	Panama City, FL 32401	32401	(850) 913-8697
<b>Whites Wrecker Service</b>	6120 East Highway 22, Panama City, FL 32404	32404	(850) 871-0680
<b>Wildcat</b>	Fort Lauderdale, FL 33301	33301	(954) 766-9933
<b>Wildcat</b>	West Palm Beach, FL 33401	33401	(561) 357-5505
<b>Wildcat Demolition Contractors and Consultants</b>	Miami, FL 33179	33179	(305) 940-2905
<b>Williams Contracting</b>	1522 West Princeton Street, Orlando, FL 32804	32804	(407) 422-4760
<b>Wilson Cal Tractor Service Inc</b>	7284 Sunshine Grove Road, Brooksville, FL 34613	34613	(352) 597-1885
<b>Wrecking Crew</b>	528 16th Street, West Palm Beach, FL 33407	33407	(561) 655-1022
<b>XL Floor Removal</b>	Palm Bay, FL 32907	32907	(321) 728-3992

## APPENDIX B: MOBILE HOME MOVERS IN FLORIDA

COMPANY NAME	ADDRESS	CITY	AREA CODE	TELEPHONE
A & A MOBILE HOME MOVERS	801 HILLTOP RD	MARY ESTHER	32569-2224	850-581-1311
AAA MOBILE HOME MOVERS	5987 W BAY POINT DR	PENSACOLA	32507-8476	850-492-0372
AAA MOBILE HOME MOVERS	4840 LAKE ONTARIO DRIVE	COCOA	32926	(407) 636-0767
AAA MOBILE HOME MOVERS	5987 W BAY POINT DR	PENSACOLA	32507	904-492-0372
ABC TRANSPORT	10455 SE. 130TH LN.	OCKLAWAHA		352-288-1241
ABLE TRANSPORTING	2150 CROVETTI WAY,	ALFORD	32420	(850) 579-4777
ACTION TRANSPORTERS	14921 SOUTHWEST 4TH AVENUE	OCALA	34473	(352) 307-9102
ACTION TRANSPORTING	21825 SW 194TH AVE	MIAMI	33170-1205	305-247-1603
ADMIRAL MERCHANTS	5929 RAMONA BLVD	JACKSONVILLE	32205	904-783-6200
ADVANCED AUTO SALVAGE	12641 GREENBRIAR DR	FOUNTAIN	32438	904-722-1846
AERO TRANSPORTER INC	200 RIVERIA BLVD	SAINT AUGUSTINE	32086	904-797-2462
AGGREGATE HAULERS	4001 J LOUIS ST	GREEN COVE SPRINGS	32043	904-284-2888
ALL MOBILE HOME SERVICE	6046 WEST TENNESSEE STREET # B	TALLAHASSEE	32304	(850) 576-4410
ALL SEASONS HOUSE & MOBILE HOME REPAIRS	7332 SHINDLER DR	JACKSONVILLE	32222	904-771-0978
ALL STATE MOBILE HOME MOVERS	6046 WEST TENNESSEE STREET	TALLAHASSEE	32304	(850) 575-5336
ALLEN BAKER CONSTRUCTION & M H	1954 JUNGLE RD	NEW SMYRNA BEACH	32168	904-427-5125
ALRED TRUCKING AGRIBUSINESS	HWY 27	BRANFORD	32008	904-935-3057
AMERICAN MOBILE HOME SERVICE	5818 ALSTRUM DR	PORT ORANGE	32127	904-767-7047
AMERICAS BEST MOBILE HOME MOV	1505 HALSEMA RD N	JACKSONVILLE	32220	904-783-0127
ANIMAL HOUSE	1811 LEWIS TURNER BLVD	FORT WALTON BEACH	32547	904-863-3334
ARTHURS LIGHT HAULING	2436 DENNIS ST	JACKSONVILLE	32204	904-632-0510
B & D MOBILE HOME SERVICE	650 BENJULYN ROAD	CANTONMENT	32533	(850) 968-1020
B & R TRAILER RENTALS	5211 W BEAVER ST	JACKSONVILLE	32254	904-786-4808
BADGETT MOBILE HOME REPAIRS	5125 BLAND RD	JACKSONVILLE	32254	904-781-4998
BAGLEY TRUCKING	BIBBY RD	BRANFORD	32008	904-935-0242
BARNEY C TRANSPORT	101 S STATE ST	BUNNELL	32110	904-437-5742
BARRETT MOBILE HOME TRANSPORT	4231 NORTHEAST 22ND AVENUE	LIGHTHOUSE POINT	33064	(561) 967-3936
BARRETT MOBILE HOME TRANSPORT	2500 US HIGHWAY 441	FRUITLAND PARK	34731	(352) 365-9033
BARTLET SHAVINGS	561 KEUKA RD	INTERLACHEN	32148	904-684-3795
BELL MOBILE HOME SERVICE	HIGHWAY 221	GREENVILLE		850-948-4914
BESSENT MOBILE HOME SERVICE	12504 PULASKI RD	JACKSONVILLE	32218	904-757-9007
BIG FOOT TRANSPORTING	4869 CHICKPEA ST	MIDDLEBURG	32068	904-282-6416
BILLY BAKER'S MOBILE HOME	1414 SOUTH FORBES ROAD	PLANT CITY	33567	(813) 754-6352
BILLY MASK & SONS	5769 COUNTY ROAD 551	BUSHNELL	33513	352-793-8868
BLANCHARDS MOBILE HOME REMOVAL & TRANSPORT, INC.	3441 N. 72ND WAY	HOLLYWOOD	33024	954-986-1722
BOBBY DEEDRICK MOBILE HOME	5630 SW 36TH CT	FORT LAUDERDALE	33314-2704	954-584-7306

## APPENDIX B: MOBILE HOME MOVERS IN FLORIDA

<b>BOB'S MOBILE HOME SERVICE</b>	2719 SOUTHEAST 59TH STREET	OCALA,	34480	(352) 368-3856
<b>BOOTH MOBILE HOME DELIVERY</b>	3710 DRAWDY ROAD	PLANT CIT	33567	(813) 754-1743
<b>BOYCE MOBILE HOME SERVICE</b>	17372 43RD ROAD NORTH	LOXAHATCHEE,	33470	(561) 798-0160
<b>BROWN MOBILE HOMES MOVERS</b>	4249 AURANTIA RD	MIMS	32754-4710	407-268-3718
<b>BROWN MOBILE HOMES MOVERS</b>	2245 EAST JAY JAY ROAD,	TITUSVILLE,	32796	(407) 268-3718
<b>BUDDY'S MOBILE HOME SET UP</b>	1907 SAUNDERS ROAD	ZEPHYRHILLS	33540	(813) 782-0009
<b>BURNHAM MOBILE HOME</b>	1400 HIGHWAY 29 NORTH,	CANTONMENT	32533	(850) 968-1956
<b>BUTTERFIELD'S</b>	5117 GALL BOULEVARD	ZEPHYRHILLS	33541	(813) 780-7807
<b>C &amp; C BULK LIQUID TRANSFER</b>	401 BRYAN ST	JACKSONVILLE	32202	904-356-5320
<b>C &amp; C MOTORS</b>	JEFFERSON AV	GLEN SAINT MARY	32063	904-259-2512
<b>C &amp; T MOBILE HOME MOVERS</b>	ASHLEY SHIVER RD	BLOUNTSTOWN	32424	904-674-5322
<b>C STAR TRAILERS</b>	2233 HIGHWAY 182	PACE	32571	904-994-0874
<b>CARRIER TRANSCOLD OF JACKSONVILLE</b>	625 ELLIS RD N	JACKSONVILLE	32254	904-783-1180
<b>CENTRAL MOBILE HOME SERVICE</b>	5006 SOUTHWEST 67TH TERRACE	GAINESVILLE	32608	(352) 332-7050
<b>CENTRAL MOBILE SETUP INC</b>	2805 CASE RD	LABELLE	33935-9538	941-675-5000
<b>CENTURY TRANSPORT</b>	1705 PECAN PARK RD	JACKSONVILLE	32218	904-757-2433
<b>CHABOT DEVELOPMENT</b>	18833 NE 21ST ST	GAINESVILLE	32609-4243	352-485-1082
<b>CHAMBLEE MOBILE HOME INC</b>	4905 NE 240TH TER	MELROSE	32666-6354	352-475-1171
<b>CHARLES BOUTWELL SERVICE</b>	BLOUNTSTOWN HWY	TALLAHASSEE	32310	850-576-6876
<b>CHEROKEE TRUCKING INC</b>	779 HIGHWAY 20	PALATKA	32178	904-328-8188
<b>CIRCLE B MOBILE HOMES SALES IN</b>	W HIGHWAY 90	LAKE CITY	32024	904-755-5114
<b>CIRCLE L TRAILER</b>	S HWY 301	STARKE	32091	904-964-2119
<b>CLASSIC TRANSPORT INC.</b>	12800 SE.81ST. CT.	BELLEVUE		352-307-7200
<b>COLLINS MANUFACTURED HOUSING SERVICE</b>	1061 BAY DR	NEW SMYRNA BEACH	32168	904-427-6355
<b>CONNELL MOBILE HOME MOVING</b>	PAGE ROAD	TALLAHASSEE	32301	(850) 421-5365
<b>CONRAD'S MOBILE HOMES</b>	5428 E 15TH ST	PANAMA CITY	32404-9443	850-763-6005
<b>CORPORATE TRANSPORTATION INC</b>	905 S KINGS RD	HILLIARD	32046	904-845-7044
<b>CTL DISTRIBUTION INC</b>	5310 NEW KINGS RD	JACKSONVILLE	32209	904-768-6555
<b>D &amp; R MOBILE HOME TRANSPORT</b>	1223 W 12TH ST	PANAMA CITY	32401-2072	850-747-8504
<b>DAN'S MOBILE HOME SERVICE</b>	TOLAR RD.	GREENSBORO		850-442-9245
<b>DAWSONS MOBILE HOME SERVICE</b>	24245 SE HIGHWAY 450	UMATILLA	32784-8502	352-669-6493
<b>DEACON DISPATCH</b>	2289 SURF RD	PANACEA	32346	904-984-5051
<b>DIGIAMMARINO &amp; SON TRUCKING</b>	FAWN RUN	LAKE CITY	32055	904-752-2900
<b>DONS MOBILE HOMES</b>	1774 WISTERIA ST	WEST PALM BEACH	33414-8609	561-753-9853
<b>DOUBLE WIDE HOME CENTER</b>	HIGHWAY 100 W	STARKE	32091	904-964-8222
<b>DSI TRANSPORTS</b>	3350 COPTER RD	PENSACOLA	32514	904-477-5761
<b>E &amp; L LIMITED INC</b>	10244 NEW KINGS RD	JACKSONVILLE	32219	904-768-7478
<b>EAGLE TRANSPORT CORP</b>	3636 PHOENIX AVE	JACKSONVILLE	32206	904-632-1288

## APPENDIX B: MOBILE HOME MOVERS IN FLORIDA

EJK TRANSPORT	9440 OGALALA,	NEW PORT RICHEY	34654	(813) 863-7272
EXPANDO TRAILER SALES	1600 NW 119TH ST	MIAMI	33167-3131	305-769-0991
FAIRFIELD TRUCKING CO	4729 HIGHWAY 98 E	DESTIN	32541	904-837-4737
FANCY PANTS HAULING INC	2107 NEW BERLIN RD	JACKSONVILLE	32218	904-757-7576
FEAGLE MOBILE HOME SERVICE	7227 RICKER RD	JACKSONVILLE	32244	904-771-8928
FIVE STAR MOBILE HOME MOVERS		PANAMA CITY	32409	850-271-8346
FLEET CARRIER CORP	1814 INDUSTRIAL BLVD	JACKSONVILLE	32254	904-781-9303
FLORIDA ROCK & TANK LINE	HWY 137	WHITE SPRINGS	32096	904-397-2116
FLORIDA ROCK & TANK LINES	5827 N DAVIS HWY	PENSACOLA	32503	904-476-2332
FLORIDA ROCK & TANK LINES INC	404 ELM AVE	PANAMA CITY	32401	904-763-6557
FLOYD GARRETT CO INC	S 14TH ST	FERNANDINA BEACH	32034	904-261-0882
FRALEY & SCHILLING TRUCKING	2058 E 21ST ST	JACKSONVILLE	32206	904-633-9819
FULMER BROTHERS INC	HIGHWAY 280	COTTONDALE	32431	904-638-7800
GASKIN MOVERS	17047 STATE HIGHWAY 83 N	DE FUNIAK SPGS	32433	(850) 834-4346
GIANT MOTOR LINES INC	4107 BUCKMAN ST	JACKSONVILLE	32206	904-356-6886
GLASS MOBILE HOME MOVING	5510 GLASS DR	PENSACOLA	32505-2104	850-432-7916
GODWIN'S AAA HAULING & SET	35162 STATE ROAD 54	ZEPHYRHILLS	33541	(813) 986-3665
GULF COAST MOBILE HOME SERVICE	700 ELAND DR	FORT MYERS	33917-1574	941-997-7576
H & R MOBILE HOME TOWING	HIGHWAY 337	NEWBERRY	32669	352-472-3734
HALL BROTHERS MOBILE HOME TOWING	HIGHWAY 345	CHIEFLAND	32626	352-493-4906
HALL BROTHERS MOBILE HOME TOWING	HIGHWAY 47	TRENTON	32693	352-472-6594
HAPS MOBILE HOME SERVICE	8005 LAKELAND ST	JACKSONVILLE	32221	904-783-6102
HERB MILLER'S MOBILE HOME SERVICE	4849 SOUTHEAST 110TH STREET	BELLEVUE	34420	(352) 245-7126
HESTER'S MOBILE HOME MOVERS	10445 SOUTHEAST FEDERAL HIGHWAY	HOBE SOUND	33455	(561) 546-6986
HICKS L A	8301 RANDAL DR	NAVARRE	32566	904-939-8858
HOCHSTEDLER MONROE OFC	W HWY 20	TALLAHASSEE	32304	904-576-2690
HOLCOMB MOBILE HOME TRANSPORT	905 GAMBIT PL	SEFFNER	33584-3906	813-681-6423
HYTEK MOBILE HOME SERVICES	6690 NORMANDY BLVD	JACKSONVILLE	32205	904-781-9064
J & H HOMES	1748 NW 58TH LN	OCALA	34475-3042	352-351-8153
J & L CONTRACTING	1344 EUCLID AVE	FORT MYERS	33917-3419	941-543-8028
J & S MOBILE HOMES INC	9907 SURREY RIDGE RD	ORLANDO	32825-8745	407-281-8339
J B J ENTERPRISES INC	771 FENTRESS BLVD	DAYTONA BEACH	32114	904-274-1080
J BAR C CUSTOM HORSE HAULING	24026 NW 126TH LN	ALACHUA	32615	904-454-4181
J C'S MOBILE HOMES MOVING	2537 EAST 21ST PLAZA	PANAMA CITY	32405	(850) 769-8651
JABOS MOBILE HOME SERVICE	9842 103RD ST	JACKSONVILLE	32210	904-786-2543
JACK'S TRUCKING COMPANY	10389 SOUTHEAST 50TH AVENUE	BELLEVUE	34420	(352) 245-3033
JAY MARK EXPRESS INC	9651 HOOD RD	JACKSONVILLE	32257	904-268-4280
JIM TURNER TRUCKING	13125 N MAIN ST	JACKSONVILLE	32218	904-751-9805

## APPENDIX B: MOBILE HOME MOVERS IN FLORIDA

JIM'S MOBILE HOME SERVICE	5428 EAST 15TH STREET,	PANAMA CITY	32404	(850) 763-6005
JLC MOBILE HOME TRANSPORT	20851 NE. 30TH ST.	WILLISTON		352-528-3154
JLH MOBILE HOME SERVICE	9696 SAINT CLAIR RD	HAINES CITY	33844-9031	941-439-2248
JOHNSON'S MOBILE HOME MOVING	7071 PROVIDENCE CHURCH ROAD	GRAND RIDGE	32442	(850) 592-5674
JONES TRUCKING CO INC	HIGHWAY A1A	CALLAHAN	32011	904-225-0234
JOSEY TRANSPORT INC	E HWY 90	BONIFAY	32425	904-547-4555
KENAN TRANSPORT CO	120 S CHURCH AVE	PANAMA CITY	32401	904-784-2167
KENAN TRANSPORT CO	3710 TALLEYRAND AVE	JACKSONVILLE	32206	904-353-5112
KENNEDY JIMMY R INC	HIGHWAY 4	JAY	32565	904-675-0288
KEN'S MOBILE HOME SERVICE	5923 CEDAR LAKE DRIVE,	COCOA,	32927	(407) 632-2603
KING MOBILE HOME SERVICE INC	4083 WINDSOR LANE	MILTON	32571	(850) 994-1321
KING MOBILE HOME SERVICE INC	540 WINDSOR LN	PACE	32571	904-994-1321
KINGRY TRUCKING CO	10350 COVE AVE	PENSACOLA	32534	904-969-0201
LABONTE TRANSPORTATION SERVICE	13355 47TH COURT NORTH	ROYAL PALM BEACH	33411	(561) 793-1489
LDL ENTERPRISES	1848 NW 22ND ST	POMPANO BEACH	33069-1318	954-979-5340
LEE COUNTY MOBILE HOME SERVICE	16071 ONEAL DR	FORT MYERS	33903-2290	941-995-0024
LEES MOBILE HOME TRANSPORT SE	2237 OXBOW RD	JACKSONVILLE	32210	904-781-3080
LEES TRAILER SERVICE	9159 SW 77TH AVE	MIAMI	33156-7664	305-274-3353
LEHMAN MOBILE HOME SERVICE INC	14951 113TH AVE	LARGO	33774-4325	813-596-9929
LENNY'S MOBILE HOME MOVING		MONTVERDE	34756	(407) 469-3055
LEONARD SLAY MOBILE HOME SERVICE	7305 QUINN ROAD	MILTON	32583	(850) 623-1345
LIPFORD MOBILE HOME MOVING	4415 MAGNOLIA RD	MARIANNA	32448	904-482-4347
LONGS TRUCKING	7005 KEITHAN RD	JACKSONVILLE	32220	904-786-4257
LORDS MOBILE HOME CENTER	16642 US HIGHWAY 19	PORT RICHEY	34667	(813) 869-4903
LTS TRANSPORTING	US HIGHWAY 60 E.	LAKE WALES		863-676-6582
M & H SERVICE	7038 W HOMOSASSA TRL	HOMOSASSA	34448-2037	352-628-5641
M C S INC	1726 KINGSLEY AVE	ORANGE PARK	32073	904-264-7833
M C Z TRUCKING SERVICE INC	5433 US HIGHWAY 17 S	GREEN COVE SPRINGS	32043	904-284-0850
M H TZRA INC	1200 NORTH CENTRAL AVENUE # 103	KISSIMMEE,	34741	(407) 892-7169
MANNY TIMIRAO'S PILOT / ESCORT	22785 SW 130 CT	MIAMI	33032	305-257-1974
MANUFACTURED HOME SERVICE	11150 MOORE ST.	LEESBURG		352-742-4407
MARK JACKSON'S MOBILE HOME SERVICE	9040 SOUTHWEST 54TH PLACE	COOPER CITY	33328	(954) 680-6912
MATLACK INC	11637 CAMDEN RD	JACKSONVILLE	32218	904-757-9083
MC KENZIE TANK LINES	6549 ROBINSON RD	JACKSONVILLE	32254	904-786-6330
MCGEE JAMES P MOBILE HOME MOVING	5605 STATE ROAD 16	SAINT AUGUSTINE	32092	904-825-2315
MCKENZIE TANK LINES INC	122 APPLEYARD DR	TALLAHASSEE	32304	904-576-1221
MCKENZIE TANK LINES INC	MCKENZIE ST	SOUTHPORT	32444	904-265-2871
MCMELLON TRUCKING CO	7100 PLANTATION RD	PENSACOLA	32504	904-474-4877

## APPENDIX B: MOBILE HOME MOVERS IN FLORIDA

MENDEZ MOBILE HOME SETUP	16203 US HIGHWAY 19	HUDSON	34667	(813) 862-8194
MID-FLORIDA MOVERS INC	510 SANDAL CT	ALTAMONTE SPRINGS	32714-1454	407-862-5700
MILLER MOBILE HOME TRANSPORT	11102 BROWNING RD	LITHIA	33547-2850	813-620-1770
MILLER MOBILE HOME TRANSPORT	3119 E KEYSVILLE RD	PLANT CITY	33567	813-737-5262
MOBILE TRAILER REFRIGERATION INC	6531 COMMONWEALTH AVE	JACKSONVILLE	32254	904-783-6400
MONROES MOBILE HOME SERVICE	W HIGHWAY 20	TALLAHASSEE	32310	850-576-2690
MORRISON'S MOBILE HOME SET UP	18790 5TH AVENUE	ORLANDO	32820	(407) 568-0520
MOTOR TREND MOBILE HOME MOVERS	IOWA ST.	GRAND RIDGE		850-592-8001
NARRAMORE TRUCKING	710 BARTOW AVE S	AUBURNDALE	33823	941-967-9444
NELSON TRUCKING	4422 W HIGHWAY 40	OCALA	34482-4043	352-732-7660
NICK UNDERWOOD MOBILE HOME SERVICE	3702 SE 18TH TER	OKEECHOBEE	34974-7017	941-763-4120
NORRIS MOBILE HOME MOVERS & SERVICE	BRANFORD HWY	LAKE CITY	32055	904-752-3871
OMNI SERVICES INTERNATIONAL	2514 WARFIELD AVE	JACKSONVILLE	32218	904-751-9418
ONE STOP HOUSING INC	5400 NW 52ND AVE	OCALA	34482-2867	352-351-3143
OTIS DAY MOBILE HOME SPECIALTY	43 NW 4TH ST	WILLISTON	32696-2066	352-528-2975
PARKER MOBILE HOME SERVICE INC	4866 DRYDEN RD	WEST PALM BEACH	33415-3820	561-684-0030
PARRISH PETE	242 N TYMBER CREEK RD	ORMOND BEACH	32174	904-672-2953
PAXTON MOBILE HOME SERVICE	120 SPEARS STREET	MILTON	32571	(850) 994-8242
PAXTON MOBILE HOME SERVICES	102 SPEARS ST	PACE	32571	904-994-8242
PERKINS MOBILE HOME SERVICE	6114 GOODMAN RD	JACKSONVILLE	32244	904-779-1515
PET CHAUFFEUR	3801 CROWN POINT RD	JACKSONVILLE	32257	904-268-7041
PORT ST LUCIE MOVERS INC	1618 SOUTHEAST VILLAGE GREEN DRIVE # 8	PORT ST LUCIE	34952	(561) 335-9955
PRES MOBILE HOME TRANSPORTING	6341 HOFSTRA CT	FORT MYERS	33919-5024	941-481-4510
PRO-SET SERVICES	41234 DURHAM DRIVE	LAKELAND, FL	33809	(941) 686-7100
QUALITY CARE MOBILE HOME SERVICE	1232 MORGAN DR	LAKELAND	33801-2932	941-667-0766
QUALITY MOBILE HOME MOVING	5537 CHRISTINE RD	LAKELAND	33810-1885	941-858-9238
R&W MOBILE HOME MOVERS		HOLT		850-537-5293
RANDY NICHOLS MOBILE HOME EXP	12030 SE 123RD AVE	OCKLAWAHA	32179-4888	352-288-6683
REDWING CARRIERS INC	2058 E 21ST ST	JACKSONVILLE	32206	904-356-6661
REINHARD EARLE A	5485 SOUTH LIRA POINT	LECANTO	34461	(352) 628-0490
RELIABLE MOBILE HOME SET-UP	8800 COUNTY ROAD 674	BUSHNELL	33513-4773	352-793-8161
RHODES BROTHERS TRUCK BROKERS INC	8515 STATE ROAD 207	HASTINGS	32145	904-692-1159
ROBS MOBILE HOME MOVING	11702 N US HIGHWAY 301	THONOTOSASSA	33592-2948	813-986-0465
SAB TRUCKING	225 MAIN ST	DESTIN	32541	904-837-3767
SCOTT MOBILE HOME SERVICE	2134 HENTZ DR	PANAMA CITY	32405	904-769-6392
SEA VENTURES MOBILE HOME AND RV SERVICE	P.O. BOX 602	OCOEE	34761	407-761-1665
SOUTHERN MOBILE HOME SERVICE INC	HIGHWAY 684	ARCADIA	34266	941-735-2220

## APPENDIX B: MOBILE HOME MOVERS IN FLORIDA

SOUTHERN MOVES MOBILE HOME SERVICE	460 CALHOUN ST	LABELLE	33935-4860	941-675-4061
SOUTHERN REFRIGERATION ENGINEER	6831 W BEAVER ST	JACKSONVILLE	32254	904-781-1202
SPECIALIZED MOBILE HOME MOVING & SET	845 W LAKE WALES RD N	LAKE WALES	33853	863-676-3371
SPECIALIZED MOBILE HOME REPAIR	837 WEST LAKE WALES ROAD NORTH	LAKE WALES	33853	(941) 676-3371
STATEWIDE MOBILE MOVING & SET	2694 MASTERPIECE ROAD	LAKE WALES	33853	(941) 676-3451
STEEL HICKS MOBILE HOME MOVERS		ALFORD	32420	(850) 579-4441
STONE'S MOBILE HOMES	1608 ALASKA AVENUE,	LYNN HAVEN	32444	(850) 265-0418
STUARTS MOBILE HOME SERVICE	2503 NW 42ND AVE	OKEECHOBEE	34972-8874	941-763-7889
SUGGS DON MOBILE HOME MOVERS	8708 WIDE RD	TALLAHASSEE	32310	904-421-9329
SUN COUNTRY TRANSPORTATION	1851 EXECUTIVE CENTER DR	JACKSONVILLE	32207	904-399-8002
SUNCO INDUSTRIES		SEFFNER	33583-1079	813-986-5961
SUNSHINE TRANSIT	17720 N. US HIGHWAY 27	MINNEOLA		352-2426507
SUWANNEE MANUFACTURED HOMES INC	217 LEE AVE NE	LIVE OAK	32060	904-364-1144
SUWANNEE MATERIALS CARRIERS	HWY 49	BRANFORD	32008	904-935-1555
T & H TRUCKING	377 AGMAC AVE	JACKSONVILLE	32254	904-781-4908
T & L	7978 MCDANIEL DR	FORT MYERS	33917-1934	941-543-6527
THERMO-KING OF NORTH FLORIDA	828 EDGEWOOD AVE N	JACKSONVILLE	32254	904-388-6692
THOMAS R JOHNSON MOBILE HOME	10800 SE 70TH AVE	TRENTON	32693-2056	352-472-5934
TODDS MOBILE HOME TRANSPORT SERVICE	LUNDY LN	LIVE OAK	32060	904-362-7103
TOM PRATOR HOUSE MOVING	RR 1 BOX 2620	LEE	32059	(850) 971-5249
TRANSIT MOBILE HOME MOVING INC	5947 POETRY CT	FORT MYERS	33903-4500	941-997-7176
TRANSPORT SERVICES	12800 SE 81ST CT	BELLEVIEW	34420	352-307-8028
TRANSPORT SOUTH INC	3529 TALLEYRAND AVE	JACKSONVILLE	32206	904-354-4003
TRI STATE TRUCKING INC	5146 VERMONT RD	ALTHA	32421	904-762-8300
TRI-COUNTY SUPPLY & HARDWARE	WEST HIGHWAY 20	TALLAHASSEE,	32310	(850) 575-1391
TROPICAL EXPRESS	9851 THOMAS DR	PANAMA CITY BEACH	32408	904-230-1788
TRUMPET COACH INC	902 FALLING WATERS ROAD,	CHIPLEY	32428	(850) 638-5511
TWEETY BIRD TRAILER SALES	3051 PINE FOREST RD	CANTONMENT	32533	904-478-1990
WALKER AUTRY TRUCKING	5380 WALKER RD	MILTON	32570	904-626-6996
WESCO TRANSPORTATION INC	TOBE RETHERFORD RD	CARYVILLE	32427	904-548-9045
WILHITES TRANSPORT & MOBILE	5637 35TH AVE N	SAINT PETERSBURG	33710-1911	813-384-9606
WINNS TRAILER MOVING SERVICE	BLOUNTSTOWN HWY	TALLAHASSEE	32310	850-576-1035
YELLOW FREIGHT SYSTEM INC	8240 MCCARTY ST	PENSACOLA	32534	904-477-0400
YOUNG & SONS INC	3901 COUNTY ROAD 311	BUSHNELL	33513-8421	352-793-3660

**APPENDIX C: CONSTRUCTION AND DEMOLITION DEBRIS RECYCLING FACILITIES IN FLORIDA**

Facility/Address/City/Zip ("P" Indicates Proposed Facility)	Zip Code (Florida)	Phone# (Area Code)	Type <sup>1</sup> (Abbreviations below)	Ownership		Capacity	Processed	PC	Service Area <sup>2</sup>		Material Source				
				Public	Private				Tons/Day	Tons/Day	EC	MC	R	B	C
<b>Alachua</b> Boone Waste Management 5002 SW 41 Blvd, Gainesville, FL 32608	32608	352-375-3908	RMPF,DO,O	X		95.00	75.00			X				X	
Habitat for Humanity 511 NW 1 St, Gainesville FL 32601	32601	352-378-4663	RMPF,DO,O		X					X				X	
Reuser Rebuilder Products 622 SE 2 St, Gainesville FL 32601	32601	352-379-4600	MRF		X					X				X	
<b>Totals</b>	<b>3</b>														
<b>Baker</b> NRSWA Processing Center P.O. Box 647, Raiford 32083	32083	904/431-1000	MRF		X					X		X		X	
<b>Totals</b>	<b>1</b>														
<b>Bay</b> <b>Totals</b>	<b>0</b>														
<b>Bradford</b> NRSWA Processing Center P.O. Box 647, Raiford 32083	32083	904-431-1000	MRF		X					X		X		X	
<b>Totals</b>	<b>1</b>														
<b>Brevard</b> <b>Totals</b>	<b>0</b>					NA	1	1		1	1	1	1	1	1
<b>Broward</b> Central Trash Transfer Station 5490 Reese Rd., Davie	33317	954-75-4999	DO		X					X		X			
South Trash Transfer Station 5601 W Hallandale Beach Blvd., Hollywood	33023	954-765-4999	DO		X					X		X			
<b>Totals</b>	<b>2</b>														
<b>Calhoun</b> <b>Totals</b>	<b>0</b>														
<b>Charlotte</b> Charlotte County Zemel Road Landfill 27221 Beechcraft Rd. Punta Gorda, Fl		941-639-1802	O		X		20.00			X		X			
<b>Totals</b>															
<b>Citrus</b> <b>Totals</b>	<b>0</b>														
<b>Clay</b> <b>Totals</b>	<b>0</b>														
<b>Collier</b> Naples landfill & Recycling Facility 3750 Landfill Rd., Naples, Fl 34134	34134	941/455-8062	O		X	1000.00	300.00			X		X			
Naples Transfer & Recycling Fac. 2640 W. Enterprise Ave.34104	34104	941/643-3099	DO		X	N/A	50.00			X		X			
Marco Transfer & Rec. Fac. 771 Elkcam Cir. Marco Island 34145	34145	941/394-2134	DO		X	N/A	40.00			X		X			
Carnestown Recycling & transfer station US 41 & SR 29 Carnestown	34139	941/695-4331	DO		X	N/A	1.00	X							
Immokalee Disposal 120 New Market Rd.	34120	941/657-2729	DO		X	N/A	N/A	X				X			
<b>Totals</b>	<b>5</b>														
<b>Columbia</b> Winfield Solid Waste Facility P.O. Box 969, Lake City, FL 32056	32056	904-752-6050	RMPF		X	4.00	2.00			X		X			
<b>Totals</b>	<b>1</b>														
<b>Dade</b> A-B MartIN/All Dade Recycling 3680 NW 135 Street - Opa-Locka 33054	33054	(305)836-2851	MRF		X	720 CY	600 CY			X		X			
Dade Recycling 15490 NW 97 Avenue Miami, FL 33016	33018	(305)826-0707	MRF		X	3500 CY	2000 CY	X				X			
Homestead Landfill 11695 SW 328 St. Homestead,Fl 33033	33033	(941)597-8727	MRF		X	450.00	260.00	X				X			

**APPENDIX C: CONSTRUCTION AND DEMOLITION DEBRIS RECYCLING FACILITIES IN FLORIDA**

<b>Facility/Address/City/Zip</b> ("P" Indicates Proposed Facility)	<b>Zip Code</b> (Florida)	<b>Phone#</b> (Area Code)	<b>Type<sup>1</sup></b> (Abbreviations below)	<b>Ownership</b>	<b>Capacity</b>	<b>Processed</b>	<b>Service Area<sup>2</sup></b>	<b>Material Source</b>					
				Public	Private	Tons/Day	Tons/Day	PC	EC	MC	R	B	C
J&M Scaffolds of Florida 11050 NW 36 Ave. Miami, FL 33167	33167	(305)592-6960	MRF	X	0.00	0.00			X		X		
<b>Totals</b>	4												
<b>DeSoto</b>													
<b>Dixie</b>	<b>Totals</b>	0											
Dixie Co Transfer Station P. O. Box 2009, Cross City, FL 32628	32628	352)498-1289	RMPF	X			X				X		
<b>Totals</b>	1												
<b>Duval</b>													
Jones Road Landfill & Recycling 3400 Jones Rd/Jax/32220	32204	904-781-2407	O	X						X		X	
Mulliniks Construction 5937 Soutel Dr/Jax/32219	32219	904-764-3644	O	X						X		X	
Old Kings Road Solid Waste 8540 N. Old Kings Rd/Jax/32219	32219	904-768-5363	O	X						X		X	
Realco Recycling Co. Inc. 8707 Somers Rd/Jax/32226	32226	904-751-1556	O	X						X		X	
<b>Totals</b>	4												
<b>Escambia</b>													
<b>Flagler</b>	<b>Totals</b>	0											
<b>Franklin.</b>	<b>Totals</b>	0											
<b>Gadsden</b>	<b>Totals</b>	0											
<b>Gilchrist</b>	<b>Totals</b>	0											
Gilchrist County SWTS/RRF 1659 N.W. 10th St. Bell, FL 32693	32693	352-463-3185	MRF/DO	X	10.00	6.00	X			X		X	
<b>Totals</b>	1												
<b>Glades</b>													
Landfill #2 - 11990 W. SR78 Moore Haven, FL 33471	33471	941 675-0124	DO	X		18.00	X			X		X	
<b>Totals</b>	1												
<b>Gulf</b>													
<b>Hamilton</b>	<b>Totals</b>	0											
<b>Hardee</b>	<b>Totals</b>	0											
<b>Hendry</b>	<b>Totals</b>	0											
<b>Hernando</b>	<b>Totals</b>	0											
Northwest Waste Management Facility 14450 Landfill Rd, Brooksville 34614	34614	352-754-4112	RMPF	X	30.00	16-20	X			X		X	
East Hernando Transfer Station 33070 Cortez Blvd, Ridge Manor 33523	33523	352-583-2783	DO	X									
West Hernando Transfer Station 2525 Osowaw Blvd. Spring Hill 34607	34607	352-688-5008	DO	X									
<b>Totals</b>	3												
<b>Highlands</b>													
<b>Hillsborough</b>	<b>Totals</b>	0											
<b>Holmes</b>	<b>Totals</b>	0											
<b>Indian River</b>	<b>Totals</b>	0											
Indian River County Sanitary Landfill 1325 SW 74th Ave. Vero Beach 32968	32968	561-770-5112	RMPF	X	500.00	140.00	X			X		X	
C&D landfill 1325 SW 74th Ave. Vero Beach 32968	32968	561-770-5112	C&D	X		100.00	X			X		X	
<b>Jackson</b>	<b>Totals</b>	2											
<b>Totals</b>	0												

**APPENDIX C: CONSTRUCTION AND DEMOLITION DEBRIS RECYCLING FACILITIES IN FLORIDA**

Facility/Address/City/Zip ("P" Indicates Proposed Facility)		Zip Code (Florida)	Phone# (Area Code)	Type <sup>1</sup> (Abbreviations below)	Ownership	Capacity	Processed	Service Area <sup>2</sup>	Material Source					
					Public	Private	Tons/Day	Tons/Day	PC	EC	MC	R	B	C
<b>Jefferson</b>	Totals	0												
<b>Lafayette</b>	Totals	0												
<b>Lake</b>	Totals	0												
<b>Lee</b>	Totals	0												
Forestry Resources, Inc 4353 Michigan Link Ft. Myers 33916			33916	(941)334-7343 RMPF		X	100.00	X				X		
<b>Leon</b>	Totals	1												
Crowder Excavation 901 Geddie Road, Tallahassee, FL 32304			32304	850-576-7176 O		X					X		X	
<b>Levy</b>	Totals	1												
<b>Liberty</b>	Totals	0												
County Recycling Center P.O. Box 399, Bristol, 32321			32321	850-643-3777 MTWRFS	X					X		X		
<b>Madison</b>	Totals	1												
<b>Manatee</b>	Totals	0												
<b>Marion</b>	Totals	0												
Baseline Recycling Center 5601 S.E. 66th St. Ocala 34480			34480	352-245-1580 DO	X			X				X		
<b>Martin</b>	Totals	1												
<b>Monroe</b>	Totals	0												
Key West Recycling Facility 5701 W. College Rd., Key West 33040			33040	305-293-6409 RMPF	X	100.00	20.00	X				X		
<b>Nassau</b>	Totals	1												
<b>Okaloosa</b>	Totals	0												
<b>Okeechobee</b>	Totals	0												
Waste Management Berman Rd Landfill 10800 NE 128th Ave, Okee. 34972			34872	863-357-0111 O	X	5000.00	3000.00				X	X		
<b>Orange</b>	Totals	0												
All-Rite Recycling 3401 Overland Rd, Orlando 32860			32860	407-290-8611 O	X						X	X		
Central Florida Crushers 303 Taft-Vineland, Orlando 32833			32833	407-568-5879 O	X						X	X		
Orlando Rock & Sealing Corp. 303 W. Taft-Vineland Rd., Orlando			32824	407-859-5990 O	X						X	X		
Recycling Center, Inc. 9800 Recycle Center Rd., Orlando			32824	407-859-4043 O	X						X	X		
<b>Osceola</b>	Totals	4												
<b>Palm Beach</b>	Totals	0												
Delta Tall Pines 1475 S.W. 4th Ave, Delray Beach 33444			33444	561/451-0909 O	X	400.25	150.07	X				X		

**APPENDIX C: CONSTRUCTION AND DEMOLITION DEBRIS RECYCLING FACILITIES IN FLORIDA**

Facility/Address/City/Zip ("P" Indicates Proposed Facility)	Zip Code (Florida)	Phone# (Area Code)	Type <sup>1</sup> (Abbreviations below)	Ownership		Capacity Tons/Day	Processed Tons/Day	PC	Service Area <sup>2</sup>		Material Source		
				Public	Private				EC	MC	R	B	C
D. S. Eakins Construction Corporation 300 W. 10th St, Riviera Beach 33404	33404	561/842-0001	O		X	35000.00	744.01		X			X	
D. S. Eakins Construction Corporation 100 Railroad Ave, Lake Worth 33461	33461	561/588-1518	O		X		0.00		X			X	
Palm Beach Transfer & Recycling 6911 Wallis Rd, West Palm Beach 33401	33401	N/A	O		X	875.00	75.56		X			X	
Atlas Environmental Inc/Waste Magic 15400 Lox Rd, Delray Beach 33483	33483	561/451-0909	O		X	875.00	610.00		X			X	
Pratt & Whitney Beeline Highway, West Palm Beach 33418	33418	561/796-2000	O		X		4.43		X			X	
Florida Resource Recovery, Inc. 1001 Congress Ave, Riviera Beach 33407	33407	561/840-1846	O		X	135.00	131.51		X			X	
Atlas Environmental Inc/Waste Magic 4735 Barbour Rd, Riviera Beach 33404	33404	561/451-0909	O		X	N/A	N/A		X			X	
SWA Class III Waste Reduction Facility 6554-B N Jog Rd, West Palm Bch 33412	33412	561/688-9001	O	X		N/A	N/A		X			X	
<b>Totals</b>	<b>9</b>												
<b>Pasco</b>													
(P) Florida Fiber Recycling, Inc. 9121 Eden Avenue, Hudson, FL 34667	34667	727-819-9242	BB		X				X			X	
<b>Totals</b>	<b>1</b>												
<b>Pinellas</b>													
Frontier Recycling/ Angelo's P.O. Box 1493, Largo FL 33779	33779	(727) 581-1544	O		X				X			X	
Sonny Glassbrenner 6409 123rd Ave N CLW 33773	33773	(727)536-6607	O		X					X		X	
<b>Totals</b>	<b>2</b>												
<b>Polk</b>													
Central Florida Waste Disposal Corp 3400 US 98 N, Ft. Meade, FL 33841	33841	863/687/6095	RMPF		X					X		X	
BFI - Cedar Trails Landfill 2500 HWY 60 W, Bartow, FL 33830	33830	863/533-8776	O		X					X		X	
Polk County Landfills (NC, SE, NE) 50 Environmental Loop, Winter Haven, FL 33880	33880	863/499-2771	O	X					X			X	
Polk County School Board		863/534-5052	O	X				X				X	
Wood Waste Recycling Inc. 4965 New Tampa Hwy, Lakeland, FL 33801	33801	863/683-7266	O	X					X			X	
<b>Totals</b>	<b>4</b>												
<b>Putnam</b>													
<b>Totals</b>	<b>0</b>												
<b>Santa Rosa</b>													
<b>Totals</b>	<b>0</b>												
<b>Sarasota</b>													
Handi Phil 7521 Winchester Blvd, Englewood 34224	34224		O		X					X			
Meyer&Gabbert Excavating Inc 8491 Bolen Road, Sarasota 34241	34241	941-377-5370	O		X					X			
Southwest Land Developers 28062-A Mitchel Ave, Punta Gorda 33982	33982		RMPF	X									
<b>Totals</b>	<b>3</b>												

**APPENDIX C: CONSTRUCTION AND DEMOLITION DEBRIS RECYCLING FACILITIES IN FLORIDA**

<b>Facility/Address/City/Zip</b> ("P" Indicates Proposed Facility)	<b>Zip Code</b> (Florida)	<b>Phone#</b> (Area Code)	<b>Type<sup>1</sup></b> (Abbreviations below)	<b>Ownership</b>	<b>Capacity</b>	<b>Processed</b>	<b>Service Area<sup>2</sup></b>	<b>Material Source</b>
				Public	Private	Tons/Day	Tons/Day	PC EC MC R B C
<b>Seminole</b> Seminole County Landfill 1930 Osceola Rd., Geneva, FL 32732	32732	407-349-5539	O	X	no limit	unknown		X X
<b>Totals</b>	1							
<b>St. Johns</b>	<b>Totals</b>	0						
<b>St. Lucie.</b> East Coast Recycling 4880 Glades Cutoff Rd., Fort Pierce		(561) 461-5883	MRF	X	150.00	150.00		X X
Second Chance Salvage 1303 Selvitz Rd., Fort Pierce		(561) 461-2222	BB		UNKNOWN			
C.A.T. Recycling Range Line Rd., Fort Pierce		(888)CATCYCLE	BB	X	UNKNOWN			X X
T.R.S. Concrete Recycling 8800 Midway Rd., Fort Pierce, FL		(561) 461-0655	BB	X	UNKNOWN	1000.00		X X
<b>Totals</b>	4							
<b>Sumter</b>	<b>Totals</b>	0						
<b>Suwannee</b>	<b>Totals</b>	0						
<b>Taylor</b>	<b>Totals</b>	0						
<b>Union</b> NRSWA Processing Center P.O. 647, Raiford 32083	32083	904/431-1000	MRF	X				X X
<b>Totals</b>	0							
<b>Volusia</b>	<b>Totals</b>	0						
<b>Wakulla</b> Lower Bridge Central Landfill 159 Landfill Rd. Crawfordville, FL 32326	32326	(850) 926-7010	MRF	X	0	0.00	0.00	X 1 0 0 0 0
<b>Totals</b>	1			NA	1	0	0	
<b>Walton</b> Walton County Recycling Center 1118 WWII Veterans Lane, DeFuniak Springs, FL 32433	32433	850-892-8180	MRF	X	100.00	75.00		X X
<b>Totals</b>	1							
<b>Washington</b>	<b>Totals</b>	0						
<b>State Total</b>	67							

1 MRF- Materials Recovery Facility (dirty MRF), RMPF- Recovered Materials Processing Facility (clean MRF), D - Drop off center, B - Buy back center, O - Other

2 PC - Partial County, EC - Entire County, MC - Multiple County

## APPENDIX D: SCRAP METAL RECYCLING FACILITIES IN FLORIDA

		(Area Code)	(Abbreviations below)	Public	Private	Tons/Day	Tons/Day	PC	EC	MC	R	B	C
<b>Alachua</b>													
Sunstate Recycling													
1508 NW 55 Place, Gainesville FL		32653	352-375-0224	MRF		X	2000.00	10.60		X		X	
Wise Recycling													
817 NE Waldo Rd, Gainesville FL		32641	352-373-6354	MRF		X		1.30		X		X	
<b>Totals</b>	2												
<b>Baker</b>													
Northeast Florida State Hospital													
Rt 1, Box 519, Macclenny		32063	904/259-6211	O		X				X		X	
Baker County Correctional Institution													
P.O. Box 500, Macclenny		32063	904/259-6211	O		X				X		X	
Baker County School District													
Macclenny		32063	904/719-4500	O		X				X		X	
<b>Totals</b>	3												
<b>Bay</b>													
City of Callaway													
City Yard, Bertha Ave., Callaway		32404	850-872-7780	RMPF		X	100.00	27.20	X		X		
City Transfer Station													
1690 Bay Ave., Panama City,		32404	850-784-4028	DO		X				X		X	
Bay County Incinerator													
6510 Bay Line Dr., Panama City,		32404	850-784-4028	DO		X				X		X	
Bay County Beach Transfer Station													
1507 N. Gulf Blvd., P.C. Bch.		32407	850-233-5060	DO		X				X		X	
Bay County Water Plant													
3410 Transmitter Rd., P.C.,		32404	850-784-4028	DO		X				X		X	
National Marine Fisheries Laboratory													
3500 Delwood Dr., P.C. Bch,		32407	850-784-4028	DO		X				X		X	
Parker Sports Complex													
Bus. Hwy. 98, Parker		32404	850-871-4104	DO		X				X		X	
City of Lynn Haven- Fire Department													
825 Ohio Ave., Lynn Haven,		32444	850-265-2121	DO		X				X		X	
Coastal Metals Recycling Center													
1023 E. 15th St., Panama City		32401	850-785-0267	BB							X	X	
Lewis Metals													
2311 Industrial Dr., Panama City		32404	850-769-1336	BB							X	X	
Wise Recycling													
511 E 11th St., Panama City		32401	850-784-6001	BB		X				X		X	
<b>Totals</b>	11												
<b>Bradford</b>													
Florida State Prison - Workcamp													
State Road 16, Starke		32081	904-964-8125	O		X				X		X	
Florida State Prison - Prison													
State Road 16, Starke		32081	904-964-8125	O		X				X		X	
Lawtey Correctional Institute													
P.O. Box 229, Lawtey		32083	904-782-3811	O		X				X		X	
Florida DCFS													
Starke													
Bradford Family Services													
Starke		32081	904-964-6280	O		X				X		X	
New River Correctional Institute													
P.O. Box 333, Starke		32081	904-964-4000	O		X				X		X	
Bradford County School District													
Starke													
Starke Probation and Parole													
Starke		32081	904-485-1812	O		X				X		X	
<b>Totals</b>	8												
<b>Brevard</b>													
Bell Metal & Recycling Center													
2600 Rowena Drive, Palm Bay		32905	407-725-3272	BB,RMPF		X	100.00	75.00	X				X
Progressive Recovery, Inc.													

**APPENDIX D: SCRAP METAL RECYCLING FACILITIES IN FLORIDA**

		(Area Code)	(Abbreviations below)	Public	Private	Tons/Day	Tons/Day	PC	EC	MC	R	B	C
		407-632-6341	BB,RMPF	X		100.00	75.00	X			X	X	X
520 Cidco Road, Cocoa		32922											
Yorke Doliner & Company		32922	407-636-2781	BB,RMPF	X	200.00	150.00		X				
490 Ansin Road, Cocoa													
<b>Totals</b>	<b>3</b>												
<b>Broward</b>													
47th Ave. Recyclers Auto Part		33314	954-486-7777	BB	X				X		X		
4000 SW 47 Ave., Davie.													
ABC/Svinga Brothers Corp.		33124	305-523-9151	O	X				X		X		X
3511 NW N River Dr., Miami													
Academy Recyclers		33089	954-943-2375	BB	X				X		X		
811 NW 13 Ave., Pompano		33326	954-524-3711	BB	X				X		X		
Acme Scrap Metal Co.													
728 NW 9 Ave., Ft. Lauderdale		33314	954-581-6298	BB,O	X				X		X		
AJH Recycling		33441	954-429-9983	BB	X				X		X		
3100 Burris Rd., Davie		33311	954-764-6716						X		X		
Allstate Recycling Center		33311	954-791-2844	DO	X				X		X		X
198 NW 2 St., Deerfield Beach		33317	954-370-1212	BB	X				X		X		
American Scrap Metal Alloy		33023	954-961-3033	BB	X				X		X		
824 NW 9 Ave., Ft. Lauderdale		33444	561-278-3458	BB	X				X		X		
Associated Auto Salvage		33311	954-764-8275	BB	X				X		X		
700 NW 21 Terrace, Ft. Lauderdale		33069	954-972-8440	BB	X				X		X		
Bernie's Scrap Metal		33004	954-920-2630	BB	X				X		X		
2061 SW 70 Ave., Davie		33069	954-960-1770	BB	X				X		X		
Broward Recycling		33142	800-272-3458	BB	X				X		X		
5801 Wiley St., Hollywood		33023	954-989-9544	BB,O	X				X		X		
C & S Gold Coast Scrap Metals		33315	954-525-0053	BB	X				X		X		
140 SE 2 Ave., Delray Beach		33311	954-486-2010	BB,O	X				X		X		
Carribean Recycling		33073	954-970-7500	BB	X				X		X		
712 NW 9 Ave., Ft. Lauderdale		33069	954-974-0741	BB	X				X		X		
Dania Scrap Metals		33069	954-975-4004	BB	X				X		X		
177 Phippen-Waiter, Dania		33054	305-681-4001	BB	X				X		X		
Doug's Auto Parts		33069	954-972-1111	BB	X				X		X		
2070 N Powerline Rd., Pompanao Beach		33069	954-978-1510	BB	X				X		X		
D's Scrap Yard		33054	305-681-4001	BB	X				X		X		
4150 SW 47 Ave., Davie		33069	954-974-0741	BB	X				X		X		
Exotech		33069	954-975-4004	BB	X				X		X		
2087 N Powerline Rd., Pompano Beach		33069	954-972-1111	BB	X				X		X		
Gator Iron & Metal Corp.		33069	954-978-1510	BB	X				X		X		
1833 NW 21 St., Pompano Beach		33069	954-974-0741	BB	X				X		X		
General Metals Corp.		33069	954-975-4004	BB	X				X		X		
3115 NW N River Dr., Miami		33023	954-989-9544	BB,O	X				X		X		
Hollywood Scrap Recycling		33315	954-525-0053	BB	X				X		X		
5835 Plunkett St., Hollywood		33069	954-972-1111	BB	X				X		X		
Joseph's Recycling Center		33069	954-978-1510	BB	X				X		X		
2309 SW 2 Avenue, Ft. Lauderdale		33069	954-974-0741	BB	X				X		X		
Metropolitan Metals		33069	954-975-4004	BB	X				X		X		
1701 NW 31 Avenue, Ft. Lauderdale		33069	954-972-1111	BB	X				X		X		
Pompano Metals Recycling, Inc.		33069	954-978-1510	BB	X				X		X		
4100 N Powerline Rd., Pompanao Beach		33069	954-974-0741	BB	X				X		X		
Powerline Metal Recycling		33069	954-975-4004	BB	X				X		X		
2220 Powerline Road, Pompano Beach		33069	954-972-1111	BB	X				X		X		
Sam's Recycling		33069	954-978-1510	BB	X				X		X		
1610 N Powerline Rd., Pompano Beach		33069	954-974-0741	BB	X				X		X		
Scrap Metal Recycling		33069	954-975-4004	BB	X				X		X		
840 NW 12 Terrace, Pompano Beach		33069	954-972-1111	BB	X				X		X		
Scrappy's Recycling		33054	305-681-4001	BB	X				X		X		
13070 Cairo Lane, Opa Locka		33069	954-688-7715	BB	X				X		X		
Shoreline Recyclers													
3300 NW 27 Ave., Pompano Beach													
Central Trash Transfer Station													

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		(Area Code)	(Abbreviations below)	Public	Private	Tons/Day	Tons/Day	PC	EC	MC	R	B	C
		954-75-4999	DO	X				X	X		X		
5490 Reese Rd., Davie South Trash Transfer Station 5601 W Hallandale Beach Blvd., Hollywood		33317	954-75-4999	DO	X								
<b>Totals</b>	<b>29</b>	33023	954-765-4999	DO	X								
<b>Calhoun</b>													
Cumbaa Enterprises Hwy 71, Blountstown, FL		32424	O		X				X			X	
<b>Totals</b>	<b>1</b>												
<b>Charlotte</b>													
City of Punta Gorda Drop Off Center Nesbit St., Punta Gorda, Fl. Charlotte County Zemel Road Landfill 27221 Beechcraft Rd. Punta Gorda, Fl Buy Back Center 2820 Worth Ave. Englewood, Fl. Florida Scrap Metals 4137 D James St., Pt. Char., Fl. Chucks Recycling 5005 Dalewood St., Punta Gorda, Fl.		33950	941-639-4532	DO	X		1.76	X				X	
			941-639-1802	O	X		20.00		X		X	X	
			941-474-9391	BB	X		0.00	X				X	
			941-627-4545	BB	X		5.00		X		X	X	
			941-575-0586	BB	X		1.50		X		X	X	
<b>Totals</b>	<b>5</b>												
<b>Citrus</b>													
Citrus Recycling 505 E Gulf to Lake Hwy, Inverness Inter-County Recycling 1801 W. Gulf to Lake Hwy, Lecanto ACRS Enterprises 142 NE 11th St., Crystal River		34461	352-344-3537	BB	X				X			X	
		34461	352-746-5272	BB	X				X			X	
		34428	352-795-4456	BB	X				X			X	
<b>Totals</b>	<b>3</b>												
<b>Clay</b>													
Clay County Recycling Center 3545 Rosemary Hill Rd. Grn. Cv. Spgs,		32043	904-284-6374	RMPF	X	75.00	20.00	X			B		
<b>Totals</b>	<b>1</b>												
<b>Collier</b>													
Naples Transfer & Recycling Fac. 2640 W. Enterprise Ave Marco Transfer & Rec. Fac. 771 Elkcam Cir. Marco Island Carnestown Recycling & transfer station US 41 & SR 29 Carnestown City of Naples Operations Center Goodlette Rd. & Central Ave, Naples Naples Recycling 5801 Yahl St. Wise Recycling 3693 Enterprise Ave. Schneider Metals 5755 Yahl St. Garden St. Recycling 6101 Shirley St., Naples		34104	941/643-3099	DO	X	N/A	50.00	X			X		
		34145	941/394-2134	DO	X	N/A	40.00	X			X		
		34139	941/695-4331	DO	X	N/A	1.00	X					
		34102	941/434/4678	DO	X	N/A	N/A	X				X	
		34109	941/597-8727	DO	X	N/A	N/A	X				X	
		34104	941/261-8889	BB	X	N/A	N/A	X			X		
		34109	941/597-207	BB	X	N/A	N/A	X			X		
		34109	941/597-4300	BB	X	N/A	N/A	X			X		
<b>Totals</b>													
<b>Columbia</b>													
Winfield Solid Waste Facility P.O. Box 969, Lake City, FL Interstate Recycling W. U.S. Hwy 90, Lake City, FL Commercial Metals, Inc. 201 E. Hwy 100A, Lake City, FL Columbia Salvage 515 N. Marion St. Lake City, FL		32056	904-752-6050	RMPF	X	4.00	2.00	X			X		
		32055	904-752-7584	BB	X	3.00	2.75	X			X		
		32055	904-755-7852	BB	X	40.00	36.00	X			X		
		32055	904-755-6380	BB	X	12.00	10.00	X			X		
<b>Totals</b>	<b>4</b>												

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		(Area Code)	(Abbreviations below)	Public	Private	Tons/Day	Tons/Day	PC	EC	MC	R	B	C
<b>Dade</b>													
ABC Scrap Metal/ Svinga Brothers		33142	(305)836-2851 BB		X	275.00	62.00		X		X		
3495 NW N River Dr - Miami, Fl													
All Florida Scrap Metal		33142	(305)635-2483 DO,BB		X	5.70	5.00		X		X		
2710 NW 32 Avenue Miami, FL													
Arrow Recycling Corp.		33142	(305)634-4668 DO,BB		X	2.00	2.00		X		X		
3333 NW N. River Dr Miami, FL													
Atlas-Miami River/ FPT		33142	(305)638-0040 O		X	600.00	300.00		X		X		
3700 NW N. River Drive Miami, FL													
Bob's Recycling Center		33157	(305)252-2084 DO,BB		X	0.00	1.50	X				X	
10695 S.W. 184 Terrace Miami, FL													
Dade Recylcing		33018	(305)826-0707 MRF		X	3500 CY	2000 CY	X				X	
15490 NW 97 Avenue Miami, FL													
Dade Scap Iron & Metal		33142	(305)634-5865 DO,BB		X	3.00	1.70		X		X		
2770 NW 32 Avenue , Miami, FL													
East Coast Scrap Metal		33142	(305)534-7744 DO,BB		X	40.00	30.00		X		X		
3273 NW N River Dr Miami, FL													
Everglades/Newell		33054	(305)681-4204 RMPF		X	1000.00	650.00		X		X		
3440 NW 135 St -Opa-Locka													
Federal Metals Company Inc.		33142	(305)633-9054 BB		X	20.00	15.00		X		X		
2782 NW N. River Dr Miami, FL													
General Metals Corp		33142	(305)635-4200 BB		X	25.00	19.00		X		X		
3115 NW N.River Dr, Miami, FL													
J&M Scaffolds of Florida		33167	(305)592-6960 MRF		X	0.00	0.00		X		X		
11050 NW 36 Ave. Miami, Fl													
Lead Enterprises		33142-6310	(305)635-8644 DO,BB		X	1.00	1.00		X		X		
3300 NW 29 St. Miami, FL													
Miami Iron & Metal		33142	(305)634-3090 O		X	120.00	120.00		X		X		
3338 NW N. River Dr. Miami, FL													
Namco International		33178	(305)591-2784 MRF		X	240.00	115.00		X		X		
6990 NW 97 Avenue Miami, FL													
Recycle America of Dade County		33029	(954)977-9551 MRF		X	200.00	180.00		X		X		
20701 Pembroke Rd, Pem Pines													
Triangle Scrap Metal Processing		33142	(305)633-1929 BB		X	15.00	12.00		X		X		
3101 NW N River Dr. Miami, FL													
<b>Totals</b>	17												
<b>DeSoto</b>													
Bobby Suggs Recycling		34268	941-993-4224 BB		X				X		X		
2279 SW Highway 17, Arcadia													
<b>Totals</b>	1												
<b>Dixie</b>													
Dixie Co Transfer Station		32628	352)498-1289 RMPF		X				X		X		
P. O. Box 2009, Cross City, Fl 32628													
349 North		32680	DO		X				X		X		
Old Town, Fl		32680	DO		X				X		X		
CR351A & 351		32680	DO		X				X		X		
Old Town, Fl		32680	DO		X				X		X		
CR317-Hinton Landing		32680	DO		X				X		X		
Old Town, Fl		32680	DO		X				X		X		
CR55A-Bert Lee Rd		32680	DO		X				X		X		
Old Town, Fl		32680	DO		X				X		X		
Suwannee		32692	DO		X				X		X		
Suwannee, Fl		32692	DO		X				X		X		
CR351-Jack Roberts Curve		32628	DO		X				X		X		
Cross City, Fl		32648	DO		X				X		X		
Horseshoe Beach		32648	DO		X				X		X		
Horseshoe Beach, Fl		32628	DO		X				X		X		
Jena		32628	DO		X				X		X		
Jena, Fl		32628	DO		X				X		X		
County Yard													

**APPENDIX D: SCRAP METAL RECYCLING FACILITIES IN FLORIDA**

		(Area Code)	(Abbreviations below)	Public	Private	Tons/Day	Tons/Day	PC	EC	MC	R	B	C
		DO	X	X				X	X		X		
Cross City, Fl		32628											
CCCI		32628	O	X									
Cross City, Fl													
<b>Totals</b>	<b>11</b>												
<b>Duval</b>													
City Appliance Center		32254	904-387-8999	RMPF	X	1.00	0.55	X				X	X
2675 Commonwealth/Jax		32233	904-246-7581	O								X	X
Beaches Recycling Center		32206	904-353-3694	O								X	X
56W.6St/Atl Bh		332254	904-786-2771	O								X	X
Berman Brothers		32234	904-266-3161	O								X	X
2500 Evergreen/Jax/		32204	904-354-3708	DO,BB								X	X
Commercial Metals		32254	904-783-2633	BB								X	X
2038 N. Lane Ave/Jax		32254	904-781-0688	BB								X	X
Global Shredding Technologies		32254	904-389-9976	BB/O								X	X
16770 Rebar Rd/Jax													
Main Recycling													
1225 Houston St/Jax/													
Scrap Aluminum Processors													
5042 W. Beaver St/Jax													
Wise Recycling Centers													
5252 Shawland Rd/Jax													
Reliable Rubbish													
2940 Strickland St/Jax													
<b>Totals</b>	<b>9</b>												
<b>Escambia</b>													
Auto Shred Recycling, L.L.C.		32505	850-432-0977	O (Ferrous/Non ferrous Yar	X			Proprietary				X	X
1000 S. Myrick St., Pensacola		32505	850-434-3219	O (Ferrous/Non ferrous Yar	X			Proprietary				X	X
GSI Recycling, Inc.		32582	850-438-3197	O (Ferrous/Non ferrous Yar	X			Proprietary				X	X
1831 N Hollywood Ave, Pensacola		32533	850-477-5336	O (Non ferrous Yard)		X		Proprietary				X	X
Southern Scrap Co., Inc													
P.O. Box 12388, Pensacola													
Wise Recycling, L.L.C.													
605 W. Hope Dr., Pensacola													
Perdido Landfill													
13009 Beulah Rd., Cantonment													
<b>Totals</b>	<b>5</b>												
<b>Flagler</b>													
Flagler County C&D Facility		32110	904-517-2075	C&D	X	100.00	80.00	X				X	X
1200 E. Moody Blvd.													
<b>Totals</b>	<b>1</b>												
Franklin Co. Recycling Center		32328	850-670-8167	MRF	X	12.16	0.25	X				X	X
210 S.R. 65, Eastpoint													
<b>Totals</b>	<b>1</b>												
<b>Gadsden</b>													
Florida State Hospital		32324	850-663-7565	RMPF	X	10.00	5.00	X				X	X
PO Box 1000, Chattahoochee		32353	850-875-8658	RMPF	X	50.00	20.00	X				X	X
Gadsden County Recycling Center													
PO Box 1799, Quincy,													
<b>Totals</b>	<b>2</b>												
<b>Gilchrist</b>													
Gilchrist County SWTS/RRF		32693	352-463-3185	MRF/DO	X	10.00	6.00	X				X	X
1659 N.W. 10th St. Bell, FL.		32693	352-472-1140	DO	X	10.00		X				X	X
S.E. Community Center Drop-Off Site													
6970 S.E. 70th Ave. Trenton, FL.													
<b>Totals</b>	<b>2</b>												
<b>Glades</b>													
Landfill #2 - 11990 W. SR78		33471	941 675-0124	DO	X							X	X
Moore Haven, Fl 33471													
<b>Totals</b>	<b>1</b>												
<b>Gulf</b>													

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		(Area Code)	(Abbreviations below)	Public	Private	Tons/Day	Tons/Day	PC	EC	MC	R	B	C
Port St. Joe Recycling Facility Port St. Joe		32456	850-229-8261	MRF	X	25.00	15.00	X			X	X	
<b>Hamilton</b>	<b>Totals</b>	<b>1</b>											
<b>Hardee</b>	<b>Totals</b>	<b>0</b>											
Hardee County MRF 685 Airport Road, Wauchula, FL		33873	941-773-5089	MRF	X	100.00	55-65	X			X	X	
<b>Hendry</b>	<b>Totals</b>	<b>1</b>											
Hendry County Recycling Center			863-674-4162	MRF	X	200.00	100.00	X			X	X	
Hendry County Recycling Center			863-250-2943	MRF	X	100.00	50.00	X			X		
<b>Hernando</b>	<b>Totals</b>	<b>2</b>											
Northwest Waste Management Facility 14450 Landfill Rd, Brooksville		34614	352-754-4112	RMPF	X	30.00	16-20	X			X	X	
<b>Highlands</b>	<b>Totals</b>	<b>1</b>											
Heartland Recycling, Inc.											X	X	
Avon Park		33825	863-452-5557	BB			X						
Lake Placid Recycling Center		33852	863-699-1165	BB			X				X	X	
Lake Placid													
Sprint Telephone Work Center		33825		Unmanned dropoff	DO	X					X	X	
Avon Park		33870		Unmanned dropoff	O	X					X	X	
<b>Hillsborough</b>	<b>Totals</b>	<b>4</b>											
Hills. Cnty. Resource Recovery													
350 Falkenburg Rd. Tampa		33619	813-684-5688	MRF	X	1200.00	1200.00	X				X	
McKay Bay Refuse to Energy		33605	813-242-5320	MRF	X	1000.00	1000.00	X				X	
112 S. 34th St. Tampa													
South County CCC													
13000 US HWY 41 Tampa ,		33534	813-671-7611	DO	X	12.00	12.00	X				X	
Southeast County CCC													
County Road 672 Tampa,		33547	813-671-7674	DO	X	12.00	12.00	X				X	
North Star Recycling													
5220 Dover St. Tampa		33619	813-677-4471	RMPF,BB	X	300.00	300.00	X				X	
Finer Scrap Processors													
3204 5th Ave. Tampa		33605	813-247-5546	RMPF,BB	X	50.00	50.00	X			X	X	
David Joseph Company		33605	813-247-6303	RMPF,BB	X	500.00	500.00	X			X	X	
4201 Maritime Blvd. Tampa													
Scrap All, Inc.													
2801 4th Ave. Tampa		33675	813-247-3619	RMPF,BB	X	50.00	50.00	X			X	X	
R & L Metals Inc													
1902 Orient Rd. Tampa		33619	813-621-3966	RMPF,BB	X	50.00	50.00	X			X	X	
Gulf Coast Metals													
6912 E. 9th Ave. Tampa		33605	813-626-5443	RMPF,BB	X	50.00	50.00	X			X	X	
Commercial Metals													
1900 62nd. St. Tampa		33619	813-248-1918	RMPF,BB	X	300.00	300.00	X			X	X	
Reeves Southeastern													
9800 Reeves Rd. Tampa		33618	813-626-3192	RMPF,BB	X	5.00	5.00	X			X	X	
Kimmins Recycling													
3518 4th Ave. Tampa		33605	813-248-3606	RMPF,BB	X	75.00	75.00	X			X	X	
Winner Metals of Florida													
2801 Guy Verger Blvd. Tampa		33605	813-247-5252	RMPF,BB	X	150.00	150.00	X			X	X	

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			(Area Code)	(Abbreviations below)	Public	Private	Tons/Day	Tons/Day	PC	EC	MC	R	B	C
<b>Holmes</b>	Totals	14												
MRF, Rt. 1 Box 268, Bonifay, FL			32425	850-547-0922	MRF	X	3.00	1.00	x			x		
<b>Indian River</b>	<b>Totals</b>	<b>1</b>												
Indian River County Sanitary Landfill			32968	561-770-5112	RMPF	X	500.00	140.00	X			X		
1325 SW 74th Ave, Vero Beach			32962	561-770-5115	DO	X		23.39	X			X		
Old Dixie Transfer Station			32067	561-770-5044	DO	X		14.39	X			X		
950 1st Place Vero Beach			32967	561-770-5094	DO	X		5.25	X			X		
Gifford Transfer Station			32948	561-571-0483	DO	X		8.53	X			X		
4901 41st St, Vero Beach														
Winter Beach Transfer Station														
3955 65th St, Vero Beach														
Fellsmerer Transfer Station														
15210 CR 512 Fellsmere														
<b>Totals</b>	<b>5</b>													
<b>Jackson</b>														
JackSun Recycling Facility			32446	850-482-9274	RMPF	X			X			X		
3530 Wiley Dr., Marianna, Florida														
<b>Totals</b>	<b>1</b>													
<b>Jefferson</b>														
<b>Totals</b>	<b>0</b>													
<b>Lafayette</b>														
<b>Totals</b>	<b>0</b>													
<b>Lake</b>														
Astor Drop-off Center			32102	352-759-2776	DO	X	3.00	3.00	X			X		
Astor Transfer Station Rd., Astor			34711	352-394-5137	DO	X	3.00	3.00	X			X		
Loghouse Drop-off Center			32767	352-669-3430	DO	X	3.00	3.00	X			X		
10435 Loghouse Rd., Clermont			32159	352-753-2212	DO	X	3.00	3.00	X			X		
Paisley Drop-off Center			32778	352-343-3776	DO, RMPF	X			X			X		
44225 Spring Creek Rd., Paisley			32778	352-343-5144	MRF	X	*		X			X		
Lady Lake Drop-off Center			34748	352-326-2267	MRF	X	*					X		
1200 Jackson St., Lady Lake			34731	352-365-1469	MRF	X	*		X			X		
Lake Co. Landfill- 13130 Astatula														
Landfill Rd., Tavares														
American Allied Aluminum Inc.														
Old Hwy 441, Tavares														
Intercounty Recycling														
1308 W Center St., Leesburg														
Sunstate Recycling														
2296 US Hwy 441, Fruitland Park														
<b>Totals</b>	<b>8</b>													
<b>Lee</b>														
Allied Recycling			33916	(941) 332-7766	BB	X	100.00		X			X		
3460 Mlkng Jr, Blvd Ft Myers			33904	(941) 332-2688	BB	X	10.00	X				X		
Cm Gray Scrap Metals			33912	(941) 482-5722	BB	X	10.00	X				X		
2803 Lafayette St Cape Coral														
All Scrap Salvage														
2294 Bruner Ln Ft Myers														
<b>Totals</b>	<b>3</b>													
<b>Leon</b>														
Ace Salvage			32343	850-574-1364	BB	X			X			X		
Hwy 90 W, Midway, FL			32311	850-877-6106	BB	X						X		
Leon Iron & Metal			32311	850-487-2890	DO	X						X		
3720 Woodville Hwy, Tallahassee, FL														
Solid Waste Facility RWCC														
7550 Apalachee Parkway, Tallahassee, FL														
<b>Totals</b>	<b>3</b>													
<b>Levy</b>														

## APPENDIX D: SCRAP METAL RECYCLING FACILITIES IN FLORIDA

		(Area Code)	(Abbreviations below)	Public	Private	Tons/Day	Tons/Day	PC	EC	MC	R	B	C
Banks Recycling Center 17998 N Hwy 19, Fanning Spring		32680	352-463-6010	RMPF	X					X	X		
<b>Totals</b>	<b>1</b>												
<b>Liberty</b>													
County Recycling Center P.O. Box 399, Bristol,		32321	850-643-3777	MTWRFS	X					X	X		
<b>Totals</b>	<b>1</b>												
<b>Madison</b>													
Rocky Ford Collection Center Rocky Ford Road (CR591) Madison		32340	850-973-8640	DO	X	1.00	0.00	X			X		
Greenville Collection Center Hwt 221 South of Greenville, Cherry Lake Collection Center		32331	850-948-3717	DO	X	1.00	0.00	X			X		
Hwy 53 North (Cherry Lake) Madison		32340	850-929-7517	DO	X	1.00	0.00	X			X		
Raven's Wood Collection Center U.S. 90 West of Madison, Madison		32340	850-973-9279	DO	X	1.00	0.00	X			X		
Lee Collection Center Hwy 255 North of Lee		32069	850-973-9279	DO	X	1.00	0.00	X			X		
Pinetta Collection Center Hwy 150 West of Pinetta		32350	850-000-0000	DO	X	1.00	0.00	X			X		
Madison County Recycling Center Rocky Ford Road (CR591) Madison		32340	850-973-2611	MRF	X	125.00	1.20	X	X	X	X	X	
Madison Metal Company U.S. 14 South of Madison		32340	850-973-8483	BB	X	300.00	5.00	X	X	X	X	X	
B & W Salvage U.S. 53 South of Madison			850-973-3314	BB	X	350.00	7.50	X	X	X	X	X	
<b>Totals</b>	<b>9</b>												
<b>Manatee</b>													
Allied Scrap Processors, Inc. P.O. Box 1585, Lakeland, Commercial Metals Company		33802	941-665-7157	RMPF	X	N/A	N/A	X		X			
P.O. Box 1046, Dallas, TX		75221	214-689-4362	RMPF	X	N/A	N/A	X		X			
Finer Scrap Processors of Tampa, Inc. P.O. Box 75336, Tampa, Industrial Metals Recycling Corp.		33675	813-247-5646	RMPF	X	N/A	N/A	X		X			
P.O. Box 76566, Tampa, North Star Recycling, Inc.		33675	813-247-2556		X	N/A	N/A	X		X			
5220 Dover Street, Tampa, R & L Metals		33619	813-677-4471		X	N/A	N/A	X		X			
1902 Orient Road, Tampa, Scrap-All, Inc.		33619	813-621-3966	RMPF	X	N/A	N/A	X		X			
P.O. Box 5567, Tampa, Steve Weisman & Co., Inc.		33675	813-247-3619	RMPF	X	N/A	N/A	X		X			
P.O. Box 806, Oneco, Trademark Metals Recycling, LLC		34264	941-755-4894	RMPF	X	N/A	N/A	X		X			
102 W. Whiting St., Ste. 302, Tampa		33602	813-226-0088	RMPF	X	N/A	N/A	X		X			
United States Gypsum Company 6825 Evergreen Ave., Jacksonville, Winner Metals of Florida, Inc.		32208	904-768-2501	RMPF	X	N/A	N/A	X		X			
2799 Guy Verger Blvd., Tampa,		33605	813-247-5252	RMPF	X	N/A	N/A	X		X			
<b>Totals</b>	<b>11</b>												
<b>Marion</b>													
All American 4351 W. Hwy. 40 Ocala		34482	352-622-0101	RMPF	X					X	X		
ABC Scrap Metal, Svinga Bros. 206 N.E. 9th St. Ocala		34475	352-351-2841	RMPF	X					X	X		
Ocala Recycling Inc. 2402 N.W. 6th St. Ocala		34475	352-351-3383	RMPF	X					X	X		
Sun-State Recycling Inc. 7100 N.W. Gainesville Rd. Ocala		34475	352-622-4719	RMPF	X					X	X		

## APPENDIX D: SCRAP METAL RECYCLING FACILITIES IN FLORIDA

		(Area Code)	(Abbreviations below)	Public	Private	Tons/Day	Tons/Day	PC	EC	MC	R	B	C
Baseline Recycling Center 5601 S.E. 66th St. Ocala 3		34480	352-245-1580	DO	X			X			X		
<b>Martin</b>	<b>Totals</b>	<b>5</b>											
Snake Road Auto Salvage 1650 SE Salerno Rd., Port Salerno		34997	(561) 287-2060	BB		X		X			X		
<b>Monroe</b>	<b>Totals</b>	<b>1</b>											
Key West Recycling Facility 5701 W. College Rd., Key West		33040	305-293-6409	RMPF	X	100.00	20.00	X			X		
Long Key Recycling Facility MM 68 Overseas Hwy, Long Key		33050	305-289-6308	RMPF	X	100.00		X			X		
<b>Nassau</b>	<b>Totals</b>	<b>2</b>											
Nassau County 440 S. Kings Road, Callahan		32011	904-879-5722	O/DO	X			X			X		
City Of Fernandina Beach P.O. Box 668, Fernandina Beach		32035	904-277-7380	O/DO	X			X			X		
Amelia Buy Back Center P.O.Box 1461 Fernandina Bch Fl		32034	904-261-4498	BB		X		X			X		
Callahan Recycling 1609 Kings Rd, Callahan Fl		32011	904-879-4357	BB	X			X			X		
<b>Okaloosa</b>	<b>Totals</b>	<b>4</b>											
Baker Landfill 1415 Charlie Day Rd, Baker Fl.		32531	(850)689-5780	DO	X	0.50	0.20	X			X		
Costal City Metals, 42 NW Hollywood Blvd, Ft. Walton Beach,		32548	(850) 222-5099	BB		X	1.40	0.82	X		X		
Reynold Aluminum Recycling Mobile Sites			(850)477-8850	BB	X	15.00	10.00	X			X		
Auto Shred N. Beal Ext. Ft. Walton Beach		32547	(850) 682-6282	BB	X	20.00	15.00	X			X		
<b>Okeechobee</b>	<b>Totals</b>	<b>4</b>											
Waste Management Berman Rd Landfill 10800 NE 128th Ave, Okee.		34872	863-357-0111	O	X	5000.00	3000.00	X			X		
<b>Orange</b>	<b>Totals</b>	<b>1</b>											
Aard-Wolf, Inc 2213 Clarcona Rd, Apopka		32703	407-889-8885	RMPF	X			X			X		
Aaron Scrap Metals 3000 Gamson Rd, Apopka		32703	407-293-6584	RMPF	X			X			X		
Commercial Refuse 109 Sampey Rd., Groveland		34737	407-656-6273	RMPF	X			X			X		
Commercial Condrey Enterprise 7301 Overland Rd., Orlando		32836	407-236-0644	RMPF	X			X			X		
Commercial Iron & Metals Co. 7301 Overland Rd., Orlando		32856	407-422-9866	RMPF	X			X			X		
Orlando Waste Paper 2715 Staten Rd., Orlando		32804	407-299-1380	RMPF	X			X			X		
Orange County 5901 Young Pine Rd., Orlando		32831	407-836-6601	MRF	X	1000.00	100.00	X			X		
Orange County 5901 Young Pine Rd., Orlando		32831	407-836-6601	DO	X	85.00	100.00	X			X		
<b>Osceola</b>	<b>Totals</b>	<b>8</b>											
<b>Palm Beach</b>	<b>Totals</b>	<b>0</b>											
Reynolds Aluminum Recycling 4034 Lake Worth Rd, Lake Worth		33461	561/433-3127	BB	X	N/A	N/A	X			X		
C & S Gold Coast Scrap													

**APPENDIX D: SCRAP METAL RECYCLING FACILITIES IN FLORIDA**

		(Area Code)	(Abbreviations below)	Public	Private	Tons/Day	Tons/Day	PC	EC	MC	R	B	C
140 S.E. 2nd Ave, Delray Beach	33483	561/278-3458	BB	X	N/A	N/A	X					X	
Florida Metals Recycling	33444	561/278-5268	BB	X	N/A	N/A	X					X	
800 S.W. 17th Ave, Delray Beach													
Liberty Scrap metal	33409	561/833-0392	BB	X	N/A	N/A	X					X	
1030 25th Court, West Palm Beach													
Palm Beach Metals	33417	561/689-0909	BB	X	N/A	N/A	X					X	
7796 Belvedere Rd, West Palm Beach													
Delta Tall Pines													
1475 S.W. 4th Ave, Delray Beach	33444	561/451-0909	O	X	400.25	150.07	X					X	
D. S. Eakins Construction Corporation	33404	561/842-0001	O	X	35000.00	744.01	X					X	
300 W. 10th St, Riviera Beach													
D. S. Eakins Construction Corporation													
100 Railroad Ave, Lake Worth	33461	561/588-1518	O	X	0.00	X						X	
Palm Beach Transfer & Recycling													
6911 Wallis Rd, West Palm Beach	33401	N/A	O	X	875.00	75.56	X					X	
Atlas Environmental Inc/Waste Magic													
15400 Lox Rd, Delray Beach	33483	561/451-0909	O	X	875.00	610.00	X					X	
Florida Resource Recovery, Inc.													
1001 Congress Ave, Riviera Beach	33407	561/840-1846	O	X	135.00	131.51	X					X	
Atlas Environmental Inc/Waste Magic													
4735 Barbour Rd, Riviera Beach	33404	561/451-0909	O	X	N/A	N/A	X					X	
SWA Class III Waste Reduction Facility													
6554-B N Jog Rd, West Palm Bch	33412	561/688-9001	O	X	N/A	N/A	X					X	
D. J. Joseph Ferrous Processing Facility													
6895 N. Jog Rd, West Palm Bch 3	33412	561/697-8716	O	X	125.00	72.38	X					X	
<b>Totals</b>	<b>14</b>												
<b>Pasco</b>													
West Pasco Recycling Center													
Hays Rd. (S.R. 52) Shady Hills, FL		727-847-8041	DO	X				X				X	
Zephyrhills Recycling													
9150 Gall Blvd. Zephyrhills, FL	34248	813-780-7959	BB	X				X				X	
Matts Recycling													
12021 Hicks Road, Hudson, FL 34669	34669	727-868-8526	BB	X				X				X	
Pasco Recycling													
15641 HWY 301 N., Dade City, FL 33525	33525	352-567-2392	BB	X				X				X	
Expert Transportation & SVC													
5710 Land O'Lakes Blvd., Land O'Lakes, FL 34639	34639	813-996-5530	BB	X				X				X	
All American Metal Recycling													
3919 Land O'Lakes, FL 34639	34639	813-996-6531	BB	X				X				X	
(P) Florida Fiber Recycling, Inc.													
9121 Eden Avenue, Hudson, FL 34667	34667	727-819-9242	BB	X				X				X	
Goodwill Industries													
US HWY 19, Jasmine Plaza, Port Richey, FL		727-523-1512	DO	X				X				X	
Goodwill Industries													
US HWY 19 N., Tahitian Center, Holiday, FL		727-523-1512	DO	X				X				X	
Goodwill Industries													
HWY 301, Dade Village Shop Ctr, Dade City, FL		727-523-1512	DO	X				X				X	
Goodwill Industries													
Gall Boulevard, Zephyrhills, FL		727-523-1512	DO	X				X				X	
Goodwill Industries													
Village Lakes Shop Ctr., Land O' Lakes		727-523-1512	DO	X				X				X	
<b>Totals</b>	<b>12</b>												
<b>Pinellas</b>													
Resource Recycling, Inc.													
3000 110th Ave. N, St.Pete, 33716	33716	(727) 573-2482	O	X				X				X	
Frontier Recycling/ Angelo's													
P.O. Box 1493, Largo FL 33779	33779	(727) 581-1544	O	X				X				X	
<b>Totals</b>	<b>2</b>												
<b>Polk</b>													
Allied Scrap Recycling													

## APPENDIX D: SCRAP METAL RECYCLING FACILITIES IN FLORIDA

		(Area Code)	(Abbreviations below)	Public	Private	Tons/Day	Tons/Day	PC	EC	MC	R	B	C
		33801	863/665-7157 BB	X				X		X		X	X
3330 E Main St, Lakeland, FL 33801		33844	863/422-5130 BB		X								X
American Allied Recycling			863/678-3267 BB		X								X
1610 Buff Av, Haines City, FL 33844													
B&H Enterprises International													
301 Old Icehouse Rd, Lake Wales, FL													
Evergreen Recycling													
160 Av F South, Auburndale, FL 33823		33823	863/665-2811 BB, RMPF		X							X	X
Gregco													
2901 E Main St, Lakeland, FL 33801		33801	863/665-8175 BB		X							X	X
Harrell's Scrap Metal													
2243 Mershon, Lakeland, FL 33801		33801	863/687-9451 BB		X							X	X
Metals and Materials Recycling, Inc.													
2908 Sydney Rd, Plant City, FL 33567		33567	813/759-8292 BB		X							X	X
Central Florida Recycling													
7623 US 98 N, Lakeland, FL 33809		33809	863/858-4959 BB		X							X	X
BFI - Cedar Trails Landfill													
2500 HWY 60 W, Bartow, FL 33830		33830	863/533-8776 O		X							X	X
Polk County Landfills (NC, SE, NE)													
50 Environmental Loop, Winter Haven, FL 33880		33880	863/499-2771 O	X								X	X
Polk County School Board			863/534-5052 O	X								X	X
Publix Supermarkets													
1963 George Jenkins Blvd, Lakeland, FL 33801		33801	863/688-1188 RMPF		X							X	X
Wise Recycling LLC													
1235 E Rose Street, Lakeland, FL 33801		33801	863/688-1389 RMPF		X							X	X
Scrappy Thomas, Inc.													
Pebbledale Rd, Mulberry, FL 33860		33860	863/428-1486 BB		X							X	X
Southeast Recycling Corporation													
52 Environmental Loop, Winter Haven, FL 33880		33880	863/665-2637 RMPF		X							X	X
T&M Salvage													
2605 Hwy 37 S., Mulberry, FL 33860		33680	863/425-1956 BB		X							X	X
<b>Totals</b>	<b>17</b>												
<b>Putnam</b>													
Tomoka Salvage													
Rt. 6 Box 1001, Palatka 32177		32177	904-325-4645 BB		X							X	X
Putnam Recycling													
1819 Madison Avenue, Palatka 32177		32177	904-325-5011 BB		X							X	X
John's Metals													
4305 Crill Avenue, Palatka 32177		32177	904-437-2163 BB		X							X	X
<b>Totals</b>	<b>3</b>												
<b>Santa Rosa</b>													
Recycle Santa Rosa													
6337 Dalisard, Milton 32583		32583	850-623-9349 RMRF		X							X	X
Navare Recycling													
6124 Hwy 98, Navarre		32561	850-934-8025 BB		X							X	X
Milton Iron & Metal													
7400 St Joseph St, Milton		32583	850-983-0709 BB		X							X	X
<b>Totals</b>	<b>3</b>												
<b>Sarasota</b>													
Augustine Used Auto Parts													
1395 5th St, Sarasota 34236		34236	941-355-2301 O		X							X	
Don's Recycling													
5084 Trott Circle, N.Port 34287		34287	941-426-3579 BB		X							X	
Englewood Buy Back Service Center													
2820 Worth Ave, Englewood 33422		33422	941-474-9391 BB		X							X	
Scrap=All													
1735 Myrtle St., Sarasota 34234		34234	941-351-4144 BB		X								
Venice Scrap Metal													
12 James St., Venice 34292		34292	941-484-3496 BB		X								
<b>Totals</b>	<b>5</b>												

## APPENDIX D: SCRAP METAL RECYCLING FACILITIES IN FLORIDA

		(Area Code)	(Abbreviations below)	Public	Private	Tons/Day	Tons/Day	PC	EC	MC	R	B	C
<b>Seminole</b>													
Seminole County Landfill													
1930 Osceola Rd., Geneva, FL 32732		32732	407-349-5539 O		X	no limit	unknown		X	X			
Kokomo Recycling, 918 W. 1st ST.													
Sanford, FL 32771		32771	407-321-0004 O		X	10.00	10.00		X		X		
Brothers Scrap Metals, Inc.													
420 S. Norton Ave., Orlando, FL 32805		320850	407-872-3622 BB		X	no limit	no limit		X		X		
Florida Recycling													
420 S. Florida Ave., Deland, FL 32720		32720	904-736-1109		X	no limit	no limit		X		X		
<b>Totals</b>	4												
<b>St. Johns</b>													
Tillman Ridge Landfill													
P.O. Drawer 349, St. Augustine 32085		32085	904-824-9720 DO		X	N/A	N/A		X		X		
Seaboard Sanitation Inc.													
445B International Golf Parkway, St. Augustine 32095		32095	904.825.0991 DO		X	N/A	N/A		X		X		
Tomoka			904-325-4645 MRF		X	300.00	100.00		X		X		
<b>Totals</b>	3												
<b>St. Lucie.</b>													
Atlantic Coast Recycling													
3301 Avenue D, Fort Pierce, FL 34947		34947	(561) 461-1831 BB		X	30.00	25.00		X		X		
Auto Busters													
4190 Selvitz Rd., Fort Pierce			(561) 466-5122 BB		X	UNKNOWN	6.00		X		X		
Second Chance Salvage													
1303 Selvitz Rd., Fort Pierce			(561) 461-2222 BB			UNKNOWN							
St. Lucie County Landfill													
4120 Glades Cutoff Rd, Ft. Pierce			(561) 462-1768 MRF		X	350.00	50.00		X		X		
<b>Totals</b>	4												
<b>Sumter</b>													
Beeman's Salvage													
County Road 416, Lake Panasofkee 33538		33538	352-793-8888 DO, BB		X	0.07			X		X		
Lynch Recyclers													
1616 W C-48, Bushnell 33513		33513	352-793-4588 DO, BB		X	0.60			X		X		
SCSWF													
835 County Road 529, Sumterville 33538		33538	352-793-3368 MRF		X	100.00	50.00		X		X		
<b>Totals</b>	3												
<b>Suwannee</b>													
Suwannee Auto Salvage													
Recycling Center Of Live Oak		32060	904-362-5004 BB		X				X		X		
Suwannee Co. Collection Site #1		32060	904-364-5865 B.B		X				X		X		
27002 CR 49		32060	904-935-1354 DO		X								
Suwannee County Collection Site #2		32060	904-364-5731 DO		X				X		X		
12706 80th Terr		32060	904-658-1278 DO		X				X		X		
Suwannee County Collection Site #3		32060	904-362-5603 DO		X				X		X		
23163 CR 250		32060	904-935-2794 DO		X				X		X		
Suwannee County Collection Site #4		32060	904-935-0315 DO		X				X		X		
18524 52nd St		32060	904-364-4878 DO		X				X		X		
Suwannee County Collection Site #5		32060	904-362-7399 DO		X				X		X		
21486 CR 49		32060	904-362-6840 DO		X				X		X		
Suwannee County Collection Site #6		32060	904-362-6840 DO		X				X		X		
9186 216th St		32060	904-362-6840 DO		X				X		X		
Suwannee County Collection Site #7		32060	904-362-6840 DO		X				X		X		
11182 144th St		32060	904-362-6840 DO		X				X		X		
Suwannee County Collection Site #8		32060	904-362-6840 DO		X				X		X		
9202 101st Rd		32060	904-362-6840 DO		X				X		X		
Suwannee County Collection Site #9		32060	904-362-6840 DO		X				X		X		
9681 SR 51		32060	904-362-6840 DO		X				X		X		
Suwannee County Collection Site #10		32060	904-362-6840 DO		X				X		X		

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		(Area Code)	(Abbreviations below)	Public	Private	Tons/Day	Tons/Day	PC	EC	MC	R	B	C
9743 CR 136		32060	904-364-4880	DO	X				X			X	
Suwannee County Collection Site #11		32060	904-364-1229	DO	X				X			X	
6830 CR 249		32060	904-776-1468	DO	X				X			X	
Suwannee County Collection Site #12		32060	904-362-1629	DO	X				X			X	
14890 SR 51		32060	904-963-4885	DO	X				X			X	
Suwannee County Collection Site #13													
11673 CR 137													
Suwannee County Collection Site #14													
SR 129 N													
<b>Totals</b>	<b>15</b>												
<b>Taylor</b>													
Taylor County Recycling Facility		32347	850-838-3533	MRF	X	10.00	6.00	X				X	
3750 Hwy. 98 West, Perry FL 32347		32347	850-838-5865	MRF	X	25.00	12.00	X				X	
Recycling Center													
1617 S. Byron Butler Pkwy, Perry 32347													
<b>Totals</b>	<b>2</b>												
<b>Union</b>													
Union County Correctional Institute		32083	904/431-2000	O	X			X				X	
P.O. 221, Raiford 32083		32054	904/496-2222	O	X			X				X	
North Florida Reception Center		32083	904/496-2180	O	X			X				X	
Highway 231, Lake Butler 32054													
Union County School District													
55 SW 6th Street, Raiford 32083													
<b>Totals</b>	<b>3</b>												
<b>Volusia</b>													
Trademark		32120	904-255-1453	BB	X	120.00	112.00	X				X	
402 Third St., Holly Hill 32120		33114	904-252-4488	BB	X			X				X	
Mid -Florida Recycling		3220	904-736-2547	BB	X			X				X	
412 Second Av., Daytona Bch. 32114		32720	904-736-1109	BB	X			X				X	
Charlie's Alumacan		32124	904-736-4255	BB	X			X				X	
227 W. Vermont Av., DeLand 3220													
Florida Recycling													
420 S. Florida Av., DeLand 32720													
Lewis Metal Service													
1315 E. HWY 92, DeLand 32124													
<b>Totals</b>	<b>5</b>												
<b>Wakulla</b>													
Lower Bridge Central Landfill		32326	(850) 926-7010	MRF	X			X					
159 Landfill Rd. Crawfordville, FL 32326													
<b>Totals</b>	<b>1</b>												
<b>Walton</b>													
Walton County Recycling Center		32433	850-892-8180	MRF	X	100.00	75.00	X				X	
1118 WWII Vetrans Lane, DeFuniak Springs, FL 32433		32435	850-835-3316	BB	X	N/A	N/A	X				X	
Freeport Recycling													
U.S. 331 South, Freeport, FL 32435													
<b>Totals</b>	<b>2</b>												
<b>Washington</b>													
Wise Recycling			L.L.C.	Semi-trailer	X	No Limit	Various	X				X	X
<b>Totals</b>	<b>1</b>												

1 MRF- Materials Recovery Facility (dirty MRF), RMPF- Recovered Materials Processing Facility (clean MRF), D - Drop off center, B - Buy back center, O - Other

2 PC - Partial County, EC - Entire County, MC - Multiple County

## APPENDIX E: WHITE GOODS RECYCLING FACILITIES IN FLORIDA

<b>Facility/Address/City/Zip</b> ("P" Indicates Proposed Facility)	<b>Zip Code</b> (Florida)	<b>Phone#</b> (Area Code)	<b>Type<sup>1</sup></b> (Abbreviations below)	<b>Ownership</b>	<b>Capacity</b> Tons/Day	<b>Processed</b> Tons/Day	<b>Service Area<sup>2</sup></b>			<b>Material Source<sup>3</sup></b>				
							Public	Private	Tons/Day	PC	EC	MC	R	B
<b>Alachua</b> Southeast Recycling 906 SW 3 St, Gainesville FL 32601	32601	352-378-3001	RMPF,BB	X						X			X	
<b>Totals</b>	1													
<b>Baker</b> NRSWA Processing Center P.O. Box 647, Raiford 32083	32083	904/431-1000	MRF	X						X	X	X		
<b>Totals</b>	1													
<b>Bay</b> Bay County Incinerator 6510 Bay Line Dr., Panama City, 32404	32404	850-784-4028	DO	X						X			X	
Bay County Beach Transfer Station 1507 N. Gulf Blvd., P.C. Bch., 32407	32407	850-233-5060	DO	X						X			X	
Coastal Metals Recycling Center 1023 E. 15th St., Panama City, 32401	32401	850-785-0267	BB	X						X	X			
Lewis Metals 2311 Industrial Dr., Panama City, 32404	32404	850-769-1336	BB	X						X	X			
<b>Totals</b>	4													
<b>Bradford</b> NRSWA Processing Center P.O. Box 647, Raiford 32083	32083	904-431-1000	MRF	X						X	X	X		
Starke Igloo Location City of Starke, Starke 32081	32081	904-964-5027	DO	X						X		X		
<b>Totals</b>	2													
<b>Brevard</b> Yorke Doliner & Company 490 Ansin Road, Cocoa	32922	407-636-2781	BB,RMPF	X	200.00	150.00				X		X		
<b>Totals</b>	1													
<b>Broward</b> Hollywood Scrap Recycling 5835 Plunkett St., Hollywood	33023	954-989-9544	BB,O	X						X	X			
Hollywood/City 3390 N 56 Ave., Hollywood	33023	954-967-4200	DO	X						X		X		
Central Trash Transfer Station 5490 Reese Rd., Davie	33317	954-75-4999	DO	X						X		X		
South Trash Transfer Station 5601 W Hallandale Beach Blvd., Hollywood	33023	954-765-4999	DO	X						X		X		
<b>Totals</b>	4													
<b>Calhoun</b> Cumbaa Enterprises Hwy 71, Blountstown, FL 32424	32424	O		X						X		X		
<b>Totals</b>	1													
<b>Charlotte</b> Charlotte County Zemel Road Landfill 27221 Beechcraft Rd. Punta Gorda, Fl		941-639-1802	O	X		20.00				X		X		
Chucks Recycling 5005 Dalewood St., Punta Gorda, Fl.		941-575-0586	BB	X		1.50				X		X		
<b>Totals</b>	2													
<b>Citrus</b> Inter-County Recycling 1801 W. Gulf to Lake Hwy, Lecanto 34461	34461	352-746-5272	BB	X						X		X		
ACRS Enterprises 142 NE 11th St., Crystal River 34428	34428	352-795-4456	BB	X						X		X		
<b>Totals</b>	2													
<b>Clay</b> Clay County Recycling Center 3545 Rosemary Hill Rd. Grn. Cv. Spgs, 32043	32043	904-284-6374	RMPF	X	75.00	20.00				X		B		
Doctors Inlet ECC 288 Sleepy Hollow Rd Orange Park 32065	32065	904-284-6374	DO	X	2.00	2.00	X					R		

**APPENDIX E: WHITE GOODS RECYCLING FACILITIES IN FLORIDA**

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				Public	Private			PC	EC	MC	R	B	C
Long Bay ECC 1589 Long Bay Rd Middleburg 32068	32068	904-284-6374	DO	X		2.00	2.00	X			R		
Keystone Heights ECC 5505 County Rd 214 Keystone Hghts. 32656	36556	904-284-6374	DO	X		2.00	2.00	X			R		
Clay Hill ECC 5869 County Rd 218 Clay Hill 32234	32234	904-284-6374	DO	X		2.00	2.00	X			R		
<b>Totals</b>	<b>5</b>												
<b>Collier</b>													
Naples landfill & Recycling Facility 3750 Landfill Rd., Naples, FL 34134	34134	941/455-8062	O	X		1000.00	300.00	X			X		
Naples Transfer & Recycling Fac. 2640 W. Enterprise Ave.34104	34104	941/643-3099	DO	X		N/A	50.00	X			X		
Marco Transfer & Rec. Fac. 771 Elkcam Cir. Marco Island 34145	34145	941/394-2134	DO	X		N/A	40.00	X			X		
Carnestown Recycling & transfer station US 41 & SR 29 Carnestown	34139	941/695-4331	DO	X		N/A	1.00	X					
City of Naples Operations Center Goodlette Rd. & Central Ave, Naples	34102	941/434/4678	DO	X		N/A	N/A	X			X		
Schneider Metals 5755 Yahl St	34109	941/597-207	BB	X		N/A	N/A	X			X		
Immokalee Disposal 120 New Market Rd.	34102	941/657-2729	DO	X		N/A	N/A	X			X		
<b>Totals</b>	<b>7</b>												
<b>Columbia</b>													
Interstate Recycling W. U.S. Hwy 90, Lake City, FL 32055	32055	904-752-7584	BB	X		3.00	2.75	X			X		
Commercial Metals, Inc. 201 E. Hwy 100A, Lake City, FL 32055	32055	904-755-7852	BB	X		40.00	36.00	X			X		
Columbia Salvage 515 N. Marion St. Lake City, FL 32055	32055	904-755-6380	BB	X		12.00	10.00	X			X		
<b>Totals</b>	<b>3</b>												
<b>Dade</b>													
A-1 Pallet Depot 3320 N.W. 35 Avenue , Miami, FL 33142	33143	(305)638-3588	DO, BB	X		120 CY	80 CY	X			X		
Everglades/Newell 3440 NW 135 St -Opa-Locka 33054	33054	(305)681-4204	RMPF	X		1000.00	650.00	X			X		
Mr. Delivery of Miami, Inc. 2139 SW 138 Ct. Miami, FL 33175	33175	(305)266-7678	DO,BB	X		100.00	50.00	X			X		
<b>Totals</b>	<b>3</b>												
<b>DeSoto</b>													
Bobby Suggs Recycling 2279 SW Highway 17, Arcadia 34266	34268	941-993-4224	BB	X				X			X		
<b>Totals</b>	<b>1</b>					NA	0	1	0.00	0.00	0	0	1
<b>Dixie</b>													
Dixie Co Transfer Station P. O. Box 2009, Cross City, FL 32628	32628	352)498-1289	RMPF	X				X			X		
349 North Old Town, FL	32680		DO	X				X			X		
CR351A & 351 Old Town, FL	32680		DO	X				X			X		
CR317-Hinton Landing Old Town, FL	32680		DO	X				X			X		
CR55A-Bert Lee Rd Old Town, FL	32680		DO	X				X			X		
Suwannee Suwannee, FL	32680		DO	X				X			X		
CR351-Jack Roberts Curve Cross City, FL	32692		DO	X				X			X		
Horseshoe Beach Horseshoe Beach, FL	32648		DO	X				X			X		

**APPENDIX E: WHITE GOODS RECYCLING FACILITIES IN FLORIDA**

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				Public	Private			PC	EC	MC	R	B	C
Jena Jena, FL County Yard Cross City, FL CCCI Cross City, FL	32628		DO	X					X		X		
	32628		DO	X					X		X		
	32628		O	X					X		X		
<b>Totals</b>	11												
<b>Duval</b>													
City Appliance Center 2675 Commonwealth/Jax/32254	32254	904-387-8999	RMPF	X		1.00	0.55	X			X		X
Commercial Metals 2038 N. Lane Ave/Jax/32254	332254	904-786-2771	O		X				X		X		
Global Shredding Technologies 16770 Rebar Rd/Jax/32234	32234	904-266-3161	O		X				X		X		
<b>Totals</b>	3												
<b>Escambia</b>													
Auto Shred Recycling, L.L.C. 1000 S. Myrick St., Pensacola 32505	32505	850-432-0977	O (Ferrous/Non ferrous Ya	X				Proprietary		X		X	
GSI Recycling, Inc. 1831 N Hollywood Ave, Pensacola 32505	32505	850-434-3219	O (Ferrous/Non ferrous Ya	X				Proprietary		X		X	
Southern Scrap Co., Inc P.O. Box 12388, Pensacola 32582	32582	850-438-3197	O (Ferrous/Non ferrous Ya	X				Proprietary		X		X	
Wise Recycling, L.L.C. 605 W. Hope Dr., Pensacola		850-477-5336	O (Non ferrous Yard)		X			Proprietary		X		X	
Perdido Landfill 13009 Beulah Rd., Cantonment 32533	32533	850-968-4180	RMRF	X		200.00	8.00	X					
<b>Totals</b>	5												
<b>Flagler</b>													
Flagler County C&D Facility 1200 E. Moody Blvd. 32110	32110	904-517-2075	C&D	X		100.00	80.00	X			X		
<b>Totals</b>	1												
<b>Franklin Co. Recycling Center</b> 210 S.R. 65, Eastpoint 32328	32328	850-670-8167	MRF	X		12.16	0.25	X			X		
<b>Totals</b>	1												
<b>Gadsden</b>													
Florida State Hospital PO Box 1000, Chattahoochee, 32324	32324	850-663-7565	RMPF	X		10.00	5.00	X			X		
Gadsden County Recycling Center PO Box 1799, Quincy, 32353	32353	850-875-8658	RMPF	X		50.00	20.00	X			X		
<b>Totals</b>	2												
<b>Gilchrist</b>													
Gilchrist County SWTS/RRF 1659 N.W. 10th St. Bell, FL. 32693	32693	352-463-3185	MRF/DO	X		10.00	6.00	X			X		
S.E. Community Center Drop-Off Site 6970 S.E. 70th Ave. Trenton, FL. 32693	32693	352-472-1140	DO	X		10.00		X			X		
<b>Totals</b>	2												
<b>Glades</b>													
Landfill #2 - 11990 W. SR78 Moore Haven, FL 33471	33471	941 675-0124	DO	X			18.00	X			X		
<b>Totals</b>	1												
<b>Gulf</b>													
Port St. Joe Recycling Facility Port St. Joe 32456	32456	850-229-8261	MRF	X		25.00	15.00	X			X		
<b>Totals</b>	1												
<b>Hamilton</b>													
<b>Totals</b>	0												
<b>Hardee</b>													
Hardee County MRF													

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				Public      Private			PC      EC      MC	R      B      C
685 Airport Road, Wauchula, FL 33873	33873	941-773-5089	MRF	X	100.00	55-65	X	X
<b>Totals</b>	1							
<b>Hendry</b>								
Hendry County Recycling Center		863-674-4162	MRF	X	200.00	100.00	X	X      X
Hendry County Recycling Center		863-250-2943	MRF	X	100.00	50.00	X	X
<b>Totals</b>	2							
<b>Hernando</b>								
Northwest Waste Management Facility 14450 Landfill Rd, Brooksville 34614	34614	352-754-4112	RMPF	X	30.00	16-20	X	X
<b>Totals</b>	1							
<b>Highlands</b>								
County Class I Landfill Sebring 33870	33870	Unmanned dropoff	O	X			X	X
<b>Totals</b>	1							
<b>Hillsborough</b>								
South County CCC 13000 US HWY 41 Tampa , 33534	33534	813-671-7611	DO	X	12.00	12.00	X	X
Southeast County CCC County Road 672 Tampa, 33547	33547	813-671-7674	DO	X	12.00	12.00	X	X
North Star Recycling 5220 Dover St. Tampa 33619	33619	813-677-4471	RMPF,BB	X	300.00	300.00	X	X
Finer Scrap Processors 3204 5th Ave. Tampa 33605	33605	813-247-5546	RMPF,BB	X	50.00	50.00	X	X
<b>Totals</b>	4							
<b>Holmes</b>								
MRF, Rt. 1 Box 268, Bonifay, FL 32425	32425	850-547-0922	MRF	X	3.00	1.00	x	x
<b>Totals</b>	1							
<b>Indian River</b>								
Indian River County Sanitary Landfill 1325 SW 74th Ave. Vero Beach 32968	32968	561-770-5112	RMPF	X	500.00	140.00	X	X
Old Dixie Transfer Station 950 1st Place Vero Beach 32962	32962	561-770-5115	DO	X		23.39	X	X
Gifford Transfer Station 4901 41st St. Vero Beach 32967	32067	561-770-5044	DO	X		14.39	X	X
Winter Beach Transfer Station 3955 65th St. Vero Beach 32967	32967	561-770-5094	DO	X		5.25	X	X
Fellsmerer Transfer Station 15210 CR 512 Fellsmere 32948	32948	561-571-0483	DO	X		8.53	X	X
<b>Totals</b>	5							
<b>Jackson</b>								
JackSun Recycling Facility 3530 Wiley Dr., Marianna, Florida 32446	32446	850-482-9274	RMPF	X			X	X
<b>Totals</b>	1							
<b>Jefferson</b>								
<b>Lafayette</b>	Totals	0						
<b>Lake</b>	Totals	0						
Astor Drop-off Center Astor Transfer Station Rd. ,Astor 32102	32102	352-759-2776	DO	X	3.00	3.00	X	X
Loghouse Drop-off Center 10435 Loghouse Rd., Clermont 34711	34711	352-394-5137	DO	X	3.00	3.00	X	X
Paisley Drop-off Center 44225 Spring Creek Rd., Paisley 32767	32767	352-669-3430	DO	X	3.00	3.00	X	X
Lady Lake Drop-off Center 1200 Jackson St., Lady Lake 32159	32159	352-753-2212	DO	X	3.00	3.00	X	X
Lake Co. Landfill- 13130 Astatula								

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				Public X	Private		PC X	EC X	MC X	R X	B X	C
Landfill Rd., Tavares 32778	32778	352-343-3776	DO, RMPF	X	*			X				X
American Allied Aluminum Inc.-15940												
Old Hwy 441, Tavares 32778	32778	352-343-5144	MRF	X	*			X				X
<b>Totals</b>	<b>6</b>											
<b>Lee</b>												
Garden St. Iron & Metal												
3350 Metro Parkway Ft Mayers 33916	33916	941-337-5865	BB	X		200	X					X
Allied Recycling												
3460 Mlkng Jr, Blvd Ft Myers 33916	33916	(941) 332-7766	BB	X		100.00		X				X
Cm Gray Scrap Metals												
2803 Lafayette St Cape Coral 33904	33904	(941) 332-2688	BB	X		10.00	X					X
All Scrap Salvage												
2294 Bruner Ln Ft Myers 33912	33912	(941) 482-5722	BB	X		10.00	X					X
<b>Totals</b>	<b>3</b>											
<b>Leon</b>												
Ace Salvage								X				X
Hwy 90 W, Midway, FL 32343	32343	850-574-1364	BB	X								X
Crowder Excavation												
901 Geddie Road, Tallahassee, FL 32304	32304	850-576-7176	O	X								X
Leon Iron & Metal												
3720 Woodville Hwy, Tallahassee, FL 32311	32311	850-877-6106	BB	X								X
Blount Rural Waste Collection Center												
Hwy 20 W, Tallahassee, FL 32304	32304	850-922-0098	DO	X			X					X
Miccosukee RWCC												
Miccosukee Road, Tallahassee, FL 32308	32308	850-922-0097	DO	X			X					X
Ft. Braden RWCC												
Hwy 20 W, Tallahassee, FL 32304	32304	850-488-9119	DO	X			X					X
Woodville RWCC												
Joe Thomas Road, Woodville, FL 32311	32311	850-488-9099	DO	X			X					X
Solid Waste Facility RWCC												
7550 Apalachee Parkway, Tallahassee, FL 32311	32311	850-487-2890	DO	X			X					X
<b>Totals</b>	<b>8</b>											
<b>Levy</b>												
Levy Co. Solid Waste Mmg. Facility												
12051 NE 19th Ln. Bronson 32621	32621	352-486-5127	RMPF,DO,O	X				X				X
<b>Totals</b>	<b>1</b>											
<b>Liberty</b>												
County Recycling Center												
P.O. Box 399, Bristol, 32321	32321	850-643-3777	MTWRFS	X				X				X
<b>Totals</b>	<b>1</b>											
<b>Madison</b>												
Rocky Ford Collection Center												
Rocky Ford Road (CR591) Madison 32340	32340	850-973-8640	DO	X	1.00	0.00	X					X
Greenville Collection Center												
Hwt 221 South of Greenville, 32331	32331	850-948-3717	DO	X	1.00	0.00	X					X
Cherry Lake Collection Center												
Hwy 53 North (Cherry Lake) Madison 32340	32340	850-929-7517	DO	X	1.00	0.00	X					X
Raven's Wood Collection Center												
U.S. 90 West of Madison, Madison 32340	32340	850-973-9279	DO	X	1.00	0.00	X					X
Lee Collection Center												
Hwy 255 North of Lee 32059	32069	850-973-9279	DO	X	1.00	0.00	X					X
Pinetta Collection Center												
Hwy 150 West of Pinetta 32350	32350	850-000-0000	DO	X	1.00	0.00	X					X
Madison County Recycling Center												
Rocky Ford Road (CR591) Madison 32340	32340	850-973-2611	MRF	X	125.00	1.20	X				X	X
Madison Metal Company												
U.S. 14 South of Madison 32340	32340	850-973-8483	BB	X	300.00	5.00	X	X	X	X	X	X
B & W Salvage												
U.S. 53 South of Madison 32340		850-973-3314	BB	X	350.00	7.50	X	X	X	X	X	X
<b>Totals</b>	<b>9</b>											

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	Totals	0			Public      Private			PC    EC    MC	R    B    C
<b>Marion</b>	ABC Scrap Metal, Svinga Bros. 206 N.E. 9th St. Ocala 34475 Ocala Recycling Inc. 2402 N.W. 6th St. Ocala 34471 Sun-State Recycling Inc. 7100 N.W. Gainesville Rd. Ocala 34475 Baseline Recycling Center 5601 S.E. 66th St. Ocala 34480		34475      34475      34475      34480	352-351-2841    352-351-3383    352-622-4719    352-245-1580 RMPF      RMPF      RMPF      DO	X      X      X      X			X      X	X      X
	Totals	4							
<b>Martin</b>	Snake Road Auto Salvage 1650 SE Salerno Rd., Port Salerno		34997	(561) 287-2060	BB	X		X	X
	Totals	1							
<b>Monroe</b>	Key West Recycling Facility 5701 W. College Rd., Key West 33040 Long Key Recycling Facility MM 68 Overseas Hwy, Long Key		33040      33050	305-293-6409    305-289-6308	RMPF      RMPF	X      X	100.00      100.00	20.00      X	X      X
	Totals	2							
<b>Nassau</b>	Nassau County 440 S. Kings Road, Callahan 32011 City Of Fernandina Beach P.O. Box 668, Fernandina Beach 32035		32011      32035	904-879-5722    904-277-7380	O/DO      O/DO	X      X		X      X	X      X
	Totals	2							
<b>Okaloosa</b>	Baker Landfill 1415 Charlie Day Rd, Baker Fl. 32531 Auto Shred N. Beal Ext. Ft. Walton Beach 32547		32531      32547	(850)689-5780    (850) 682-6282	DO      BB	X      X	0.50      20.00	0.20      15.00	X      X
	Totals	2							
<b>Okeechobee</b>	Totals	0							
<b>Orange</b>	Totals	0							
<b>Osceola</b>	Totals	0							
<b>Palm Beach</b>	SWA Class III Waste Reduction Facility 6554-B N Jog Rd, West Palm Bch 33412		33412	561/688-9001	O	X	N/A	N/A	X      X
	Totals	1							
<b>Pasco</b>	West Pasco Recycling Center Hays Rd. (S.R. 52) Shady Hills, FL US HWY 19, Jasmine Plaza, Port Richey, FL Goodwill Industries US HWY 19 N., Tahitian Center, Holiday, FL Goodwill Industries HWY 301, Dade Village Shop Ctr, Dade City, FL Goodwill Industries Gall Boulevard, Zephyrhills, FL Goodwill Industries Village Lakes Shop Ctr., Land O' Lakes			727-847-8041    727-523-1512	DO      DO	X      X		X      X	X      X
	Totals	6							
<b>Pinellas</b>	Resource Recycling, Inc. 3000 110th Ave. N, St.Pete, 33716		33716	(727) 573-2482	O	X		X	X

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				Public      Private	Tons/Day	Tons/Day	PC    EC    MC	R    B    C
<b>Totals</b>	1							
<b>Polk</b>								
Gregco 2901 E Main St, Lakeland, FL 33801	33801	863/665-8175	BB	X			X	X
Central Florida Recycling 7623 US 98 N, Lakeland, FL 33809	33809	863/858-4959	BB	X			X	X
Polk County Landfills (NC, SE, NE) 50 Environmental Loop, Winter Haven, FL 33880	33880	863/499-2771						
<b>Totals</b>	3							
<b>Putnam</b>								
Waste Management, Inc. Rt. 6 Box 5374M, Palatka 32177	32177	904-328-5445	RMPF	X			X	X
Tomoka Salvage Rt. 6 Box 1001, Palatka 32177	32177	904-325-4645	BB	X			X	X
Putnam Recycling 1819 Madison Avenue, Palatka 32177	32177	904-325-5011	BB	X			X	X
John's Metals 4305 Crill Avenue, Palatka 32177	32177	904-437-2163	BB	X			X	X
<b>Totals</b>	4							
<b>Santa Rosa</b>								
Recycle Santa Rosa 6337 Dalisard, Milton 32583	32583	850-623-9349	RMRF	X			X	X
Navare Recycling 6124 Hwy 98, Navarre	32561	850-934-8025	BB	X			X	X
Milton Iron & Metal 7400 St Joseph St, Milton	32583	850-983-0709	BB	X			X	X
<b>Totals</b>	3							
<b>Sarasota</b>								
<b>Totals</b>	0							
<b>Seminole</b>								
Seminole County Landfill 1930 Osceola Rd., Geneva, FL 32732	32732	407-349-5539	O	X	no limit	unknown	X	X
<b>Totals</b>	1							
<b>St. Johns</b>								
Tillman Ridge Landfill P.O. Drawer 349, St. Augustine 32085	32085	904-824-9720	DO	X	N/A	N/A	X	X
Seaboard Sanitation Inc. 445B International Golf Parkway, St. Augustine 32095	32095	904.825.0991	DO	X	N/A	N/A	X	X
Tomoka		904-325-4645	MRF	X	300.00	100.00	X	X
<b>Totals</b>	3							
<b>St. Lucie.</b>								
<b>Totals</b>	0							
<b>Sumter</b>								
SCSWF 835 County Road 529, Sumterville 33538	33538	352-793-3368	MRF	X	100.00	50.00	X	X
<b>Totals</b>	1							
<b>Suwannee</b>								
Suwannee Auto Salvage	32060	904-362-5004	BB	X			X	X
Recycling Center Of Live Oak	32060	904-364-5865	B.B	X			X	X
Suwannee Co. Collection Site #1 27002 CR 49	32060	904-935-1354	DO	X			X	
Suwannee County Collection Site #2 12706 80th Terr	32060	904-364-5731	DO	X			X	X
Suwannee County Collection Site #3 23163 CR 250	32060	904-658-1278	DO	X			X	X
Suwannee County Collection Site #4 18524 52nd St	32060	904-362-5603	DO	X			X	X

## APPENDIX E: WHITE GOODS RECYCLING FACILITIES IN FLORIDA

<b>Facility/Address/City/Zip</b> ("P" Indicates Proposed Facility)	<b>Zip Code</b> (Florida)	<b>Phone#</b> (Area Code)	<b>Type<sup>1</sup></b> (Abbreviations below)	<b>Ownership</b>		<b>Capacity</b> Tons/Day	<b>Processed</b> Tons/Day	<b>Service Area<sup>2</sup></b>			<b>Material Source<sup>3</sup></b>		
				Public	Private			PC	EC	MC	R	B	C
Swannee County Collection Site #5 21486 CR 49	32071	904-935-2794	DO	X					X			X	
Swannee County Collection Site #6 9186 216th St	32071	904-935-0315	DO	X					X			X	
Swannee County Collection Site #7 11182 144th St	32060	904-364-4878	DO	X					X			X	
Swannee County Collection Site #8 9202 101st Rd	32060	904-362-7399	DO	X					X			X	
Swannee County Collection Site #9 9681 SR 51	32060	904-362-6840	DO	X					X			X	
Swannee County Collection Site #10 9743 CR 136	32060	904-364-4880	DO	X					X			X	
Swannee County Collection Site #11 6830 CR 249	32060	904-364-1229	DO	X					X			X	
Swannee County Collection Site #12 14890 SR 51	32060	904-776-1468	DO	X					X			X	
Swannee County Collection Site #13 11673 CR 137	32060	904-362-1629	DO	X					X			X	
Swannee County Collection Site #14 SR 129 N	32060	904-963-4885	DO	X					X			X	
<b>Totals</b>	<b>15</b>												
<b>Taylor</b> Recycling Center 1617 S. Byron Butler Pkwy, Perry 32347	32347	850-838-5865	MRF		X	25.00	12.00			X		X	
<b>Totals</b>	<b>1</b>												
<b>Union</b> NRSWA Processing Center P.O. 647, Raiford 32083	32083	904/431-1000	MRF	X						X		X	
<b>Totals</b>	<b>1</b>												
<b>Volusia</b> Trademark 402 Third St., Holly Hill 32120	32120	904-255-1453	BB		X	120.00	112.00			X		X	
Charlie's Alumacan 227 W. Vermont Av., DeLand 3220	3220	904-736-2547	BB		X					X		X	
Lewis Metal Service 1315 E. HWY 92, DeLand 32124	32124	904-736-4255	BB		X					X		X	
<b>Totals</b>	<b>3</b>												
<b>Wakulla</b> Lower Bridge Central Landfill 159 Landfill Rd. Crawfordville, FL 32326	32326	(850) 926-7010	MRF	X						X			
<b>Totals</b>	<b>1</b>												
<b>Walton</b> Walton County Recycling Center 1118 WWII Vetrans Lane, DeFuniak Springs, FL 32433	32433	850-892-8180	MRF	X		100.00	75.00			X		X	
Freeport Recycling U.S. 331 South, Freeport, FL 32435	32435	850-835-3316	BB		X	N/A	N/A	X				X	
<b>Totals</b>	<b>2</b>												
<b>Washington</b> <b>Totals</b>	<b>0</b>												

1 MRF- Materials Recovery Facility (dirty MRF), RMPF- Recovered Materials Processing Facility (clean MRF), D - Drop off center, B - Buy back center, O - Other

2 PC - Partial County, EC - Entire County, MC - Multiple County

**APPENDIX F: CLASS I, II AND III LANDFILL FACILITIES IN FLORIDA**

COUNTY	SITE NAME	CLASS	SITE LOCATION	CITY	OPERATOR
ALACHUA	SOUTHWEST ALACHUA LANDFILL	I	SR24, 2MI W ARCHER	ARCHER	ALACHUA COUNTY
	SOUTHWEST ALACHUA LANDFILL	III	SR24, 2 MI W ARCHER	ARCHER	ALACHUA COUNTY COMMISSIONERS
BAY	STEELFIELD ROAD LANDFILL	I	STEELFIELD RD,3 MI W OF HWY 79	WEST BAY	BAY COUNTY COMMISSIONERS
	STEELFIELD ROAD LANDFILL	III	STEELFIELD RD,3 MI W OF HWY 79	WEST BAY	BAY COUNTY COMMISSIONERS
BREVARD	BREVARD COUNTY CENTRAL LANDFILL	I	W OF ADAMSON RD, 2MI N SR524	COCOA	BREVARD CO BOARD COUNTY COMM
	CAPE CANAVERAL ASBESTOS MONOFILL	III	CENTRAL CONTROL RD	CAPE CANAVERAL AFS	USAF PATRICK AIR FORCE BASE
	SARNO ROAD LANDFILL	III	.5MI S SARNO RD, 1.5MI E I95	MELBOURNE	BREVARD COUNTY SOLID WASTE
	SCHWARTZ ROAD LANDFILL	III	SCHWARTZ RD	KENNEDY CENTER	SPACE DIRECTOR,DESIGN NASA ENG,KSC-
BROWARD	BROWARD CO INTERIM CONTINGENCY LF	I	US 27 & SHERIDAN STREET	PEMBROKE PINES	BROWARD CO OFFICE
	BROWARD CO SOUTH RRF ASH MONOFILL	I	4400 S SR 7	FT. LAUDERDALE	WHEELABRATOR
	CENTRAL SANITARY LF & RECYCLING CENTER	I	3000 NW 48TH ST (HILTON RD)	POMPANO BEACH	WASTE MANAGEMENT
CHARLOTTE	CHARLOTTE COUNTY SLF (ZEMEL RD LF)	I	ZEMEL RD, W US41	TROPICAL GULF ACRES	CHARLOTTE CO MOSQUITO CONTROL
CITRUS	CITRUS CENTRAL LANDFILL	I	3MI E LECANTO, SR44	LECANTO	CITRUS COUNTY COMMISSIONERS
CLAY	ROSEMARY HILL LANDFILL	III	ROSEMARY HILL RD, W OF C-315	GREEN COVE SPRINGS	CLAY COUNTY COMMISSIONERS
COLLIER	IMMOKALEE LANDFILL (NO 2 - STOCKADE)	I	STOCKADE RD @ CR846	IMMOKALEE	WASTE MANAGEMENT OF FLORIDA
COLLIER	NAPLES LANDFILL CELL NO 6 (COLLIER COUNTY)	I	1.5MI E JCT SR951 & SR84	NAPLES	WASTE MANAGEMENT OF FLORIDA
COLUMBIA	WINFIELD SW FACILITY	I	OOSTERCHOUTD RD, W. OF US41	LAKE CITY	COLUMBIA CO BOARD OF CO COMM
	WINFIELD SW FACILITY	III	OOSTERCHOUTD RD, W OF US 41	LAKE CITY	COLUMBIA CO BOARD OF CO COMM
DADE	MEDLEY LANDFILL & RECYCLING CENTER	I	9350 NW 89 AVENUE	MEDLEY	WASTE MANAGEMENT
	SOUTH DADE LANDFILL	I	SW 248TH ST & 97TH AVE	GOULDS	MIAMI-DADE DEPT SOLID WASTE MGMT
	DADE CO RES. RECOVERY ASH MONOFILL	I	6990 NW 97TH AVE & NW 69TH STREET	MIAMI	MIAMI-DADE DEPT SOLID WASTE MGMT
	NORTH DADE LANDFILL	III	NW 215TH ST & 47TH AVE	CAROL CITY	MIAMI-DADE DEPT SOLID WASTE MGMT
DESOTO	SECTION 16 LANDFILL EXPANSION	I	2MI NW JCT US17 & SR760	NOCATEE	DESOTO COUNTY COMMISSIONERS

**APPENDIX F: CLASS I, II AND III LANDFILL FACILITIES IN FLORIDA**

DUVAL	TRAIL RIDGE LANDFILL	I	US 301, 1.5MI NW OF MAXVILLE	BALDWIN	TRAIL RIDGE LANDFILL, INC
ESCAMBIA	CRIST PLANT COAL ASH MONOFILL	I	END OF PATE STREET	PENSACOLA	GULF POWER COMPANY
	PERDIDO LANDFILL	I	BEULAH-MUSKOGEE RD	MUSCOGEE	ESCAMBIA COUNTY SOLID WASTE
	PERDIDO LANDFILL	III	BEULAH-MUSKOGEE RD	MUSCOGEE	ESCAMBIA COUNTY SOLID WASTE
	ROCK CROSSING (CHAMPION PAPER)	I	MUSCOGEE RD, 1 MI S JACKS BRANCH	CANTONMENT	CHAMPION INTERNATIONAL CORP
FRANKLIN	FRANKLIN COUNTY CENTRAL LANDFILL	III	SR65, 1.2MI N OF US HWY 98	GREENPOINT	FRANKLIN CO BOARD OF CO COMM
GADSDEN	BYRD LANDFILL	III	1.5MI FROM SR10 ON SELMAN RD	QUINCY	CITY OF QUINCY
GLADES	GLADES COUNTY LANDFILL	II	1/4 MI N OF SR78, W OF US27	MOOREHAVEN	GLADES CO BOARD OF CO COMM
GULF	FIVE POINTS LANDFILL	III	0.75 MI E OF HWY 71 2MI NE OF	PORT ST. JOE	GULF COUNTY COMMISSIONERS
	FL COAST PAPER (HIGHLAND VIEW DISP SITE)	I	HIGHLAND VIEW	PORT ST. JOE	FLORIDA COAST PAPER COMPANY
HAMILTON	HAMILTON COUNTY LANDFILL	I	BASIN SWAMP RD & S CEMETERY RD	JASPER	HAMILTON COUNTY COMMISSIONERS
HARDEE	HARDEE COUNTY REGIONAL LANDFILL	I	AIRPORT RD, N SR636	WAUCHULA	HARDEE COUNTY COMMISSIONERS
HENDRY	LEE/HENDRY CO REGIONAL LANDFILL	I	SOUTH CHRUCH ROAD, HENDRY CO	FELDA	LEE COUNTY SW MANAGEMENT
HERNANDO	HERNANDO CO NORTHWEST LANDFILL	I	US90 & TATUM ROAD	BROOKSVILLE	HERNANDO COUNTY UTILITIES DEPT
HIGHLANDS	HIGHLANDS COUNTY SW MGMT CENTER	I	12700 ARBUCKLE CREEK ROAD	SEBRING	HIGHLANDS COUNTY SOLID WASTE
	SEBRING TRASH SITE	III	CEMETARY ROAD	SEBRING	CITY OF SEBRING
	AVON PARK LANDFILL & TRANSFER STATION	III	N HIGHLANDS AVE & SR17A	AVON PARK	HIGHLANDS COUNTY COMMISSIONERS
HILLSBOROUGH	DAVID J JOSEPH LANDFILL	I	KINGSWAY RD, 0.5MI N OF I4	TAMPA	DAVID J JOSEPH
	SOUTHEAST COUNTY LANDFILL (PICNIC LF)	I	.2MI W OF CR39, N OF CR 672	PICNIC	HILLS COUNTY SOLID WASTE DEPT
INDIAN RIVER	INDIAN RIVER COUNTY LANDFILL - CLASS I	I	RANGE LINE ROAD	OSLO	INDIAN RIVER COUNTY UTILITIES
JACKSON	SPRINGHILL REGIONAL LANDFILL	I	1.5MI SW CAMPBELLTON, W SR273	CAMPBELLTON	WASTE MGMT OF NORTH AMERICA
	APALACHEE CORRECTIONAL INSTITUTION	III	US 90 & SR 271	SNEADS	DEPT OF CORRECTIONS
LAKE	LAKE CO SOLID WASTE MGMT FACILITY	I	W OF SR561	ASTATULA	LAKE COUNTY PUBLIC WORKS DEPT
LEE	GULF COAST LANDFILL	I	11990 SR-82, E OF FT MYERS	FT MYERS	WASTE MANAGEMENT OF FLORIDA
LEON	US 27 SOUTH LANDFILL	I	5MI E SR261 & US27	TALLAHASSEE	LEON COUNTY COMMISSIONERS

**APPENDIX F: CLASS I, II AND III LANDFILL FACILITIES IN FLORIDA**

	US 27 SOUTH LANDFILL	III	5MI E SR261 & US27	TALLAHASSEE	LEON COUNTY COMMISSIONERS
LEVY	LEVY CO SW MANAGEMENT FACILITY	I	4MI SE BRONSON OFF US 27	BRONSON	LEVY COUNTY COMMISSIONERS
	LEVY CO SW MANAGEMENT FACILITY	III	4MI SE BRONSON OFF US 27	BRONSON	LEVY COUNTY COMMISSIONERS
LIBERTY	LIBERTY COUNTY LANDFILL	III	SR 271, 1/3 MI SE OF SR 12	BRISTOL	LIBERTY COUNTY COMMISSIONERS
	TIMBER ENERGY ASH LANDFILL	I	HWY 65 SOUTH	TELOGIA	TIMBER ENERGY RESOURCE, INC.
MADISON	AUCILLA AREA SW FACILITY	I	US 221, 1 MI SE OF GREENVILLE	GREENVILLE	AUCILLA AREA SW ASSOCIATION
	AUCILLA AREA SW FACILITY	III	US 221, 1 MI SE OF GREENVILLE	GREENVILLE	AUCILLA AREA SW ASSOCIATION
MANATEE	LENA ROAD COUNTY LANDFILL	I	SR64 & LENA ROAD	BRADENTON	MANATEE CO PUBLIC UTILITY
MARION	BASE LINE LANDFILL	I	BASELINE ROAD	OCALA	MARION COUNTY SOLID WASTE
	BAYSIDE OF MARION LANDFILL	III	41ST STREET	SILVER SPRINGS	WILLIAM E HENDERSON
MARTIN	MARTIN COUNTY PALM CITY II LANDFILL	I	3.7MI W TURNPK OVERPASS SR714	PALM CITY	MARTIN CO SOLID WASTE MGMT
MONROE	CUDJOE KEY LANDFILL	I	CUDJOE KEY RD, WEST OF MM 21.5	CUDJOE KEY	MONROE CO MUNICIPAL SERV DIST
NASSAU	WEST NASSAU LANDFILL	I	2.5MI N CALLAHAN OFF US1	CALLAHAN	NASSAU COUNTY COMMISSIONERS
OKEECHOBEE	OKEECHOBEE LANDFILL, INC.	I	10800 NE 128TH AVENUE	OKEECHOBEE	WASTE MANAGEMENT
ORANGE	ORANGE CO LF (AKA DEMONSTRATION)	I	CURRY FORD ROAD	ORLANDO	ORANGE COUNTY UTILITIES DIV
	ORANGE CO LF (AKA DEMONSTRATION)	III	CURRY FORD ROAD	ORLANDO	ORANGE COUNTY UTILITIES DIV
	KEENE ROAD LANDFILL	III	KEENE ROAD, NEAR CR435	APOPKA	KEENE ROAD LANDFILL, INC
	BAY LAKE C&D LANDFILL	III	1.5MI W MAGIC KINGDOM THEME PK	ORLANDO	WALT DISNEY WORLD COMPANY
OSCEOLA	CITY OF ST. CLOUD LANDFILL	I	W 17TH ST	ST CLOUD	CITY OF ST CLOUD, PUBLIC WORKS
	SOUTHPORT ROAD LF, PHASE I & II	I	3/4MI E JCT SR531&SOUTHPORT RD	KISSIMMEE	OSCEOLA COUNTY SOLID WASTE
PALM BEACH	N CO RESOURCE RECOVERY FACILITY	I	45 STREET & FLORIDA TURNPIKE	RIVIERA BEACH	SWA OF PALM BEACH COUNTY
	N CO RESOURCE RECOVERY FACILITY	III	45 STREET & FLORIDA TURNPIKE	RIVIERA BEACH	SWA OF PALM BEACH COUNTY
PASCO	EAST PASCO LANDFILL (DADE CITY LF)	I	AUTON ROAD & RIVER ROAD	DADE CITY	PASCO COUNTY ENVIR DEPT
	WEST PASCO RRF ASH MONOFILL	I	HAYS RD & CR52, SE OF ARIPEKA	ARIPEKA	PASCO COUNTY COMMISSIONERS
	WEST PASCO LANDFILL	III	HAYS RD & CR52, SE OF ARIPEKA	ARIPEKA	PASCO COUNTY COMMISSIONERS
PINELLAS	BRIDGEWAY ACRES CLASS I LANDFILL	I	SW OF I-275 & ROOSEVELT BLVD	ST PETERSBURG	PINELLAS CO SOLID WASTE DEPT

**APPENDIX F: CLASS I, II AND III LANDFILL FACILITIES IN FLORIDA**

POLK	NORTH CENTRAL LANDFILL (SITE 201)	I	SR540, 5.4MI E US98	EATON PARK	POLK CO	ENVIRONMENTAL
	NORTH CENTRAL LANDFILL (SITE 201)	III	SR540, 5.4MI E US98	EATON PARK	POLK CO	ENVIRONMENTAL
	SOUTHEAST POLK LANDFILL (SITE 203)	I	GOLFVIEW CUT-OFF ROAD	LAKE WALES	POLK CO	ENVIRONMENTAL
	PEMBROKE-FORT MEADE LANDFILL	III	3400 N CHARLESTON AVE (US17 N)	FT MEADE	CLYDE BISTON	
PUTNAM	CEDAR TRAIL LANDFILL	III	1881 E F GRIFFIN ROAD	BARTOW	BOB OLIVER	
	PUTNAM COUNTY CENTRAL LANDFILL	I	US17 @ SR209-S, N OF PALATKA	PALATKA	PUTNAM COUNTY	
SANTA ROSA	PUTNAM CO CENTRAL LANDFILL	III	4 MI NORTH OF PALATKA	PALATKA	PUTNAM COUNTY	SANITARY DEPT
	STERLING FIBERS, INC	I	1801 CYANAMID ROAD	MILTON	AMERICAN CYANIMID	
	SANTA ROSA CENTRAL LANDFILL	I	GALT CITY ROAD	BAGDAD	SANTA ROSA CO	
SARASOTA	SANTA ROSA CENTRAL LANDFILL	III	GALT CITY ROAD	BAGDAD	SANTA ROSA CO	
	SARASOTA CENTRAL LANDFILL COMPLEX	I	N END OF KNIGHTS TRAIL ROAD	SARASOTA	SARASOTA COUNTY	SOLID WASTE
	OSCEOLA ROAD LANDFILL (SEMINOLE CO)	I	1930 OSCEOLA ROAD	GENEVA	SEMINOLE COUNTY	
SEMINOLE	TILLMAN RIDGE LANDFILL	I	S SR214, W ALLEN NEASE ROAD	ST AUGUSTINE	ST JOHNS COUNTY	
ST. JOHNS	TILLMAN RIDGE LANDFILL	I	S SR214, W ALLEN NEASE ROAD	ST AUGUSTINE	ST JOHNS COUNTY	
ST. LUCIE	ST LUCIE COUNTY GLADES ROAD LANDFILL	I	LANDFILL RD & GLADES CUTOFF RD	FT PIERCE	ST LUCIE COUNTY	PUBLIC WORKS
SUWANNEE	SUWANNEE COUNTY CENTRAL LANDFILL	I	.75MI OFF US129,6MI S LIVE OAK	SUWANNEE	SUWANNEE COUNTY	
UNION	NEW RIVER REGIONAL LANDFILL	III	2.5 MILES NORTH OF RAIFORD	RAIFORD	NEW RIVER SOLID WASTE ASSOCIATION	
	NEW RIVER REGIONAL LANDFILL	I	2.5 MILES NORTH OF RAIFORD	RAIFORD	NEW RIVER SOLID WASTE ASSOCIATION	
VOLUSIA	TOMOKA FARMS ROAD LANDFILL	I	TOMOKA FARMS RD, 2MI S I-4	DAYTONA BEACH	VOLUSIA COUNTY	PUBLIC WORKS
WAKULLA	LOWER BRIDGE LANDFILL	I	CR 368, 2MI E OF CRAWFORDVILLE	CRAWFORDVILLE	WAKULLA COUNTY	
	LOWER BRIDGE LANDFILL	III	CR 368, 2MI E OF CRAWFORDVILLE	CRAWFORDVILLE	WAKULLA COUNTY	
WALTON	WALTON COUNTY CENTRAL LANDFILL	III	4 MI N DEFUNIAK SPRINGS	DEFUNIAK SPRINGS	WALTON COUNTY	
	MARTIN COUNTY PALM CITY II LANDFILL	III	3.7MI W TURNPK OVERPASS SR714	PALM CITY	MARTIN CO SOLID WASTE MGMT	

**APPENDIX G: FLORIDA ACTIVE CONSTRUCTION AND DEMOLITION DEBRIS DISPOSAL FACILITIES**

COUNTY NAME	DIST	SITE NAME	CD	LC	SITE LOCATION	CITY	OPERATOR
ALACHUA	NE	JOHNSTON LANDFILL		X	SR 24 - 1 MI W OF ARCHER	ARCHER	DWAIN & MELVA JOHNSTON
	NE	O'STEEN BROTHERS (ARCHER RD)		X	20125 SW ARCHER ROAD	ARCHER	RON O'STEEN
	NE	FLORENCE LANDFILL	X		0.5 E SW 122, SR 24	GAINESVILLE	PAUL FLORENCE
	NE	WATSON CONSTRUCTION COMPANY, INC	X		2.5 MI W OF ARCHER, SR 24	ARCHER	LARY WATSON
	NE	W G BUCK JOHNSON & SON	X		7804 NE 69TH AVE	GAINESVILLE	GLEN JOHNSON III
	NE	VE WHITEHURST & SONS	X		1.5 MI W OF ARCHER, SR 24	ARCHER	JACK WHITEHURST
BAY	NW	AGGREGATE TRANSPORTATION	X		HWY 390 @ PIPELINE ROAD	LYNN HAVEN	H THOMAS CATO
	NW	BEACHES BARROW PIT	X		2 M W OF SR 79 ON BACK BEACH RD	PANAMA CITY BEACH	T E LEE
	NW	CALVIN'S C&D DISPOSAL FACILITY	X		SKUNK VALLEY & PROSPER ROADS	PANAMA CITY	CALVIN CLEGHORN, JR
	NW	CEDAR BLUFF PIT LCD (PITTS SAND)	X	X	2.4 MI E OF HWY 77, OFF HWY 388	PANAMA CITY	WILLIAM PITTS
	NW	CITY ENVIRONMENTAL SERVICES	X		4217 CATO ROAD	PANAMA CITY	JOHN DIXON
	NW	DISPOSAL DEPOT	X		1/4 M W SR77 2.5 M S SR20	PANAMA CITY	WILLIAN E SHAW, JR
	NW	FLORIDA ASPHALT PAVING COMPANY	X		1MI E SR77 ON SR20	PANAMA CITY	MOODY LAND & TIMBER
	NW	GULF ASPHALT CORPORATION (HWY 388)	X		HWY 388	PANAMA CITY	GULF ASPHALT CORPORATION
	NW	HALL'S C&D LANDFILL	X		1/2 MI W HWY 77 ON CROOKED LANE	PANAMA CITY	JIMMY PETTY
	NW	LYNN HAVEN C&D LANDFILL	X		1 M W SR 77 & 3 M S SR 20	LYNN HAVEN	CITY OF LYNN HAVEN
BROWARD	NW	SAND HILLS MINE LAND CLEARING	X		985 CROOKED LANE	SOUTH PORT	TOMMY RICHARDSON
	NW	STEELFIELD ROAD LAND CLEARING	X		SEMINOLE PLANTATION (STEELFLD)	PANAMA CITY BEACH	RICHARD DODD
BROWARD	SE	CENTRAL SANITARY LF & RECYCLING CENTER	X		3000 NW 48TH STREET (HILTON)	POMPANO BEACH	WASTE MANAGEMENT
BREVARD	CN	CAPE CANAVERAL AFS	X		CENTRAL CONTROL ROAD	CAPE CANAVERAL	USAF PATRICK AIR FORCE BASE
	CN	ROYAL OAK RANCH C&D FACILITY	X		3600 FOX LAKE ROAD	TITUSVILLE	ROYAL OAK RANCH
	CN	FLORIDA RECYCLERS OF BREVARD	X		SARNO ROAD	MELBOURNE	FLORIDA RECYCLERS OF BREVARD INC
CHARLOTTE	SO	ZEMEL ROAD SW LAND DEVELOPERS	X		30001 ZEMEL ROAD	PUNTA GORDA	BRUCE LAISHLEY & RICK TREWORGY
CITRUS	SW	CITRUS SAND & DEBRIS II (aka CITRUS PIPE)	X		3890 W GROVER CLEVELAND BLVD	HOMOSASSA	CITRUS PIPELINE CONSTRUCTION
	SW	CITRUS SAND & DEBRIS	X		1590 N QUARTERBACK TERRACE	CRYSTAL RIVER	CITRUS SAND & DEBRIS, INC
	SW	MATERIAL EXCHANGE CORP	X		MONIER RESOURCES FLY ASH LF	HOMOSASSA SPRINGS	MATERIAL EXCHANGE CORP
	SW	SANLAND PIT C&D DEBRIS	X		US41, S OF HOLDER	HOLDER	SANLAND OF FLORIDA ENTERPRISE
CLAY	NE	ORANGE PARK CONSTRUCTION	X		ROSEHILL ROAD	GREEN COVE SPRINGS	TODD STURCH
DADE	SE	WASTE MASTERS - CAT	X		SW 240TH ST & SW 100TH AVE	MIAMI	CAT
	SE	WASTE MASTERS - CAT	X		FPL MAINTENANCE RD 7 SW 97 AVE	DADE COUNTY	CAT
	SE	DADE RECYCLING CENTER, INC T49-52	X		NW 97TH AVE & NW 154 STREET	MIAMI	DADE RECYCLING CENTER, INC
	SE	SECURITY ESTATES	X		NW 97TH AVE & NW 154 STREET	MIAMI	JOE CAPELLETTI
	SE	C & C RECYCLING T9-12	X		NW 97TH AVE & NW 154 STREET	MIAMI	JOHN CLADWELL
	SE	LOFRA RECYCLING	X		NW 87TH AVE & 77 STREET	MIAMI	CRE INVESTMENTS, INC
	SE	HOMESTEAD LANDFILL & RECYCLING CTR	X		25550 SW 142 AVE	PRINCETON	HOMESTEAD LANDFILL MANAGEMENT
DIXIE	NE	DIXIE COUNTY C&D LANDFILL	X		2 MI S CROSS CITY, ROSCOE SWAFF	CROSS CITY	DIXIE COUNTY COMMISSIONERS
DUVAL	NE	JONES RD LANDFILL & RECYCLING LTD	X		3400 JONES ROAD	JACKSONVILLE	BFI WASTE SYSTEMS - DON KIDIG
	NE	OLD KING'S ROAD SOLID WASTE, INC	X		OLD KINGS ROAD & I-95	JACKSONVILLE	CARL DALTON
ESCAMBIA	NW	AMERICAN CLAY & SHELL LAND CLEARING	X		OFF GODWIN - N END OF BEDFORD	PENSACOLA	AMERICAN CLAY & SHELL, INC
	NW	BANKHEAD C&D SITE (HEATON BROTHERS)	X		BANKHEAD ROAD	PENSACOLA	CHARLES HEATON
	NW	BORIDER/CARTER	X		HOLESBERRY LANE, 1MI N 9-MILE RD	CANTONMENT	CARTER & HASSEL

**APPENDIX G: FLORIDA ACTIVE CONSTRUCTION AND DEMOLITION DEBRIS DISPOSAL FACILITIES**

COUNTY NAME	DIST	SITE NAME	CD	LC	SITE LOCATION	CITY	OPERATOR
ESCAMBIA (cont)	NW	SAUFLEY ROAD C&D	X		5635 SAUFLEY FIELD ROAD	PENSACOLA	CELIA A MORTON
	NW	CANTONMENT IND.COMM. ROOFING	X		IN BEULAH, ON TOWER RIDGE RD	CANTONMENT	WILLETTA DANIEL
	NW	CHADBOURNE (KILBEE PIT) C&D DEBRIS	X		X IN END OF SAINT ELMO OFF AIRPORT	PENSACOLA	W M CHADBOURNE, INC
	NW	CHADBOURNE (MCCOY PIT) C&D DEBRIS	X		SOUTH END OF MCCOY DRIVE	PENSACOLA	EDWARD M CHADBOURNE, INC
	NW	CLARK SAND COMPANY, INC	X		E FENCE RD-NEXT TO SAUFLEY FIELD	PENSACOLA	CLARK SAND CO., INC
	NW	GFD CONSTRUCTION COMPANY, INC	X		END OF BLOSSOM TRAIL	PENSACOLA	ANTHONY J GREEN
	NW	GREEN FILL DIRT NORTH	X		WINGFOOT WAY	PENSACOLA	ANTHONY J GREEN
	NW	GULF COAST P&G LCD (HAYWARD AVE)	X		X 7320 HAYWARD STREET	PENSACOLA	GERALD D MILLS, SR
	NW	GULF COAST P&G C&D (ROLLING HILLS)	X		ROLLING HILLS ROAD	PENSACOLA	GULF COAST PAVING & GRADING
	NW	GULF-ATLANTIC CONSTRUCTION (GODWIN)	X		X OFF GODWIN-E OF PINE FOREST RD	PENSACOLA	GULF-ATLANTIC CONSTRUCTORS, INC
	NW	HEATON BROS. (SAUFLEY)	X		X 5805 SAUFLEY FIELD ROAD	PENSACOLA	CHARLES W & WILBER J HEATON
	NW	HEATON BROS. (HOLSBERRY LANE)	X		X HOLSBERRY LANE	PENSACOLA	CHARLES HEATON
	NW	CURTIS L LEE, INC C&D (HOLSBERRY RD)	X		X HOLSBERRY LANE	PENSACOLA	CURTIS LEE
	NW	FAIRGROUNDS LCD	X		X .4 M W MOBILE HWY ON BELLVIEW AVE	PENSACOLA	JEFF GODWIN
	NW	KINGRY TRUCKING C&D (CERNY ROAD)	X		MILFORD RD, NEAR CEARNEY BLVD	PENSACOLA	KINGRY TRUCKING CO
FLAGLER	NW	PANHANDLE GRAD & PAV (8 MILE CR RD)	X		X 8 MILE CREEK ROAD - NEAR I-10	PENSACOLA	JOHNNIE F LONG
	NW	TOWN OF CENTURY C&D DISPOSAL	X		X HWY 4 WEST	CENTURY	TOWN OF CENTURY, E A ROSS, MAYOR
	NW	WILLOW VALLEY PROPERTIES, INC	X		X 52ND AVE, 3 BLOCKS S OF LILLIAN	PENSACOLA	WILLOW VALLEY PROPERTIES, INC
	NE	FLAGLER C&D	X		CR 13, NE OF BUNNELL	BUNNELL	ERIC McLAUGHLIN
	NE	OLDS KINGS ROAD LANDFILL (PHASE II)	X		1 MI S SR100 - OLD KINGS ROAD	BUNNELL	FLAGLER COUNTY
GILCHRIST	NE	DARRELL CONE DOZER SERVICES, INC	X		S OF CR 304, 1/2 MI W OF US 1	BUNNELL	DARRELL CONE
	NE	LCD OF FLAGLER, INC	X		OFF HWY US 1, 1/2 MI S MATANZAS PK	BUNNELL	PAMELA TRAUSNECK
	NE	HID OF GILCREST, INC	X		COUNTY ROAD 232	HIGH SPRINGS	WATSON, CRAIG
	NW	WETAPPO C&D DISPOSAL FACILITY	X		SR22, 5MI W OF WEWAHITCHKA	WEWAHITCHKA	GULF COUNTY COMMISSIONERS
HERNANDO	SW	NORTHWEST LANDFILL	X		US90 & TATUM ROAD	BROOKSVILLE	HERNANDO COUNTY UTILITIES DEPT
	SW	SUNSHINE GROVE ROAD, PHASE I	X		SUNSHINE GROVE ROAD	BROOKSVILLE	HERNANDO SANDPIT & WOOD INC
HIGHLANDS	SO	SEBRING LANDFILL	X		955 SHERIFF'S TOWER ROAD	SEBRING	ALEC RIGBY
HILLSBOROUGH	SW	CONE ROAD C&D FACILITY	X		4800 CONE ROAD	COCONUT GROVE	BFI, INC
	SW	CONIGLIO C&D LANDFILL	X		11981 N WILLIAMS ROAD	THONOTOSASSA	GEORGE CONIGLIO
	SW	CR 672 RECOVERY INC	X		SR672 (BALM ROAD)	BALM	RICHARD HAIN
INDIAN RIVER	CN	INDIAN RIVER COUNTY LANDFILL	X		RANGE LINE ROAD	VERO BEACH	INDIAN RIVER COUNTY UTILITIES
LAKE	CN	DANIS ENVIRONMENTAL	X		HWY 27 & LITTLE GRASSY LAKE ROAD	MINNEOLA	DALLAS WOLFORD
	CN	GRANTHAM PIT C&D FACILITY	X		39414 COUNTY ROAD 439	UMATILLA	ROBERT O GRANTHAM
	CN	LAKE COUNTY SOLID WASTE MANAGEMENT	X		WEST OF SR 561	ASTATULA	LAKE COUNTY PUBLIC WORKS
	CN	RODGERS LANDCLEARING SITE	X		X 31806 TOLLGATE TRAIL	SORRENTO	WILLIAM RODGERS
	CN	PROFESSIONAL DIRT SERVICE INC	X		C44-A, 1/4MI W SR-439	EUSTIS	PROFESSIONAL DIRT SERVICE INC
LEON	NW	J & A LAND CLEARING (AEON CHURCH RD)	X	X	AENON CHURCH ROAD	TALLAHASSEE	ALLEN WELDON
	NW	CROWDER LF - AEON CHURCH ROAD	X	X	AENON CHURCH ROAD	TALLAHASSEE	CROWDER EXCAVATING
	NW	MORRISON PIT (CUMBIE CONCRETE)	X	X	SOUTH OF TRAM ROAD	TALLAHASSEE	B T CUMBIE
	NW	EISENHOWER CLAY PIT	X	X	NEAR AEON CHURCH ROAD	TALLAHASSEE	LEON COUNTY PUBLIC WORKS
	NW	FLORIDA DEVELOPERS, INC	X	X	CAPITAL CIRCLE SE (SR-263)	TALLAHASSEE	FLORIDA DEVELOPERS, INC
	NW	SANDCO, INC	X	X	4900 RUTHENIA RD	TALLAHASSEE	SANDCO, INC
	NW	SOLOMON CONSTRUCTION COMP OF QUINCY	X		X HWY 20 3.5 MI W OF TALLAHASSEE	TALLAHASSEE	SOLOMON CONSTRUCTION
	NW	CROWDER C&D (TRAM ROAD)	X		TRAM RD .1 MI E OF CAPITAL CIRCLE	TALLAHASSEE	JIMMIE CROWDER EXCAVATING

**APPENDIX G: FLORIDA ACTIVE CONSTRUCTION AND DEMOLITION DEBRIS DISPOSAL FACILITIES**

COUNTY NAME	DIST	SITE NAME	CD	LC	SITE LOCATION	CITY	OPERATOR
MARION	CN	AMODEO TRUCKING & EXCAVATION	X		5300 NE JACKSONVILLE RD	OCALA	AMODEO TRUCKING & EXCAVATION
	CN	BIG D ROOFING INC	X		4480 NE 35TH ST	OCALA	BIG D ROOFING INC
	SW	H & B EXCAVATING	X		7007 SW 38TH ST	OCALA	H & B EXCAVATING
	CN	HOLMES DIRT SERVICES	X		HWY 42 WEST	ALTOONA	HOLMES DIRT SERVICE INC
	CN	H&I SAND & CLAY ENTERPRISES	X	X	.5 MI S EMERALD RD, W OF RT 4	CANDLER	H&I SAND & CLAY ENTERPRISES
	CN	SUPERIOR CYPRESS ACRES (SANDMAN)	X		NE 36TH AVE & SR326	OCALA	SANDMAN TRUCKING CORP
NASSAU	NE	NASSAU SANITATION C&D FACILITY II	X		HWY A1A, 3 MI E OF CALLAHAN	CALLAHAN	BFI WASTE SYSTEMS - DON KINDIG
OKALOOSA	NW	PHIL DIRT LAND CLEARING (RIDGE RD.)	X	X	RIDGE ROAD	CRESTVIEW	FRED & MARIE BOWMAN
	NW	EGLIN AFB C&D FACILITY	X	X	RANGE RD 635, 3MI N OF SR85	EGLIN AFB	USAF
	NW	H & J LANDSCAPING C&D FACILITY	X		1.5MI E OF OCI	CRESTVIEW	HOMER HUTTO & JIM C TURNER
	NW	J & B SAND LCD	X		2 MI S OF I-10, OFF HWY 85	CRESTVIEW	J. R. PARISH
	NW	J & K OF OKALOOSA	X		1530 N BEAL EXTENSION	FT. WALTON BEACH	JIMMY WHITFIELD
	NW	LINGENFELTER C&D FACILITY	X		ARENA RD- SW OF CRESTVIEW	CRESTVIEW	CHARLES & SHARON LINGENFELTER
	NW	POINT CENTER INC	X		7.5MI W OF CRESTVIEW ON HWY90	CRESTVIEW	RHETT E ENZOR
	NW	SILVER CREEK MATERIALS C & D FACILITY	X	X	LITTLE SILVER CREEK RD	CRESTVIEW	MICHAEL FLEISCHMAN & STEVEN CATO
	NW	WASTE RECYCLERS OF NORTH FLORIDA	X		LITTLE SILVER RD, E OF OCI	CRESTVIEW	HAISEAL TIMBER, INC
	NW	JMB C&D	X		CARMEL DRIVE	FT WALTON BEACH	WHITROCK ASSOCIATES, INC
ORANGE	CN	MID-FLORIDA MATERIALS C&D LANDFILL	X		GOLDEN GEM ROAD	PLYMOUTH	MID-FLORIDA MATERIALS, INC
	CN	PINE RIDGE	X		5400 DANBURY ROAD	WINTER GARDEN	SANIFILL OF FLORIDA, INC
	CN	SOUTH ALAFAYA TRAIL RECYCLING	X	X	6000 SOUTH ALAFAYA TRAIL	ORLANDO	CECIL REDITT
	CN	CWI (SCHOFIELD)	X		SR 545, S OF SCHOFIELD ROAD	WINTER GARDEN	CONTINENTAL WASTE INDUSTRIES
	CN	ACME RECYCLING INC	X	X	1056 BAILEY HILL ROAD	PLYMOUTH	ACME RECYCLING INC
OSCEOLA	CN	BASS ROAD LF	X		BASS ROAD	KISSIMMEE	OSCEOLA COUNTY SOLID WASTE
PASCO	SW	ASH-LEN COMPANY	X		SUNSET BLVD & VINE ST	HUDSON	WAYNE SPINKS
	SW	COASTAL LANDFILL DISPOSAL INC	X		8TH AVE, 2 MI EAST OF US19	NEW PORT RICHEY	ERIC CASH
	SW	PASCO LAKES INC	X		PASCO RD, I-75 & SR52	SAN ANTONIO	JEFF ROGERS
POLK	SW	CLINE LAND CLEARING DEBRIS DISPOSAL	X	X	BONNIE MINE RD, 1 MI FROM SR 60	LAKELAND	R CLINE INC
	SW	NORTHEAST LANDFILL	X		BANNON ISLAND RD	LAKE HAMILTON	POLK COUNTY ENVIR SERVICES
	SW	PEMBROKE SOUTH	X		US HWY 17 N, 3400 CHARLESTON AVE	FT. MEADE	CROSS ENVIRONMENTAL
	SW	SOUTHEAST LANDFILL	X		GOLFVIEW CUT-OFF ROAD	LAKE WALES	POLK COUNTY COMMISSIONERS
PUTNAM	NE	Z TO A, INC (aka: WEST RIVER RD)	X		WEST RIVER ROAD	PALATKA	CLIFF JOHNSON
SANTA ROSA	NW	CURTIS LEE LANDSCRAPING	X		N OF MILTON, E OF HWY 87	MILTON	CURTIS LEE
	NW	GULF COAST PAVING & GRADING (B BOB)	X		BILLY BOB LN, OFF OF HWY 87 N	MILTON	GULF COAST P & G, INC
	NW	GULF COAST PAVING & GRADING (GALT)	X		OFF GALT CITY RD NEAR RR XING	MILTON	GULF COAST P & G, INC
	NW	GULF COAST PAVING & GRADING(GALT E)	X		EAST OF GALT CITY RD @ WARREN	MILTON	GULF COAST P & G, INC
	NW	GULF COAST PAVING & GRAD (FIVE FORKS)	X		BETWEEN RIVER RD & FIVE FORKS RD	HOLLEY	GULF COAST P & G, INC
	NW	HOLLEY DIRT COMP DBA BAYSIDE DVLP	X		3224 RIVER ROAD	NAVARRE	HOLLEY DIRT CO INC
	NW	JOINER FILL DIRT	X		NORTH STEWART STREET	MILTON	LONNIE JOINER
	NW	K & K CONSTRUCTION (JERNIGAN CONST)	X		AVERY OLSEN ROAD	HOLLEY	CURTIS J JERNIGAN
	NW	M & L SAND COMPANY, INC	X		8286 NUTHATCH ROAD	NAVARRE	J R CLARK
	NW	P&S CONSTRUCTION	X		5890 CHEROKEE ROAD	MILTON	STEVE SMITH
	NW	PHILLIP C BARNARD	X		2750 PASO DE VIVEZ	GULF BREEZE	PHILLIP BARNARD
	NW	SIMMONS CONSTRUCTION (RIDGE AVE PIT)	X		RIDGE AVENUE	MILTON	ANDREW W SIMMONS
	NW	MCN OF PACE LCD	X		5280 MULAT ROAD	MILTON	BILLY R ROBERSON
	NW	SANTA ROSA CO ROAD DEPT-AVALON	X		AVALON BLVD (MULAT/AVALON BCH)	MILTON	SANTA ROSA CO COMMISSIONERS
	NW	SANTA ROSA CO ROAD DEPT-BELL LN	X		BELL LANE (PEA RIDGE AREA)	MILTON	SANTA ROSA CO COMMISSIONERS

**APPENDIX G: FLORIDA ACTIVE CONSTRUCTION AND DEMOLITION DEBRIS DISPOSAL FACILITIES**

COUNTY NAME	DIST	SITE NAME	CD	LC	SITE LOCATION	CITY	OPERATOR
SANTA ROSA (cont)	NW	SALTER CONSTRUCTION COMPANY	X	X	W. END OF SWAN ST, PEA RIDGE	PEE RIDGE	SALTER CONSTRUCTION COMPANY
	NW	WALKER, AUTRY L C&D		X	4.3 MI E OF SR87 S OF US90	MILTON	AUTRY L WALKER
	NW	WELLS LAND CLEARING		X	MULAT ROAD	MILTON	FARON H WELLS
SEMINOLE	CN	OVIEDO MATERIALS	X		EVANS ROAD, 1 MILE E OF OVIEDO	OVIEDO	ROBERT G MARTIN
ST. JOHNS	NE	SOUTHLAND ENVIR SERVICES (REPUBLIC OF FL)	X		1 MI W OF US 1 ON NINE MILE RD	ST. AUGUSTINE	ROBERT CRAWFORD
ST. LUCIE	SE	ST LUCIE COUNTY GLADES ROAD LANDFILL	X		LANDFILL RD & GLADES CUTOFF RD	FT PIERCE	ST LUCIE COUNTY PUBLIC WORKS
SUMTER	SW	D&C DISPOSAL INC	X		0.5 MI W I-75 NEAR CR 470 & CR 489	SUMTERVILLE	WILLIAM GREGORY
VOLUSIA	CN	CLYDE MORRIS BLVD C&D DISPOSAL SITE	X		CLYDE MORRIS BLVD	DAYTONA BEACH	CITY OF DAYTONA BEACH
	CN	FOUR JAY'S LANDCLEARING/EMUND JUNG	X		S OF HWY 44	SAMSULA	FOUR JAY'S LANDCLEARING
	CN	GEL CORPORATION	X		1200 SOUTH LEAVITT AVENUE	ORANGE CITY	MILTON E EVANS, JR
	CN	SAMSULA (YANCEY) LAND CLEARING	X		S SR-44, 1.25MI ON SR-415 E	NEW SMYRNA BEACH	CLYDE HART
	CN	CONTINENTAL WASTE INDUSTRIES	X		1988 W PLYMOUTH AVE	DELAND	CWI OF FLORIDA
	CN	HTS LANDFILL INC	X		RHODE ISLAND AVE & JUANITA LN	ORANGE CITY	HTS LANDFILL INC
	CN	KIRTON LANDFILL - EAST	X		1630 TOMOKA FARMS RD, W OF SR415	DAYTONA BEACH	MYRON & KENNETH KIRTON
	CN	KIRTON C & D (WEST)	X		1630 TOMOKA FARMS RD, W OF SR415	DAYTONA BEACH	MYRON & KENNETH KIRTON
	CN	KLENK, ROBERT C&D	X		409 BAYWOOD CIRCLE	PORT ORANGE	ROBERT KLENK
	CN	JADE (OSTEEN) C & D DISPOSAL FACILITY	X		255 DIXON LAKE ROAD	OSTEEN	JAN K PILCHER
	CN	TOMOKA FARMS RD LANDFILL	X		TOMOKA FARMS ROAD	DAYTONA	VOLUSIA COUNTY PUBLIC WORKS
	CN	LINKOVICH LANDFILL	X		W JCT GRAND AVE & MINNESOTA AVE	DELAND	RAY LINKOVICH
	NW	HARRELL BROTHERS	X		HWY 365 OLD SHELL POINT ROAD	SOPCHOPPY	BARNEY HARRELL
	NW	WELCH, JAMES T. LAND CLEARING	X		SPRING CREEK RD 1/4 MI S OF US 98	CRAWFORDVILLE	JAMES T WELCH
	NW	WITHER'S PIT - LAND CLEARING	X		HWY US 319, BUCKHORN COMMUNITY	SOPCHOPPY	BEN WITHERS
WALTON	NW	COYOTE LAND COMPANY	X		SR-20, 2.5MI W OF FREEPORT	FREEPORT	COYOTE LAND COMPANY, INC
	NW	CRAWFORD SUGAR PROPERTIES, INC	X		END OF SUGAR DRIVE	SANTA ROSA BCH	CRAWFORD SUGAR PROPERTIES, INC
	NW	L&S SAND COMPANY, INC	X		.5MI E OF CR 83A SOUTH	PORTLAND	DAVID C LADD
	NW	TIPTON LAND CLEARING DISPOSAL SITE	X		PINEWOOD LN & STINNETT RD	INLET BEACH	ROBBIE TIPTON
	NW	WASTE RECYCLERS OF NORTH FL, INC	X		N SIDE OF HWY 20-W OF FREEPORT	FREEPORT	ANITA TAUNTON

TOTAL NUMBER OF ACTIVE PERMITTED C & D DEBRIS FACILITIES = 92

TOTAL NUMBER OF ACTIVE PERMITTED LAND CLEARING FACILITIES = 69

TOTAL NUMBER OF FACILITIES CLASSIFIED AS BOTH C & D AND LAND CLEARING = 3

TOTAL NUMBER OF ACTIVE FACILITIES = 158

CD = Construction and Demolition Debris disposal facility (regular permit required).

LC = Land Clearing Debris disposal facility (general permit required).

**APPENDIX H: IMPACT OF MOBILE HOME RECYCLING PROGRAM ON LANDFILL OPERATIONS  
(STATEWIDE ANALYSIS)**

**ASSUMING ALL PRE-1976 MOBILE HOMES TO BE REMOVED IN 5 YEARS**

Estimated number of <b>pre-1976</b> mobile home units	338,000
Estimated number of <b>pre-1976</b> units to be demolished per year	67,600
Waste to be disposed of per mobile home unit (after recycling), tons	3.44
Total waste generated per year from the <b>pre-1976</b> units, tons	232,544
Total Municipal Solid Waste (MSW) landfilled in the state in 1998 (reported by FDEP), tons	14,108,142
Total C&D waste landfilled in the state in 1998 (reported by FDEP), tons	5,239,357
Total MSW landfilled in the state in 2001 (estimated from the 1998 figures based on population growth), tons	15,025,171
Total C&D waste landfilled in the state in 2001 (estimated from the 1998 figures based on population growth), tons	5,579,915
Waste generated per year from the <b>pre-1976</b> units as a percentage of the MSW landfilled in 2001	1.5%
Waste generated per year from the <b>pre-1976</b> units as a percentage of C&D waste landfilled in 2001	4.2%

**ASSUMING A 10-YEAR PROJECT LIFE**

Estimated number of <b>pre-1976</b> mobile home units	338,000
Estimated number of <b>pre-1994</b> mobile home units	981,000
Estimated number of <b>pre-1976</b> units to be demolished per year	33,800
Estimated number of <b>pre-1994</b> units to be demolished per year	98,100
Waste to be disposed of per mobile home unit (after recycling), tons	3.44
Total waste generated per year from the <b>pre-1976</b> units, tons	116,272
Total waste generated per year from the <b>pre-1994</b> units, tons	337,464
Total Municipal Solid Waste (MSW) landfilled in the state in 1998 (reported by FDEP), tons	14,108,142
Total C&D waste landfilled in the state in 1998 (reported by FDEP), tons	5,239,357
Total MSW landfilled in the state in 2001 (estimated from the 1998 figures based on population growth), tons	15,025,171
Total C&D waste landfilled in the state in 2001 (estimated from the 1998 figures based on population growth), tons	5,579,915
Waste generated per year from the <b>pre-1976</b> units as a percentage of the MSW landfilled in 2001	0.77%
Waste generated per year from the <b>pre-1994</b> units as a percentage of the MSW landfilled in 2001	2.25%
Waste generated per year from the <b>pre-1976</b> units as a percentage of C&D waste landfilled in 2001	2.08%
Waste generated per year from the <b>pre-1994</b> units as a percentage of C&D waste landfilled in 2001	6.05%

**APPENDIX I: IMPACT OF MOBILE HOME RECYCLING PROGRAM ON LANDFILL OPERATIONS  
(REGION 4 ANALYSIS)**

**ASSUMING A 10-YEAR PROJECT LIFE**

Estimated number of <b>pre-1976</b> mobile home units	128,102
Estimated number of <b>pre-1994</b> mobile home units	371,799
Estimated number of <b>pre-1976</b> units to be demolished per year	12,810
Estimated number of <b>pre-1994</b> units to be demolished per year	37,180
Waste to be disposed of per mobile home unit (after recycling), tons	3.44
Total waste generated per year from the <b>pre-1976</b> units, tons	44,067
Total waste generated per year from the <b>pre-1994</b> units, tons	127,899
Total Municipal Solid Waste (MSW) landfilled in Region 4 in 1998 (reported by FDEP), tons	3,052,181
Total C&D waste landfilled in the Region 4 in 1998 (reported by FDEP), tons	1,389,169
Total MSW landfilled in Region 4 in 2001 (estimated from the 1998 figures based on population growth), tons	3,250,573
Total C&D waste landfilled in Region 4 in 2001 (estimated from the 1998 figures based on population growth), tons	1,479,465
Waste generated per year from the <b>pre-1976</b> units as a percentage of the MSW landfilled in 2001	1.36%
Waste generated per year from the <b>pre-1994</b> units as a percentage of the MSW landfilled in 2001	3.93%
Waste generated per year from the <b>pre-1976</b> units as a percentage of C&D waste landfilled in 2001	2.98%
Waste generated per year from the <b>pre-1994</b> units as a percentage of C&D waste landfilled in 2001	8.64%

## **Phase II**

The success of any program requires not only solving the technical issues (how to dispose of the units) as discussed above in the Phase I findings, but also solving some important social issues. Before any discussion of what a program might look like, it is important to first get a clear picture of those who live in first generation highly vulnerable homes. The following data sections lay this important foundation.

### **Data Analysis**

Data was collected via telephone interviews on a variety of issues pertaining to a recycling program with a focus on moving people from older mobile homes to safer housing. Data was collected for both those living in mobile home parks and those with mobile homes on a private parcel. The data is being analyzed separately because on some issues the two groups are significantly different. While data was collected for those living in all mobile home generations, the analysis included here represents only those living in first generation, pre-1976 mobile homes. In the following tables, the results marked “yes” represent those individuals living in mobile home parks; those marked “no” represent those who indicated they do not live in a park.

Table 1: If your home were heavily damaged by a hurricane would you prefer to: get another mobile home or move into another type of housing (e.g. single family home or condo)?

**Change from mobhome to other housing**

Is your home located in a mobile home park?			Frequency	Percent	Valid Percent	Cumulative Percent
Yes	Valid	Get another mobile home	106	40.0	50.5	50.5
		Choose another type of housing	104	39.2	49.5	100.0
		Total	210	79.2	100.0	
	Missing	dk/nr	55	20.8		
	Total		265	100.0		
No	Valid	Get another mobile home	8	25.8	28.6	28.6
		Choose another type of housing	20	64.5	71.4	100.0
		Total	28	90.3	100.0	
	Missing	dk/nr	3	9.7		
	Total		31	100.0		

As evident in Table 1, of those living in mobile home parks, about half would still chose to live in a mobile home even if they had other housing options. Only about a quarter of those living out of parks feel the same. One explanation of this difference could be that those who own their own property live in a mobile home as a type of transition housing until they can build a standard site built home. Concentrating on those in parks, it is clear that at least half enjoy the lifestyle. These would be the households most open to a program that helped them get into another type of mobile home. The other half would probably be more open to a program that helped them get into an alternate type of housing.

On a positive note, as the following tables indicate most people are interested in a wind resistant mobile home, and would pay more for one.

Table 2: Mobile homes can be built to higher standards for wind resistance. If you were shopping for a new mobile home, would you be interested in buying a more wind resistant home?

Interest in wind resistant mobhome						
Is your home located in a mobile home park?			Frequency	Percent	Valid Percent	Cumulative Percent
Yes	Valid	Yes	170	64.2	69.7	69.7
		No	74	27.9	30.3	100.0
		Total	244	92.1	100.0	
	Missing	dk/nr	21	7.9		
		Total	265	100.0		
No	Valid	Yes	21	67.7	75.0	75.0
		No	7	22.6	25.0	100.0
		Total	28	90.3	100.0	
	Missing	dk/nr	3	9.7		
		Total	31	100.0		

Most respondents indicate that they would be interested in a wind resistant mobile home. It is unclear why some would not be. Conjecture might lead us to conclude that people correlate wind resistance with increased cost, and thus would not be interested in a mobile home that cost more money. It is unlikely that respondents understand the post-1994 wind resistance standards set up by HUD, and do not realize that any new mobile home they bought would have to meet the appropriate wind standards. It is positive that for at least the majority of people that wind resistance is important.

Additionally, little variation exists between those in parks and those on private parcels.

In addition, most respondents who indicated that they would be interested in wind resistant mobile homes are also willing to pay more for such home. While the majority would only be willing to spend under \$2000, a sizable portion, a little more than a third, would be willing to pay over \$3000. Again, it is important to caution that these findings are not indicative of how many people would want to trade in an older home for a newer. It helps, however, to put things into context. This point is particularly salient when looking at how important wind resistance is when people make mobile home purchasing decisions.

As Table 3 illustrates, for almost 40% of the park sample, wind resistance is somewhat or not important. One-third indicated that it is very important.

**Table 3:** There are many factors that might affect your decision to buy a mobile home, including price, size, style, room layout, etc. Compared to other factors, how important is the wind resistance of your mobile home?

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**Importance of wind resistance for mobhome**

Is your home located in a mobile home park?			Frequency	Percent	Valid Percent	Cumulative Percent
Yes	Valid	Not important	30	11.3	12.1	12.1
		Somewhat important	61	23.0	24.6	36.7
		important	79	29.8	31.9	68.5
		Very important	78	29.4	31.5	100.0
		Total	248	93.6	100.0	
	Missing	dk/nr	17	6.4		
		Total	265	100.0		
No	Valid	Not important	4	12.9	13.3	13.3
		Somewhat important	5	16.1	16.7	30.0
		important	10	32.3	33.3	63.3
		Very important	11	35.5	36.7	100.0
		Total	30	96.8	100.0	
	Missing	dk/nr	1	3.2		
		Total	31	100.0		

---

The environment, then, seems conducive for a program of recycling. People seem interested in mobile home safety and wind resistance, and in an ideal world this would translate to willingness to move from more vulnerable housing to safer housing. However, other conditions counteract this as Table 4 illustrates.

Table 4: If there were a special program that allowed you to receive credit for your current home, as a down payment on a single-family site built home or a new mobile home, would you be interested in participating?

Interest in program for new home						
Is your home located in a mobile home park?			Frequency	Percent	Valid Percent	Cumulative Percent
Yes	Valid	Yes, for a new mobile home	26	9.8	10.0	10.0
		Yes, for a single family home	47	17.7	18.1	28.2
		No	142	53.6	54.8	83.0
		It would depend	44	16.6	17.0	100.0
		Total	259	97.7	100.0	
	Missing	dk/nr	6	2.3		
	Total		265	100.0		
No	Valid	Yes, for a new mobile home	8	25.8	26.7	26.7
		Yes, for a single family home	17	54.8	56.7	83.3
		No	5	16.1	16.7	100.0
		It would depend	30	96.8	100.0	
		Total	1	3.2		
	Missing	dk/nr	31	100.0		
	Total					

As Table 4 shows, the majority of respondents indicate that they would not be willing to participate in a program that offered credit for their current mobile home. Of those in a mobile home park, only 10% would be interested in a program helping them move into a newer mobile home, while another 18% would be interested in a program to help them move into a single-family home. Another 17% would need more information to make a decision. None of the respondents who live on a private parcel would want to be involved in a program for another mobile home. As with those in mobile home parks, the majority would choose not to be involved in a program.

Despite the fact that the options would be more wind-resistant, and thus safer, the majority would not want to be involved. Since the majority feels that wind resistance is important, it would lead us to conclude that other issues are more salient. The following section profiles more demographic characteristics of those living in first generation mobile homes.

Only a small percent of those living in pre-1976 mobile homes currently have a mortgage. Living in their current home, then, is a very affordable option. As Table 5 shows, only about 7% of those living in a mobile home park have a mortgage. A higher percentage of those living on private parcels have a mortgage.

Table 5: Do you have a mortgage?

Do you have a mortage?						
Is your home located in a mobile home park?			Frequency	Percent	Valid Percent	Cumulative Percent
Yes	Valid	Yes	18	6.8	6.9	6.9
		No	244	92.1	93.1	100.0
		Total	262	98.9	100.0	
	Missing	dk/nr	3	1.1		
		Total	265	100.0		
No	Valid	Yes	6	19.4	19.4	19.4
		No	25	80.6	80.6	100.0
		Total	31	100.0	100.0	
	Missing	dk/nr				
		Total				

Not having a mortgage can in part explain why people are not interested in a program. Without a mortgage, housing related expenses are, at a minimum, moderate. Any increased expenses might be impossible for these households to manage. What is interesting is that of those that do not currently have a mortgage, the majority has never had a mortgage. Only about 18% who live in mobile home parks have ever had a mortgage for their mobile home, while 28% on private parcels have had a mortgage (See Table 6).

Table 6: Have you ever had a mortgage?

Have you ever have mortgage?						
Is your home located in a mobile home park?			Frequency	Percent	Valid Percent	Cumulative Percent
Yes	Valid	Yes	43	16.2	17.6	17.6
		No	202	76.2	82.4	100.0
		Total	245	92.5	100.0	
	Missing	dk/nr	2	.8		
		System	18	6.8		
		Total	20	7.5		
		Total	265	100.0		
No	Valid	Yes	7	22.6	28.0	28.0
		No	18	58.1	72.0	100.0
		Total	25	80.6	100.0	
	Missing	dk/nr	6	19.4		
		System				
		Total	31	100.0		

A program of recycling might have to take into consideration that about 25% of the population has never had to deal with mortgage issues. Regardless of what type of financial incentive you give, if it requires households to take on a mortgage payment, many will not be interested because of economics. The population living in first generation mobile homes tends to be older and economically marginal. As Table 7 illustrates, the average age of survey respondents living in mobile home parks was a little over 65, with the most common age, 76. Those on private parcels tend to be younger with the average age 55. Clearly, it would be difficult to motivate people at these stages of their lives to take on the expense of a newer home.

Table 7: Age of Respondent Statistics

Age			
Respondent's age			
Yes	N	Valid	253
		Missing	12
		Mean	65.38
		Median	69.00
		Mode	76
No	N	Valid	31
		Missing	0
		Mean	55.03
		Median	51.00
		Mode	46 <sup>a</sup>

a. Multiple modes exist. The smallest value is shown

It should come at no surprise that significant portions of those living in first-generation mobile homes are widows and widowers. In mobile home parks, a little over 30% are windowed and another almost 13% in private lots are widowed. Inferences can be made from these statistics about the social environment in which a mobile home recycling program would attempt to be viable (See Table 8).

Table 8: Marital Status

Marital status						
Is your home located in a mobile home park?			Frequency	Percent	Valid Percent	Cumulative Percent
Yes	Valid	Single	35	13.2	13.3	13.3
		Married	106	40.0	40.3	53.6
		Living together	3	1.1	1.1	54.8
		Widowed	82	30.9	31.2	85.9
		Divorced	30	11.3	11.4	97.3
		Separated	3	1.1	1.1	98.5
		Never married	3	1.1	1.1	99.6
		Other, specify	1	.4	.4	100.0
		Total	263	99.2	100.0	
	Missing	dk/nr	2	.8		
	Total		265	100.0		
No	Valid	Single	2	6.5	6.5	6.5
		Married	18	58.1	58.1	64.5
		Living together				
		Widowed	4	12.9	12.9	77.4
		Divorced	6	19.4	19.4	96.8
		Separated				
		Never married	1	3.2	3.2	100.0
		Other, specify				
		Total	31	100.0	100.0	
	Missing	dk/nr				
	Total					

Finally, as can be expected, those living in pre-1976 mobile homes report relatively low income levels with those living in parks the most economically marginal. About 20% of those in parks report an annual income of \$10,000 or less with another 32% reporting their household income between \$10,000 and \$20,000. As Table 9 helps illustrate, about 53% of those in parks report their household income under \$20,000 per year. Of those not in parks, only 28% report similar income levels. Of those who live on private parcels, only one reports renting the land. Therefore, it is reasonable to expect that those who own real property would have higher income levels.

Table 9: Approximately, what is your annual household income?

Annual household income						
Is your home located in a mobile home park?			Frequency	Percent	Valid Percent	Cumulative Percent
Yes	Valid	UNDER \$5,000	12	4.5	6.5	6.5
		\$5,000 _ \$10,000	26	9.8	14.1	20.5
		\$10,000 _ \$20,000	60	22.6	32.4	53.0
		\$20,000 _ \$30,000	49	18.5	26.5	79.5
		\$30,000 _ \$50,000	25	9.4	13.5	93.0
		\$50,000 _ \$75,000	11	4.2	5.9	98.9
		\$75,000 _ \$100,000				
		OVER \$100,000	2	.8	1.1	100.0
		Total	185	69.8	100.0	
		Missing	dk/nr	80	30.2	
No	Valid	UNDER \$5,000	1	3.2	4.0	4.0
		\$5,000 _ \$10,000	3	9.7	12.0	16.0
		\$10,000 _ \$20,000	3	9.7	12.0	28.0
		\$20,000 _ \$30,000	6	19.4	24.0	52.0
		\$30,000 _ \$50,000	9	29.0	36.0	88.0
		\$50,000 _ \$75,000				
		\$75,000 _ \$100,000	2	6.5	8.0	96.0
		OVER \$100,000	1	3.2	4.0	100.0
		Total	25	80.6	100.0	
		Missing	dk/nr	6	19.4	
		Total	31	100.0		

## Data Analysis Summary

For a voluntary recycling program to be successful, it requires homeowner participation. Participation requires not only willingness, but also having the resources necessary to participate. The analysis presented here illustrates that willingness and access to resources will both be an issue. Overall, those living in first generation mobile homes are elderly and poor. The most vulnerable housing units are inhabited by those most socially vulnerable. When developing a recycling program it is important to remember whom the program will be target towards.

Using this understanding as a foundation, the following introduces three different options for recycling the most vulnerable mobile homes.

## **Recycling Program Options**

The above data analysis emphasizes a multitude of important and complicated issues that are involved in developing a potential program. As a result of these complexities, three possible options are offered. Using focus groups, these three options were tested for feasibility with homeowners. While a program would ultimately have to include other stakeholders, understanding how those who live in these mobile homes feel about possible programs is of vital importance.

As we have learned through other programs, homeowners are not always receptive to programs that appear to be in their benefit. An excellent example is the RCMP program that had difficulties getting homeowners interested in participating. Without this willingness to participate, no program can work. The following addresses program types and other issues involved.

### **Eligibility**

The basic plan for the eligibility and technical aspects of recycling would be the same for all of the recycling options. The oldest most vulnerable homes would be eligible for recycling first. Two steps will be required to determine eligibility based on location of the mobile home.

1. **Mobile Homes as Personal Property:** In order to determine the most vulnerable, changes will be required in the types of data collected during registration by the Department of Motor Vehicles. Currently, the DMV data only includes address of the individual registering the mobile home. When spatially analyzing zip code data, registrations are all over the United States and Canada. (See attached map) It is in the vital interest of the State of Florida to know where these units are in the state. The only way to know the true exposure is to know the distribution of mobile home units within Florida. In addition, the actual location of the mobile home in relation to high hazard zones will determine those most at risk. Using a calculation of year manufactured and location, we will be able to rank order units so that the most at risk are recycled first.
2. **Mobile Homes as Real Property:** We estimate that about half of all mobile homes in the State are on personal property. This varies greatly by county. More urban counties like Miami-Dade and Broward have only a small portion of their mobile homes as real property. Other counties that are more rural in nature have a higher proportion on private property. The only way to determine location and eligibility of these units is through real estate tax records. Based on county land

use codes, mobile homes can be extracted from tax records. The data should include property data and year built (in this case manufactured). Using the same formula as above, units can be given an eligibility score. Those units with scores within specific parameters (yet to be determined) will be considered a priority for recycling.

**Physical Recycling:** Florida will be broken down into regions, and within each region, lists of recycling contractors will be developed. Costs for the physical recycling of the unit will be absorbed by the State of Florida. Where applicable, materials from the mobile home will be salvaged and recycled in order to defray some costs. **All units must be removed from stock; no unit may be resold.** More details on the physical recycling issues have been identified in the findings for Phase I.

**Costs:** Costs for a program vary dramatically depending on the type of program that is chosen. Minimum costs will include administration and costs for the physical recycling. In addition, costs will vary based on location within the state. Costs will be discussed more below for each type of recycling.

### **Three Program Options**

As discussed in the earlier in this report, those living in these older mobile homes tend to be those most economically marginal. Keeping this in mind, there are three types of recycling programs that need further exploration.

1. **Rebate Plan:** The first option for a recycling program is a simple rebate plan. Those in older first generation mobile homes would get a rebate from a manufacturer for turning in their old unit for recycling. The rebate would be applied to the cost of a new mobile home that meets the stricter wind standards.

a. **Advantages:**

- The overall cost to the State would be minimized.
- Manufacturers would increase sales.

b. **Disadvantages:**

- Majority of those who own pre-1976 mobile homes will not be able to participate because of financial reasons.
- Requires manufacturers to cooperate.

c. **Discussion:** When first thinking about a recycling program where the focus was putting people in the most vulnerable mobile homes into safer housing, the rebate option was the first option that came to mind. On the surface, this type of program seems to be the most reasonable and obvious. Once we looked at the demographics of the population in question, this option actually seemed unworkable.

As the data analysis shows, the majority of those who live in pre-1976 mobile homes are economically marginal and/or elderly. Very few currently have a mortgage, and only a handful or so have ever had a mortgage. Even with a rebate (regardless of amount), monthly expenses will rise. For most of this population, this is not an option because of their economic status, particularly for those on fixed incomes.

2. **Down Payment Assistance:** Program would offer those who live in pre-1976 mobile homes, assistance with down payments for site built home or condominium.

a. **Advantages**

- Helps those who are living in mobile homes by circumstance and not desire, get into a safer form of housing that they would prefer to live in.

b. **Disadvantages**

- Cost: Would have to find a way to underwrite the program such as homebuilders.
- Limited appeal. Many people prefer to live in mobile homes.
- Will only put very small dent in overall exposure since program would probably be very small.

c. **Discussion:** A program offering down-payment assistance would be better in conjunction with the rebate program and not as an independent stand-alone program. The majority of people who live in mobile homes want to stay in mobile homes (see Focus Group section below). Most do not want to move. Having an option for down-payment assistance will help the few who are trying to get into site-built homes.

As with the Rebate program discussed above, these types of programs will not meet the needs of those who are the most economically marginal. Even a program that includes options for either the rebate or down payment assistance for a site-built home will preclude the majority of those who are the most vulnerable from participation. For a program to be effective, it will have to consider the nature of the population for which it is being developed.

3. **Free Replacement:** A program would be developed that offers those in older units a new mobile home with little or no out of pocket expenses.

a. **Advantages:**

- More households can participate. One of the biggest problems with options one and two is that they would require significant increased expense on the part of the participant.
- Allows household to stay in mobile home (which many desire).

b. **Disadvantages:**

- This type of program would be very expensive. Funding would have to come from some type of additional tax on mobile home registrations.
- Because of the cost, the program would make only a minor dent in the level of exposure. Funding of \$5 million per year would only eliminate about 100 vulnerable homes from the housing stock.

c. **Discussion:** Offering a newer mobile home in exchange for an older one seems to be the type of program most would be willing to join. The problem lies in that a newer mobile home may not be able to go into the same lot because of zoning regulations. In addition, even though the unit itself may not increase out of pocket monthly expenses, these larger units may cause other expenses to increase. Those on fixed incomes may not be willing to participate.

4. **Banning:** Pre-1976 mobile homes in Florida would basically be banned or outlawed. Current owners would be grandfathered in so that they did not have to replace their home immediately, but the home could not be turned over to another owner in Florida (could be moved out of state). Because mobile homes

are personal property, the State would probably have to offer some type of payment to buy-out owners. Problem is determining equitable market value for an aging mobile home. State would assume responsibility of disposal.

a. **Advantages:**

- Does not require the displacement of households right away. Program allows people to make plans for when they would have to move into other housing.
- Relatively low cost (without buyout).

b. **Disadvantages:**

- Could have possible legal challenges.
- Does not have much effect on current exposure to losses. The hope is that over time it will have the necessary benefit (particularly since there is an aging population in the pre-1976 mobile homes).

c. **Discussion:** If the State has to buy-out mobile home owners, the cost of this program increases dramatically. Research has shown that the market value of pre-1976 mobile homes varies considerably. The following list is just an example of recent mobile homes on the market.

- 1969 Mobile Home, 12 X 12 Addition, in Mobile Home Park: \$7000
- 1974 Doublewide, needs minor repair: \$3,000
- 1973 Marlette, 14 X70: \$15,000
- 1971 Marlette, 12 X 70, must be moved: \$4,800
- 1972 Excalibur, 12 X 65, in park or can be moved: \$19,900
- 1972 Buddy, 14 X 70, located in family park: \$, 16,500

These are just a few examples of the range of asking prices. Clearly some owners will be more than willing to get involved in a program that offers \$5,000, but others will balk. Settling on an equitable amount will be

challenging. A program like this could also be tied up in significant legal red tape since many owners will be vocally against this policy.

In addition to the challenges designing a program creates, other issues come into play when trying to develop a program that residents of Florida would be willing to participate.

### **Other Issues:**

1. **Zoning issues:** Since many of these homes are single wide and new mobile homes are double-wide, it is possible that people will not only have to move out of their home, but also to a new park as well. Parks with older mobile homes cannot accommodate larger doublewide units. The lots are too small, and a larger unit will violate setback requirements, and ultimately cause the park not to be in compliance with municipal codes.
2. **Skepticism:** Regardless of the program that is ultimately designed, the overall skepticism of Floridians will have to be overcome. Convincing people that the program is legitimate will be a first step. When the RCMP program first started, interviews of households who chose not to participate revealed that most thought the program too good to be true.

### **Panel Discussion**

To better understand how those who live in these older mobile homes feel about the various options discussed above, a panel of respondents was selected from around the State of Florida to discuss the various plans being considered. Because our goal was to have a group representing the entire state, discussions were done over the phone in order to get as broad of a representative sample as possible.

This panel was presented with a series of questions outlining various programs, and their opinion was solicited as to their interest in the different options. Those not interested were further probed to determine what was causing the hesitation. The questions asked can be found in the Appendix. Clearly the findings indicate that the majority of people who live in mobile homes enjoy such a lifestyle and do not necessarily want to live in a different type of housing.

## **Panel Discussion Findings**

### **Housing Preference**

As alluded to earlier, the majority of people who live in mobile homes appear to want to remain in that type of housing. Over 72% of the panel discussants indicate that a mobile home is their preferred housing type. About 23% would prefer to be in a site-built single family home with only about 4% preferring to live in either an apartment or condominium. These findings suggest that a program that keeps people in a mobile home would be the best type of program.

Table 10: What type of housing would you prefer to live in?

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What type of housing preferred					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Site built	10	21.3	23.3	23.3
	MH	31	66.0	72.1	95.3
	Apt	1	2.1	2.3	97.7
	Condo	1	2.1	2.3	100.0
	Total	43	91.5	100.0	
Missing	System	4	8.5		
	Total	47	100.0		

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### **Program Option 1**

Question Asked: The first type of program would give you a rebate towards a new mobile home. How interested would you be in a program that offered you up to \$5,000 towards a new mobile home? Would you be very interested, Somewhat Interested A little interested or Not interested at all?

As Table 11 shows, about 75% of the panel indicates that they would not be interested in a rebate program. With the addition of those who are only a little interested, about 84% would probably opt out of involvement in a program. None of the panel members indicate that they would be very interested. About 16% are in a group that might be persuaded through program options to be involved.

Table 11: Interest in Rebate Program

**Interested in rebate program for another MH**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not interested at all	32	68.1	74.4	74.4
	A little Interested	4	8.5	9.3	83.7
	Somewhat Interested	7	14.9	16.3	100.0
	Total	43	91.5	100.0	
Missing	System	4	8.5		
	Total	47	100.0		

To better understand why people are not interested in a rebate program, panelists who indicated that they were either not interested or only a little interested were asked why their interest was low. To give the best feel for the different responses, they are enumerated below instead of categorized.

In general, however, the major issues appear to be age, economics, and comfort/convenience. A rebate incentive does not appeal to the elderly population living in these older mobile homes in part because of the economics of moving, but also in terms of convenience. The data also suggest that the economics and inconvenience of moving are issues for everyone.

As the responses below reflect, some panelists indicate that their mobile home is worth more than the \$5,000 offered, and in addition, some have invested significant money into their unit making it more valuable in their own eyes. Most of all, however, it appears that the inconvenience of moving is the dominant reason why people are not interested in a rebate program.

**Panel Responses:**

Reasons why panelist is not interested at all in a program:

- Doesn't want a new home.
- Mobile home is only a winter home. Very happy with the mobile home, which is a double lot.
- Very limited budget.
- Already too old, 81 years old.
- Too old to move.
- Doesn't like mobile homes.

- I don't need any money.
- Doesn't want to move.
- Doesn't want to move.
- I am set in my house.
- Too old to move.
- Like my current home.
- Has put a lot of money in her mobile home.
- Too old to be moving.
- Doesn't want to move from current home.
- Can't worry about moving now, I am too sick.
- Don't like mobile homes.
- Invested money into current home, I have a new roof, a new kitchen, and a new bathroom.
- Can't afford to move.
- Don't plan to move due to the age, but if I do I would move up north.
- Don't want to go anywhere.
- Too sick and old to change homes.
- I use my mobile home only during the winter.
- My home is worth more than that.
- This is my winter home.
- I have invested money in my home.
- Not interested in changing homes.
- I wouldn't consider moving from my home now.
- Don't want to change my house.
- Don't have time to think about it.
- My home is only 8 years old. It is manufactured.
- I'm 91 years old and I like my home.
- I don't want to move. I never thought about it.

Reasons why panelists are only a little bit interested in a Rebate Program:

- Depending on what you have to do.
- Cost.
- Satisfied with the home I am on.
- It all depends in the cost.
- Depends on what kind of mobile home.

## **Program Option 2**

Question Asked: How interested would you be in a program that gave you up to \$5,000 towards a down payment on a site built home?

Few panelists are interesting in a program for a down payment. This finding reflects that the majority of those in mobile homes wish to stay in mobile homes. In addition, it also reflects the economic reality of the majority of those in these older mobile homes. With over 95% of panelists indicating that they are not interested in a down payment program, this option appears to be the least likely to work.

Table 12: Interest in a Program for Down Payment Assistance

Interested in program for down payment on site built home					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not interested at all	41	87.2	95.3	95.3
	Somewhat Interested	1	2.1	2.3	97.7
	Very Interested	1	2.1	2.3	100.0
	Total	43	91.5	100.0	
Missing	System	4	8.5		
	Total	47	100.0		

The reasons why panelists are not interested in a down payment assistance program are similar to the reasons mentioned for why they are not interested in a rebate program. More emphasis, however, appears to be on the expense of living in a single-family home in comparison to living in a mobile home. Other frequently mentioned reasons were that they prefer to live in a mobile home and not interested in moving.

### **Panel Responses:**

Why panelists are not interested in a down payment assistance program:

- Owns his mobile home and also owns the lot.
- Has a house up north.
- Happy in mobile home.
- Like to live in a mobile home.
- Too expensive.
- Have a home in Maine.
- Prefer mobile home.
- Don't need any money.
- Doesn't want to move.

- Houses are too expensive.
- Houses are too expensive, and I am too old.
- Don't want to be bothered.
- Houses are too expensive.
- Like to live in a mobile home.
- Likes her mobile home.
- Houses are too expensive, and I am too old and sick to move.
- Don't want to move at all.
- Not planning on moving.
- Houses are too expensive. I don't have the money for one.
- Too expensive, don't have the money for the house.
- Likes mobile home.
- Can't afford a home.
- Don't want to move.
- Houses are too expensive.
- Don't want to live in a house.
- Homes are too expensive.
- Don't want to move.
- Don't want to move.
- I have a home up north.
- Likes her mobile home.
- I prefer to live in a mobile home.
- Can't afford a home.
- Doesn't want to move.
- I already have a home up north.
- I already have a home.
- I like my mobile home.
- I like my home.
- I like my mobile home.
- I like my home.
- Like my home.
- Don't care to move.
- I like my home.

Reasons cited for being only a little interested:

- A little interested because you do own the land.

### Option 3

Question Asked: Another type of program would offer you a mobile home that was built after 1994. You would have no additional out of pocket expenses, but you might have to live in another mobile home park, if you live in a park. How interested would you be in such a program?

Of the three program options, before talking to panelists, the belief was that this option would be the one with significant interest. But, as Table 13 illustrates, almost 80% of panelists indicate that they are not interested in this program at all. About 15% report that they are somewhat or very interested. These findings were surprising. The expectation was that a large proportion of panelists would be interested in a program that offered them a newer, safer mobile home. Reality, however, was clearly different.

Table 13: Interest in Newer Mobile Home, No Additional Expenses

Interested in program that gives newer Mobile Home					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not interested at all	34	72.3	79.1	79.1
	A little Interested	3	6.4	7.0	86.0
	Somewhat Interested	5	10.6	11.6	97.7
	Very Interested	1	2.1	2.3	100.0
	Total	43	91.5	100.0	
	Missing System	4	8.5		
Missing	Total	47	100.0		

Looking at the responses from panelists as to why they are not interested in a program that would offer them a newer, safer mobile home, the most salient issue appears to be that people simply do not want to move. The cost and inconvenience of packing and moving outweighs the benefit of a newer, safer home. Much of this reflects the general demographics of this population. As Table 7 earlier illustrated, the mean age of those in pre-1976 mobile homes is a little over 65 with the most frequent response 76. Without a doubt, the demographics of the population play a very significant role in their willingness to participate in a program.

#### Panel Responses:

Reasons why respondents are not interested at all:

- Doesn't want to move.
- Mobile home is only winter home.

- Live with a very limited budget.
- Has home in Maine.
- Don't want to move.
- Don't like mobile homes.
- Doesn't want to move.
- I am 80 years old, not interested maybe if I was younger, too sick to move.
- Doesn't want to move.
- Don't want to move.
- Too old to move.
- Don't want to move to another mobile home.
- Doesn't want to move.
- Doesn't want to move.
- Don't want to move.
- Already set in my house, I am too old to move.
- Don't want to move.
- Don't want to move into another mobile home.
- Don't want to move, I have already a lovely home.
- Too old and not enough money to move.
- I am 90 years old and I am taking each day as it comes.
- Not interested.
- Not interested.
- Would not want to move.
- Don't want to leave the place I am at.
- I like where I am.
- I use my mobile home only a couple of months during the year.
- I don't want a new mobile home.
- Not interested.
- Don't want a new home.
- I don't want to move.
- Not interested.
- Don't have a reason to move.
- I am very sick to think about this.
- I am very comfortable where I am. I don't care to move.

Reasons why only a little interested:

- Depending on what I have to do.
- Yes, but depends on cost.

- Depends on the area.
- Depends on the mobile home park.

## **Overall Assessment**

Realizing that none of the options might appeal to panelists, a final open-ended question was asked to determine what, if anything, would motivate panelists to move from their current home. The two most common responses appear to be “nothing” or “death.” Other reasons include increased income or damage to home. Actual responses are listed below.

Panelist's responses:

- Nothing.
- No, has a home already.
- Death.
- Money.
- If circumstances change in the home such as my wife dying.
- Nothing, at the moment.
- Depends on the situation. Does not want to move to another mobile home, prefer a home but it is too expensive.
- Will not move out of current home.
- Nothing, love the neighbors, and the place, has good doctors around.
- Too old to move.
- Death.
- Money. If I had a better income, maybe I would consider moving out.
- If they evicted me.
- End of days.
- Nothing.
- Can't think of anything.
- Death.
- Cost, the type of program and help available.
- At this point nothing.
- Another lot with a home on it.
- Higher income to be able to afford a home.
- Money, I have been living in this mobile home for 2 years, and am planning to stay for 2 more years until we have enough save for a better home.
- Nothing.
- If I was younger and if I had more money.

- If my home got destroyed by a tornado or a hurricane.
- Income, if I had better means to afford a new home.
- No desire to move unless there is a flood.
- When I pass away.
- Nothing.
- Nothing, very happy were she is at; park fees are low, already own mobile home.
- Depends on the deal and the transaction money wise.
- If my home got damaged or destroyed.
- Death.
- I can't think of anything.
- I am too old to think about moving.
- Only if I had to help my kids and move in with them.
- Nothing, I am comfortable and I like my home.
- I own my home and I like where I am.
- Nothing.
- Nothing, very happy where I am.
- Only death.
- If a natural disaster strikes and damages my house.
- Nothing.

### **Summary: Program Options**

Three alternative program options were presented and tested using a panel of people who live in pre-1976 mobile homes. The three options presented were a) rebate program for newer, post-1994 mobile home, b) down payment assistance program for a site built home, and 3) a program that would offer those in pre-1976 mobile homes a newer home with no extra out of pocket expenses. The results of the panel discussions suggest that few would be willing to participate in any of these programs.

In fact, open-ended questions suggest that there are few if any conditions under which people would be willing to move out of their current homes. These findings are not surprising considering the demographics of the population. Those who live in the oldest most vulnerable mobile homes are those who tend to be more economically marginal and elderly. Issues that contradict inclusion into a program include having a fixed income, having limited income for monthly expenses and being too frail or sick to even consider moving. Unfortunately, the vulnerability of these older mobile home units coincides with a population that is more socially vulnerable to the impacts of tropical weather. Meeting the needs of these populations after impact will require more

resources and will be more challenging. However, what is clear is that voluntary programs are not viable options.

The only viable option appears to be the most controversial one: banning pre-1976 mobile homes in the State of Florida. And even the viability of this option is questionable considering the overall implications in regards to legal challenges and equitable buy-outs.

## References

1. Marshall, R. D., "Manufactured Homes – Probability of Failure and the Need for Better Windstorm Protection Through Improved Anchor Systems," NISTIR 5370, National Institute of Standards and Technology, US Department of Commerce, November, 1994.
2. "A Feasibility Study of Mobile Home Recycling," Cooperative Report prepared by Vermont Agency of Natural Resources, Town of Bristol, Vermont, and Manufactured Housing Institute, Arlington, Virginia, October 2000.

## Panel Discussion Survey Instrument

Survey #\_\_\_\_\_ Phone #\_\_\_\_\_

Demographics from 1<sup>st</sup> Survey:

Income: \_\_\_\_\_ Age: \_\_\_\_\_ Mobile Home Built: \_\_\_\_\_

Mortgage: \_\_\_\_\_ Ever? \_\_\_\_\_ ZipCode \_\_\_\_\_

Hi. My name is \_\_\_\_\_, and I am calling from the International Hurricane Center at Florida International University. We are currently working on a project for the state of Florida regarding housing programs and would like your input on some issues. This will only take a few minutes of your time. Could I ask you a few questions?

If no, thank them for their time and wish them a good day.

1. Do you live in a mobile home?
  - a. Yes
  - b. No (Thank you for your time. Unfortunately at this time we're only interested in talking to those who live in a mobile home.)
  
2. Where is your mobile home located?
  - a. In a mobile home park
  - b. In a private lot
  
3. In what type of housing unit would you prefer to live in?
  - a. A site built home
  - b. Mobile Home
  - c. Apartment
  - d. Condo
  - e. Other: \_\_\_\_\_
  
4. Was your mobile home manufactured prior to 1976?
  - a. Yes
  - b. No

There are various types of programs we are exploring that could help people move into a newer mobile home or site built home. I'm going to describe a couple of programs and ask you how interested you would be in that type of program.

5. The first type of program would give you a rebate towards a new mobile home. How interested would you be in a program that offered you up to \$5,000 towards a new mobile home? Would you be Very Interested, Somewhat Interested, A Little Interested or Not Interested at all?

- a. Not Interested at all (go to 5a)
- b. A little Interested (go to 5a)
- c. Somewhat Interested (skip to 6)
- d. Very Interested (skip to 6)

5a. Why aren't you more interested in a rebate program that would give you money towards a new mobile home?

6. How interested would you be in a program that gave you up to \$5,000 towards a down payment on a site built home?

- a. Not Interested at all (go to 6a)
- b. A little Interested (go to 6a)
- c. Somewhat Interested (Skip to 7)
- d. Very Interested (Skip to 7)

6a. Why aren't you more interested in a program that gives you money towards a down payment on a site built home?

7. Another type of program would offer you a mobile home that was built after 1994. You would have no additional out of pocket expenses, but you might have to live in another mobile home park, if you live in a park. How interested would you be in such a program

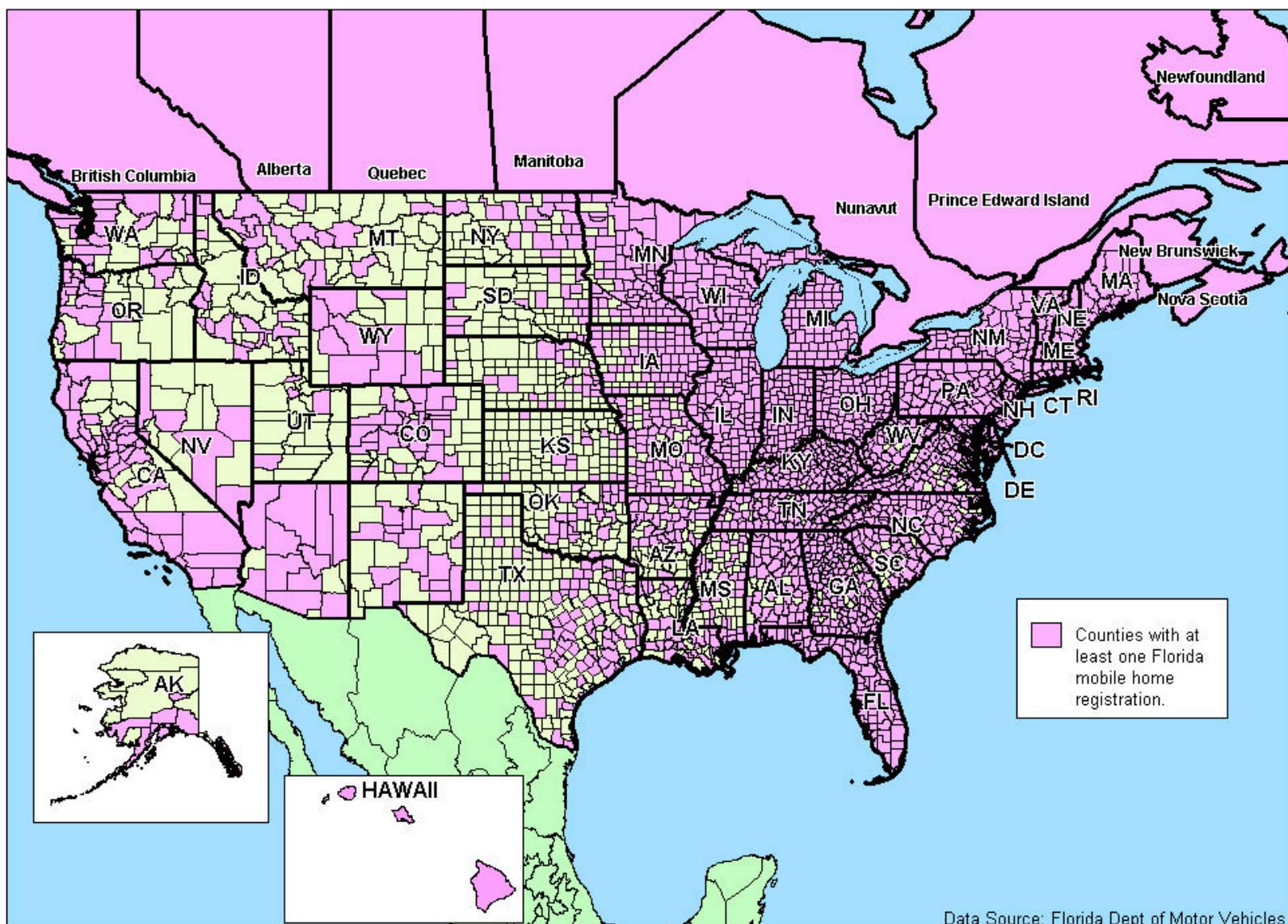
- a. Not Interested at all (go to 7a)
- b. A little Interested (go to 7a)
- c. Somewhat Interested (skip to 8)
- d. Very Interested (skip to 8)

7a. Why aren't you interested in a program that would offer you a new mobile home that may be more resistant to hurricanes?

8. What would motivate you to move out of your current home?

Thank you very much for your time. We appreciate your willingness to help with this ongoing project. Do you have any final comments? Put comments below if any. If not: Say thank you and have a nice day.

## **Dispersion of Florida Mobile Home Registrations in the United States and Canada**



**Programs of Research and Development  
Relating to Hurricane Loss Reduction Devices  
And Techniques for Site-Built Residences**

**Volume 2  
Chapter 3**

## **Hurricane Loss Reduction: Retrofits and Structural Performance**

### **GOALS AND OBJECTIVES**

The goal of the research conducted during fiscal year 2002 was to provide improved scientific bases for evaluating the structural resistance and performance of building components and systems when subjected to extreme wind loading. Research was conducted on roof coverings, attachment of roof sheathing to roof structural members and anchorage of the roof structure to wall structural systems. Specific objectives included:

1. Review and evaluation of test methods for assessing the performance of asphalt shingle roof covering systems
2. Assessment of uplift resistance of roof sheathing attachments and the design procedures used to establish fastener schedules
3. Assessment of capacities and development of guidelines for design of high wind connections in light-frame wood structures subjected to combined loads.

### **GENERAL**

Five of the most common failures experienced by residential buildings subjected to hurricanes are:

1. Damage to and loss of roof coverings.
2. Loss of roof sheathing, including failure of sheathing at gable roof overhangs.
3. Breaching of components of the building envelope, such as windows and doors.
4. Water penetration of the building envelope.
5. Collapse and/or loss of entire roofs, including coverings, sheathing, and roof structure.

Roof shingles remain a weak link in the protection of the building envelope during strong wind events. The Asphalt Roofing Manufacturer's Association (ARMA) funded research a number of years ago to look into design loads for shingles subjected to high wind events. This research was conducted by Cermak, Peterka, Peterson of Fort Collins Colorado and concentrated on the mechanisms affecting shingle tab uplift. This research concluded that shingles were a relatively porous roof covering. As a result, they are believed to act somewhat independently from the wind pressures occurring in various zones of the roof and to be most dependent

on the flow over the raised edges of the tabs. Based on this research, ARMA has proposed a tab uplift test, which is coupled with wind tunnel tests to determine the uplift force coefficients on the shingle tabs. The results of wind tunnel tests suggest that thinner shingles should perform better than thicker ones because uplift forces are lower on the thinner shingles. In contrast, the *1994 South Florida Building Code* adopted test methods (also incorporated into the High Velocity Hurricane Zone sections of the *2001 Florida Building Code*) that require shingles to be directly evaluated in high velocity wind flows. The roof covering research conducted as part of this project sought to develop links between these different tests. The research included measurements of pressure fluctuations and pressure distributions generated by the various wind tunnel tests and seeks to identify similarities and differences between the loading conditions produced in the various tests.

A related issue concerns the performance of the shingles along the edges of the gables on a gable roof. Post storm investigations frequently reveal that shingles are blown off the gable ends when winds blow nearly parallel to the ridgeline of the gable end. Included in this research were preliminary tests conducted using airboats to generate wind flows over the gable end of a mock-up roof in an effort to investigate wind loadings generated in these conditions.

Several recent studies have demonstrated that the capacities of roof sheathing attachments are linked to the tributary areas of the fasteners used to attach the sheets. In the past, design of attachment systems have been developed using a variety of methods including assumptions that the uplift capacity could be estimated from the sum of the capacities of the individual fasteners. While the most recent analytical and experimental studies do suggest that there is some local sharing of capacity between adjacent fasteners, the mean failure capacity is closely linked to the capacities of the fasteners with the largest tributary areas. Studies of panel uplift capacities with missing fasteners have also shown that the ultimate capacities may be dependent on which fasteners are missing, how many adjacent fasteners are missing and the thickness of the sheathing. The studies have suggested that bending of the sheathing can affect load sharing between fasteners. There is a clear need for development of a more robust model for calculating panel capacities and the variability in the capacities. Debates have also centered on the relationship between panel capacities developed from uniform quasi-static loading and the actual performance of panels in a real high wind loading environment where wind loads are not likely to act uniformly over the entire panel and the magnitude of the loading is expected to change rapidly with time. In the case of metal panels with widely spaced fasteners, it is clear that low-cycle fatigue can play a role in the failure of the connections. This may also be important for roof

sheathing panels, but evidence of research linking the static and cyclic load performance of roof sheathing subjected to uplift loads was not found in the literature search conducted during this study. Finally, head pull-through failures can contribute to or control the ultimate uplift capacity of roof panel connections. However, the *National Design Standard for Wood* (NDS) only mentions the issue in passing and does not provide any guidance for estimating head pull-through capacities. Preliminary Monte Carlo based simulations that account for statistics on both fastener withdrawal and head pull-through capacities have yielded reasonable estimates of mean panel uplift capacities but poorer estimates of variability in panel uplift capacities.

Over the years a number of fastener types, sizes and spacing have been used to attach a variety of types and thickness of wood structural panels. In some cases, such as gable roof overhangs, commonly used prescriptive designs and construction methods can create situations where roof sheathing performs poorly in a severe windstorm. Despite the movement towards a statewide building code in Florida, fastener sizes, types and schedules allowed for sheathing connections still vary widely throughout the state. Some new recommendations, such as those being promoted by FLASH (Federal Alliance For Safe Homes), suggest that 10d nails be installed at 4-inch spacing along the edges of panels (this is also required for sheathing attachment along the edge of gable ends in the High Velocity Hurricane Zone regions of the 2001 Florida Building Code). However, in panel tests with 6 and 12 or 6 and 6 spacing, it has been observed that uplift failure of the panels did not initiate along the panel edges. In fact, a double row of 10d nails at 4-inch spacing may actually lead to significant splitting of the wood framing members and an overall reduction in uplift capacity.

Clearly, there has been a need for a more complete study of panel attachments and the resulting uplift capacities. The research conducted included testing of individual fasteners and full panels. It included enough samples to build a sound statistical basis for developing a design procedure that properly accounts for nail pullout, nail pull-through, load sharing between fasteners and special situations such as gable overhangs. Load information, including time histories of simultaneous loads on the top and bottom surfaces of gable roof overhangs, were used to provide loading information for gable overhangs. The resulting analysis can provide more reliable estimates of uplift capacities for existing nailing schedules and sheathing types. This will aid in vulnerability analyses and in the design of appropriate retrofit methods. It may also be used to develop designs that will provide comparable reliabilities for gable and hip roof systems. If appropriate modifications are made to the gable end construction, the Florida Wind Pool insurance premium increase associated with gable ends could be modified.

Connections between roof trusses or rafters and walls are required to transmit a complex set of loads from the roof structural system into the walls which then transmit these loads to the foundations. In general, the connections must transmit uplift loads on the roof into the walls along with shear forces developed through the roof diaphragm action and out-of-plane loads on the walls. In some cases, the roof structural system will deform so much under the wind loading (scissors trusses or cathedral ceilings, for example) that this deformation results in additional significant out of plane loading on the walls. Questions persist concerning the definition of the loads to be applied to the design of these connections as well as the members that make up the various systems involved in these connections. The questions concern the appropriate use of component and cladding loads, main wind force resisting system loads, and combinations of these loads. Some guidance has been provided in the *Guide To The Use of ASCE 7-98*, but confusion still persists. Some work on these issues was carried out during the preparation of the FEMA guide for tornado community shelters. However, this report has not been widely circulated within the engineering or building communities and the study adopted a number of conservative provisions because research was not available to answer the questions raised during the development of the document.

The research conducted with regards to roof-to-wall connections was comprised of three major components. The first was a literature review of design procedures, guidelines and wind loading information related to dealing with combined wind loads on low-rise buildings. The second was the development and execution of a series of carefully designed full-scale roof-to-wall system tests to develop interaction diagrams for use in designing connections that are subjected to combined loads. The third was model scale wind tunnel tests that investigated load combinations for use in the design of the connections. Results of these investigations provide additional guidance for the design of roof-to-wall connections of light-frame wood structures.

## KEY FINDINGS

The research conducted during the year 2002 involved the development of new and unique test facilities as well as the use of these facilities for a series of tests. The research produced a number of key findings, provided insight into design procedures and raised several new issues.

### **Roof Shingle Testing and Performance Evaluation**

The 2001 *Florida Building Code* requires that shingle products be subjected to two different types of tests. The first test protocol, PA 107, subjects shingles to high-speed wind flows and aims to determine the resistance of the shingles to wind induced blow-up or blow-off. In this test, a specimen covered with the shingles being evaluated is subjected to a uniform flow of 110 mph for a period of two hours. The second test protocol, TAS 100, seeks to evaluate the resistance of the roofing product to wind and wind driven rain. Once again, the flow is a uniform jet of air. In some instances, the wind flow has been generated through the use of airboat engines equipped with multi-blade propellers.

During this fiscal year, the shingle related research focused on reproducing the PA 107 test protocol with the addition of detailed pressure measurements and on conducting exploratory testing using a pair of airboats to evaluate their usefulness in studying the performance of roofing along the gable roof edge.

In the airboat tests, a gable roof mockup 12 feet by 22 feet (the trusses spanned the 22-foot direction) was constructed with a roof pitch of 2.5-inches in 12-inches. The wall height was chosen such that the edge of the gable spanned between the middle and the upper third of the airboat propellers. Two airboats were setup parallel to each other and with their airstreams perpendicular to the gable. Pressure taps were located on the top surface of the felt underlayment, on the top surface of the shingles, and on the surface of the bottom shingle under the tabs at a position above the line of adhesive. Along one gable end, the shingles were glued to the felt and to each other using an asphalt adhesive layer 8-inches wide. This corresponds to the installation requirements of the 2001 *Florida Building Code* for the High Velocity Hurricane Zone areas. Shingles along the other side of the gable roof were installed without the adhesive layer. The latter represents a more typical installation in most of the State of Florida as well as in and most other states. Wind speeds of 110 to 120 mph were produced by the airboats at a height of 9 to 12 inches above the roof surface.

Pressure measurements obtained during these tests indicated that peak negative pressures consistent with code design values for these wind speeds were in fact produced on the top surface of the shingles. However, the pressures were very localized and there was little correlation of the high peaks over distances of as little as 4 inches. When the shingles were not adhered to the surface, positive mean pressures and relatively large positive pressure fluctuations occurred in the cavity between the felt and the bottom surface of the shingles. Positive and negative pressure fluctuations occurred in the cavity below the shingle tabs and there was no

clear indication of correlation between the large negative pressures on the top surface of the shingles and the negative pressure fluctuations in the cavity below the tabs. This suggests that for this test configuration, there was little equalization of pressures due to the porous nature of the shingle setup.

The lack of correlation of pressures over short distances is in direct conflict with available full-scale data on pressure distributions on roofs. The results clearly suggest that the airboat arrangement does not produce pressure distributions that are consistent with those produced by a natural wind event. This was further confirmed by conducting visualization of the flow around the gable edge of the roof with the airboats operating and comparing the flow with that produced by natural winds at the site. The flow from the airboat engines tended to blow almost parallel with the top surface of the gable roof and there was very little indication of a flow separation region over the top surface of the roof. However, the natural wind produced a very well defined flow separation bubble over the top surface of the roof. On one hand, the lack of correlation of the high negative pressure peaks may well create a more severe wind loading on the shingle tabs than the loading that would occur in a natural wind of similar magnitude. On the other hand, the lack of correlation of the pressures may result in less severe loading on the shingle attachment system than that created by a natural wind when the shingles are adhered to the felt paper and to each other along the roof edge.

Pressure measurements for the PA 107 configuration tests are still to be completed. However, since the flow is a uniform jet, it is expected that the pressures and resulting loads will most closely resemble the loads produced by flow disruptions over the edges of the shingles. These tests are expected to produce loadings that will correlate most closely with those that are the basis for the tab lift tests proposed by the Asphalt Roofing Manufacturers Association.

While the various tests may not produce loads that truly represent the action of wind on shingles in a severe wind storm, they may well still serve a useful purpose as a means of establishing relative performance levels for different products and for establishing threshold performance levels for regulatory purposes. It is clear from the language in the test protocols that some understanding of these potential limitations is already recognized. As more is learned about the pressure and load distributions actually produced in the various tests and if full-scale testing can be completed in the next fiscal year, it may be possible to begin building a relationship between performance in these tests and the subsequent expected performance in field applications.

## **Roof Sheathing Attachment**

As plywood and other structural sheathing products were introduced into the marketplace, their attachment to the roof and wall structural members was based more on concerns about warping of the product and the shear capacity of the roof diaphragm than on their capacity to resist suction pressures that would be generated by severe windstorms. Consequently, the same nailing patterns for roof sheathing attachment were being specified in Miami, Florida and Minneapolis, Minnesota. Furthermore, local wind loads used in the design of roof sheathing attachment have been significantly increased in modern building codes as the result of field studies and improved wind tunnel model studies.

Several recent studies have demonstrated that the capacities of roof sheathing attachments are linked to the tributary areas of the fasteners used to attach the sheets. In the past, design of attachment systems have been developed using a variety of methods including assumptions that the uplift capacity could be estimated from the sum of the capacities of the individual fasteners. While the most recent analytical and experimental studies do suggest that there is some local sharing of capacity between adjacent fasteners, the mean failure capacity is closely linked to the capacities of the fasteners with the largest tributary areas. Studies of panel uplift capacities with missing fasteners have also shown that the ultimate capacities may be dependent on which fasteners are missing, how many adjacent fasteners are missing and the thickness of the sheathing. The studies have suggested that bending of the sheathing can affect load sharing between fasteners. Debates have also centered on the relationship between panel capacities developed from uniform quasi-static loading and actual performance of panels in a real high-wind loading environment where wind loads are not likely to act uniformly over the entire panel and the magnitude of the loading is expected to change rapidly with time. These two potential effects are expected to have opposite effects on actual performance. The variation in loading over the panel surface may well result in less severe loading of the panel than that exerted by a uniform pressure distribution. However, cyclic loads nearly always result in failures at lower load levels than the loads required to cause failure under a simple increase in load to failure (a single cycle). There is a clear need for development of a robust model for calculating panel capacities, the variability of the capacities and for predicting response under non-uniform time varying loads. Finally, head pull-through failures can contribute to or control the ultimate uplift capacity of roof panel connections. However, the *National Design Standard for Wood* (NDS) only mentions the issue in passing and does not provide any guidance for estimating head pull-through capacities. Preliminary Monte Carlo based simulations that account for statistics on both fastener withdrawal

and head pull-through capacities have yielded reasonable estimates on mean panel uplift capacities but poorer estimates of the variability in panel uplift capacities (Sutt 2000).

Most of the testing and analysis conducted to date has focused on nominal ½-inch plywood (actual thickness 15/32-inch) since that has been the thickness specified in most areas of the United States. However, South Florida has required nominal 5/8-inch plywood panels (actual 19/32-inch thick) for the roof deck for some time and this thickness is being specified in the Blueprint for Safety, the IBHS Fortified for Safer Living recommendations and in the high wind requirements of the new Florida Building Code. Consequently, research conducted during fiscal year 2002 involved investigation of the uplift capacity of nominal 5/8-inch thick plywood panels. A variety of fastener types and fastener spacing schedules were investigated. A mobile panel test apparatus was constructed as part of this project and about 120 roof panels were tested. With the use of nominal 5/8-inch thick plywood panels, head pull-through was not an issue and designs with this thickness of sheathing and most common fasteners can be carried out without concern for head pull-through.

Two series of tests were conducted. The first consisted of a number of sets of 3 to 7 panels with the same nail type and nail spacing. These tests also included a separate series of individual fastener withdrawal tests for the lumber used to construct each specimen. Summary results from the panel tests are listed in Table 1. Detailed listing of test results and individual data sheets for each test specimen are included in Appendix A. Use of 8d ring shank nails nearly doubled the uplift capacity of the 5/8-inch roof sheathing as compared to the panels attached with 8d common bright or 8d galvanized nails. A single missing fastener along the edge of the panel (series 13 versus series 3) resulted in no reduction in uplift capacity, while two missing fasteners along the edge (series 23 versus series 3) resulted in an 18 percent reduction in average uplift capacity. Since the overdriven nails in series 5 did not generally produce head pull-through with the 5/8-inch sheathing, the test results did not indicate any reduction in uplift capacity.

Table 1. Summary of Roof Panel Uplift Test Results

Panel Series #	Type of Nail	No. of Panels Tested	Mean Failure Pressure (psf)	Standard Deviation of Failure Pressure (psf)	# of Nail Pullout Tests	Mean Nail Pullout (lbs)	Standard Deviation of Nail Pullout (lbs)
1	8D Common Bright	7	127	23.8	125	175	47
2	8D Galvanized	7	116	24.8	118	225	95
3	10D Coated Galvanized	7	108	14.4	101	167	40
4	10D Sinkers 2 7/8"	6	125	20.6	96	178	81
5	10D Coated Galvanized	3	132	33.7			
6	8D Ring Shank	7	231	38.2	87	373	82
13	10D Coated Galvanized	3	108	13.6	57	120	50
23	10D Coated Galvanized	3	89	16.5	57	126	56

A second set of tests consisted of two sets of 40 specimen. One set was constructed using 8d smooth shank common nails using a 6-inch spacing of nails to attach the panel to each of the support structural members. The second set consisted of panels attached with 8d ring shank nails installed with a similar spacing. Results of these tests series provided much more reliable estimates of the standard deviation of results and showed that the panel uplift resistance capacities closely followed the normal distribution for each type of fastener. The panels attached with smooth shank nails exhibited a mean ultimate uplift capacity that corresponded to a pressure of 126 pounds per square foot. The coefficient of variation in uplift capacities was 21.4 percent. The mean ultimate uplift capacity of the panels connected with the ring shank nails corresponded to a pressure of 292 pounds per square foot with a coefficient of variation of 15 percent. The ring shank nails installed at 6-inch fastener spacing actually out performed the 10d smooth shank nails installed with a 4-inch spacing as specified in the Blueprint for Safety recommendations (292 psf for the ring shank nails at 6-inch spacing

versus 267 psf for the 10d nails at 4-inch spacing).

## Performance of Hurricane Straps Under Combined Loading Conditions

Connections between roof trusses or rafters and walls are required to transmit a complex set of loads from the roof structural system into the walls which then transmit these loads to the foundations. In general, the connections must transmit uplift loads on the roof into the walls along with shear forces developed through the roof diaphragm action and out-of-plane loads on the walls. In some cases, the roof structural system will deform so much under the wind loading (scissors trusses or cathedral ceilings, for example) that this deformation results in additional significant out of plane loading on the walls. Questions have persisted concerning the definition of the loads to be applied to the design of these connections as well as the members that make up the various systems involved in these connections. The questions concern the appropriate use of component and cladding loads, main wind force resisting system loads, and combinations of these loads. Some guidance has been provided in the *Guide To The Use Of ASCE 7-98*, but confusion still persists. Some work on these issues was carried out during the preparation of the FEMA guide for tornado community shelters. However, this report has not been widely circulated within the engineering or building communities and the study adopted a number of conservative provisions because research was not available to answer the questions raised during the development of the document.

A literature review of design procedures, guidelines and wind loading information related to dealing with combined wind loads on low-rise buildings was conducted as part of this project. A series model scale wind tunnel tests were conducted to investigate appropriate load combinations and possible load combination reductions for use in the design of these connections. The wind tunnel tests indicated that for the most critical wind directions, the directions where the combined loads are that largest (wind directions within 15 degrees of perpendicular to the gable end), the reduction in loads for the combined loads is only 90 percent of the sum of the maximum component and cladding loads for the appropriate tributary areas in each of the individual directions. The wind loads on the individual faces were generally consistent with the ASCE 7-98 component and cladding coefficients for the corresponding tributary area except for the windward wall where the positive pressures were about 20 percent higher than the ASCE 7-98 values.

In order to assess the performance of actual roof-to-wall connections under combined load conditions, a test apparatus was constructed which allowed loads to be applied

individually or in combination to the roof and walls. The ultimate capacities found for single direction loading in any of the three loading directions were very close to the ultimate capacities published by the connector manufacturer. Furthermore, it was found that the design relation frequently used for handling combined loads on steel, concrete or aluminum structures ((design action 1/allowable 1) + (design action 2/allowable 2) + (design action 3/allowable 3) < 1.0 ) also works well for design of the roof to wall connections in light timber frame structures.

The walls and roof structures were built following the 2001 Florida Building Code requirements for wood frame walls and roofs constructed in High Velocity Hurricane Zones. The tests demonstrated that the ultimate capacity of the walls was frequently exceeded before the ultimate capacity of the connectors was exceeded. This was remedied by decreasing the spacing of 8d nails in the upper piece of wall sheathing to 3 inches. For these tests, the anchorage of the wall studs to the base also proved to be a critical connection, particularly for high shear loads. The design of these connections needs to be assessed using typical installations during the next year of the project.

## ROOF SHINGLE TESTING AND EVALUATION

### Background

Roof shingles remain a weak link in the protection of the building envelope during strong wind events. Some of the earliest tests on shingles involved the placement of an inclined roof panel covered by shingles in uniform flow produced by a ducted fan. For some time, shingles subjected to these tests were rated for different wind speeds based on the maximum wind speed applied to the panel without lifting of the shingle tabs. More recently, the Asphalt Roofing Manufacturer's Association (ARMA) funded research aimed at developing design loads for shingles subjected to high wind events. The research was conducted by Cermak, Peterka, Peterson of Fort Collins, Colorado and concentrated on the mechanisms affecting shingle tab uplift. This research concluded that shingles were a relatively porous roof covering. As a result, they are believed to act somewhat independently from the wind pressures occurring in various zones of the roof and to be most dependent on the flow over the raised edges of the tabs. Based on this research, ARMA has proposed a tab uplift test, which is coupled with wind tunnel tests to determine the uplift force coefficients on the shingle tabs. The results of wind tunnel tests suggest that thinner shingles should perform better than thicker ones because uplift forces are lower on the thinner shingles. However, this reduction in loads must be coupled with the reduced stiffness of the tabs as the shingles become thinner. In contrast, the 1994 *South Florida Building Code* adopted test methods (also incorporated into the High Velocity Hurricane Zone sections of the 2001 *Florida Building Code*) that require shingles to be directly evaluated in high velocity wind flows using procedures that are somewhat similar to the older test methods. It also requires testing in a wind driven rain environment that seeks to assess the resistance of the roof to water penetration.

The two test protocols for evaluating roof shingles for use in the 2001 *Florida Building Code* High Velocity Hurricane Zone are PA 107 and TAS 100. The first test protocol, PA 107, subjects shingles to high-speed wind flows and aims to determine the resistance of the shingles to wind induced blow-up or blow-off. In this test a specimen covered with the shingles being evaluated is subjected to a uniform flow of 110 mph for a period of two hours. The second test protocol, TAS 100, seeks to evaluate the resistance of the roofing product to wind and wind driven rain. Once again, the flow is a uniform jet of air. In some instances, the wind flow has been generated through the use of airboat engines equipped with multi-blade propellers.

A related issue concerns the performance of the shingles along the edges of the gables on a gable roof. Post storm investigations frequently reveal that shingles are blown off the gable ends when winds blow nearly parallel to the ridgeline of the gable end. This effect has not been the focus of any of the current test methods. However, in the High Velocity Hurricane Zone, the 2001 Florida Building Code addresses this issue by requiring that the shingles be fully adhered to the felt paper and to each other using an asphalt roofing adhesive for a distance of 8-inches from

the gable end. The potential downside of this approach is that this sealing of the shingles will reduce or eliminate their permeability at least along the roof edges where the uplift pressures are typically the highest.

## **Objectives and Scope**

The objective of the roof covering related research is to develop a scientific basis for assessing differences and similarities between the various tests. Ultimately, it is hoped that the research will lead to assessments of how well the various tests reproduce the factors that affect the performance of roof shingles in natural winds.

The roof covering research conducted during this fiscal year seeks to begin the process of developing links between the different test methods. This research includes measurements of pressure fluctuations and pressure distributions generated by the various methods for generating wind flows over the shingles. It seeks to identify similarities and differences between the loading conditions produced in the various tests. During this fiscal year, the shingle related research primarily focused on reproducing the PA 107 test protocol and on conducting exploratory testing using a pair of airboats to evaluate their usefulness in studying the performance of roofing along the gable roof edge. In both cases, the testing includes detailed pressure measurements on the surface of the shingles and between the layers of shingles.

## **Test Program and Results**

In the airboat tests, a gable roof mockup 12 feet by 22 feet (the trusses spanned the 22-foot direction) was constructed with a roof pitch of 2.5-inches in 12-inches. The wall height was chosen such that the edge of the gable spanned between the middle and the upper third of the airboat propellers. Two airboats were set up parallel to each other and with their airstreams perpendicular to the gable. Figure 1 shows the configuration of the mockup roof and airboats.

Pressure taps were located on the top surface of the felt underlayment, on the top surface of the shingles, and on the surface of the bottom shingle under the tabs at a position above the line of adhesive that is used to anchor the shingle tabs to the lower shingles. The taps were installed in rows that started at the edge of the gable and extended perpendicular to the gable end. This arrangement resulted in a row of taps that ran parallel to the air stream from the airboats. One row of taps was located 26 and  $\frac{1}{2}$  inches from the roof eave. A second row was located 75 inches from the eave. Figure 2 shows one of the rows of taps on the top surface of the shingles.



Figure 1. Roof Mockup and Airboat Test Configuration



Figure 2. Row of Pressure Taps Installed on Top Surface of Shingles

Along one gable end, the shingles were glued to the felt and to each other using an asphalt adhesive layer 8-inches wide. This corresponds to the installation requirements of the 2001 *Florida Building Code* for the High Velocity Hurricane Zone areas. Shingles along the other side of the gable roof were installed without the adhesive layer. The latter represents a more typical installation in most of the State of Florida as well as in and most other states. As shown in Figure 2, the first pressure tap on the top surface of the shingles was located about 2 and  $\frac{3}{4}$  inches from the edge of the roof and subsequent taps were spaced 3 and  $\frac{1}{2}$  inches apart. Four taps were installed in a row on the top surface of the shingles. On the roof edges that were not sealed with adhesive, four taps were installed on the surface between the shingle tab and the bottom layer of shingles, as shown in Figure 3, and three taps were installed on the top surface of the felt underlayment. On the roof edges that were sealed with adhesive, a single pressure tap was installed on the top surface of the felt and between the layers of shingles at a distance 10 inches from the gable edge. Since it was anticipated that pressures would be reasonably well correlated over distance of 1 to 2 feet, the rows of taps at the various layers were offset by two shingle tab along the slope of the roof.



Figure 3. Installation of Pressure Taps Below Shingle Tabs

The typical test sequence involved taking zero voltage readings for each sensor with the airboat engines turned off. The airboat engines were then started and the speed was set at a moderate level with the directional control vanes set in a straight away orientation (the flow was perpendicular to the gable end). Data collection was then initiated. After about 30 seconds, the operators began to cycle the directional control vanes back and forth to change the direction of the flow relative to the gable end. After about 30 seconds, the cycling of the vanes was stopped and the wind speed was increased. After about 30 seconds, the operators again began to cycle

the directional control vanes. After an additional 30 seconds, the wind speed was increased to the maximum value allowed with the airboats sitting in a stationary position and the movement of the vanes was stopped. Again, after an additional 30 seconds, the motion of the directional control vanes was once again initiated. After a final 30 second period, the test was stopped and the engines were shut down.

Maximum wind speeds of 110 to 120 mph were produced by the airboats at a height of 9 to 12 inches above the roof surface. For these wind speeds, ASCE 7-98 wind load provisions indicate design wind pressures would be on the order of -50 to -70 psf on the roof edge zone. Table 1 lists the maximum and minimum pressures recorded at the various taps during one of the airboat tests. The highest wind speed measured during this test was 106 mph.

Table 1. Maximum and Minimum Pressures Measured During Airboat Tests of Roof without Adhesive Along Gable End – Maximum Wind Speed was 106 mph

Tap Name	Data Channel	Surface	Distance from Gable edge (inches)	Minimum Pressure (psf)	Maximum Pressure (psf)
R1	10	Top of Shingle	2.75	-71	24
R2	8	Top of Shingle	6.25	-39	29
R3	3	Top of Shingle	9.75	-21	15
R4	11	Top of Shingle	13.25	-20	12
U1	2	Under Shingle Tab	2.75	-24	21
U2	4	Under Shingle Tab	6.25	-15	26
U3	5	Under Shingle Tab	9.75	-15	19
F1	1	Top of Felt Underlayment	2.75	-15	26
F2	7	Top of Felt Underlayment	6.25	-8	18
F3	6	Top of Felt Underlayment	9.75	-9	18

The negative pressure of -71 psf measured at Tap R1 is certainly on the order of the high negative pressures expected for this wind speed. However, this peak negative pressure was very localized as indicated by the drop to a peak negative pressure of -39 psf at the tap R2, which was located only 3.5 inches farther away from the edge of the gable overhang. A comparison of pressure traces from Taps R1, R2 and R3 indicated some weak correlation between the peak pressure events. However, it is clear that the negative peak pressure fluctuations are very localized. This comparison for a typical segment of the record is shown in Figure 4. Pressure

fluctuations measured between the layers of shingles were much better correlated as shown in Figure 5. Finally, the correlation between pressures at the various layers was essentially uncorrelated with the major peak negative pressures on the surface of the shingles. This is illustrated in Figure 6. These graphs are typical of the results obtained during the various tests. It was also found that the highest peak negative pressures on the roof surface occurred when the directional control vanes were being used to sweep the flow back and forth across the gable end.

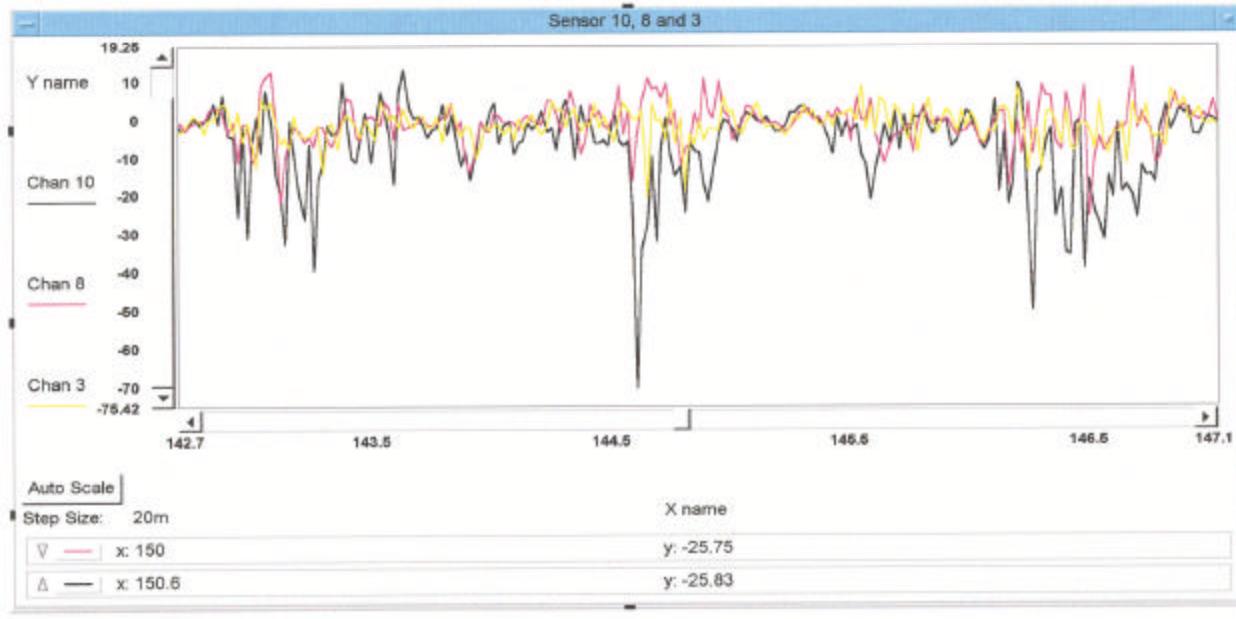


Figure 4. Comparison of Pressure Measurements from Taps Located on Top Surface of Shingles – Channel 10 is closest to gable roof edge and Channel 3 is farthest away.

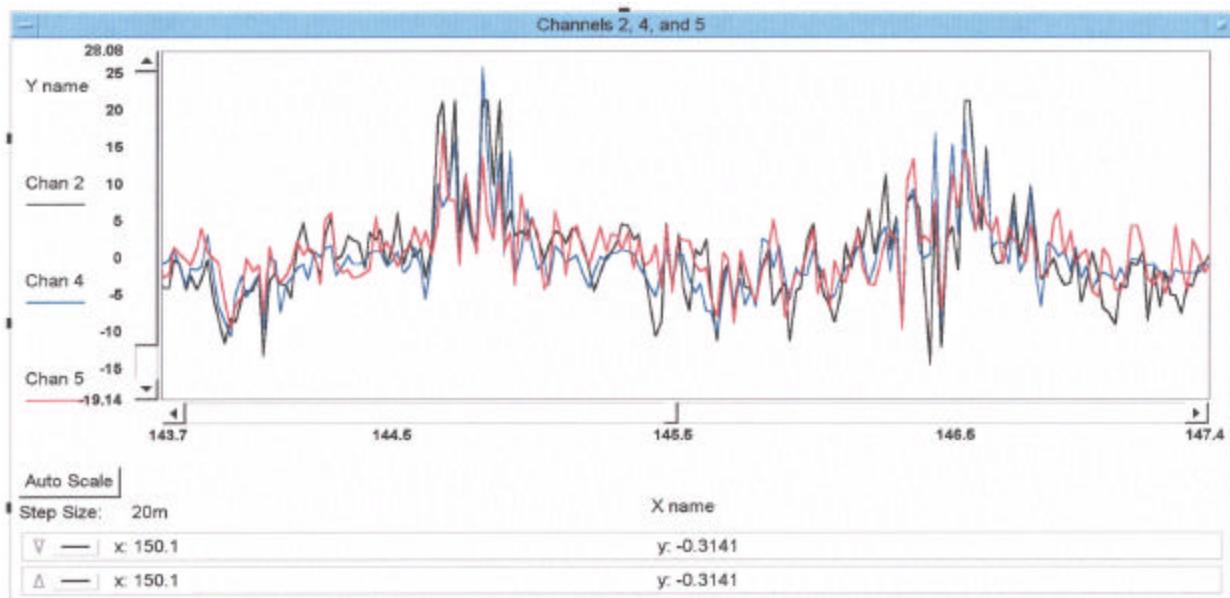


Figure 5. Comparison of Pressure measurements at Taps Under Shingle Tabs

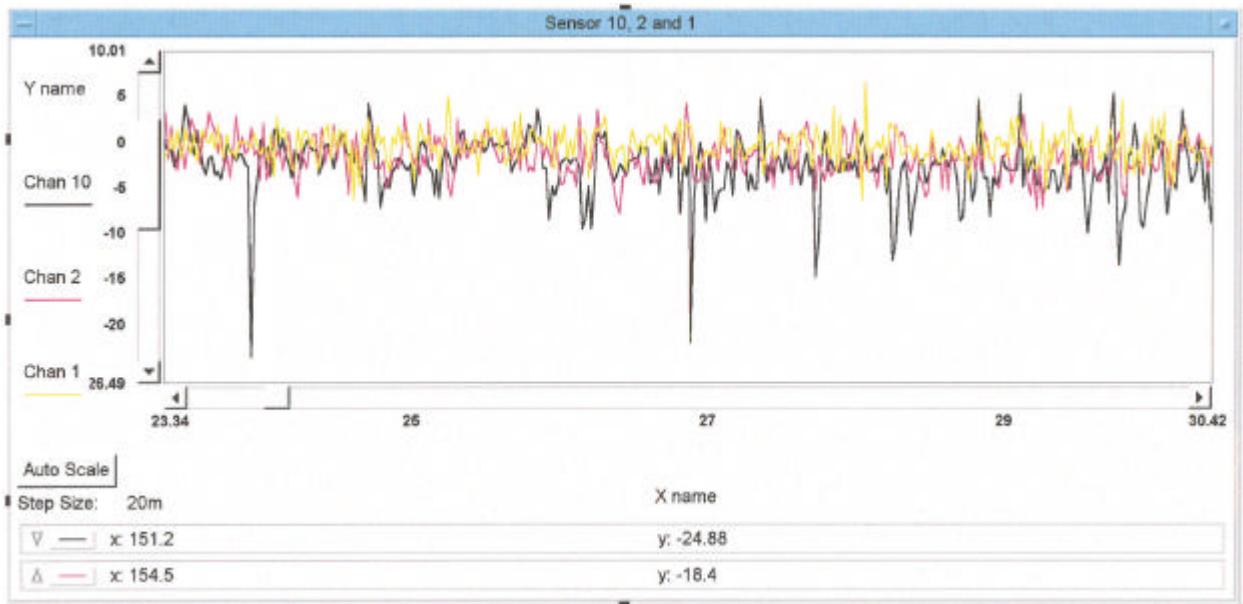


Figure 6. Comparison of Pressure Fluctuations Measured at Taps on the Shingle Surface, Between the Layer of Shingles and on the Surface of the Felt Underlayment

### Summary and Conclusions

Pressure measurements obtained during the airboat tests indicated that peak negative pressures consistent with code design values, for the wind speeds generated, were in fact produced on the top surface of the shingles. However, the pressures were very localized and there was little correlation of the high peaks over distances of as little as 4 inches. When the shingles were not adhered to the surface, positive mean pressures and relatively large positive pressure fluctuations occurred in the cavity between the felt and the bottom surface of the shingles. Positive and negative pressure fluctuations occurred in the cavity below the shingle tabs and there was no clear indication of correlation between the large negative pressures on the top surface of the shingles and the negative pressure fluctuations in the cavity below the tabs. This suggests that for this test configuration, there was little equalization of pressures due to the porous nature of the shingle setup. However, much of this lack of correlation or pressure equalization may be the result of the highly localized nature pressure fluctuations produced with this setup and the relatively large lateral separation of the taps on the various layers (10 inches). Testing should be repeated in the next fiscal year with the taps on the various layers located with minimal lateral separation between taps.

The lack of correlation of pressures over short distances is in direct conflict with available full-scale data on pressure distributions on roofs. The results clearly suggest that the airboat arrangement does not produce pressure distributions that are consistent with those produced by a natural wind event. This was further confirmed by conducting

visualization of the flow around the gable edge of the roof with the airboats operating and comparing that flow visualization with a visualization produced when natural winds at the site were on the order of 15 miles per hour. The flow from the airboat engines tended to blow almost parallel with the top surface of the gable roof and there was very little indication of a flow separation region over the top surface of the roof. This is consistent with the fact that relatively large positive peak pressure fluctuations were also observed for the taps located on the surface of the shingles. In contrast, the natural wind produced a very well defined flow separation bubble over the top surface of the roof. Digital video clips of the flow visualization are available on a CD rom.

The lack of correlation of the high negative pressure peaks may well create a more severe wind loading on the shingle tabs than the loading that would occur in a natural wind of similar magnitude. However, the lack of correlation of the pressures may also result in less severe loading on the shingle attachment system than that created by a natural wind when the shingles are adhered to the felt paper and to each other along the roof edge. Further testing in the next fiscal year should include changes in distance between the airboats and the roof as well as changes in the angle of the flow relative to horizontal. This may lead to the generation of an appropriate flow separation bubble over the roof surface.

Pressure measurements for the PA 107 configuration tests are still to be completed. However, since the flow is a uniform jet, it is expected that the pressures and resulting loads will most closely resemble the loads produced by flow disruptions over the edges of the shingles. These tests are expected to produce loadings that will correlate most closely with those that are the basis for the tab lift tests proposed by the Asphalt Roofing Manufacturers Association.

While the various tests may not produce loads that truly represent the action of wind on shingles in a severe wind storm, they may well still serve a useful purpose as a means of establishing relative performance levels for different products and for establishing threshold performance levels for regulatory purposes. It is clear from the language in the test protocols that some understanding of these potential limitations is already recognized. As more is learned about the pressure and load distributions actually produced in the various tests and if full-scale testing can be completed in the next fiscal year, it may be possible to begin building a relationship between performance in these tests and the subsequent expected performance in field applications.

## ROOF SHEATHING ATTACHMENT IN HIGH VELOCITY HURRICANE WIND ZONES

### Background

When plywood and other structural roof sheathing products were introduced into the marketplace their attachment to roof and wall structural members was based more on concerns about warping and shear capacity of the products as diaphragms than on their capacity to resist the suction generated by severe windstorms. Consequently, the same nailing patterns for roof sheathing attachment were specified in areas subjected to widely different windstorm conditions such as Miami, Florida and Minneapolis, Minnesota. Eventually local building codes were updated (and in many cases roof sheathing design loads were significantly increased) as a result of field studies and improved wind tunnel model studies.

It has been well established that the capacities of roof sheathing attachments are linked to the tributary areas of the fasteners used to attach the sheets (Cunningham 1993, Sutt 2000). While recent analytical and experimental studies suggest that there is some local sharing of capacity between adjacent fasteners, the mean failure capacity is closely linked to the capacities of the fasteners with the largest tributary areas. Finite element analyses have further supported this approach (Cunningham 1993, Mizzell 1994). These finite element analyses have also shown, however, that certain fasteners can attract more load than that calculated using tributary areas, particularly when the spacing of fasteners on interior members is 12-inches on center. Mizzell demonstrated this by measuring loads in the fasteners. As the number of fasteners used to attach a panel increases, the difference between the tributary area and finite element analyses are reduced. Cunningham concluded that the tributary area approach was adequate for design purposes. Analysis and subsequent testing of panels with missing fasteners (Cunningham 1993) indicated that loss of a single critical fastener, when fasteners on interior members are spaced at 12 inches, could result in as much as a 30 percent reduction in panel uplift capacity.

Cunningham proposed a design methodology for calculating panel uplift capacity that is based on *National Design Standard for Wood* (NDS) allowable capacities of individual fasteners and the largest tributary areas for fasteners in a panel. He conducted a limited number of panel tests as a means of verifying his analysis and supplemented the panel tests with a series of nail withdrawal tests. He was able to demonstrate good agreement between the calculated panel uplift capacities and the test results when he adjusted the calculations based on the actual nail withdrawal results rather than the NDS values. The reason the adjustments were necessary was that 6d common nail withdrawal capacities were only about 2.5 times the NDS allowable while 8d common nail withdrawal capacities were about 5.35 times the NDS allowable and 8d ring shank nails had an average withdrawal capacity that was 7.35 times the NDS allowable value (Cunningham 1993). The allowable withdrawal capacities for nails in the NDS are typically about one-fifth of the average ultimate test values (NDS Commentary 1999). Therefore if the NDS values had been used without any adjustment the measured panel uplift capacity for panels attached with 6d nails would have been much lower than the

calculated value, while the uplift capacity for panels attached with 8d ring shank nails would have been substantially higher than calculated. *The 2001 Florida Building Code* nailing schedules for the High Velocity Hurricane Zone are consistent with Cunningham's recommendations for nailing schedules in high wind areas. Because Cunningham's assumed average 8d fastener withdrawal capacities were consistent with or higher than the NDS average withdrawal values (5 or more times the NDS allowable values), these recommendations are valid only if the actual performance of fasteners, in the framing being used, is comparable to or higher than the NDS values.

Cunningham's tests were conducted using Douglas Fir-Larch (DFL) lumber. Subsequent panel tests with Southern Yellow Pine (SYP) and nominal ½-inch (15/32-inch actual) plywood panels have been conducted by a number of researchers at Clemson University (Kallem 1996, Sutt 1996, Sutt 2000) and have produced results that vary significantly from the NDS values. Most of the test results have revealed substantially lower uplift capacities than those expected using Cunningham's procedure and NDS withdrawal values. The current study was motivated by these variations in results and the fact that nominal 5/8-inch (actual 19/32-inch) thick sheathing, for which very little actual test data is available, is specified in the High Velocity Hurricane Zones in the *2001 Florida Building Code*.

Additional debates about panel uplift capacities have centered on the relationship between panel capacities developed from uniform quasi-static loading and the actual performance of panels in a real high wind loading environment where wind loads are not likely to act uniformly over the entire panel and the magnitude of the loading is expected to change rapidly with time. In the case of metal panels with widely spaced fasteners, it is clear that low-cycle fatigue can play a role in the failure of the connections. This may also be important for roof sheathing panels, but documentation of research linking the static and cyclic load performance of roof sheathing subjected to uplift loads was not found in the literature search conducted in this study. The two potential effects, non-uniform loading and cyclic loading are expected to have opposite effects on actual performance. The variation in loading over the panel surface may well result in less severe loading of the panel than that exerted by a uniform pressure distribution. However, cyclic loads nearly always result in failures at lower load levels than those required to cause failure under a simple increase in load to failure (a single cycle). As a first step, it is important to establish a reliable design procedure that at least handles the quasi-static uniform load case. Modifications to these procedures to account for variations in pressures or cyclic loading will be the subject of subsequent studies.

Finally, head pull-through failures can contribute to or control the ultimate uplift capacity of roof panel connections. Unfortunately, the *National Design Standard for Wood* (NDS) only mentions the issue in passing and does not provide any guidance for estimating head pull-through capacities. Head pull-through failures have been frequently observed when ring-shank nails or screws have been used to attach nominal ½-inch plywood and Oriented Strand Board (OSB). Monte Carlo based simulations that account for statistics on both fastener withdrawal and head pull-through capacities have yielded reasonable estimates of mean panel uplift capacities but poorer estimates of variability in panel

uplift capacities (Sutt 2000). In the panel tests conducted as part of this study, head pull-through failures were extremely rare even when ring-shank nails were used to attach the sheathing. Consequently, as long as the 5/8-inch plywood is specified, there is no need to add this level of complexity to the analysis.

Over the years a number of fastener types, sizes and spacing have been used to attach a variety of types and thickness of wood structural panels. In some cases, such as gable roof overhangs, commonly used prescriptive designs and construction methods can create situations where roof sheathing performs poorly in a severe windstorm. Despite the movement towards a statewide building code in Florida, fastener sizes, types and schedules allowed for sheathing connections still vary widely throughout the state. Some new recommendations, such as those being promoted by FLASH (Florida Alliance For Safe Homes), suggest that 10d nails be installed at 4-inch spacing along the edges of panels (this is also required for sheathing attachment along the edge of gable ends in the HVHZ regions of the 2001 FBC). However, in panel tests with 6 and 12 or 6 and 6 spacing, it has been observed that uplift failure of the panels did not initiate along panel edges. In fact, these attachment schemes may actually lead to significant splitting of the wood framing members and an overall reduction in uplift capacity.

### **Objectives and Scope**

The first objective of this research was to conduct studies of panel attachments and the resulting uplift capacities that are specific to the thickness of sheathing and types of fasteners being specified for the High Velocity Hurricane Zone in Florida. The second objective was to develop a design procedure for estimating panel uplift capacities.

The research conducted included testing of individual fasteners and full panels. It included enough samples to build a sound statistical basis for evaluating potential design procedures. Load information, including time histories of simultaneous loads on the top and bottom surfaces of gable roof overhangs, were used to improve loading information used in the design of fastener schedules for gable overhangs. The test results and resulting analysis suggest that nailing schedules currently specified in the High Velocity Hurricane Zone are not adequate if nail withdrawal capacities are substantially lower than those resulting from the use the NDS withdrawal equation. Results of this study and of a number of other recent studies have demonstrated that withdrawal capacities of smooth shank nails in SYP are consistently being overestimated by the NDS withdrawal equation while the values for ring-shank nails in SYP are consistent with the NDS withdrawal equation. Based on this research, new nailing schedules are proposed for the High Velocity Hurricane Zone.

## **Review of Current Code Provisions**

Building code provisions can be grouped in two categories. One category is the performance criteria that are used to establish minimum design loads. These design loads are then used in engineering analyses to provide designs that specify member sizes, member spacing and the type and spacing of connectors. The performance criteria of choice for wind loads are the provisions of the American Society of Civil Engineers' standard ASCE 7-98. These wind load provisions have been adopted in the *2001 Florida Building Code* as well as the new *International Building Code* (IBC) and the *International Residential Code* (IRC). The second category of building code provisions include the various prescriptive requirements that provide specific requirements for minimum member sizes, maximum member spacing and minimum connection details. In the case of roof sheathing, these provisions include requirements for minimum lumber or panel thickness and the type and spacing of fasteners. These prescriptive requirements are frequently called deem-to-comply provisions since it is expected that buildings built using these requirements will automatically comply with the performance criteria since the detailed requirements have been pre-engineered.

### **Performance Criteria for Wind Uplift Resistance of Roof Sheathing**

The wind load provisions of ASCE 7-98 have been used to calculate the design wind loads on a per square foot basis for exposed sites (exposure C) and built up areas (exposure B) for 3-second gust design wind speeds at 10 meters height ranging between 100 and 150 miles per hour. These speeds cover the entire range of design wind speeds in ASCE 7-98 for the State of Florida. Two adjustments have been made in calculating design wind pressures for gable roof overhangs and the nailing along the gable end truss or rafter. The first adjustment involves increasing the uplift pressure coefficient on the gable overhang by adding a value of GC<sub>p</sub> of 1.0 to the roof uplift coefficient rather than using the ASCE 7-98 overhang uplift coefficient. This is slightly more conservative than the ASCE 7-98 provisions and reflects results of detailed studies of net uplift on gable ends conducted at Clemson University (McKinney 2001). The second adjustment is based on the assumption that the gable overhang is 1-foot, which is the maximum overhang typically allowed before prescriptive requirements force the builder to use outriggers to support the gable overhang. Since it is assumed that the spacing of rafters or trusses is 2-feet, the tributary area for the fasteners on the gable end wall consists of the 1-foot overhang and 1-foot of the roof between the two end trusses or rafters. Consequently, the design pressures for the gable end wall are based on the average of the gable overhang pressure and the pressure on the roof adjacent to the overhang.

Tables 2 and 3 provide a detailed listing of the design pressures for buildings with different mean roof heights located in areas subject to the various design wind speeds. Table 2 provides results for houses located in a built up area (exposure B) while Table 3 provides results for houses located in an open exposure (exposure C). Results are also presented for buildings designed as enclosed structures and buildings designed as partially enclosed. This relates to issues of opening protection in the High Velocity Hurricane Zone. The wind loads are based on pressure coefficients for buildings with roof slopes between 2.5 in 12 and 6 in 12. ASCE 7-98 gives lower pressure coefficients for roofs with slopes greater than 30 degrees (7 in 12 slope) but those values are based on relatively little data. The study by McKinney suggests that there is some reduction in uplift coefficients as the roof slope increases but not nearly as much reduction as that given in ASCE 7-98. Consequently, it is recommended that these wind loads and the resulting nailing schedules be used for all roof slopes greater than 10 degrees (2 in 12 slope).

Table 2. Design Uplift Pressures for Roof Sheathing on Buildings with Roof Slopes Greater than 2 in 12 – Exposure B (Built Up Terrain)

Roof Zone & Condition	Roof Height (feet)	Design Wind Speed					
		100	110	120	130	140	150
Zone 1 - enclosed	15	-16.5	-19.9	-23.7	-27.8	-32.2	-37.0
Zone 1 – partial encl.	15	-22.1	-26.7	-31.8	-37.3	-43.3	-49.7
Zone 2 & 3 - enclosed	15	-34.7	-42.0	-50.0	-58.7	-68.1	-78.1
Zone 2 & 3 - partial encl.	15	-40.4	-48.8	-58.1	-68.2	-79.1	-90.8
Zone 2 & 3 – Gable End	15	-43.8	-53.0	-63.0	-74.0	-85.8	-98.5
Zone 1 - enclosed	20	-16.5	-19.9	-23.7	-27.8	-32.2	-37.0
Zone 1 – partial encl.	20	-22.1	-26.7	-31.8	-37.3	-43.3	-49.7
Zone 2 & 3 - enclosed	20	-34.7	-42.0	-50.0	-58.7	-68.1	-78.1
Zone 2 & 3 - partial encl.	20	-40.4	-48.8	-58.1	-68.2	-79.1	-90.8
Zone 2 & 3 – Gable End	20	-43.8	-53.0	-63.0	-74.0	-85.8	-98.5
Zone 1 - enclosed	25	-16.5	-19.9	-23.7	-27.8	-32.2	-37.0
Zone 1 – partial encl.	25	-22.1	-26.7	-31.8	-37.3	-43.3	-49.7
Zone 2 & 3 - enclosed	25	-34.7	-42.0	-50.0	-58.7	-68.1	-78.1
Zone 2 & 3 - partial encl.	25	-40.4	-48.8	-58.1	-68.2	-79.1	-90.8
Zone 2 & 3 – Gable End	25	-43.8	-53.0	-63.0	-74.0	-85.8	-98.5
Zone 1 - enclosed	30	-16.5	-19.9	-23.7	-27.8	-32.2	-37.0
Zone 1 – partial encl.	30	-22.1	-26.7	-31.8	-37.3	-43.3	-49.7
Zone 2 & 3 - enclosed	30	-34.7	-42.0	-50.0	-58.7	-68.1	-78.1
Zone 2 & 3 - partial encl.	30	-40.4	-48.8	-58.1	-68.2	-79.1	-90.8
Zone 2 & 3 – Gable End	30	-43.8	-53.0	-63.0	-74.0	-85.8	-98.5
Zone 1 - enclosed	35	-17.2	-20.8	-24.7	-29.0	-33.6	-38.6
Zone 1 – partial encl.	35	-23.0	-27.9	-33.2	-38.9	-45.1	-51.8
Zone 2 & 3 - enclosed	35	-36.2	-43.8	-52.2	-61.2	-71.0	-81.5
Zone 2 & 3 - partial encl.	35	-42.1	-50.9	-60.6	-71.1	-82.5	-94.7
Zone 2 & 3 – Gable End	35	-45.7	-55.3	-65.8	-77.2	-89.5	-102.8
Zone 1 - enclosed	40	-17.9	-21.6	-25.7	-30.2	-35.0	-40.2
Zone 1 – partial encl.	40	-24.0	-29.0	-34.5	-40.5	-47.0	-54.0
Zone 2 & 3 - enclosed	40	-37.7	-45.6	-54.3	-63.7	-73.9	-84.8
Zone 2 & 3 - partial encl.	40	-43.8	-53.0	-63.1	-74.1	-85.9	-98.6
Zone 2 & 3 – Gable End	40	-47.6	-57.5	-68.5	-80.4	-93.2	-107.0

Table 3. Design Uplift Pressures for Roof Sheathing on Buildings with Roof Slopes Greater than 2 in 12 – Exposure C (Open Terrain)

Roof Zone & Condition	Roof Height (feet)	Design Wind Speed					
		100	110	120	130	140	150
Zone 1 - enclosed	15	-20.0	-24.2	-28.8	-33.8	-39.2	-44.9
Zone 1 – partial encl.	15	-26.8	-32.5	-38.6	-45.3	-52.6	-60.3
Zone 2 & 3 - enclosed	15	-42.2	-51.0	-60.7	-71.3	-82.7	-94.9
Zone 2 & 3 - partial encl.	15	-49.0	-59.3	-70.6	-82.8	-96.1	-110.3
Zone 2 & 3 – Gable End	15	-53.2	-64.4	-76.6	-89.9	-104.3	-119.7
Zone 1 - enclosed	20	-21.2	-25.6	-30.5	-35.7	-41.5	-47.6
Zone 1 – partial encl.	20	-28.4	-34.4	-40.9	-48.0	-55.7	-63.9
Zone 2 & 3 - enclosed	20	-44.7	-54.0	-64.3	-75.5	-87.5	-100.5
Zone 2 & 3 - partial encl.	20	-51.9	-62.8	-74.7	-87.7	-101.7	-116.8
Zone 2 & 3 – Gable End	20	-56.3	-68.2	-81.1	-95.2	-110.4	-126.7
Zone 1 - enclosed	25	-22.1	-26.7	-31.8	-37.3	-43.3	-49.7
Zone 1 – partial encl.	25	-29.7	-35.9	-42.7	-50.1	-58.1	-66.7
Zone 2 & 3 - enclosed	25	-46.6	-56.4	-67.2	-78.8	-91.4	-104.9
Zone 2 & 3 - partial encl.	25	-54.2	-65.6	-78.1	-91.6	-106.2	-122.0
Zone 2 & 3 – Gable End	25	-58.8	-71.2	-84.7	-99.4	-115.3	-132.4
Zone 1 - enclosed	30	-23.0	-27.9	-33.2	-38.9	-45.1	-51.8
Zone 1 – partial encl.	30	-30.9	-37.4	-44.5	-52.3	-60.6	-69.6
Zone 2 & 3 - enclosed	30	-48.6	-58.8	-70.0	-82.2	-95.3	-109.4
Zone 2 & 3 - partial encl.	30	-56.5	-68.4	-81.4	-95.5	-110.8	-127.1
Zone 2 & 3 – Gable End	30	-61.3	-74.2	-88.3	-103.6	-120.2	-137.9
Zone 1 - enclosed	35	-23.7	-28.7	-34.2	-40.1	-46.5	-53.4
Zone 1 – partial encl.	35	-31.9	-38.6	-45.9	-53.9	-62.5	-71.7
Zone 2 & 3 - enclosed	35	-50.1	-60.6	-72.2	-84.7	-98.2	-112.7
Zone 2 & 3 - partial encl.	35	-58.2	-70.5	-83.9	-98.4	-114.2	-131.0
Zone 2 & 3 – Gable End	35	-63.2	-76.5	-91.0	-106.8	-123.9	-142.2
Zone 1 - enclosed	40	-24.4	-29.6	-35.2	-41.3	-47.9	-55.0
Zone 1 – partial encl.	40	-32.8	-39.7	-47.3	-55.5	-64.3	-73.8
Zone 2 & 3 - enclosed	40	-51.6	-62.4	-74.3	-87.2	-101.1	-116.1
Zone 2 & 3 - partial encl.	40	-60.0	-72.6	-86.4	-101.4	-117.5	-134.9
Zone 2 & 3 – Gable End	40	-65.1	-78.8	-93.7	-110.0	-127.5	-146.4

Since the High Velocity Hurricane Zone provisions of the 2001 *Florida Building Code* do not differentiate between different exposures or roof heights, the prescriptive requirements should be adequate to provide protection from sheathing uplift failure for wind loads of up to about 116 psf for enclosed buildings and the attachment of the sheathing to the gable end wall should be capable of resisting wind uplift loads of about 147 psf. If additional details and options are included, the nailing schedules could be

adjusted for various exposures and roof heights.

#### Prescriptive Criteria for Roof Sheathing Attachment in the High Velocity Hurricane Zone

The *2001 Florida Building Code* includes specific provisions for roof sheathing and the attachment of roof sheathing in the High Velocity Hurricane Zone. The requirements are generally as follows:

1. Roof sheathing shall be boards or plywood.
2. Plywood sheathing shall be rated for Exposure 1 and have a minimum nominal thickness of 19/32-inch. The sheathing shall be continuous over at least two spans with the face grain of the plywood perpendicular to the supports.
3. Plywood sheathing shall have a minimum of 2x4 edgewise blocking at all horizontal joints with edge spacing in accordance with the manufacturer's specifications for a distance of at least 4-feet from each gable end.
4. Plywood panels shall be nailed to the supports using 8d common nails. The nails shall be spaced 6-inches on center at the panel edges and at the intermediate supports.
5. Nail spacing shall be 4-inches on center at gable ends with 10d common nails.
6. 8d common nails used for sheathing attachment can be either hand or power driven and must have a diameter of 0.131-inches, a length of 2.5-inches, and a full head with a minimum head diameter of 0.281-inches.
7. 10d nails used for sheathing attachment at the gable ends can be either hand or power driven and must have a diameter of 0.148-inches, a length of 3.0-inches, and a full head with a minimum diameter of 0.312 inches.

#### **Test Program and Results**

Two series of panel uplift tests were conducted using nominal 5/8-inch (actual 19/32-inch) thick CDX plywood. The first series consisted of a number of sets of 3 to 7 panels installed with the same nail type and nail spacing. These tests also included a separate series of individual fastener withdrawal tests for the lumber used to construct each specimen. Summary results from the panel tests are listed in Table 1. A detailed listing of test results and individual data sheets for each test specimen are included in Appendix A. Use of 8d ring shank nails nearly doubled the uplift capacity of the 5/8-inch roof sheathing as compared to the panels attached with 8d common bright or 8d galvanized nails. A single missing fastener along the edge of the panel (series 13 versus series 3) resulted in no reduction in uplift capacity, while two missing fasteners along the edge (series 23 versus series 3) resulted in an 18 percent reduction in average uplift capacity. Test series 5 was constructed with overdriven fasteners. Since the overdriven nails did not result in head pull-through with the 5/8-inch sheathing, the test results did not indicate any reduction in uplift capacity.

Table 4. Summary of Roof Panel Uplift Test Results

Panel Series #	Type of Nail Diameter/Length	No. of Panels Tested	Mean Failure Pressure (psf)	Standard Deviation of Failure Pressure (psf)	# of Nail Pullout Tests	Mean Nail Pullout (lbs)	Standard Deviation of Nail Pullout (lbs)
1	8D Common Bright 0.131 / 2.5	7	127	23.8	125	175	47
2	8D Galvanized 0.137 / 2.5	7	116	24.8	118	225	95
3	10D Coated Galvanized 0.120 / 3.0	7	108	14.4	101	167	40
4	10D Sinkers 0.121 / 2.883	6	125	20.6	96	178	81
5	10D Coated Galvanized (over driven) 0.120 / 3.0	3	132	33.7			
6	8D Ring Shank 0.113 / 2.375	7	231	38.2	87	373	82
13	10D Coated Galvanized (1 missing) 0.120 / 3.0	3	108	13.6	57	120	50
23	10D Coated Galvanized (2 missing) 0.120 / 3.0	3	89	16.5	57	126	56

A second series of panel tests was conducted using 8d smooth and 8d ring shank nails. This series of tests consisted of two sets of 40 specimens. Specimens in both sets were constructed using a 6-inch spacing of nails to attach the panel to each of the support structural members. Results of these tests provided much more reliable estimates of the standard deviation of panel uplift capacities and showed that the panel uplift resistance capacities closely followed the normal distribution for each type of fastener. The panels attached with smooth shank nails exhibited a mean ultimate uplift capacity that corresponded to a pressure of 126 pounds per square foot. The coefficient of variation in uplift capacities was 21.4 percent. The mean ultimate uplift capacity of the panels connected with the ring shank nails corresponded to a pressure of 292 pounds per square foot with a coefficient of variation of 15 percent. Histograms and cumulative probability distributions of the panel capacities are shown in Figures 7

and 8.

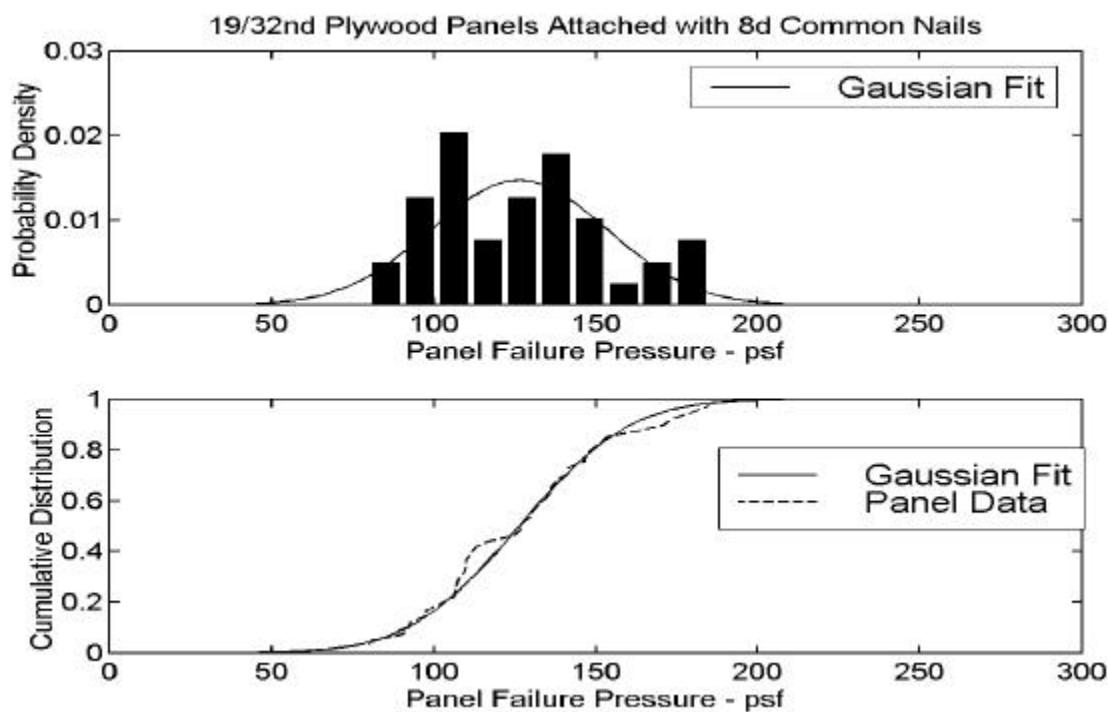


Figure 7. Comparison of Panel Uplift Capacity Results for 8d Common Nails with Normal or Gaussian Distribution

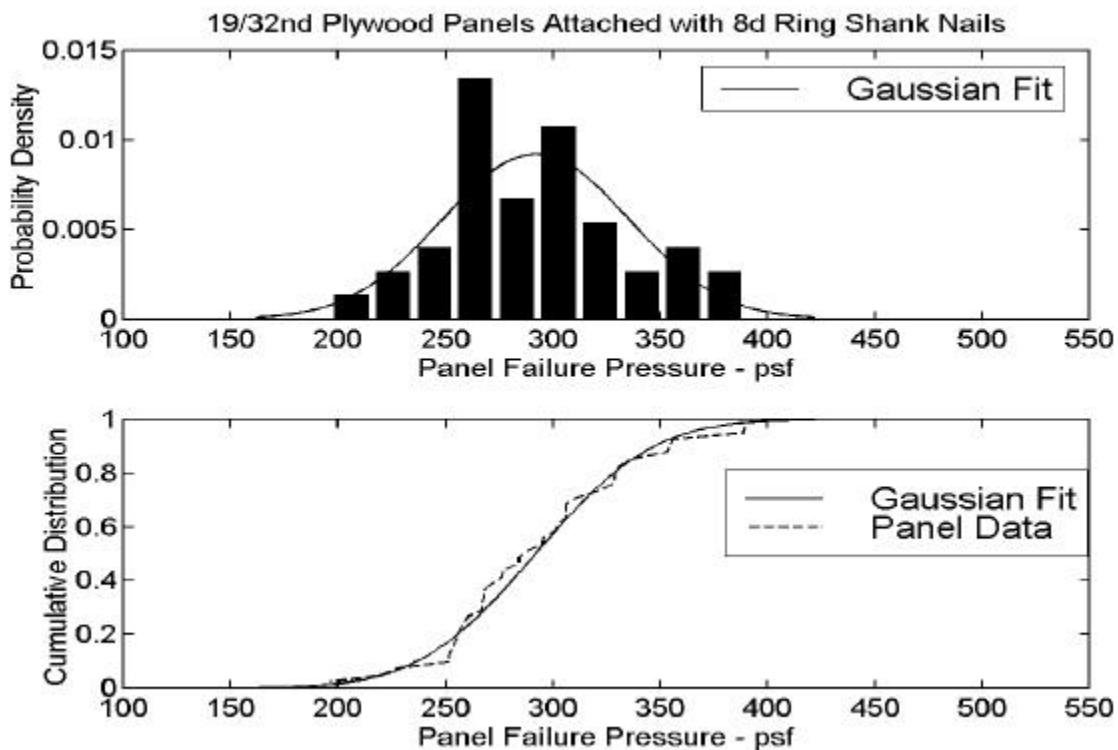


Figure 8. Comparison of Panel Uplift Capacity Results for 8d Ring Shank Nails with Normal or Gaussian Distribution

## Discussion of Results

There are a number of ways to try and estimate allowable design values for panel uplift capacities. Since it has been demonstrated that panel capacities follow the normal distribution, it is possible to estimate 95% exclusion limits for the panel capacities. These limits correspond to lower threshold value on the capacity where 95 out of 100 panels would be expected to have capacities equal to or greater than the specified value. Another way of expressing it is that 5 out of 100 panels would fail if loaded to that level. The 95 percent exclusion value can be calculated from the mean uplift failure capacity minus 1.67 times the standard deviation in panel uplift capacity. For the panels attached using the 8d common nails, the 95 percent exclusion value is 81 psf. For the panels attached using the 8d ring shank nails, the 95 percent exclusion value is 219 psf. In some cases the 95 percent exclusion values are considered adequate for design purposes. However, it is more common to reduce these values even further to provide safety margins that will account for workmanship, missing fasteners, etc. A common factor applied to wall panels, windows and other parts of the building envelope is an overload of 50 percent. Thus, dividing the 95 percent exclusion value by a factor of 1.5 would seem a reasonable approach to achieving a margin of safety. Based on the test results obtained in this study, this approach would produce an allowable design value of 54 psf for 19/32-inch thick panels attached using 8d smooth shank nails at a 6-inch spacing. The allowable design pressure would be 146 psf for 19/32-inch thick plywood panels attached using 8d ring shank nails at a 6-inch spacing.

A review of the results obtained by Cunningham indicates that the failure capacity he obtained for a single 5/8 panel tested with 8d common nails at a 6-inch spacing was between 194 and 218 psf. The 194 psf value corresponds to the initiation of failure while the 218 psf value was the pressure recorded when the testing was stopped at substantial failure of the panel attachment. These results are substantially higher than the average failure capacity of 126 psf obtained for the 40 panels tested during this research. The difference in results can be traced to the difference in individual fastener withdrawal capacities. Cunningham conducted 40 fastener withdrawal tests from lumber similar to that used in his tests. The average fastener withdrawal capacity was found to be 272 pounds per inch of embedment of the fastener. This value was reported to be about 5.35 times the NDS design value. Using a nominal specific gravity for SYP of 0.55, the NDS design value is 41 pounds per inch of embedment for the 8d common nails used in the testing conducted as part of this research. The mean nail pullout capacity per inch of penetration obtained from 125 nail withdrawal tests in the SYP used for construction of the test specimens in this study was about 92 pounds per inch which is only about 2.25 times the NDS design value. Thus, the SYP structural members used in these tests provided substantially lower nail withdrawal capacities for the 8d nails than would have been expected based on the NDS values.

A similar review of nail pullout capacities for ring shank nails used in Cunningham's tests and the current research program show a much closer agreement in capacities. Cunningham's single 5/8-inch panel attached with 8d ring shank nails at a 6-inch spacing had a failure capacity between 330 psf and 397 psf, with the lower value

corresponding to the initiation of failure. The 40 19/32 inch plywood panels attached to SYP lumber with 8d ring shank nails at 6-inch spacing that were tested as part of this study yielded an average ultimate uplift capacity of 292 psf. Cunningham conducted 40 nail withdrawal tests using the ring shank nails in his framing lumber and found the average withdrawal capacity to be about 348 pounds per inch. This was reported to be about 7.35 times the NDS design value. The mean nail pullout capacity per inch of penetration obtained from 87 nail withdrawal tests in the SYP used for construction of the test specimens in this study was about 209 pounds per inch. This is about 5.1 times the NDS design value. Significantly, the lumber used to construct the panels attached with the 8d common nails and the 8d ring shank nails came from the same bundles of SYP 2x4s.

The wide variation in nail withdrawal capacities, as compared to the NDS design values, is not a new or isolated phenomenon. Cunningham reported that the average withdrawal capacities of 6d nails that were a part of his test program provided only about 2.5 times the NDS design withdrawal capacity. No explanation was given for the differences between the relative withdrawal capacities as compared with the NDS values. Table 5 provides further examples of the variability in panel capacities and particularly the variation in fastener withdrawal capacity in relation to the NDS design values.

Table 5. Summary of Panel and Nail Withdrawal Capacities from a Variety of Tests

Ref	Framing Type	Sheathing Thickness (inches)	Fastener Type	Fastener Dia. / Len. In / in	Fastener Spac. Edge & Interior (inches)	No. of Tests	Panel Capacity (psf)	Nail Withdrawal (lbs/in)	NDS Design (lbs/in)	Ratio Nail / NDS
1	SYP	19/32	8d Com.	0.131 / 2.5	6 & 6	7	127	91.8	41	2.24
1	SYP	19/32	8d Gal.	0.137 / 2.5	6 & 6	7	116	117.8	42	2.80
1	SYP	19/32	10d Coat	0.120 / 3.0	6 & 6	7	108	69.4	38	1.83
1	SYP	19/32	10d Sink	0.121 / 2.9	6 & 6	6	125	77.7	38	2.04
1	SYP	19/32	8d Ring	0.131 / 2.4	6 & 6	7	231	209.4	41	5.11
2	DFL	15/32	6d Com.	/ 2.0	6 & 6	1	120	123.5	49	2.50
2	DFL	5/8	8d Com.	/ 2.5	6 & 6	1	194	272.1	51	5.35
2	DFL	5/8	8d Ring	/ 2.5	6 & 6	1	330	348.4	47	7.35
3	SYP	15/32	8d Ring	0.131 / 2.5	6 & 12	7	79	114	41	2.78
3	SYP	15/32	#8 Screw	0.111 / 1.9	6 & 12	7	169*	772	109	7.08
4	SYP	15/32	8d Com	0.131 / 2.5	6 & 6	6	153	93.4	41	2.28
4	SYP	15/32	8d Ring	0.113 / 2.4	6 & 6	7	158*	283.1	41	6.90
4	SYP	19/32	8d Ring	0.113 / 2.4	6 & 6	6	326	283.1	41	6.90

\* Failures dominated by head pulling through panel.

The references or sources of data used in the Table 5 are as follows. Reference 1 is the current study. Reference 2 is the study by Cunningham (Cunningham 1993). Reference 3 is the study by Sutt (Sutt 2000). Reference 4 is the results of unpublished testing conducted at Clemson University for Sutt in 2000. With the exception of the 8d common nail withdrawal capacities obtained by Cunningham, all of the other smooth shank nail tests that were conducted in support of panel tests produced mean withdrawal capacities that are between 1.8 and 2.8 times the NDS design values. At the same time, the ring shank nails, manufactured by various suppliers, and screws have consistently produced withdrawal values that are 5 or more times the NDS design values. In other words, ring shank nails and the screws have yielded withdrawal values

that are consistent with the ultimate capacities implied by NDS since the design values are typically about 1/5<sup>th</sup> of the average ultimate values. It is also clear that when high capacity fasteners are used with thinner sheathing (15/32-inch versus 19/32-inch) the panel uplift capacities may well be limited by head pull-through capacities.

### Design Implications

The results of tests conducted as part of this project and the results of other panel uplift tests indicate that Cunningham's design procedure breaks down when the average withdrawal capacity of the fasteners on a per inch basis drop significantly below 5 times the NDS design value. In these instances, the panel uplift resistance afforded by the prescriptive requirements will not provide adequate margins of safety. Fundamentally, there are two problems with the design methodology used by Cunningham. First, he assumes that the ratios between 8d smooth shank withdrawal capacities and NDS design values obtained in his DFL lumber are typical of withdrawal capacity ratios from other group II lumber species and samples. It is entirely possible that the lumber available in today's market is likely to provide lower withdrawal capacities for smooth shank nails than the lumber used to develop the NDS withdrawal equation. In any case, numerous test series conducted over a period of several years using lumber from different suppliers have consistently shown that withdrawal capacities for smooth shank fasteners in SYP (the dominant wood type used to construct roof systems in hurricane prone regions) can be substantially lower than those implied by the NDS withdrawal equation. The second problem is that typical panel uplift capacities tend to be somewhat lower than those calculated based on the average nail withdrawal capacities. Typically, there are a number of critical nails where the failure can be initiated. This leads to a slight lowering of the panel uplift capacity as compared to a simple tributary area calculation based on average nail withdrawal capacities.

The following design procedure is offered as an alternative method that is believed to more adequately reflect the uncertainties in withdrawal capacities discovered during the course of this research and the relationship between panel uplift capacities and nail withdrawal capacities. The multiplying factors included in step 2 of the procedures given below have been empirically adjusted to provide reasonable predictions of panel capacities for a variety of fastener sizes and spacing.

#### For Smooth Shank Nails

1. Determine the NDS design value for the particular fastener being considered.
2. Multiply this value by 1.65 and by the length of the fastener minus the thickness of the plywood sheathing.
3. To determine the allowable design pressure for a particular nail spacing:
  - a. Multiply the maximum allowed nail spacing for an interior support (in feet) by the distance between supports (in feet) [this is the tributary area for the fastener in square feet]
  - b. Divide the answer obtained in step 2 by the tributary area obtained in (a.) – [This is an estimate of the average ultimate uplift capacity (psf)]

- assuming that the average ultimate withdrawal capacity of the fasteners is only 2 times the NDS design value].
- c. Multiply this value by 0.45 to obtain the allowable design uplift capacity. – [This adjustment assumes a coefficient of variation of 20 percent in the uplift capacity and reduces the average ultimate capacity to obtain the 95% exclusion value and subsequently reduces that value by a factor of 1.5 which is consistent with Cunningham's safety factor. – He applied this safety factor to the minimum nail capacity obtained from his 40 tests.]
  4. To determine the required spacing for a particular fastener, given a design pressure:
    - d. Multiply the design pressure by the spacing between supports.
    - e. Multiply the load in lbs/ft obtained in (a.) by 2.22 – [This increases the loading by the inverse of the factors used to go from ultimate capacity to allowable capacity]
    - f. Divide the answer obtained in step 2 by the value calculated in (b.) and multiply by 12 to get the spacing in inches.

#### For Ring Shank Nails or Screws

1. Determine the NDS design value for the particular fastener being considered.
2. Multiply this value by 3.5 and by the length of the fastener minus the thickness of the plywood sheathing.
3. To determine the allowable design pressure for a particular nail spacing:
  - g. Multiply the maximum allowed nail spacing for an interior support (in feet) by the distance between supports (in feet) [this is the tributary area for the fastener in square feet]
  - h. Divide the answer obtained in step 2 by the tributary area obtained in (a.) – [This is an estimate of the average ultimate uplift capacity (psf) assuming that the average ultimate withdrawal capacity of the fasteners is only 2 times the NDS design value].
  - i. Multiply this value by 0.50 to obtain the allowable design uplift capacity. – [This adjustment assumes a coefficient of variation of 15 percent in the uplift capacity and reduces the average ultimate capacity to obtain the 95% exclusion value and subsequently reduces that value by a factor of 1.5 which is consistent with Cunningham's safety factor. – He applied this safety factor to the minimum nail capacity obtained from his 40 tests.]
4. To determine the required spacing for a particular fastener, given a design pressure:
  - j. Multiply the design pressure by the spacing between supports.
  - k. Multiply the load in lbs/ft obtained in (a.) by 2.0 – [This increases the loading by the inverse of the factors used to go from ultimate capacity to allowable capacity]
  - l. Divide the answer obtained in step 2 by the value calculated in (b.) and multiply by 12 to get the spacing in inches.

This design procedure results in an allowable design uplift pressure of 58 psf for 19/32-

inch sheathing attached using 8d common nails with a diameter of 0.131 inches and a length of 2.5 inches. The corresponding allowable design uplift pressure for similar size ring shank nails at a 6 inch spacing would be 150 psf. The bad news is that the use of 8d common nails at a 6-inch spacing would not be allowed in the High Velocity Hurricane Zone except in interior portions of the roof (roof zone 1 in ASCE 7-98). The good news is that a simple switch to 8d ring shank nails of the same size installed with a 6-inch spacing would provide adequate capacity for roof sheathing attachment, including gable roof overhangs, in any exposure for mean roof heights up to 40 feet.

## ROOF TO WALL CONNECTIONS SUBJECTED TO COMBINED LOADS

### Background

Connections between roof trusses or rafters and walls are required to transmit a complex set of loads from the roof structural system into the walls which then transmit these loads to the foundations. In general, the connections experience uplift loads on the roof that are transmitted into the walls, shear forces developed through the roof diaphragm action and out-of-plane loads on the walls. In some cases, the roof structural system will deform so much under the wind loading (scissors trusses or cathedral ceilings, for example) that this deformation results in additional significant out of plane loading on the walls. Questions persist concerning the definition of the loads to be applied to the design of these connections as well as the members that make up the various systems involved in these connections. The questions concern the appropriate use of component and cladding loads, main wind force resisting system loads, and combinations of these loads. Some guidance has been provided in the *Guide To The Use of ASCE 7-98*, but confusion still persists. It has been common practice in the design of high-rise buildings to reduce main wind force resisting system loads when they are used in combination. For example, each of the design wind loads are reduced by 85 percent when two orthogonal wind loads are combined and each design wind load is reduced by 75 percent when three orthogonal wind loads are combined. These reduction factors have been developed based on numerous wind tunnel studies for high rise buildings and reflect the loss in correlation between the wind load components when an entire structure is considered.

At the other extreme, if the maximum wind loads on two surfaces can occur at the same wind direction and may be highly correlated, reductions in loads for combinations of loads may not be appropriate. One example is the development of design loads for a corner mullion that supports curtain wall elements on adjacent faces. Since the maximum positive wind loads on one face may occur for a wind direction that produces nearly the maximum suction loads on the other face, the reduction may be quite small. In these cases it is not uncommon for the curtain wall designer to apply the full positive design load on one face, the full negative design load on the other face, and design the support for the full combination of these loads. The pertinent issues involved in selecting the appropriate load combination factors include the size of the structural systems involved, whether the highest design loads are likely to occur at the same wind direction and the complexity of the structural influence functions that attract loads to the component or connection.

Consider the action of wind on a simple rectangular gable roof house when the wind blows parallel to the ridge (perpendicular to the gable end). The upwind gable end of the house experiences wind pressures that are exerted towards the center of the house (positive pressures) that try to push the wall over. Part of this loading is directly transmitted to the floor system and foundations through the connection between the bottom of the wall and the floor or foundations. The other part is transmitted into the roof structural system. That load is then resisted by shear forces developed in the side walls that run parallel to the ridge. At the same time, the wind flows over the roof and the separation of the flow and acceleration of the flow over the roof leads to uplift forces being exerted on the roof structure. These uplift forces tend to be greatest near the upwind edge of the roof. The uplift forces are transmitted to the walls as axial tension loads through the connections between the tops of the walls and the roof structure. Additionally the wind blowing around the wall corner also separates and accelerates causing suction pressures (pressures acting away from the interior of the building) to be applied to the walls. These suction forces tending to pull the wall away from the house are resisted by the connections between the wall and the roof structure and between the wall and the floor or foundations. For this wind direction, the walls and specifically the connections between the walls and the roof structural system experience shear forces, uplift forces and forces that try to pull the wall away from the house (out of plane loads).

## **Objectives and Scope**

The first objective of this research was to develop load interaction diagrams for the design of two common hurricane straps used to connect light frame wood roof structural systems to light frame wood walls when the straps are subjected to combined loads. The second objective was to develop estimates of appropriate load combinations for use in the design of these connections. Part of this second objective involved assessing whether component and cladding or main wind force resisting system loads were more appropriate for use in the design of the connections.

The research conducted with regards to roof-to-wall connections was comprised of three major components. The first was a literature review of design procedures, guidelines and wind loading information related to dealing with combined wind loads on low-rise buildings. The second was the development and execution of a series of carefully designed full-scale roof-to-wall system tests to develop interaction

diagrams for use in designing connections that are subjected to combined loads. The third was model scale wind tunnel tests that investigated load combinations for use in the design of the connections. Results of these investigations provide additional guidance for the design of roof-to-wall connections of light-frame wood structures.

### **Performance of Hurricane Straps Under Combined Loading Conditions**

In order to assess the performance of actual roof-to-wall connections under combined load conditions, a test apparatus was constructed which allows loads to be applied individually or in combination to the roof and walls. The test apparatus accommodates a seven foot segment of the wall and roof of a building and provides an additional one foot for shear movement of the wall. The test apparatus is a free standing structural frame constructed using 10-inch wide flange members. All forces and reactions are internal to the reaction frame so it does not need to be anchored in place. The reaction frame is shown in Figure 9. The frame includes two columns at each end of the wall specimen. The 8-foot spacing between these columns is spanned by beams. The columns and beams form two inverted U shaped frames that are separated by a 12-inch gap. The U shaped frames are connected together at the base and at various locations along the columns. The dual column and beam arrangement allows hydraulic rams to be mounted on short beams that span between the U shaped frames. These rams provide the means for loading the roof structure either vertically or laterally without any eccentric loading on the frames. A reaction wall is attached to the back set of columns and allows an air bag to be used to apply out of plane loads on the wall.



Figure 9. Reaction Frame With Installed Wall and Roof Section Test Specimen

The vertical load on the test specimen is applied through the hydraulic ram shown at the top center of the reaction frame. The load is applied to the roof structure through a loading tree that is linked to brackets that are attached with lag screws to the roof truss members. These vertical loads are applied directly above the hurricane straps and the system simulates the action of uplift on the roof sheathing that is subsequently transferred through the hurricane straps into the walls. Since the focus of these tests is the reaction of the hurricane straps, this load approach provides a reasonable simulation of the actual uplift loading on the straps. The hydraulic ram shown a little more than midway up the set of columns on the right hand side of Figure 9 is used to apply lateral loads to the roof structure. This is

accomplished through two steel bars that act as drag struts across the roof and are attached with lag screws to the top of each truss. Loads had been removed at the time that the picture was taken so the ram used to apply the lateral load is rotated somewhat. It was necessary to use a pivot connection in attaching the lateral ram in order to prevent damage to the ram when the roof failed in uplift. The reaction wall and airbag are located directly behind the wall specimen. Secondary supports and a clamping system is provided at the back of the reaction frame so that the trusses will not shift forward when the air bag is inflated. Figure 10 shows a wall segment after it has been tested to failure.



Figure 10. Failed Wall to Roof Connection Specimen in Reaction Frame

The walls and roof structures were built following the *2001 Florida Building Code* requirements for wood frame walls and roofs constructed in the High Velocity Hurricane Zone. Since the focus of the tests was on the roof-to-wall connection, the anchorage of the wall to the base of the reaction frame was over engineered. The two hurricane straps chosen for the testing were the H10 bracket attached with nails and two H2.5 brackets. For ease of construction, the two H2.5s used on each roof

to wall connection were installed on the outside of the wall. The normal construction practice is to install one on the inside of the wall and one on the outside of the wall so that the nails do not interact with each other when they are installed in the truss. This change did not seem to affect the test results since the ultimate uplift capacities and lateral load capacities obtained from the tests were consistent with the values published by the manufacturer.

The test program included three tests of each hurricane strap arrangement to failure when subjected only to uplift, only to shear and only to out of plane loading. Table 6 provides a listing of the average ultimate uplift capacities obtained from the tests and those reported by the manufacturer. Allowable values for each load component were also provided in the manufacturer's literature. Typically, the allowable values are based on the minimum of the ultimate divided by three, the load at 1/8<sup>th</sup> inch deflection or the design load from the NDS for the nails used to attach the straps. Allowable loads have been estimated for these tests by simply dividing the ultimate value by three. The ultimate uplift capacities and the allowable loads for uplift, shear and out of plane loading all compare well with the values published by the manufacturer.

Table 6. Ultimate and Allowable Loads on the Roof-to-Wall Connections

Connector Type	Data Source	Uplift		Shear		Out of Plane	
		Ultimate	Allowable	Ultimate	Allowable	Ultimate	Allowable
H10	Tests	2903	968	1635	545	2800	933
	Manufact.	3135	905	NA	585	NA	525
H2.5	Tests	3039	1013	1424	475	2800	933
	Manufact.	2600	830	NA	300	NA	300

The tests demonstrated that the ultimate capacity of the walls was frequently exceeded before the ultimate capacity of the connectors was exceeded. This was remedied by decreasing the spacing of 8d nails in the upper piece of wall sheathing to 3 inches. For these tests, the anchorage of the wall studs to the base also proved to be a critical connection, particularly for high shear loads. The design of these connections needs to be assessed using typical installations during the next year of the project.

Load interaction diagrams for uplift and shear for roof to wall connections with the H10 and H2.5 straps are shown in Figures 11 and 12, respectively. The curve shown in the figures corresponds to the relationship used for load combinations in steel, concrete and aluminum structures. The relationship is based on a linear

combination of the ultimate or allowable values for each load combination. The equation is expressed as:

$$(\text{Design load 1/Allowable 1}) + (\text{Design load 2/Allowable 2}) + (\text{Design load 3/Allowable 3}) < 1.0$$

It is clear from these graphs that this relationship provides a conservative definition of the allowable loading under combined load effects. The actual failure surface is probably better represented as a vector combination than as a linear combination. Combinations with the out-of-plane load applied in combination with the uplift and shear were still being conducted as this report was being prepared. Consequently all of these results have not been fully integrated into the report. However, tests with out of plane pressures of 50 psf in conjunction with uplift and shear loads provided almost no reduction in the combined shear and uplift capacities. A 50 psf wall pressure is consistent with typical wall design pressures in the High Velocity Hurricane Zone.

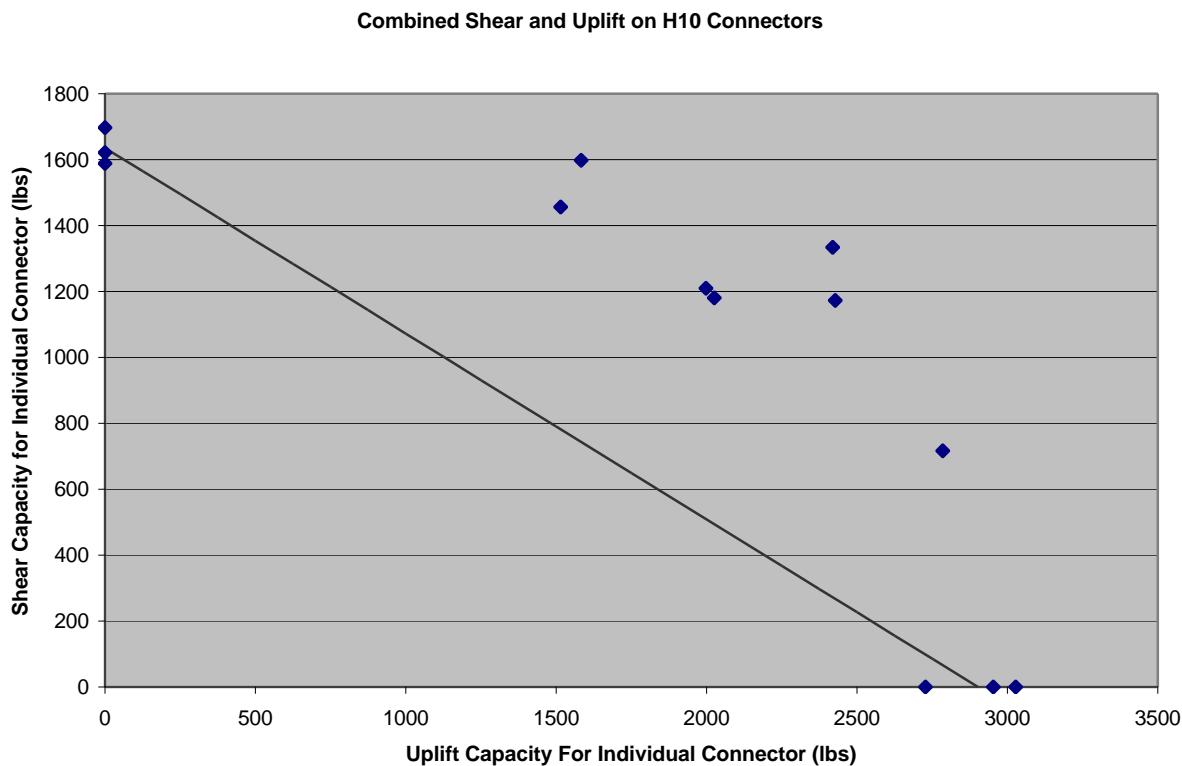


Figure 11. Interaction Diagram for H10 Connectors Subjected to Uplift and Shear Loads

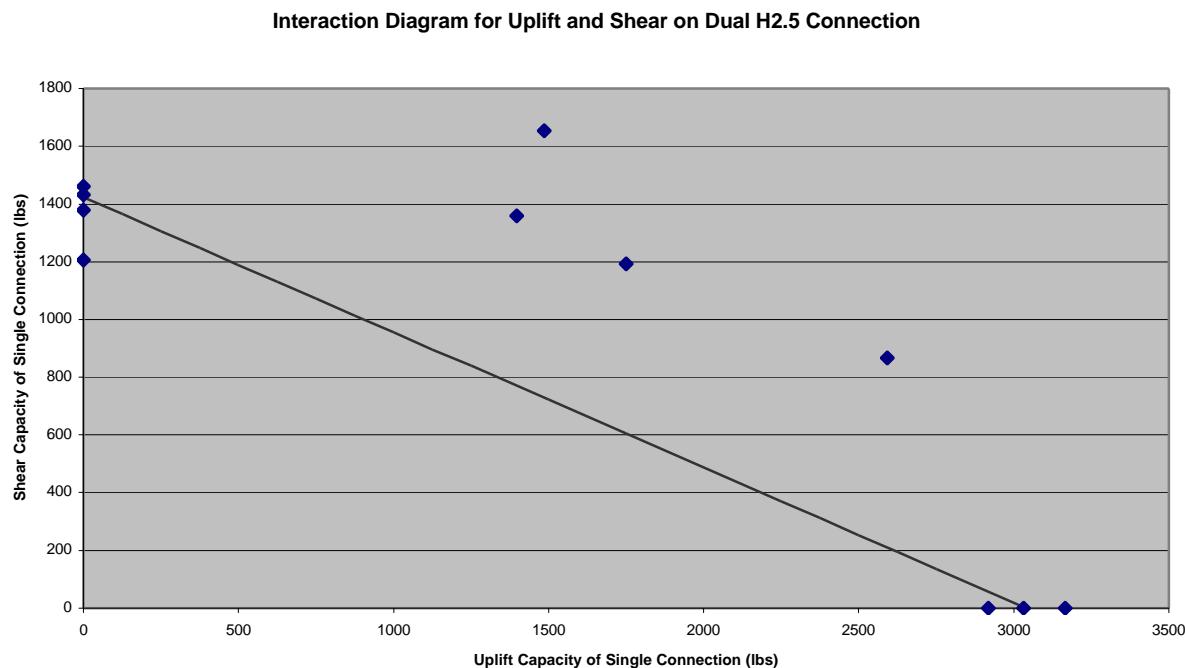


Figure 12. Interaction Diagram for Dual H2.5 Connectors Subjected to Uplift and Shear Loads

### Load Combinations

Research on load combinations was conducted using a 1:50 scale model of a gable roof low rise building with a roof slope of 3 in 12. The tests were conducted in the boundary layer wind tunnel at Clemson University using an exposure that corresponds closely to exposure C as defined in ASCE 7. Pneumatic averaging was used to produce wind loads on segments of the model that represented tributary areas of the roof, the gable end wall and the side wall of the building. The tributary areas were chosen such that they could logically contribute loads to the roof to wall connections distributed along the first 6 to 8 feet of the wall running parallel to the ridge. A photograph of the model in the wind tunnel is shown in Figure 13.

Loads were measured simultaneously on each of these tributary areas. Tests were conducted for a number of wind directions including winds perpendicular to the gable end and perpendicular to the side wall plus variations of plus and minus 15 degrees

from these directions. The resulting time histories of the area averaged loads were recorded and subsequently analyzed to determine the maximum loads on each segment as well as the maximum combined loads. Each test was repeated eight times so that averages of the individual maximum, minimum and the combined loads could be determined. The worst combinations of loads occurred for positive pressures on the gable end wall, uplift on the roof and negative pressures on the side wall as described in the background section. The wind directions that corresponded to this worst combination of loads were winds with flow within 15 degrees of being perpendicular to the gable end. For these wind directions, the average peak positive pressure coefficient, corresponding to the maximum positive wind load on the gable end, was 1.2. This value is about 25 percent higher than the corresponding ASCE 7 peak positive pressure coefficient for the corresponding area. The peak uplift pressure coefficient for the roof was -1.41, which is in good agreement with the ASCE 7 roof uplift coefficient (-1.4) for zones 2 and 3 when the tributary area is greater than 100 square feet. The negative peak pressure coefficient for the sidewall was -1.12, which is slightly lower than the ASCE 7 sidewall peak pressure coefficient for a tributary area of 32 square feet (-1.2) in zone 5. The average maximum combined load was 90 percent of the combination of the three individual maximum values. This indicates that there is significant correlation of the loads on these surfaces for these critical wind directions. It further suggests that the design of the connections near the corners of the building should be based on component and cladding loads rather than the lower main wind force resisting system loads. The basic assumption behind this approach is that the structure is flexible enough so that the loads on the roof to wall connections are largely due to loads applied to the simple tributary areas that would normally be associated with that segment of the wall. This may not be the case if there is enough load sharing and the structural influence functions are such that loads are integrated throughout the building. That kind of structural analysis and integration of loads needs to be the subject of further study.



Figure 13. Photograph of Model in the Clemson University Wind Tunnel

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