



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**

QUARTERLY REPORT No. 1
For Quarter Ended September 30, 2001

DELIVERABLE # 2
DUE BY OCTOBER 15, 2001

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

QUARTERLY REPORT FOR THE PERIOD ENDED SEPTEMBER 30, 2001

SUMMARY

This report summarizes the activities of the International Hurricane Center (IHC), at Florida International University (FIU), and its research team related to the project designated as *Hurricane Loss Reduction for Housing in Florida* (hereinafter Project) being funded by the Florida Department of Community Affairs (DCA) under contract # 02-RC-11-13-00-05-001 executed on August 6, 2001.

This quarterly report covers activities of the IHC research team from the date of contract execution through September 30, 2001. This quarterly report is submitted in compliance with Deliverable #2 of above referenced contract.

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

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

Marshall Allen, FIU HCET
Ricardo Alvarez, FIU/IHC
Amaury Caballero, FIU Dept. of Construction Management
Nicole Dash, FIU/IHC
George Epolito, University of South Florida
T. Trent Green, University of South Florida
Jose Mitrani, FIU Dept. of Construction Management
Tim Reinhold, Clemson University
Stephen Schreiber, University of South Florida

b. Graduate Students

Deepangkar Bhattacharjee, University of South Florida
Mike Dailey, University of South Florida
Kurt Dyer, FIU/IHC
Janaina Monteiro, FIU/IHC
Jorge Remedios, FIU

ACTIVITIES BY RESEARCH TOPIC

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

- 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 planes from mobile home parks in west central Florida for analyses of platting.

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

- 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

- 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. An overall plan of research was developed in three key areas: roof coverings, roof sheathing attachment, and roof to wall connections.
- c. 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
- d. 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.

- e. 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.

Power Point Presentation
Given by
Nicole Dash

August 29th, 2001

Department of Community Affairs
RCMP Advisory Council Meeting

Hurricane Loss Reduction for Residences and Mobile Homes in Florida



Year 1 Summary
Year 2 Work Plan

Background: IHC's Involvement in Hurricane Mitigation with DCA

- Airborne Laser
- RCMP Review
- RCMP Database
- State-Wide Surveys



**Bill Williams Residential Safety and
Preparedness Act**

Research Team

- Ricardo A. Alvarez P.I.
- 24 ACADEMIC RESEARCHERS
- 14 GRADUATE STUDENTS
- 3 ADMINISTRATIVE SUPPORT
- IHC + 5 STATE UNIVERSITIES

The Act

The act (s. 215.559) allocates 10% of the annual allocation to the International Hurricane Center 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.”

Year 1: RESEARCH TRACKS

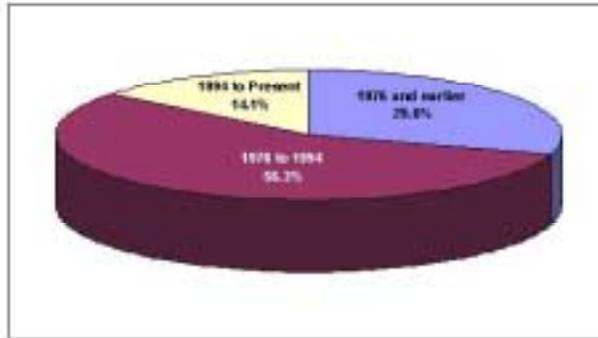
- 1. SHELTERING FOR MOBILE HOME PARKS**
- 2. MOBILE HOME RECYCLING**
- 3. LAND DEVELOPMENT & ZONING**
- 4. MITIGATION & HOMEOWNERS INSURANCE**
- 5. LOSS REDUCTION RETROFITS & STRUCTURAL PERFORMANCE**

RESEARCH SUPPORT

- 1. LITERATURE REVIEW**
- 2. REGULATORY ENVIRONMENT**
- 3. SURVEYS**
- 4. DMV DATA ANALYSIS**
- 5. IMAGING**

SCOPE OF THE ISSUE

- 2+ MILLION RESIDENTS or 12.5% of the population (2000)
- 18.1% of M.H. households have individuals 65 or older
- 15.4% widowers living alone
- 68% of units NOT in parks
- 78.6% of units have ADDITIONS (as high as 93% in some parks)



REGULATORY ENVIRONMENT

- 3-tier STRUCTURE
- KNOWLEDGE GAPS
- CONFUSION
- LACK OF ENFORCEMENT

SHELTERING FOR MOBILE HOME PARKS

- HURRICANE EVACUATION
- MANDATORY M.H. EVACUATION
- SHELTER DEFICIT
- 71.5% FEEL LESS SAFE IN M.H.
- MAJORITY OF M.H. OWNERS LIKE IDEA OF SHELTER

- MAJORITY OF PARK OWNERS DO NOT
- LIABILITY, COSTS ARE ISSUES
- 1999 DCA PROGRAM ATTEMPTED TO ADDRESS THIS BY OFFERING A PROGRAM TO PARK OWNERS

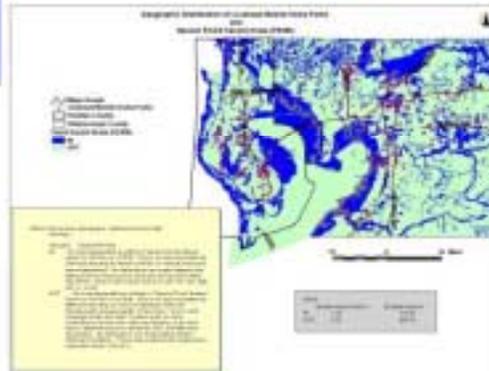
MOBILE HOME RECYCLING PROGRAM

- POTENTIAL FOR DAMAGE
- 338,000 PRE-1976 UNITS
- MAY HELP REPLACEMENT
- BENEFITS
- COST \$750/\$1000 per unit
- PROGRAMS IN OTHER STATES



LAND DEVELOPMENT AND ZONING

- MARKET FORCES
- ZONING REQUIREMENTS
 - (a) Park Size
 - (b) Density
 - (c) Hazardous Location
- ANNEXATION



**INCENTIVES & BARRIERS TO MITIGATION
WITHIN HOMEOWNERS INSURANCE**

- **ANDREW FALLOUT**
- **NO *INSURANCE INDUSTRY***
- **NO CREDIBLE DATA**
- **ON-SITE ADDITIONS**
- **MIX OF M.H. GENERATIONS**
- **CONCERNS ABOUT INSTALLATION**

**LOSS REDUCTION RETROFIT AND
STRUCTURAL PERFORMANCE**

- **PERCEPTIONS**
- **R&D FOCUS**
- **THREE GENERATIONS**
- **STRUCTURAL DISCONTINUITY**
- **ON-SITE MODIFICATIONS**



2000 Florida State Legislature authorized funding with a focused research agenda including:



- **Eliminating State and Local barriers to upgrading mobile homes and communities**
- **Research and develop a program for the recycling of existing older mobile homes**
- **Programs of research and development relating to hurricane loss reduction devices and techniques for site-built residences**

Work Plan Item #1

Eliminating State and Local barriers to upgrading mobile homes and communities

Focus on West Central and Panhandle Region of Florida

• Recommendations to help eliminate the knowledge gaps or regulatory obstacles that act as barriers to upgrading. Key areas of research include:

- **Platting issues**
- **Building Code and zoning issues**
- **Hurricane hazard zones and wind damage**

• Research additional types of barriers that may include technical issues

- **Specify contributors to hurricane losses and alternatives to reduce damage**
- **Collect Credible data to the effectiveness of devices**



Work Plan Item #2

Research and develop a program for the recycling of existing older mobile homes

Phase 1: Identify and Assess

- Technical details and costs for removal, disassembly, transportation, recycling and dumping
- Costs-Benefits
- Regulatory issues to promoting recycling
- Available support and incentives for applicable sectors
- Sources of funding

Phase 2: Design prototype recycling program to address technical and social issues. Use various methodologies to get feedback from stakeholders.

Phase 3: Use pilot projects to test the sensitivity of the program, analyze logistics, and develop operating budget

Phase 4: Develop proposal for consideration by State Legislators including timelines and budgetary estimates for implementation



Work Plan Item #3

Research and development relating to hurricane loss reduction devices and techniques for site-built residences

Two - Tier Approach

- Technical Aspects: materials and methods of construction and performance under hurricane conditions
- Qualitative Issues: what contributes to the relative vulnerability of individual site build

Tier 1: Actual Physical Field Testing, Lab Testing, and Simulation and Modeling

Focus on:

- Roof Coverings
- Roof Sheathing Connections
- Roof to Wall Connections



Work Plan Item #3 cont.

Research and development relating to hurricane loss reduction devices and techniques for site-built residences

Tier 2: What contributes to the relative vulnerability of site-built houses and communities

Factors to be studied:

- Site Selection
- Landscaping and community design
- Additions
- Architectural Design

Goal:

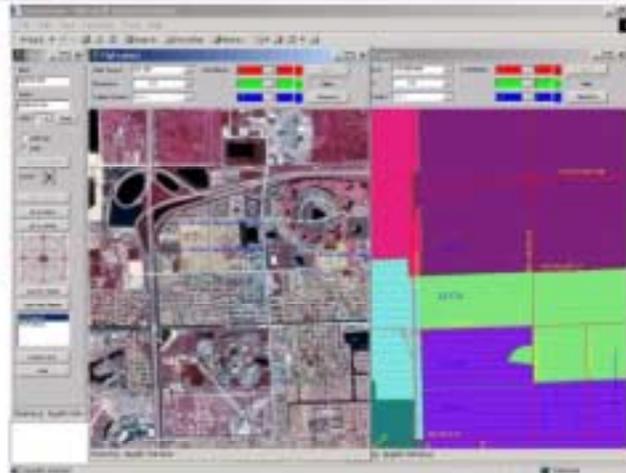
Development of "Best Practices" guidelines for planning, siting, and design



Work Plan Item #4

Expand on Work Initiated during Year 1

- Socio-Economic Data
- Department of Motor Vehicle Database
- Expand Web-Enabled Terrafly



Project Website: <http://www.ihc.fiu.edu/ihc/research/mobilehome/>

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IHC
HURRICANE ANDREW
10 YEAR ANNIVERSARY
CONFERENCE
MAY 30 - 31, 2007
EDGEMAN CENTER
 Florida International University
 Miami, Florida

International Hurricane Center

Florida International University

SIX KEY TRACKS

1. SCIENCE & TECHNOLOGY
2. GOVERNMENT
3. ENGINEERING & DESIGN
4. HUMAN IMPACT
5. VULNERABILITY & MITIGATION
6. EDUCATION & OUTREACH

FOUR KEY QUESTIONS

1. WHAT WAS THE STATUS IN 1992?
2. WHAT IS THE STATUS IN 2002? WHAT HAS CHANGED SINCE 1992?
3. WHAT ARE THE CONSEQUENCES OF THIS CHANGE?
4. WHERE MUST WE GO IN THE NEXT 10 YEARS? WHAT WILL BE THE STATUS IN 2012?

<http://www.ihc.fiu.edu>