

# BROWARD COUNTY PLANNING COUNCIL

115 SOUTH ANDREWS AVENUE, ROOM 307 ♦ FORT LAUDERDALE, FLORIDA 33301

TO: Interested Parties

FROM: Henry A. Sniezek, AICP  
Executive Director 

SUBJECT: Overview: Hurricane-Resistant Affordable Manufactured Housing Options

DATE: February 18, 2009

The attached report satisfies a Planning Council directive that Planning Council staff prepare, for general dissemination, an informal overview of hurricane-resistant affordable manufactured housing options. "Manufactured" housing in the report refers to prefabricated/modular housing, in contrast to the "traditional" mobile homes historically located throughout Broward County.

As you may recall, the directive was one result of an effort that began in 2007, when the Planning Council conducted a comprehensive review of the Broward County Land Use Plan and solicited comments from hundreds of persons, including municipal elected officials and municipal staff, County Commissioners and County Administration, various agency representatives and interested parties. As part of the review, Planning Council staff held four (4) public workshops and the Planning Council Executive Committee held three (3) public meetings to further discuss the comments, receive additional input, and develop recommendations to the full Planning Council.

The attached report was presented to the Planning Council at its January 22, 2009 meeting. Pursuant to the Council's request on said date, an addendum has been included in the report with additional information regarding existing prefabricated/modular homes within Broward County.

*It is noted that prefabricated/modular homes may be subject to different property tax regulations than "traditional" mobile homes. Property tax regulations governing prefabricated/modular homes should be fully investigated when considering such as a housing option.*

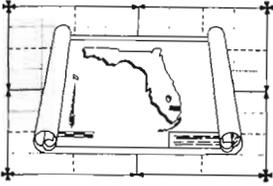
It is hoped that the attached report is useful. Please feel free to contact Planning Council staff at your convenience if you have any questions in this regard.

Attachment

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World Wide Web: <http://www.broward.org/planningcouncil>

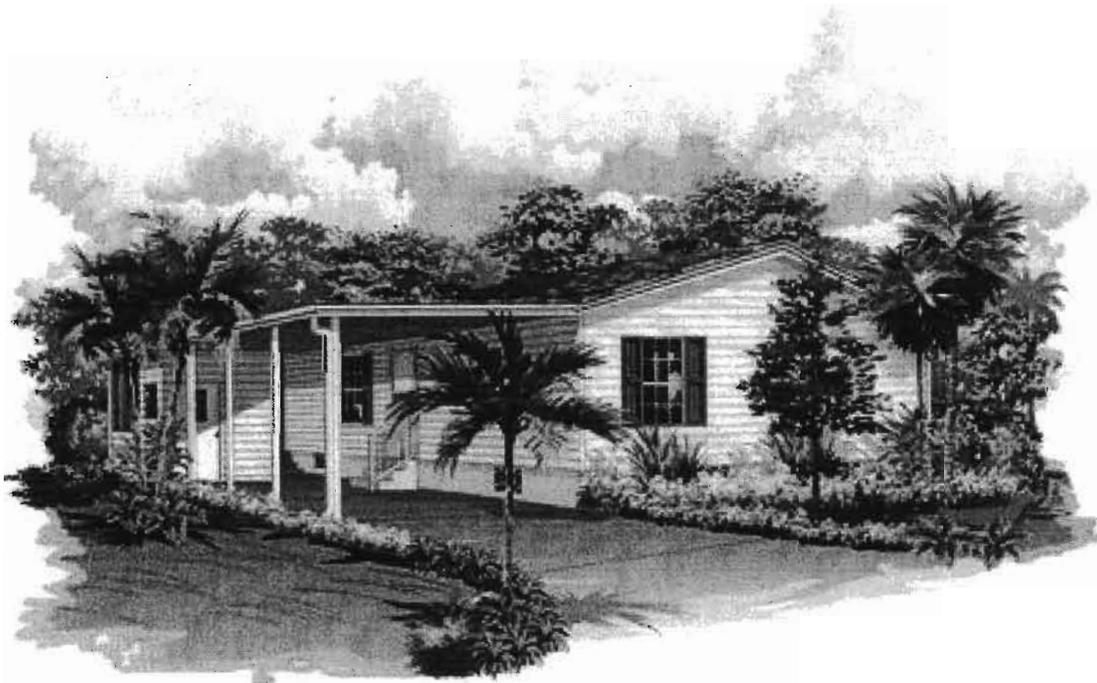


# BROWARD COUNTY PLANNING COUNCIL

115 SOUTH ANDREWS AVENUE, ROOM 307 ♦ FORT LAUDERDALE, FLORIDA 33301

## *Overview: Hurricane-Resistant Affordable Manufactured Housing Options*

*Prepared by  
Broward County Planning Council Staff  
January 2009*



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World Wide Web: <http://www.broward.org/planningcouncil>

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**SECTION I**  
**OVERVIEW: HURRICANE-RESISTANT**  
**AFFORDABLE MANUFACTURED HOUSING OPTIONS**

**INTRODUCTION**

During 2008, after receiving the Executive Committee's report on the "Comprehensive Stakeholder Review of the Broward County Land Use Plan," the Broward County Planning Council approved an implementation work program which included the **directive that Planning Council staff prepare, for general dissemination, an informal overview of hurricane-resistant affordable manufactured housing options.** The purpose of this report is to satisfy the Planning Council's directive.

The Planning Council's directive in this regard was one result of an effort that began in 2007, when the Planning Council conducted a comprehensive review of the Broward County Land Use Plan and solicited comments from hundreds of persons, including municipal elected officials and municipal staff, County Commissioners and County Administration, various agency representatives and interested parties. As part of the review, Planning Council staff held four (4) public workshops and the Planning Council Executive Committee held three (3) public meetings to further discuss the comments, receive additional input, and develop recommendations to the full Planning Council.

**SECTION II**  
**OVERVIEW: HURRICANE-RESISTANT  
AFFORDABLE MANUFACTURED HOUSING OPTIONS**

**GENERAL FINDINGS/CONCLUSIONS**

1. “Prefabricated/modular” homes are constructed to more stringent standards than traditional “mobile” homes, although both may be called “manufactured” housing.
2. “Prefabricated/modular” housing in Florida is subject to the Florida Building Code, which requires resistance to storms of up to Category Four (131-155 mph) strength. Traditional “mobile” homes in Florida are required to resist storms up to Category Two (95-110 mph) strength.
3. In Broward, “prefabricated/modular” housing would not be subject to separate provisions for emergency evacuations procedures. This is unlike traditional “mobile homes” which are subject to mandatory evacuation under Category One (75-95 mph) storm conditions.
4. Currently, the estimated average cost of reviewed “prefabricated/modular” homes is approximately \$150,000 for a 1,500 square foot unit, but this figure does not include land costs. In Broward County, use of “prefabricated/modular” units as affordable housing may be best suited as “moderate” or “workforce” housing, and/or in those areas with lower land costs, or constructed in conjunction with non-profit or public community land trusts

**SECTION III**  
**OVERVIEW: HURRICANE-RESISTANT**  
**AFFORDABLE MANUFACTURED HOUSING OPTIONS**

**MANUFACTURED AND PREFABRICATED/MODULAR HOUSING**

For the purpose of this report, “manufactured” housing refers to **prefabricated/modular** housing. It is noted that established federal, state, and local regulations include “mobile homes” within the definition of “manufactured” housing. However, the characterization of “manufactured” homes has been expanded to include modular or prefabricated homes which are constructed on a poured foundation. This report concentrates on prefabricated and/or modular-type constructed projects.

Prefabricated or modular homes are not a new phenomenon, pre-dating the 1950s, and rooted in the mobile home concept. As homes became larger and more difficult to transport, builders began permanently affixing the mobile trailers to the ground. Today, prefabricated/modular homes resemble traditional “stick” or “brick-and-mortar” construction. Prefabricated/modular homes are built in a factory in sections. The sections are then transported to the work site where they are assembled. Most have three walls prefabricated and attached at the factory, and the fourth wall attached at the work site. On-site, a concrete foundation is poured; the home is attached to the foundation, and finally roofed accordingly.

**SECTION IV**  
**OVERVIEW: HURRICANE-RESISTANT**  
**AFFORDABLE MANUFACTURED HOUSING OPTIONS**

**SAFETY AND HURRICANE RESISTANCE**

“Prefabricated/modular” and “mobile” homes are subject to different codes and regulations. Prefabricated/modular projects must conform to the *Florida Building Code* (FBC), and local zoning codes the same as traditional on-site building construction projects. Pursuant to Florida Statute 553.38, the FBC shall be applied regardless if a building is conventionally constructed or a manufactured building.<sup>1</sup> “Mobile” homes, by comparison, are subject to U.S. Department of Housing and Urban Development codes under 24 CFR 3280.<sup>2</sup>

Provisions of the FBC to which prefabricated/modular homes are subject require permanent structures to comply with particular design criteria intended to safeguard against the effects of hurricanes. For example, residential structures must meet requisite wind load, roof loads, flood loads, door and window loads, as well as live loads (the weight of the structure) and dead loads (the foundation and soil). Specific load requirements are determined by an algebraic formula by calculating the square footage of the structure multiplied by the specific pounds (or load) per square foot [load = structure square footage x pounds per square foot (psf)].<sup>3</sup> In general, in order for a structure to be deemed resistant to a specific hurricane category, it must meet the load requirement for that category. For example, if a structure is to sustain a Category One storm it must resist winds between 74 and 95 miles per hour (mph); Category Two, 96 – 110 mph; Category Three, 111 – 130 mph; Category Four, 131 – 155 mph; and Category Five, 155+ mph. Modular homes built in conformance with FBC generally withstand winds of up to 140 mph or Category Four strength. In contrast, the HUD regulations to which mobile homes are subject require the trailers to sustain winds of up to 110 mph or Category Two strength.<sup>4</sup>

The Federal Emergency Management Agency (FEMA), in December 1992, released a report titled “Building Performance: Hurricane Andrew in Florida, Observations, Recommendations and Technical Guidance” in which a team of regional staff, professional consulting engineers, and Metro-Dade County Building officials surveyed the performance of residential buildings affected by Hurricane Andrew. Among the structures observed were one and two-story wood frame structures, masonry wall structures, combination wood frame and masonry wall structures, wood frame modular structures, and mobile homes. The findings showed that “overall, relatively minimal structural damage was noted in (prefabricated) modular housing developments. The module-to-module combination of units appeared to have provided an inherently rigid system that performed much better than conventional residential framing.” (See Attachment 1.)<sup>5</sup>

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<sup>1</sup> See DCA [http://www.dca.state.fl.us/fbc/manufactured\\_buildings/Q&A-0108\\_v3.pdf](http://www.dca.state.fl.us/fbc/manufactured_buildings/Q&A-0108_v3.pdf).

<sup>2</sup> See Code of Federal Regulations, 24 CFR 3280.

<sup>3</sup> See FBC, Part III Building, Planning and Construction, Chapter 3 Building Planning, Section R301 Design Criteria (2007 Update): [http://www2.iccsafe.org/states/2004\\_florida\\_codes/](http://www2.iccsafe.org/states/2004_florida_codes/).

<sup>4</sup> See 24 CFR 3280.305, Structural Design Requirements.

<sup>5</sup> Attachment 1 includes only introductory pages and pages 29-30.

For full report see: <http://www.fema.gov/library/viewRecord.do?id=2765>.

**SECTION IV**  
**OVERVIEW: HURRICANE-RESISTANT**  
**AFFORDABLE MANUFACTURED HOUSING OPTIONS**

**SAFETY AND HURRICANE RESISTANCE (continued)**

It is imperative to note that no structure is known to be hurricane proof, although some can be more hurricane resistant than others. A prefabricated/modular project's hurricane resistance is directly correlated with its conformance to FBC. It is also noted that there are no separate provisions for emergency evacuations procedures to which prefabricated/modular homes must conform. This is unlike traditional "mobile homes" which are subject to mandatory evacuation under Category One storm conditions.

**SECTION V**  
**OVERVIEW: HURRICANE-RESISTANT**  
**AFFORDABLE MANUFACTURED HOUSING OPTIONS**

**PREFABRICATED/MODULAR HOMES AS “AFFORDABLE HOUSING”**

Housing affordability is a function of the subject housing market, household size, and annual household income. Pursuant to the Broward County Land Use Plan (BCLUP), “affordable housing [is] housing for which monthly rents or monthly mortgage payments (including taxes and insurance) do not exceed 30 percent of an amount representing the percentage (very low = 50%; low = 80%; moderate = 120%) of the median income limits adjusted for family size for the household.” (See BCLUP, IV-1). In Broward County in 2008, the estimated affordable home price for a “workforce” family of four earning 120% of the area-wide median income is approximately \$195,500.<sup>6</sup> Additionally, it is offered that an affordable home price for a family of four earning 140% of the area-wide median income (i.e. “workforce” per state definition) is approximately \$228,000\*. It is noted that based on the sources used, “affordability” assumes a 30 year fixed loan mortgage with a 5% down payment, a 6.5% interest rate and includes adjustment for taxes.

Regarding prefabricated/modular home costs, the current average cost for a modular home (approximately 1,500 square feet) that can accommodate a family without future home expansion is approximately \$150,000.<sup>7</sup> This price does not include the cost of land, and includes only the cost of materials and standard labor costs. Materials include rot and termite-resistant siding, framing, insulation, mold and mildew-resistant dry wall, electrical, plumbing, and fixtures; some homes may include appliances. Construction cost varies according to market conditions, and is significantly reduced by minimizing on-site errors, providing a controlled factory environment, controlling construction material waste and expediting assembling time.<sup>8</sup>

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<sup>6</sup> Broward County Affordable Housing Income Limits and Estimated Mortgage amounts (2008), Housing Finance and Community Development Division.

\*This figure is an estimate calculated by Planning Council staff.

<sup>7</sup> See Katrina Cottages: <http://www.katrinacottages.com/home/mission.html>.

<sup>8</sup> See *Id.*

**SECTION VI**  
**OVERVIEW: HURRICANE-RESISTANT  
AFFORDABLE MANUFACTURED HOUSING OPTIONS**

**EXAMPLES**

Existing and available prefabricated/modular projects range from single-family homes to multi-family clusters and may be able to blend seamlessly with the community in which they are built. The following serve as some examples:

1. Recently, prefabricated/modular homes have been associated with the product known as “Katrina Cottages.” (See Attachment 2A.) After Hurricane Katrina destroyed entire neighborhoods in parts of Louisiana and Mississippi in 2005, Federal Emergency Management Agency (FEMA) replaced the FEMA trailers (i.e. standard mobile homes) with “Katrina Cottages” as one method to address emergency housing needs. The “cottages” provide livable square footage as small as 300 square feet, and as large as 1,600 square feet. The “cottages” may be considered as a permanent housing option, and are designed to withstand winds up to 140 mph, or Category Four, hurricane winds.<sup>9</sup>

A model prefabricated/modular unit was built in 2006 in Sarasota, FL. for those living in the state of Florida who had not had the opportunity to see a “Katrina Cottage.” The model was hurricane resistant up to a Category Four storm with wind-resistant wall panels, approximately 600 square feet of living space, and cost \$70,000 to construct including labor and materials.<sup>10</sup> In Florida, all permanent construction must conform to the Florida Building Code, which safeguards against hurricanes. (See Attachment 2B.)

2. Elm Brook Homes, in Concord, MA, is considered by some to be a successful affordable housing prefabricated/modular home project. Developers worked closely with city officials ensuring the appropriate land use and zoning designations for 12 single-family detached homes. These coordinated efforts, as well as flexible design standards and the prefabricated construction techniques, made the project feasible. Deed restrictions were placed on the property to assure affordability for future buyers. (See Attachment 3.)
3. In an historic neighborhood in Boston, MA, Erie-Ellington Homes filled seven different sites in the community where previous homes had been neglected. The sites provided a total of 50 rental dwelling units which are intended to blend in with the surrounding properties in the form of two-story multi-unit modular homes. (See Attachment 4.)

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<sup>9</sup> See <http://www.katrinacottages.com/delivery/kits.html>.

<sup>10</sup> See Herald Tribune:  
<http://www.heraldtribune.com/apps/pbcs.dll/article?AID=/20060812/COLUMNIST10/608120312/-1/BLOG12>.

**SECTION VI**  
**OVERVIEW: HURRICANE-RESISTANT**  
**AFFORDABLE MANUFACTURED HOUSING OPTIONS**

**EXAMPLES (continued)**

4. In North Carolina, Innova Homes specializes in building green certified prefabricated/modular homes. The homes meet state codes and standards for modular, energy-efficient homes, take on average 30-90 days to build (compared to 6-12 months for traditional construction), and cost between \$150,000 and \$400,000 to construct. (See Attachment 5.)
5. U.S. Department of Energy's Consortium for Advanced Residential Buildings (CARB) sponsors the Build America project through which prefabricated/modular affordable housing techniques, among others, are applied. In Carbondale, Colorado, a town 30 miles north of Aspen, a 52-unit modular affordable housing project was completed in 2004. The project consists of multi-family units as well as single family detached homes. The cost for a single-family unit totaling 1,600 square feet was approximately \$200,000. (See Attachment 6.)

**Update: February 6, 2009 (As per request of the Planning Council):**

6. Four single family residential units were built in 1988 in Deerfield Beach, Florida. Each home is approximately 1265 square feet, and cost approximately \$54,000 to build. The average selling price was \$130,000. It is noted that the homes withstood Hurricane Wilma (Category 3) in 2005. (See Attachment 7.)

**SECTION VII**  
**OVERVIEW: HURRICANE-RESISTANT**  
**AFFORDABLE MANUFACTURED HOUSING OPTIONS**

**INFORMATION FROM MUNICIPALITIES WITHIN BROWARD**

Planning Council staff attempted to contact ten municipalities of various size and locations within Broward County and conduct a survey via phone or in writing regarding their respective zoning codes and/or ordinances addressing prefabricated/modular homes. As of the date of this report, nine municipalities have been able to provide information regarding their regulations. The following is a tally of responses to the specific inquiries:

1. Does your municipality have zoning codes or ordinances which specifically permit or prohibit prefabricated/modular homes? Are prefabricated/modular home projects permitted pursuant to the zoning codes in place?

***Response:*** Five of the nine surveyed municipalities responding indicated there are no zoning codes or ordinances which specifically permit or prohibit prefabricated/modular homes. However, these five municipalities indicated that, as a matter of practice, prefabricated homes are not permitted within their respective municipal limits. It is noted that four of the nine currently permit modular homes within their city limits.

2. Are there any prefabricated/modular homes within your municipal limits?

***Response:*** Four of the nine surveyed municipalities indicated that at least one prefabricated/modular home or non-residential project currently exists within their municipal limits. One of the four municipalities which allow prefabricated/modular homes permits the projects within their "Mobile Home" zoning district.

3. Does the municipality anticipate any future changes to its zoning code regarding prefabricated/modular homes?

***Response:*** All nine surveyed municipalities indicated there are no anticipated changes to their zoning codes with regard to prefabricated/modular housing.

**SECTION VIII**  
**OVERVIEW: HURRICANE-RESISTANT  
AFFORDABLE MANUFACTURED HOUSING OPTIONS**

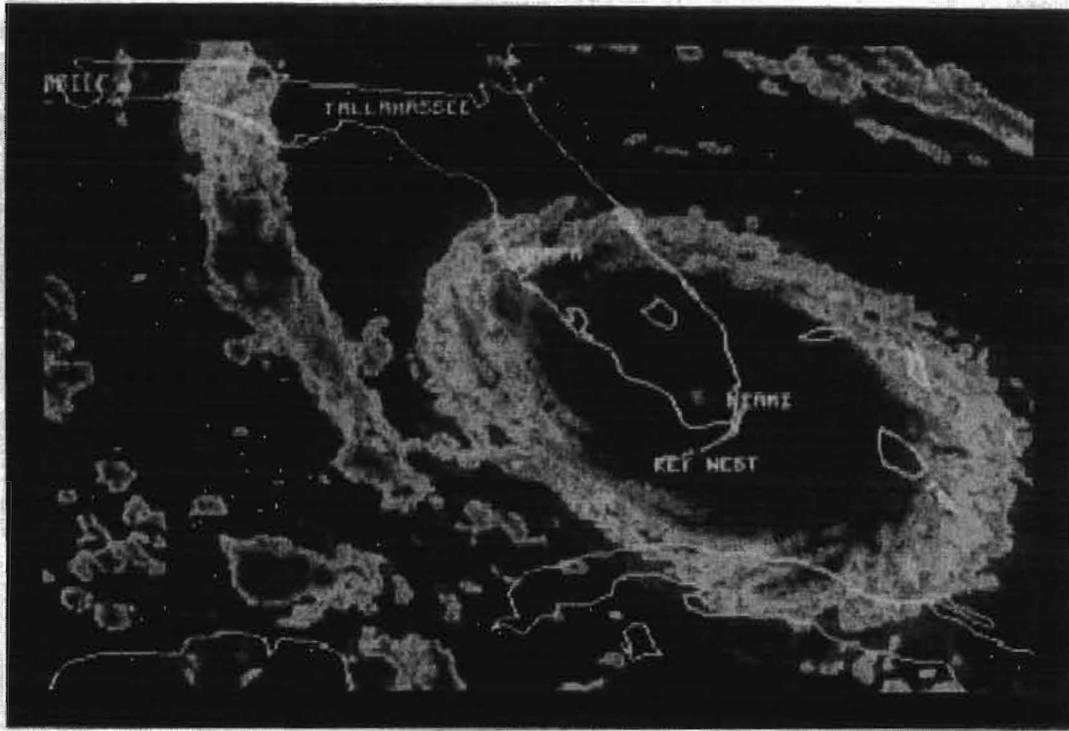
**ATTACHMENTS**

1. Excerpt of Federal Emergency Management Agency Report. Building Performance: Hurricane Andrew In Florida, Observations, Recommendations, and Technical Guidance, December 21, 1992.
- 2A. Photo, Katrina Cottage in Louisiana (2005).
- 2B. Photo, Model Katrina Cottage in Sarasota, Florida (2006).
- 2C. "Model Cottage Project Moving Forward At Last." New Urban News Vol. 13, No. 6 (September 2008), pg. 4-5.
3. Photo, Elm Brook Homes in Concord, Massachusetts (2005).
4. Photo, Erie-Ellington Homes in Boston, Massachusetts (2000).
5. Photo, Innova Homes in Asheville, North Carolina.
6. Photo, U.S. Department of Energy, Consortium for Advanced Residential Building, Build America. Project in Carbondale, Colorado (2004).

**Update: February 6, 2009 (As per request of the Planning Council):**

7. Photo, Project in Deerfield Beach, Florida (built 1988).

ATTACHMENT 1



**BUILDING PERFORMANCE:  
HURRICANE ANDREW IN FLORIDA**

OBSERVATIONS, RECOMMENDATIONS,  
AND TECHNICAL GUIDANCE



FEDERAL EMERGENCY MANAGEMENT AGENCY  
FEDERAL INSURANCE ADMINISTRATION

FIA-22  
(2/93)



COVER PHOTO:

*HURRICANE ANDREW, AUGUST 24, 1992*

*Courtesy of the National Oceanic and Atmospheric  
Administration, National Weather Service*

**BUILDING PERFORMANCE:  
HURRICANE ANDREW  
IN FLORIDA**

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**OBSERVATIONS, RECOMMENDATIONS,  
AND TECHNICAL GUIDANCE**



**FEDERAL EMERGENCY MANAGEMENT AGENCY  
FEDERAL INSURANCE ADMINISTRATION**

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**DECEMBER 21, 1992**

# EXECUTIVE SUMMARY

**O**n August 24, 1992, Hurricane Andrew struck southern Dade County, Florida, generating high winds and rain over a vast area of the county. Although the storm produced high winds and high storm surge, the effects of storm surge and wave action were limited to a relatively small area of the coastal floodplain. It was evident from the extensive damage caused by wind, however, that wind speeds were significant.

In September 1992, the Federal Emergency Management Agency's (FEMA's) Federal Insurance Administration (FIA), at the request of the FEMA Disaster Field Office staff, assembled a Building Performance Assessment Team. The team consisted of FEMA Headquarters and Regional staff, professional consulting engineers, and a Metro Dade County building official. (See Exhibit I for a list of team members.) FIA was tasked because of its extensive experience in assessing building damage caused by hurricanes. The task of the team was to survey the performance of residential buildings in the storm's path and to provide findings and recommendations to both the Interagency Hazard Mitigation Team and the Dade County Building Code Task Force. The basis for performing the survey is that better performance of building systems can be expected when causes of observed failures are corrected using recognized standards of design and construction. Collectively, the team has invested over 1,500 man-hours of effort conducting the site survey, preparing documentation, and assessing damages. Documentation of findings made during ground level and aerial surveys included field notes, photographs, and videotaping.

In conducting its survey, the assessment team investigated primary structural systems of buildings, i.e. systems that support the building against all lateral and vertical loads experienced during a hurricane. The building types observed were one- and two-story light wood-frame, masonry wall, combination masonry first floor with light wood-frame second floor, wood-frame modular, and manufactured homes. In general, it was observed that masonry buildings and wood-frame modular buildings performed relatively well.

In addition, the performance of the exterior architectural systems, such as roofing, windows, and doors was analyzed. The analysis included the effects of debris and the quality of construction workmanship. The breaching of the building envelope by failure of openings (e.g., doors, windows) due to debris impact was a significant factor in the damage to many buildings. This allowed an uncontrolled buildup of internal air pressure that resulted in further deterioration of the building's integrity. Failure of manufactured homes and other metal-clad buildings generated significant debris. Numerous accessory structures, such as light metal porch and pool enclosures, carports, and sheds, were destroyed by the wind and further added to the debris.

The loss of roof material and roof sheathing and the failure of windows and doors exposed interiors of buildings to further damage from wind and rain. The result was significant damage to building interiors and contents that rendered many buildings uninhabitable.

Field observations concluded that the loss of roof cladding was the most pervasive type of damage to buildings in southern Dade County. To varying degrees, all of the different roof types observed suffered damage due to the failure of the method of attachment and/or material, inadequate design, inadequate workmanship, and missile (debris) impact.

Much of the damage to residential structures also resulted from inadequate design, substandard workmanship, and/or misapplication of various building materials. Inadequate design for load transfer was found to be a major cause of the observed structural failures of buildings. In adequately designed buildings, the load transfer path is clearly defined. Proper connections between critical components allow for the safe transfer of loads that is required for structural stability. Where high-quality workmanship was observed, the performance of buildings was significantly improved.

Inadequate county review of construction permit documents, county organizational deficiencies such as a shortage of inspectors and inspection supervisors,

and the inadequate training of the inspectors and supervisors are factors that may have contributed to the poor-quality construction observed.

The assessment team developed recommendations for reducing future hurricane damage such as that resulting from Hurricane Andrew. Recommendations included areas of concern such as building materials, construction techniques, code compliance, quality of construction, plan review, inspection, and reconstruction/retrofit efforts. The recommendations presented in this report may also have application in other communities in Florida.

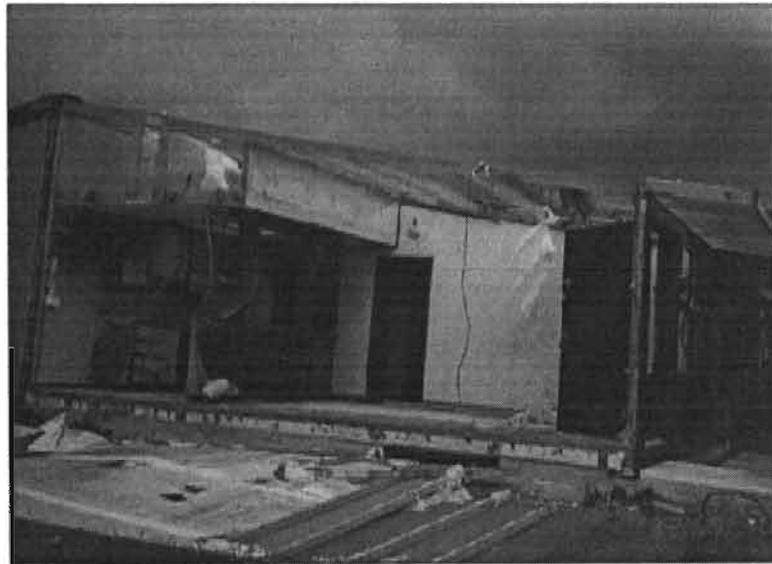
This report presents the team's observations of the successes and failures of buildings in withstanding the effects of Hurricane Andrew, comments on building failure modes, and provides recommendations for improvements intended to enhance the performance of buildings in future hurricanes. Before this final report was printed, it was reviewed by other offices within FEMA. The substantive review comments received are presented in Appendix C.

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## WOOD-FRAME MODULAR BUILDINGS

Overall, relatively minimal structural damage was noted in modular housing developments. The module-to-module combination of the units appears to have provided an inherently rigid system that performed much better than conventional residential framing. This was evident in both the transverse and longitudinal directions of the modular buildings.

Two end-wall (end wall of end modules) failures were observed in a modular home subdivision. Poor connection of the tops of the walls to the roof diaphragms was evident in these instances. Some roof sheathing was observed missing from rafters, judged to be due either to building envelope breach (window and/or door failure) or to external wind and debris. Generally, the rafters themselves were left entirely intact, because of the inherent rigidity developed by the relatively short spans and secure connections. (SEE FIGURES 19 AND 20.)



**FIGURE 19.** *Modular home. End wall of end unit separated from unit; withdrawal of nails along cave line and roof sheathing failure were also observed.*

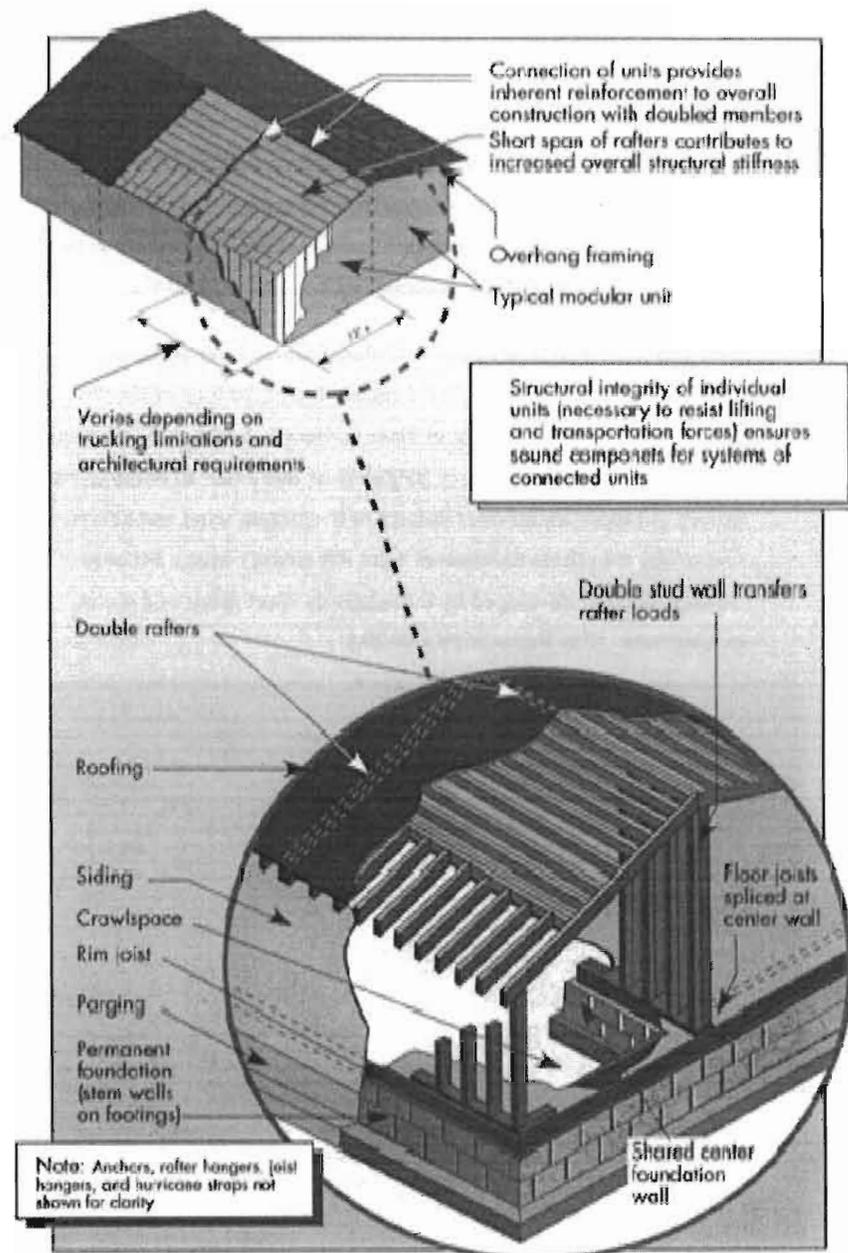


FIGURE 20. *Inherent structural strength of modular construction.*

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## ATTACHMENT 2.A.

### Katrina Cottage



Picture courtesy of Bruce Tolar 2006, copyright

After Hurricane Katrina in 2005 destroyed neighborhoods in parts of Louisiana and Mississippi, FEMA replaced their mobile home trailers with the Katrina Cottages shown above. These homes are built in sections in a factory and assembled on-site on a concrete foundation.

<b>Location:</b>	Louisiana
<b>Size:</b>	600 square feet
<b>Type:</b>	SFR
<b>Number of Units:</b>	1

Katrina Cottages: <http://katrinacottagehousing.org/>.

## ATTACHMENT 2.B.



Andres Duany, AIA. Florida Cottage (Sarasota, FL)

<b>Location:</b>	Sarasota, FL
<b>Size:</b>	600 square feet
<b>Type:</b>	Model Only
<b>Number of Units:</b>	1
<b>Cost:</b>	70,000 labor and materials

Bubil, Harold. "A Katrina Cottage You Can Visit." Herald Tribune Aug. 2006:  
<http://www.heraldtribune.com>.

# Model cottage project moving forward at last

*Ocean Springs development runs counter to a spate of bad development in Mississippi.*

Cottage Square, a model cluster of new urbanist cottages that was planned more than two years ago for Ocean Springs, Mississippi, as a response to Hurricane Katrina, is finally making rapid progress toward completion.

The Gulf Coast city's Board of Aldermen voted July 30 to allow a mix of residential and commercial uses on the two-acre site that was chosen by the developers — the Katrina Cottage Group, led by architect Bruce Tolar. The approval paved the way for the developers to erect eight 400-square-foot "Mississippi Cottages" for residential use.

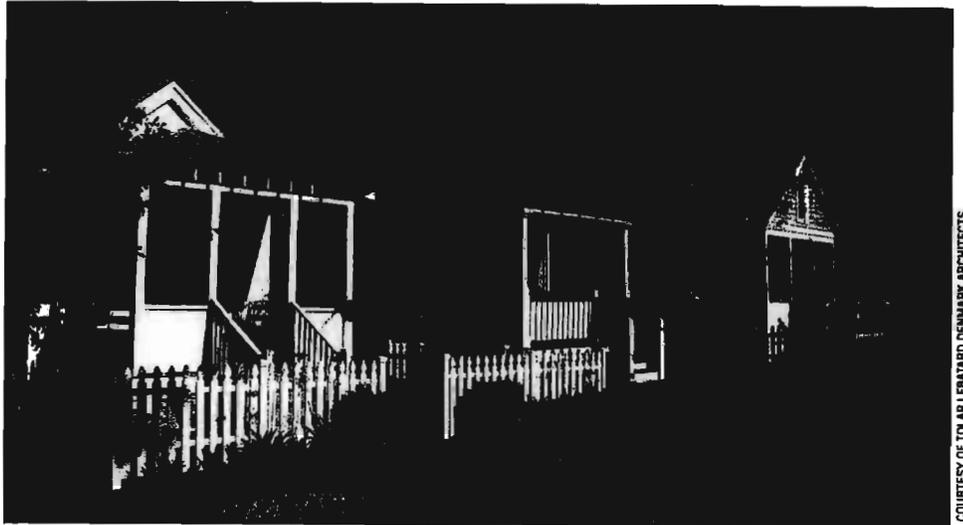
Since announcing the project in 2006, the group had erected four Katrina Cottages on the property, using one of them as a display model and filling the others with commercial uses — hair-cutting, real estate, and contracting businesses, plus Tolar's architectural practice. The July approval authorized the developers to add cottages that people will live in.

"This is something we have looked forward to since the governor's Renewal Forums in 2005," Ben Brown of Place-Makers planning consultants told the *Sun Herald*, noting that it will provide the first opportunity for people to see Mississippi Cottages "in a real neighborhood setting."

## MISSED OPPORTUNITIES

Progress toward constructing new urbanist neighborhoods and mixed-use centers on the Gulf Coast has been much slower than was anticipated when Governor Haley Barbour welcomed dozens of new urbanist planners and designers to the Renewal Forum in Biloxi in the fall of 2005. At that time, Barbour made a point of promising that decisions about how to build would be made at the local level, not imposed upon communities by the state.

Perhaps partly as a consequence of the lack of state (or regional) direction, most of what's been built on the Coast since the hurricane has been a continuation of sprawl — disappointing many new urbanists who tried to steer com-



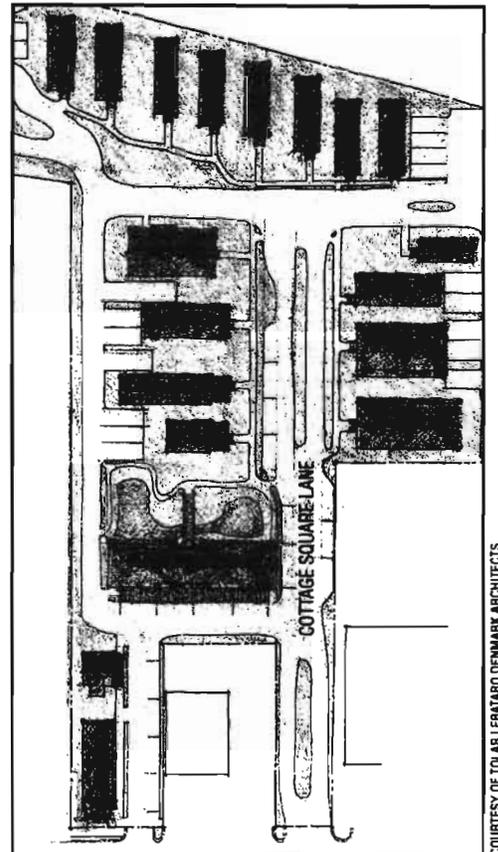
Homes at Cottage Square, above, and a plan that includes commercial buildings and a school, at bottom left.

munities onto a different path. Some municipalities have adopted the Smart-Code, but what has predominated has been single-use, automobile-dependent development.

Mississippians remain as reliant as ever on driving to jobs, stores, and other destinations — even though a sizable proportion of the residents of America's poorest state (where 19.3 percent of the population is reported to be in poverty) cannot afford such a petroleum-consuming way of life.

A national survey in May by the Oil Price Information Service found Mississippians suffering disproportionately from the past year's run-up in gasoline prices. The survey disclosed that in 13 counties across the US, people spent 13 percent or more of their family income on gasoline. Five of those counties were in Mississippi. "People are giving up meat so they can buy fuel," *The New York Times* reported in a story on the privations being visited especially upon the Mississippi Delta.

The Coast is more prosperous than the Delta, but the coastal communities contain many economically stressed households, which have a hard time coping with the expense of disconnected, automobile-dependent development. New urbanists working on the Coast have recently complained on the Gulf-Urb listserv about the prepon-



derance of bad decisions on how and where to build.

Cottage Square, on Government Street (old US 90) in Ocean Springs, just east of Biloxi, is an attempt to demonstrate the potential of small, walkable, mixed-use developments and of diminutive cottages that can withstand winds up to 150 mph.

"Adding the full-time residential

component means this will probably be the first post-Katrina infill, mixed-use cottage cluster neighborhood in the storm zone," says Brown. "It's on a bus line in Ocean Springs, a few minutes from the historic downtown, and within walking distance of a full-service grocery store, a YMCA that offers daycare, and other commercial services."

The eight one-bedroom residential cottages being added to the compound are part of the Mississippi Alternative Housing program, intended for people who have been displaced by Katrina. "We are asking for at least a 24-month rental period, but residents can live there indefinitely," Ken McCool of PBS&J, a

liaison for the housing program, told the *Sun Herald*.

Compensating for the small interiors are sizable front porches. In addition to the eight new units, two cottages designed by Steve Mouzon are expected to be built. A modular two-story cottage is also under consideration.

Brown acknowledges that "there's been considerable resistance on the Coast to permitting small-scale units on small lots in existing neighborhoods." Nonetheless, he and others hope that Cottage Square will spur more infill projects using dwellings of this sort, creating mixed-use neighborhoods. ♦

By comparison, the average resident of America's 100 largest metro areas emitted 2.24 tons — a difference of 35 percent.

**WALKING TO AMENITIES**

Now the talk in Portland is about the 20-minute neighborhood, which *The Oregonian* recently defined as "one where you can walk to essential amenities and services in 20 minutes." The center of the city already has neighborhoods matching or surpassing that description. In areas such as southeast Portland, however, neighborhoods fall short of that standard. The aim is for Portland to upgrade neighborhoods as part of the city's comprehensive plan, which is being completely rewritten for the first time since 1980.

Portland's Local Action Plan on Global Warming calls for "changing the pattern of urban development to be more compact, more bicycle- and pedestrian-friendly, to provide for mixed uses, and to offer a range of mobility choices," says Chris Dearth, sustainability planning manager in the city's Planning Bureau. The images on this page and the next show the greenhouse gases emissions of Portland neighborhoods — those that meet the 20-minute standard fare better, especially when looking at transportation.

Twenty-minute neighborhoods will come about in part through redevelopment, infill construction, less park-

# Portland pursues the '20-minute neighborhood'

The Office of Sustainable Development in Portland, Oregon, has decided that one of the best ways to cut down on greenhouse-gas emissions is by fostering what it calls the "20-minute neighborhood."

Since 1993, when Portland became the first large city in the US to adopt a plan aimed at preventing global warming, the city has made substantial progress on reducing damage to the environment, at least on a per capita basis. Carbon dioxide emissions in Portland and Multnomah County in 2007 were estimated to be slightly under those in 1990, even though the population grew by approximately 18 percent during that 17-year span. Per capita, emissions have dropped by 16.2 percent since 1990.

The improvement reflects a growing use of light-rail transit, an increase in commuting by bicycle, and the addition of housing and retail in walkable neighborhoods. It also reflects a local energy conservation ethic, the urban growth boundary, a healthy central city, and local political leadership, says Eliot Allen of Criterion Planners in Portland.

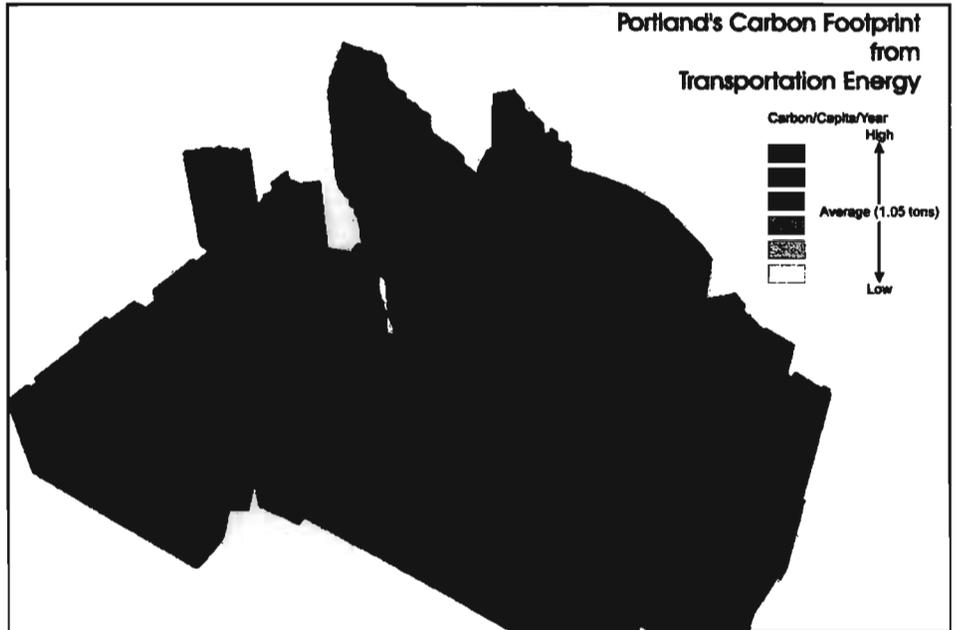
"SmartTrips," a transportation options education and outreach program administered by the Transportation Department, has reduced single-person auto trips by 9 to 12 percent in each of five target areas since 2004, says Denver Igarta in the Portland Department of

Transportation.

The city now offers \$30 a month in "Bike & Walk Bucks" as an incentive for municipal employees to commute by bike, on foot, or by other nonmotorized means. (Even skates and skateboards qualify.)

Blueprint for American Prosperity, an initiative of Brookings Institution, says that in 2005, the average resident of metropolitan Portland emitted 1.446 tons of carbon through highway transportation and residential energy use.

**In-town, walkable neighborhoods have a lower carbon footprint from transportation**



## ATTACHMENT 3

### Elm Brook Homes

Elm Brook Homes is a suburban infill residential project located on a 12.9-acre site in historic Concord, Massachusetts. The development's 12 single-family detached houses



are situated on a cul-de-sac atop a raised meadow adjacent to marshland. While the land had previously been rezoned for affordable housing, the developer also obtained a zoning amendment designating the site as a planned residential development (PRD), which allowed increased density and flexibility on setbacks. All units are modular homes whose factory-built components were installed on-site, a construction technique that kept costs low and kept the homes affordable. Deed restrictions ensure the homes will remain affordable to future buyers at the same income.

<b>Location:</b>	Concord, MA
<b>Region:</b>	Northeast
<b>Renter/Owner:</b>	Owner Only
<b>Number of Units:</b>	12
<b>Target Population:</b>	affordable to households with 80-140 percent of AMI
<b>Type:</b>	Suburban
<b>Credits:</b>	Courtesy of Urban Land Institute Development Case Studies
<b>Enabling Policies:</b>	Ensure Zoning Policies Allow Housing Diversity Expand the Supply of Homes Through Rezonings Use Shared Equity Mechanisms to Preserve Homeownership Subsidies

Center for Housing Policy:  
[http://www.housingpolicy.org/gallery/entries/Elm\\_Brook\\_Homes.html](http://www.housingpolicy.org/gallery/entries/Elm_Brook_Homes.html)

## ATTACHMENT 4



### **Erie-Ellington Homes**

Erie-Ellington Homes is a 50-unit urban infill residential project in the historic Erie-Ellington neighborhood of Dorchester, a district of Boston, Massachusetts. The project's 19 duplex and triplex buildings are located on seven scattered sites, filling gaps in the urban fabric left by arson and neglect, and were built at lower densities than allowed as of right to assuage neighbors' concerns about scale and open space. Developed using a cost-efficient panelized construction technique, in which entire walls are built in factories and assembled on-site, the environmentally-friendly homes have been designed to use about half the energy of comparable homes. Since its completion in September 2000, Erie-Ellington Homes has sparked renovation and improvement of area residences while providing much-needed affordable rental housing for city residents.



<b>Location:</b>	Boston, MA
<b>Region:</b>	Northeast
<b>Renter/Owner:</b>	Renter Only
<b>Number of Units:</b>	50
<b>Target Population:</b>	45 units affordable to households with 60 percent or less of AMI, 5 units reserved for formerly homeless households with 30 percent or less of AMI
<b>Type:</b>	Urban
<b>Credits:</b>	Courtesy of Urban Land Institute Development Case Studies
<b>Enabling Policies:</b>	Facilitate Reuse of Abandoned, Vacant and Tax-Delinquent Properties

[http://www.housingpolicy.org/gallery/entries/Erie-Ellington\\_Homes.html](http://www.housingpolicy.org/gallery/entries/Erie-Ellington_Homes.html)

## ATTACHMENT 5

### Innova Homes



In North Carolina, Innova Homes specializes in building green certified prefabricated/modular homes. The homes meet state codes and standards for modular, energy-efficient homes, take on average 30-90 days to build (compared to 6-12 months for traditional construction), and cost between \$150,000 and \$400,000 to construct.

<b>Location:</b>	Asheville, NC
<b>Size:</b>	Two modular pieces
<b>Type:</b>	SFR
<b>Number of Units:</b>	1
<b>Cost:</b>	\$150,000 - \$400,000 (depending on unit type)

Partnership for Advanced Technology Housing: <http://www.pathnet.org/sp.asp?id=19727>.

## ATTACHMENT 6



U.S. Department of Energy's Consortium for Advanced Residential Buildings (CARB) sponsors the Build America project through which prefabricated/modular affordable housing techniques, among others, are applied. In Carbondale, Colorado, a town 30 miles north of Aspen, a 52 unit modular affordable housing project was completed in 2004. The project consists of multi-family units as well as single family detached homes. The cost for a single-family unit totaling 1,600 square feet was approximately \$200,000.

<b>Location:</b>	Carbondale, CO
<b>Type:</b>	Multi-Family and SFR
<b>Number of Units:</b>	52
<b>Cost:</b>	No more than 30% of annual household median income

US Department of Energy, Consortium for Advanced Residential Buildings:  
<http://www.carb-swa.com/PDF%20files/CNJanuary04.pdf>.

## ATTACHMENT 7



The following single family residential units are located in Deerfield Beach, Florida. The homes were built in 1988.

<b>Location:</b>	West side of Northeast 6 Avenue, between Northeast 1 Street and East Hillsboro Boulevard in Deerfield Beach, FL
<b>Type:</b>	SFR
<b>Size:</b>	Approximately 1265 square feet
<b>Number of Units:</b>	4 SFR detached
<b>Cost:</b>	Cost from manufacturer: \$54,000 (1988), \$97,000 (2008 equivalent) Selling Price: \$130,000 (1988), \$234,000 (2008 equivalent)





