



A Resource of the State of Florida

**HURRICANE LOSS REDUCTION  
FOR  
HOUSING IN FLORIDA**

**A Research Project Funded by  
The State of Florida Department of Community Affairs  
Through Contract 02-RC-11-13-00-05-001**

**ANNUAL REPORT  
For Calendar Year 2001**

**DELIVERABLE # 3  
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PREPARED BY  
THE INTERNATIONAL HURRICANE CENTER  
FLORIDA INTERNATIONAL UNIVERSITY

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

A RESEARCH PROJECT UNDERTAKEN BY  
THE INTERNATIONAL HURRICANE CENTER

At Florida International University

## **ANNUAL REPORT FOR YEAR-TO-DATE 2001**

### **INTRODUCTION**

This report provides an accounting of activities by the International Hurricane Center (IHC), at Florida International University (FIU), and its research team as authorized under Section 215.559 of the Florida Statutes, Hurricane Loss Mitigation Program (a.k.a. "Bill Williams Residential safety and Preparedness Act") currently funded by the Florida Department of Community Affairs (DCA) under contract # 02-RC-11-13-00-05-001 executed on August 6, 2001. Activities from the beginning of the year through June 30, 2001 were funded under DCA contract #01-RC-11-13-00-22-004.

Funding provided to the IHC under the Bill Williams Act is designated for the following task:

*To support programs of research and development relating to hurricane loss reduction devices and techniques for residences and mobile homes and relating to the development of credible data on potential loss reduction.*

The first section of this report summarizes activities undertaken from January 1, 2001 through June 30, 2001 emphasizing those that have set a foundation of knowledge for, or are directly linked to research being undertaken during the current fiscal year.

The second part of this annual report covers activities of the IHC research team from the date of contract execution through November 30, 2001. This report is submitted in compliance with Deliverable #3 of above referenced contract.

Ricardo A. Alvarez, IHC Deputy Director, is Principal Investigator (PI) and Project Director. Nicole Dash, Research Associate at the IHC, is responsible for project coordination

## **ACTIVITIES FROM JANUARY 1 THROUGH JUNE 30, 2001**

### CONTRACTUAL MATTERS

DCA contract #01-RC-11-13-00-22-004 was executed on September 8, 2000 providing funding in the amount of \$96,000 for the IHC to commence working on the reporting of activities being undertaken under the Bill Williams Act during the state fiscal year 2000.

The main research effort was initiated by the IHC shortly after above mentioned contract was amended on January 18, 2001 providing additional resources to bring funding up to the \$700,000 authorized by the legislature in compliance with the Bill Williams Act.

### RESEARCH TRACKS

This amended contract required the IHC to pursue work on the following five specific research tracks:

1. Sheltering for Mobile Home Parks
2. Mobile Home Recycling Program
3. Land Development and Zoning
4. Incentives and Barriers to Mitigation within Homeowners Insurance
5. Loss Reduction Retrofit and Structural Performance

## THE RESEARCH TEAM

To tackle this comprehensive multidisciplinary agenda the IHC organized a multidisciplinary team of researchers, research assistants, graduate students and support staff from five public universities within the state of Florida, as well as two consultants with highly relevant expertise.

All together the IHC research team assembled for this first phase of this project involved a total of forty-two individuals representing such disciplines as: (a) architecture, (b) urban planning, (c) structural engineering, (d) civil engineering, (e) business and finance, (f) sociology and anthropology, (g) political science, (h) computer science, (i) accounting and others.

Beyond their respective specific disciplines team members contributed a wealth of expertise relevant to the project including: (a) vulnerability assessment, (b) hazard mitigation, (c) emergency management, (d) hurricane damage assessment, (e) structural testing, (f) wind engineering, (g) construction management, (h) analytical surveying methodology, (i) public opinion research, (j) statistical analysis, (k) geographic information systems (GIS), (l) visual planning technology, (m) relational database management, (n) project management and others.

The IHC research team was subdivided into sub-teams so that one or two researchers and a sub-team took specific responsibility for each of the five research tracks under the direction of the Principal Investigator and Project Director.

## RESEARCH SUPPORT FUNCTIONS

In addition to work dedicated to the five specific research tracks the IHC team also carried-out the following support functions:

- (a) Literature search and review
- (b) Regulatory environment review

- (c) Statewide phone survey of mobile home residents
- (d) Creation of graphical imaging database (GIS based)
- (e) Qualitative surveys mobile home park owners and residents, conducted face to face

## REPORTING FUNCTION

Under the above mentioned contract the IHC also carried out a reporting function, in addition to its research activities.

This reporting function involved the three specific tasks described below:

### Annual Report to the Florida Legislature

The Bill Williams Act also required the IHC to assist DCA with the annual report of activities to be submitted to the Speaker of the Florida House of Representatives, the President of the Florida senate, and the Majority and Minority Leaders of the House of Representatives and the Senate. This annual report must be submitted to the specified members of the Legislature on January 1.

To fulfill this contractual requirement the IHC prepared a draft report describing activities it undertook through the end of the year 2000.

### Periodic Reports

The IHC submitted a total of ten interim reports to DCA, according to a schedule of deliverables established by contract, to inform on the progress of the research work on the five research tracks.

### Final Report

In compliance with the contract the IHC submitted to DCA a Final Report by June 30, 2001. This Final Report included a section on "Findings and Recommendations" in addition to ten chapters and four appendixes contained in two volumes and 600+ printed pages. This report, also delivered on CD format, included numerous pictures

and graphics illustrating various aspects of the research carried out by the IHC. Also three fully illustrated “case studies” describing examples of how land development and zoning have affected mobile home parks in locations around the state. In addition the Final report included an extensive bibliography and list of references to facilitate further studies by interested parties, and samples of both survey instruments used by the IHC.

Ricardo A. Alvarez, Principal Investigator and Director of the Research Project, traveled to Tallahassee on July 19, 2001 to present a summary of findings contained in the Final Report to a group of DCA staff, members of the RCMP Advisory Council, and other interested individuals.

The full Final Report for the fiscal year ended June 30, 2001 is available for viewing on the IHC Internet web page at [www.ihc.fiu.edu](http://www.ihc.fiu.edu)

An interesting note regarding this Final Report is that Dr. Charles Finkl, a professor at Florida Atlantic University and Director of the Journal of Coastal Research, will be using this Final Report as a text for a graduate class on coastal vulnerability and other issues.

## FINDINGS

It is beyond the scope of this report to describe in detail the findings by the IHC team during the project ended on June 30, 2001. Those interested in reviewing some of these findings, and pertinent recommendations, may refer to the copy of “Chapter 3: Findings and Recommendations” from the Final Report mentioned above that is attached herewith.

It is important however to mention that the IHC arrived at two types of findings during the period cited above, these were:

- (a) Procedural Findings, and
- (b) Research Findings

### Procedural Findings

These findings, explained in detail in the above referenced attachment, refer among others to such important issues as: (a) the time period allowed for conducting the research project through June 30, 2001, (b) the scope and quantity of interim reports, and (c) the need to have access to existing pertinent information to avoid duplication of effort and to provide continuity with the existing foundation of knowledge from previous research efforts.

### Research Findings

One of the most important findings perhaps to come out of the research work through June 30, 2001 has to do with what the IHC identified as “the Scope of the Issue”. This really has to do with the more than two million Florida residents who live in mobile homes, making everything related to mobile homes a huge housing issue in the full sense of this term.

For more details on such research findings the reader is referred both to the attached “Chapter 3; Findings and Recommendations” or to the complete “Final Report” available via the IHC web page or on CD or paper formats upon request.

### RECOMMENDATIONS

The IHC team felt it was important to make recommendations to DCA for future action based on both the procedural and the research findings. Consequently the IHC did include several specific recommendations in the Final Report cited herein.

One important recommendation the IHC team would like to make at this time is the following: *the Hurricane Loss Reduction project has the potential for benefiting most of the residents of our state, especially those who are most vulnerable to potential damage from the impact of hurricanes. Consequently DCA and the ad-hoc Advisory Council should strive to provide continuity in all facets of this project, but especially regarding the research component. This will ensure such research actually results in practical*

*knowledge that could serve as a foundation for policy alternatives to be considered by the State Legislature. When considering this issue of needed continuity DCA and the Advisory Council should be particularly aware that some types of research may need periods longer than one year to produce practical results, also that findings from research often provide a foundation for further work or at the very least identify new questions that must be answered through further research.*

## **ACTIVITIES FROM JULY 1, 2001 TO DATE**

Upon reception of the executed contract by FIU the PI proceeded to notify the various team members and initiated the drafting of agreements with the various researchers within FIU and outside the university. Preparation of a project budget was also initiated.

Major activities during the period covered by this report include:

1. On August 8, 2001 executed Contract # 02-RC-11-13-00-05-001 was received at FIU. Administrative process and documentation to create project account was initiated immediately.
2. IHC submits draft of Scope of Work to DCA for inclusion in agenda for meeting of the RCMP Advisory Council scheduled for August 29, 2001.
3. Nicole Dash, Project Coordinator, represented the IHC/FIU at the meeting of the Advisory Council that took place in Tallahassee on August 29, 2001. Ms. Dash briefed the Advisory Council on the Scope of Work proposed by the IHC. (See attached copy of Power Point presentation made at the meeting).
4. Conference call on September 4, 2001, between PI and DCA staff members: Keith Delhomme, Ted Court and Leroy Thompson. Purpose of conference was to discuss scope of work and timelines.



5. Working meeting of IHC team took place in Miami on September 5, 2001. Main objective of the meeting were: (a) to review the legislative language regarding the research topics to be covered during the current fiscal year, (b) to draft a preliminary scope of work, and (c) to define timelines for major tasks and deliverables for the duration of the project.
6. On September 7, 2001 as required by the contract the IHC submitted its Scope of Work and Schedule of Timelines and budget to DCA. This Scope of Work reflected the discussion and recommendations by the Advisory Council.
7. The terrorist attack of September 11, 2001 caused a delay in the process of agreements and budgeting between the IHC and researchers within FIU and other institutions. The process was resumed however, and was largely concluded by September 30, 2001.
8. Conference call on September 18, 2001 with Ted Court regarding Scope of Work and budget.
9. By September 30, 2001 the assembled research team consisted of nine researchers and nine graduate students. The team includes representatives from the IHC, from the College of Engineering/Dept. of Construction Management at FIU, from the Dept. of Architecture at the University of South Florida (USF), and from Clemson University in South Carolina. Other team members from the Hemispheric Center for Environmental Technology at FIU and from the High Performance Database Research Center, also at FIU, had been contacted as well and were in the process of completing their respective scopes of work, schedules of timelines and budgets.

10. Research Team assembled to date:

a. Senior Researchers

Ricardo Alvarez, FIU/IHC (Principal Investigator/Project Director)

Marshall Allen, FIU HCET

Nicole Dash, FIU/IHC

Ali, Ebadian, FIU HCET

George Epolito, University of South Florida

T. Trent Green, University of South Florida

Jose Mitrani, FIU Dept. of Construction Management

Amaury Caballero, FIU Dept. of Construction Management

Tim Reinhold, Clemson University

Stephen Schreiber, University of South Florida

Cindy Zhang, FIU HCET

b. Graduate Students

Deepangkar Bhattacharjee, USF

Mike Dailey, USF

Kurt Dyer, FIU

Janaina Monteiro, FIU

Jorge Remedios, FIU

Stan Schachne, FIU

Roger Williams, FIU

In addition the IHC team will be complemented by three graduate students working under the direction of Timothy Reinhold at Clemson University, and two additional graduate students from FIU working under Jose Mitrani and Amaury Caballero.

The IHC team is supported by the following staff:

Regnier Jurado

Scott Caput

Maria Cano

## **ACTIVITIES BY RESEARCH TOPIC**

### **1. Eliminating State and Local Barriers to Upgrading Existing Mobile Homes and Communities**

This research topic will build upon the foundation of knowledge and information developed during the work completed by June 30, 2001. As such, this topic is a good example of the issue of continuity addressed by the IHC in its recommendation to DCA and the RCMP Advisory Council contained herein.

Research work under this topic involves an effort by a team from the Department of Architecture at the University of South Florida under the direction of the Department Director Steven Schreiber.

Work under this topic also involves work being conducted under the direction of IHC Deputy Director Ricardo A. Alvarez with the assistance of two graduate students from the School of Architecture and the department of Construction Management at Florida International University (FIU).

The work contributed by the USF team includes the following:

- (a) Currently collecting and analyzing zoning and other land use codes from Polk County. Areas include: Auburndale, Bartow, Davenport, Dundee, Eagle Lakes, Fort Mead, Frostproof, Haines City, Highland Park, Hillcrest Heights, Lake Alfred, Lake Hamilton, Lake Wales, Lakeland, Mulberry, Polk City, Winter Haven, and unincorporated Polk County

- (b) Collecting and creating GIS based maps for Polk County: flood, wind, land use, and census data.
- (c) Locating mobile home parks on GIS based maps for Polk County
- (d) Collecting information on hurricane resistant residences developed throughout the hurricane prone world.
- (e) Gathering site plans from mobile home parks in west central Florida for analyses of platting.

Research under this topic being conducted by the IHC/FIU team is addressing the following:

- (a) Collecting data on existing regulations from all municipalities in both Miami-Dade and Broward counties that may impede the installation of mobile homes or that may increase the vulnerability of mobile homes to potential hurricane damage.
- (b) Collecting data from various municipalities, in a tri-county area of Southeast Florida, to determine the state of knowledge of public agencies regarding the regulatory environment under which mobile homes may be installed and/or remodeled/modified in-situ.
- (c) Analysis of collected data to determine if issues of vulnerability to mobile homes may be exacerbated in any way by the knowledge or lack thereof by public agencies with respect to the regulatory environment for the installation and or in-situ modification of mobile homes.

## **2. Research and Develop a Program for the Recycling of Existing Older Mobile Homes**

As with the preceding research topic this one also will build upon a foundation of information and knowledge developed during the first phase of this project

The main objectives of this specific work are to develop a clear understanding of the regulatory, technological, social and economic issues pertaining to the feasibility of recycling first-generation (pre 1976) mobile homes in Florida, in order to draft a proposed “Mobile Home Recycling Program” that may become an alternative for policy to be considered by DCA and the State Legislature.

Regarding this research topic it is important to clarify that while the term “recycling’ is used this is not meant to signify a program for potential reuse of older mobile homes or of the potentially re-usable materials or components that may result from the demolition or dismantling of such mobile homes. The main intent of such recycling program would be to retire from use those “older” mobile homes and to provide other housing options, either mobile homes or site-built housing, for those individuals presently residing in such older mobile homes. The overriding intent of this program however would be the reduction of potential hurricane damage to those residents of older mobile homes and their property.

- (a) An analysis of the phase approach to this research topic was undertaken to determine the necessary chronological order of research tasks.
- (b) The key finding is that Phase I of the research plan which addresses key technical and regulatory issues is the foundation for phases II, III, and IV.
- (c) A key partnership was formed with FIU’s Hemispheric Center for Environmental Technology (<http://www.hcet.fiu.edu>). HCET has significant experience with decomposition of structures, the regulatory environment surrounding materials, and hazardous material disposal. HCET will be working closely with the IHC on the key technical issues surrounding the dismantling, recycling and disposal of old mobile homes in Florida.
- (d) Currently the research team is collecting data related to the logistics of removal. These logistics include finding salvage companies willing to do disassembly work, facilities capable of recycling at least some component parts of the units, and waste facilities to accommodate any remaining tonnage. These facilities need to be throughout the State of Florida.

### **3. Programs of Research and Development Relating to Hurricane Loss reduction Devices and Techniques for Site-built Residences**

This research topic is also based on some of the work conducted during the first phase of this project, thus providing some form of the recommended continuity. The work actually shifts from mobile-homes to site-built residences.

One of the main objectives of work under this topic is to use laboratory and field testing to develop design criteria as well as devices and techniques that would result in mitigating the potential for hurricane damage to the housing stock in Florida both through retrofit (of existing housing units) or through new design and construction (for new units).

One collateral objective of this specific work is the development of a solid foundation of practical expertise and knowledge that will support the development of a hurricane loss reduction testing laboratory at the IHC/FIU that would become a valuable state resource. Such testing laboratory would support continued work on areas being addressed by this project, and others to be based on findings from current work.

Work involves a team from FIU Dept. of Construction Management/College of Engineering under the direction of Jose Mitrani, and a team from Clemson University directed by Timothy Reinhold. The work will build upon and benefit from pioneering work conducted by Dr. Reinhold on the issue of wind damage to building components, assemblies, sub-structures and structural members that is quite relevant to this project.

- (a) An initial planning meeting was held between Ricardo Alvarez, Jose Mitrani, and Timothy Reinhold on July 31st in Miami. This meeting focused on the programmatic needs shaping year two of the project.

- (b) Additional planning meetings have been conducted via telephone conference during the month of October.
- (c) An overall plan of research was developed in three key areas: roof coverings, roof sheathing attachment, and roof to wall connections.
- (d) These research areas have been targeted to provide meaningful progress in reducing vulnerability. This reduction in vulnerability is to be achieved through:
  - i. Developing a more complete understanding of the loads and resistance of each component or connection.
  - ii. Providing baseline data on capacities of various materials and components.
  - iii. Improving engineering analysis tools for vulnerability assessment and design of the components or connections
- (e) Plans were designed for the facilities needed to undertake this research. These facilities include a wind tunnel suitable for conducting tests of roof shingles at high velocities, an outdoor test facility aimed at looking at roof shingle performance on gable ends of roofs, an apparatus for testing roof sheathing attachments, and a test apparatus for testing roof-to-wall connections. Further design, procurement of equipment and construction will begin during the next quarter.
- (f) Meetings have been held with Miami-Dade County staff. The purpose of these meetings was a) to obtain the Miami-Dade County/South Florida Building Code roof shingle testing protocols, b) to obtain the cyclic loading criteria specified for components by the South Florida Building Code, and 3) to discuss the implementation and methodology of both.

## OTHER ACTIVITIES

The IHC has submitted two deliverables as required by the contract:

- (a) Scope of Work, Timelines and Budget, and
- (b) First Quarterly Report (for quarter ended 09/30/01)

END OF THIS REPORT