

# **FLORIDA HURRICANE LOSS MITIGATION PROGRAM**

## Report to the Florida Legislature

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# Executive Summary

Hurricanes are among the most destructive and costliest of all natural disasters, and since 1995 the United States entered a cycle of more intense hurricane activity. Florida has been hit by nine hurricanes in the past four years, resulting in 2.9 million claims and \$31.3 billion in insured losses. The possibility of a major hurricane striking a large population center in Florida during the next 20 to 30 years of high activity emerges as a near certainty. Regardless, the United States will continue to lose an average of \$4 billion to tropical cyclone impacts and an additional \$1.3 billion to other extreme wind events. As populations continue to increase in Florida coastal regions where the threat is highest, so does the possibility for even greater destruction. This risk can be devastating for entire communities, for the insurance industry, which ultimately must pay for a significant portion of the incurred losses, for local and state government who have to struggle with the impact on their populations and economies, and for the nation as a whole. For these reasons, it is essential to reduce the destruction expected from future events.

August 24, 2007 marked the 15<sup>th</sup> anniversary of Hurricane Andrew, the devastating storm that wrought over \$25 billion in damage, leaving 43 people dead in its wake. Andrew's catastrophic disaster recovery costs threatened to undermine property insurance companies doing business in the State of Florida. In the aftermath of Hurricane Andrew, the Florida Legislature created a series of tools to stabilize the economy and insurance industry. These tools consist of the following programs:

- Citizens Property Insurance Corporation (formed from a merger of the Florida Windstorm Underwriting Association and the Florida Residential Property and Casualty Joint Underwriting Association), the state insurance plan for residents unable to obtain a conventional homeowners insurance policy;
- The Florida Hurricane Catastrophe Fund, section 215.555, F.S., a re-insurance fund established to limit insurance exposure after a storm; and
- The Bill Williams Residential Safety and Preparedness Act, which in 1999 created the Hurricane Loss Mitigation Program, section 215.559, F.S., with an annual appropriation of \$10 million. The statutory intent of this program is to direct funds to be used for,

“programs to improve the wind resistance of residences and mobile homes, including loans, subsidies, grants, demonstration projects, and direct assistance; cooperative programs with local governments and the federal government; and other efforts *to prevent or reduce losses or reduce the costs of rebuilding after a disaster*” (emphasis added).

This report satisfies the subsection 215.559 (7), F.S., requirements to provide a report accounting for activities undertaken through the Hurricane Loss Mitigation Program.

Based on section 215.559, F.S., \$3 million from the Hurricane Loss Mitigation Program is directed to retrofitting existing public facilities to enable them to be used as public shelters. An annual report of the state's shelter retrofit program, the Shelter Retrofit Report, is prepared and submitted to the Governor and the Legislature pursuant to section 252.385, F.S.

The remaining funds are currently managed by the Division of Emergency Management (Division). In June 2006 Governor Bush signed into law several bills that incorporated key emergency management initiatives under the 2006 theme of “Culture of Preparedness.” One element of the legislative package signings was (HB-1435), which codified a new reporting structure for the Division of Emergency Management. On July 1, 2006, the Division became a direct reporting entity to the Executive Office of the Governor on a full-time basis and is known as the Florida Division of Emergency Management.

The \$7 million which the Florida Division of Emergency Management administers with the input of the statutorily created Residential Construction Mitigation Program (RCMP) Advisory Council is allocated as follows:

- 40 percent, or \$2.8 million is used to mitigate future losses for mobile homes;
- 10 percent, or \$700,000, is directed to the Type I Center of the State University System dedicated to hurricane research - Florida International University;
- 50 percent, or \$3.5 million is directed to programs developed by the Department with advice from the Advisory Council to help prevent or reduce losses or to reduce the cost of rebuilding after a disaster.

The effective period of this report is the period covering January 1, 2007 through December 31, 2007. During this period, the Hurricane Loss Mitigation Program (also known as the Residential Construction Mitigation Program or RCMP) continued to support projects that have proven successful in mitigating disasters. The reporting period stretches over parts of two State Fiscal Years, 2006-2007 and 2007-2008. Information is provided on activities undertaken in each of these two State Fiscal Years. As of December 31, 2007, SFY 2006-2007 projects were closed; SFY 2007-2008 projects are underway.

The Division, based on recommendations of the RCMP Advisory Council (FS 215.599 (5), F.S.), and guided by a set of project selection criteria and guiding principles, has embarked on a number of efforts to complete tangible mitigation efforts and to educate Floridians on steps they can take to reduce the effects of disasters on their individual properties. These activities are divided into subject categories including:

1. Low-to-Moderate Income Assistance: Through partnering with local housing authorities and targeting homes in the designated Front Porch communities, the Division has been able to provide hazard mitigation upgrades to low-to-moderate income homes undergoing livability upgrades.
2. Wind Mitigation Public Education and Information: The RCMP aggressively promotes outreach on wind mitigation and wind mitigation related areas. In addition to general outreach, research continues to explore hurricane loss devices and techniques to validate and enhance existing building codes.
3. Comprehensive Planning: The RCMP continues to encourage and/or increase integration of wind mitigation into comprehensive planning and local mitigation plans.
4. Market-Based Non-Regulatory Solutions: The Division continues to support loss relativity studies. The studies allow insurance companies to make better-informed rate-setting decisions based on an actuarially sound understanding of residential structures. Much of the Division's outreach activities, including its effort to educate the public on mitigation, through the work of organizations such as the Federal Alliance for Safe Homes (FLASH), are designed to improve the market for mitigation.
5. Program Administration: A small amount of program resources are dedicated to managing the RCMP.
6. Priority Areas: Projects that will further wind mitigation and RCMP goals that have been designated by the Division as priorities in the applicable Notice of Fund Availability.
7. Manufactured Homes: With the annual allocation to this initiative Tallahassee Community College was able to tie-down manufactured homes in several Florida communities.
8. Hurricane Mitigation Research: Administered by Florida International University through an annual allocation, the Division continued to support hurricane loss reduction devices and techniques.

Projects represented in this report, for State Fiscal Years 2006-2007 and 2007-2008, were selected by a panel appointed by the Division. The selection process was competitive and projects were ranked based on

published scoring criteria. Looking forward, the Division in coordination with the RCMP Advisory Council anticipates a more streamlined, responsive and effective implementation of the program.

Regarding general administration, the Division continues to work with the Office of the Comptroller to guarantee that the RCMP is one of the most efficiently run programs of its type. This emphasis on grants administration, coupled with innovative techniques will help improve accountability, customer service and results.

Many program milestones and achievements were reached during the 2006-2007 Fiscal Year including, but not limited to:

- Structural mitigation can result in significant hurricane loss reduction. Recent research indicates that improving the resiliency of the building stock located in hurricane-prone regions can markedly reduce loss and damage. In the aftermath of Hurricane Charley, post-disaster assessments indicated that insured losses for structures built under the 2002 Florida Building Code (FBC) were as much as 40-50% lower than equivalent homes built to the Standard Building Code (SBC). The Residential Construction Mitigation Program is making a critical contribution to the State of Florida by ensuring that the built environment will have a better chance of surviving future impacts from hurricanes. Continued RCMP funding has allowed the development of an innovative research capability in full-scale structural testing to determine inherent weakness of structures when subjected to hurricane-force winds and rain. The Wall of Wind testing apparatus will permit a fundamental understanding of the failure mode of buildings and hence lead to technologies and products to mitigate hurricane impacts.
- The Disaster Contractors Network (DCN) is an innovative and unique public-private partnership that provides critical services and training to building professionals and homeowners after a disaster. In addition to activating the DCN when requested by the State of Florida and FEMA for Hurricanes Dennis, Rita, Wilma and Katrina, activities during this performance period were focused on recruitment of additional partner agencies to expand the capacity of meeting homeowner and governmental needs during the hurricane recovery process.
- The Federal Alliance for Safe Homes (FLASH) continued to train building trades professionals on the Blueprint for Safety program, which is designed to promote wind mitigation techniques beyond the minimum requirements of the Florida Building Code. Funds were used for continued enhancement of the website [www.blueprintforsafety.org](http://www.blueprintforsafety.org) including the addition of supplemental technical findings from previous hurricane seasons, Spanish translation and expansion of linking strategy via FLASH partners. FLASH also incorporated newly designed animations and icons onto the RCMP web site to assist in making the site more user friendly to homeowners, contractors, and others searching for information. In addition, various outreach and classroom training materials were updated including a 30-minute modular training video and field/manual training guide.
- Researchers updated the Mitigation Incentives Database (MID) with approved insurance company rate filing data. The updated Mitigation Incentives Database allows users to extract the wind premium insurance incentives for condominium dwellings similar to the approach used for single-family homeowners.
- The Home Retrofit Program continues to fund projects that provide low-to-moderate income homes with wind-resistive construction retrofits according to Blueprint for Safety specifications. This project actively reduced wind loss exposure while promoting economic opportunity in critical areas of the state. Many communities utilized their annual State Housing Initiatives Partnership program (SHIP), Home Investment Partnerships (HOME) and/or Community Development Block Grant (CDBG) allocations to leverage RCMP funds.

The Division is proud of the accomplishments of the programs and projects funded under the Florida

Hurricane Loss Mitigation Program. In its seven years of financial and program support for innovations and research in residential mitigation techniques, the Division has sponsored proven solutions and has helped to change the culture of many Floridians. The Hurricane Loss Mitigation Program provided the seed money to develop and test the current curriculum used to train contractors and builders on cost-effective mitigation measures. It provided funding to create the concepts and materials used to inform and educate the public on the value of residential construction mitigation. The program funded the research necessary to develop the residential inspection program that now forms the basis for the My Safe Florida Home Program. The Division looks forward to continuing to encourage and promote effective residential construction programs and practices.

# Introduction

In 1999, the Florida Legislature passed the Bill Williams Residential Safety and Preparedness Act, creating the Hurricane Loss Mitigation Program (section 215.559, F.S.), with an annual appropriation of no less than \$10 million. These funds are derived from the Florida Hurricane Catastrophe Fund (section 215.555, F.S.), and are provided to the Florida Division of Emergency Management for administration. Section 215.559, F.S., establishes minimum funding levels for specific areas and creates Advisory Council to make recommendations on developing programs.

Based on section 215.559, F.S., \$3 million is used for retrofitting existing facilities that are used as public shelters. These funds are managed by the Division of Emergency Management. The annual report of this program, the Shelter Retrofit Report, was prepared for the Governor and Legislature. The Shelter Retrofit Report provides the Department's list of facilities recommended to be retrofitted using local, state and federal funds. The report also prioritizes facilities with specific projects and cost estimates which, when funded, will improve relative safety and reduce the emergency shelter space deficit of the state. For more information on the shelter retrofit program, visit <http://www.floridadisaster.org>. The annual Shelter Retrofit Report is available for downloading in PDF format from the website.

The \$7 million which the Florida Division of Emergency Management administers with the input of the statutorily created Advisory Council is referred to as the Residential Construction Mitigation Program or RCMP and is allocated as follows:

- 40 percent, or \$2.8 million is used to mitigate future losses for mobile homes;
- 10 percent, or \$700,000, is directed to the Type I Center of the State University System dedicated to hurricane research - Florida International University;
- 50 percent, or \$3.5 million is directed to programs developed by the Division with advice from an Advisory Council to help prevent or reduce losses or to reduce the cost of rebuilding after a disaster.

To track the use of these funds, the Legislature in subsection 215.559 (7), F.S., requires the Division to provide the Speaker of the House of Representatives, the President of the Senate, and the Majority and Minority Leaders of the House of Representatives and the Senate with an annual report on programs implemented under the Hurricane Loss Mitigation Program, referred to within the Division as the Residential Construction Mitigation Program or RCMP. The annual report must include: 1) a full report of program activities; 2) an accounting of program activities; 3) an evaluation of these activities; and 4) status report for the Low Interest Loan Pilot Program.

This is the eighth annual report to be delivered to the Legislature. This report is intended to meet the mandate of section 215.559(7), F.S. It includes the following sections:

- Section I: This section addresses the legislatively mandated requirement to provide a full program report of activities during the period covering January 1, 2007 through December 31, 2008. Activities are addressed for two State Fiscal Years, 2007-2008 and 2006-2007. Spreadsheets detailing annual project awards and allocations for State Fiscal Year 2007-2008 and 2006-2007 are included as Appendix A and Appendix B.
- Section II: This section includes a discussion on the selection and evaluation of projects. Both grant cycles were competitive. Projects were ranked and selected based on designated criteria. Recommendations for program enhancement, both short term (through State Fiscal Year 2007-2008) and long term are provided.
- Section III: Recommendations for program enhancement are included in this section. Both short

term recommendations (through State Fiscal Year 2007-2008) and long-term recommendations are provided.

This report demonstrates how the activities undertaken by the State of Florida since Hurricane Andrew, including the implementation of the RCMP make Florida a national leader in reducing the exposure of insured property. These creative approaches will both strengthen our state before disaster strikes and provide a foundation for a more expeditious and complete economic recovery following a disaster.

# Section I: Program Status

This report covers portions of two state fiscal years. This section of the report provides a program status of the RCMP for State Fiscal Year 2007-2008 and State Fiscal Year 2006-2007. Due to the timing of this report, projects identified in the 2007-2008 State Fiscal Year, though underway, are not completed. Further more, in both state fiscal years, \$3 million in HLMP funds were provided to the Division of Emergency Management to help reduce the state's hurricane shelter deficit. This statutorily designated funding provides communities with resources to complete shelter retrofit projects, including those that are not eligible under traditional federal mitigation grant programs, such as emergency power generators and pre-wire connections. These projects assist communities in meeting national guidelines for shelter space. During Fiscal Year 2006-2007 13,022 shelter spaces were created and 38,076 are anticipated to be created during Fiscal Year 2007-2008.

For both fiscal years, projects are presented within the framework of the six subject categories advertised in Notice of Funding Availability. This categorization serves the purpose of ensuring that in the allocation of limited funds particular subject areas receive funding commensurate with their level of interest during each competitive cycle. These categories are listed and defined below.

**Residential Mitigation Retrofit Program (Retrofit Program):** Assistance to primarily low and moderate-income residents, which promotes wind mitigation (including retrofits, education, inspections and related activities). All retrofit or other installations of mitigation devices on residential structures comply with the Blueprint for Safety (BFS) Standard.

**Wind Mitigation Public Education & Information:** Projects that will promote public education and public information about wind mitigation and wind mitigation related areas, including but not limited to maintenance and enhancement of RCMP/wind mitigation on line information availability and program visibility.

**Comprehensive Planning:** Projects that encourage and/or increase integration of wind mitigation into comprehensive planning and local mitigation plans and compliance with the State Hazard Mitigation Plan.

**Market-based, Non-Regulatory Solutions:** Projects that will promote market based, non-regulatory approaches to mitigation, including, but not limited to, training in regard to wind mitigation (construction techniques, products and procedures, codes and standards, and related areas).

**Program Implementation and Enhancement:** Projects that enhance program effectiveness, measurement and attainment of project goals and recommendations for improvement.

**Priority Areas:** Projects that will further wind mitigation and RCMP objectives that have been designated by the program as priorities in the applicable Notice of Fund Availability.

In addition program funding is statutorily allocated to the following categories:

**Manufactured Homes:** Administered by Tallahassee Community College, funding supports tie-down projects for manufactured homes in Florida communities.

**Hurricane Mitigation Research:** Administered by Florida International University, funding supports hurricane loss reduction research projects.

## **State Fiscal Year 2007-2008**

Pursuant to Section 215.559, Florida Statutes, the Residential Construction Mitigation Program annually makes available funds that shall be used for programs to improve the wind resistance of residences and mobile homes, including loans, subsidies, grants, demonstration projects, and direct assistance; cooperative programs with local governments, the Federal Government other state agencies, universities and non-profit organizations; and other efforts to prevent or reduce losses or reduce the cost of rebuilding and mitigation.

Grants were awarded for a one-year performance period. Eligible parties submitted multiple applications, however; no single application received an award in excess of \$200,000. A panel consisting of three Division employees evaluated and scored submitted proposals based on several criteria including, but not limited to, the RCMP need and priority, benefits to the program and consistency with State/Local emergency management plans. However, consistent with statutory requirements 40 percent, or \$2.8 million continue to be used to mitigate future losses for mobile homes – administered by Tallahassee Community College and 10 percent, or \$700,000, was directed to the Type I Center of the State University System dedicated to hurricane research - Florida International University.

The RCMP project solicitation period ended June 11, 2007 during which 34 proposals were received. On June 28, 2007, the RCMP Programmatic Committee met, scored and ranked all proposals. As a result of its scoring, 20 projects were recommended for funding.

Due to administrative issues regarding the management of funding at the local level, West Florida Regional Planning Council declined the award of \$200,000 for Santa Rosa County. For State Fiscal Year 2007-2008, \$6,701,756 has been allocated to projects within the full range of subject categories. Pursuant to FS 215.559, F.S., an evaluation of each subject category is provided for the projects completed in State Fiscal Year 2007-2008. A table further detailing each specific project is included in Appendix A.

### **I. Residential Mitigation Retrofit Program (Retrofit Program):**

**Retrofit Program** – The RCMP offers grants to Low to Moderate-Income (LMI) homeowners to undertake retrofit measures needed to strengthen their homes and lessen damages from high-wind storms. All work performed will be completed using the Blueprint for Safety Building Techniques. Fully licensed contractors that have attended and successfully completed the Blueprint for Safety Class will perform all retrofit work. Individual grants of \$75,000 to \$200,000 each were awarded to six LMI communities including: **Miami-Dade Community Action Agency, Tallahassee Urban League, Holmes County, Walton County, Escambia County, and City of Jacksonville**. Projects will utilize annual State Housing Initiatives Partnership program (SHIP), Home Investment Partnerships (HOME) and/or Community Development Block Grant (CDBG) allocations to leverage RCMP funds. A total of \$1,175,000 has been allocated to this effort.

### **II. Wind Mitigation Public Education and Information**

**Statewide Public Education** – A total of \$200,000 has been allocated to **Pro Web Commercials** to improve statewide mitigation education. Pro Web will launch **Craig's Corner**, Division of Emergency Management Director Craig Fugate will speak to Florida resident each month about wind mitigation and other emergency preparedness topics. This information will be placed on the DEM 24/7 Video Media Center Website for residents to view. Pro Web will produce a mini –documentary utilizing the Hurricane House and the levels of danger residents' homes face once coming in contact with Mother Nature's deadly storms. Three wind mitigation Public Service Announcements (in English and Spanish) will be created for placement on the Division of Emergency Management 24/7 Video Media Center Website. The goal is to spread the news about wind mitigation and preparedness before the 2009 hurricane season.

**Mitigation Consumer Education** – A total of \$200,000 has been allocated to the **Federal Alliance for Safe Homes** to further develop the FLASH web site including the addition of enhanced tools for homeowners including additions to the on-line library, updated FAQs, interactive tutorial. The *One-Stop Hurricane*

*Resources Guide* will be updated for distribution before, during and after hurricane season. Continued support of *FLASH's* mitigation message and tools are essential in realizing the benefit of the support services and growing band value.

**Disaster Survival House-** A total of \$180,000 has been allocated to **Hurricane Warning** to promote public education and public information about wind mitigation. Installation of eight interactive kiosks with touch screen technology to promote interactive and self-guide technology. A wide range of working samples of various types of shutter, hurricane barriers and/or other impact resistance device will be installed throughout the house. Workshops will be that target professional in building design, construction fields and other related fields on how to use the kiosks and other resources.

**Conferences** – The 2007-2008 grant cycles were competitive. Only one project was submitted under this category and they did not meet the RCMP criteria. No projects were selected for funding in this category.

### III. Comprehensive Planning

The 2007-2008 grant cycles were competitive. No projects were submitted for funding in this category.

### IV. Market-based, Non-Regulatory Solutions

**Blueprint for Safety** - The **Federal Alliance for Safe Homes** (FLASH) continues to train building trades professionals on the Blueprint for Safety program, which is designed to promote wind mitigation techniques beyond the minimum requirements of the Florida Building Code. Activities for this performance period will include maintenance and enhancements of the web site including the additions of an “Ask the Expert” section and development of interactive tutorials and online videos for retrofitting techniques. A new Blueprint component will be developed to allow consumers to search the [www.blueprintforsafety.org](http://www.blueprintforsafety.org) website for approved BFS contractors and builders. Builders will be able to submit their blueprints for review and approval and use the BFS seal for marketing and promotional purposes once approved by the program. \$200,000 has been allocated for this effort.

**Mitigation Incentives Database** – A total of \$359,952 has been allocated to **Applied Research Associates** to update the Division's Mitigation Incentives Database of approved insurance company rate filing data for single and multiple family structures. Comprehensive testing of the website will be performed as well as verification testing of the filing data and the website code. Information will be reviewed to ensure that only companies that are continuing to do business in Florida are resident in the database. The website will be revised to accommodate changes in the Florida Building Code.

### V. Program Implementation and Enhancement

The 2007-2008 grant cycles were competitive. No projects were submitted for funding in this category.

### VI. Priority Areas

Five priority areas were identified in the 2007-2008 Notice of Funding Availability including:

- A) Projects which implement wind mitigation/projects as identified in the State Hazard Mitigation Plan (SHMP)/ applicable Local Mitigation Strategy (LMS) and are clearly identified as projects/programs which can be initiated and completed within the grant contract period.
- B) Projects, which will provide for product testing, measurement or enhancements, which will improve, wind mitigation in residential structures.
- C) Projects that will address effectiveness of wind mitigation programs, projects and measures as

specifically related to Florida landfalling hurricanes since the 2004 season and related or subsequent wind events.

- D) Projects, which promote residential wind mitigation through the code, trade or construction industries, including related or affiliated programs and organizations.
- E.) Projects which provide for public awareness about RCMP and its programs including support and maintenance of the RCMP website and on-line applications, including the Mitigation Incentives Database.

**Wind Resistant Florida Residential Construction – University of Florida** has been allocated a total of \$176,008 to quantify the vulnerability of residential structures to wind damage and provide a direct measurement of the cost-effectiveness of pre- and post-construction mitigation measures. Candidate houses slated for destruction will be identified through the Hazard Mitigation Grant Program (HMGP) buyout programs.

**Florida Coastal Monitoring Program (FCMP)** – Administered by the **University of Florida**, a total of \$199,667 has been allocated to research multiple aspects of continued mitigation research. Continued research will focus on the new deployment strategies that will target gaps in the understanding of the overland wind field. Post-storm assessments will be conducted to ensure collection of perishable structural performance data. The existing FCMP house infrastructure will be expanded by adding additional houses. Each house will be retrofitted to provide a direct evaluation of effectiveness. Analysis of full-scale datasets from 2004 and 2005 will be compared with wind tunnel tests of those homes to evaluate the methodology used to create the design wind loads used nationwide.

**Disaster Contractors Network - Florida State University (FSU)** Florida Public Affairs Center has been allocated a total of \$ 200,000 for this continuing effort. During this performance period outreach to the members of the finance and development community to educate them on the mission of the DCN and integrate them into the DCN partnership is a priority. Continued use of a survey tool developed last year which allowed users (i.e. homeowners, construction industry, government, partner organizations) of the DCN to continue to offer ideas for improvement of its function. The ability to communicate local licensing and permitting issues has emerged as a key component of the DCN during previous hurricane seasons. Efforts during this period will improve the integration of county government licensing and permitting information. A tabletop exercise on DCN operations and capacity will be developed to allow for continued education of local staff.

**Wind Rain Wall Intrusion System - University of Florida** has been allocated \$198,717 to quantify Wind Driven Rain (WDR) issues and its effects on fenestration and wall systems typical of residential and light commercial construction.

**Shutter Project** – The **Miami Dade Police Department** has been allocated a total of \$90,000 to wind retrofit the Hammocks Police Station by purchasing and installing Exeter Hurricane Barriers. All materials will be certified to meet the wind and impact standards of the current local codes.

**Knowledge & Action for Windstorm Mitigation** - A total of \$23,056 has been allocated to **St. Lucie County Board Of County Commissioners** to enhance public knowledge of windstorm mitigation techniques. A windstorm mitigation home audit checklist will be developed and made available to the public for use in assessing their homes on an annual basis. Workshops, which target the general public as well as Habitat for Humanity Homeowners and SHIP homeowners, will be held throughout the Treasure Coast. In addition certifications workshops will be held for professional contractors on windstorm resistance.

## **VII. Manufactured Homes**

**Mobile Home Tie-Down Program** – A total of \$2,800,000 has been statutorily allocated to continue the Mobile Home Tie-Down Retrofit Program, which is administered by the **Tallahassee Community College (TCC)**. Based on legislative direction the Division of Emergency Management provides this funding directly to Tallahassee Community College. By statute, TCC prepares a separate report to the Governor and Legislature

on these directives.

## VIII. Hurricane Mitigation Research

**Full Scale Simulation of Wind, Water and Structural Interaction** – A total of \$699,756 has been statutorily allocated to **Florida International University** to continue various research activities using the Wall of Wind full-scale testing apparatus. Research during 2007-2008 focused on several areas:

*Rooftop Equipment Wind Load and Its Mitigation for Buildings in Hurricane-Prone Regions Phase II:* The Phase II of the proposed research aims in mitigating roof top equipment failure during hurricane events through retrofitting techniques using elastomeric or other kinds of dampers. The dampers will dissipate the wind energy and reduce the loads transferred to the roof members. This research will help to address significant roofing damage and secondary water infiltration occurring related to the poor performance of roof top equipment like AC units.

*Development of Effective Roof-to-Wall Connections for Low-Rise Buildings to Withstand Hurricane Wind Loads – Phase II:* The proposed research aims in understanding the behavior of non-intrusive Fiber Reinforced Polymer (FRP) connections under hurricane loading and developing an effective detailing to mitigate their failure during hurricane events. This research will help to address significant wall and roofing damage and secondary water infiltration occurring related to the poor performance of roof to wall connections. A full-scale model representing a typical low-rise building will be constructed for the testing purpose. The roof trusses will be connected to the walls with the connection detail that has been developed. Experiments at the Structural Engineering Laboratory and the Wall of Wind will be performed to determine deformation of the connection joints. Force transducers and displacement transducers installed on the model and the connections will measure the wind-induced loading and displacements. Experimental data will be processed using the lab view data acquisition software. Based on the test results and the performance of the connections, design detailing will be finalized and recommendations will be developed to incorporate these connections in new residential buildings and also for retrofitting old buildings.

*Aerodynamic Mitigation of Roof Uplift, Soffit Downlift and Wall Suctions:* The proposed research aims at expanding previous research further to mitigating roof uplifts, soffit down lifts as well as wall suction on common Florida residential houses with difference roof shapes (gable and hip roofs). The present study will simulate hurricane events at full scale using the Wall of Wind, which addresses among other things the Reynolds number mismatch that exists in wind tunnel tests. Simple aerodynamic modifications that will disrupt the formation of strong vortices and that can either be retrofitted to existing structures or used for new construction will be investigated.

*Holistic Residential Structure Test for Wind-driven Water Intrusion:* During the 2004 and 2006 hurricane seasons it became apparent that water penetration from heavy wind-driven rains occurred in more cases than acceptable, leading to interior water related damage that could have been prevented. To date no full-scale testing has been performed on residential window and wall component subjects to a combined hurricane wind and rain event. The proposed research aims at studying the water instruction penetration mainly through window-wall interfaces.

*Programs of Education and Outreach:* Activities will build on the foundation of work initiated during previous grant periods including outreach initiatives, such as the Deerfield Beach-based Hurricane Warning Project, the Governor's Hurricane Conference, and the National Hurricane Conference, the South Florida Hurricane Conference, the Southeast Builders Conference and various Local Mitigation Strategy groups. In addition the IHRC will host several Wall of Wind demonstrations for governmental and commercial sectors. These efforts allow FIU research conducted under this grant to be showcased and shared with others as a way of promoting hurricane-loss mitigation and the objectives of the HLMP.

## **State Fiscal Year 2006-2007**

Pursuant to Section 215.559, Florida Statutes, the Residential Construction Mitigation Program annually makes available funds that shall be used for programs to improve the wind resistance of residences and mobile homes, including loans, subsidies, grants, demonstration projects, and direct assistance; cooperative programs with local governments, the Federal Government other state agencies, universities and non-profit organizations; and other efforts to prevent or reduce losses or reduce the cost of rebuilding and mitigation.

Grants were awarded for a one-year performance period. Eligible parties submitted multiple applications, however; no single application received an award in excess of \$200,000. A panel consisting of three Division employees evaluated and scored submitted proposals based on several criteria including, but not limited to, the RCMP need and priority, benefits to the program and consistency with State/Local emergency management plans. However, consistent with statutory requirements 40 percent, or \$2.8 million continue to be used to mitigate future losses for mobile homes – administered by Tallahassee Community College and 10 percent, or \$700,000, was directed to the Type I Center of the State University System dedicated to hurricane research - Florida International University.

The RCMP project solicitation period ended June 17, 2006 during which 34 proposals were received. On July 19, 2006, the RCMP Programmatic Committee met, scored and ranked all proposals. As a result of its scoring, 19 projects were recommended for funding. The RCMP Advisory Council met on July 31, 2006 and reviewed the initial list and submitted recommendations and modifications to the Division.

For State Fiscal Year 2006-2007, \$6,853,199 was allocated to projects within the full range of subject categories. Pursuant to FS 215.559, F.S., an evaluation of each subject category is provided for the projects completed in State Fiscal Year 2006-2007. A table further detailing each specific project is included in Appendix B.

### **I. Wind Mitigation Public Education and Information**

**Disaster Contractors Network - Florida State University (FSU)** Florida Public Affairs Center was awarded a total of \$ 200,000 for this continuing effort. During this performance period a survey tool was developed which will allow users (i.e. homeowners, construction industry, government, partner organizations) of the DCN to offer ideas to improve its function. The tool is a seamless continuing feature of the DCN. The ability to communicate local licensing and permitting issues has emerged as a key component of the DCN over the past two hurricane seasons. Efforts during this period improved the integration of county government licensing and permitting information. A tabletop exercise on DCN operations and capacity was developed to allow for continued education of local staff.

**Conferences** – A total of \$200,000 was awarded to **‘Hurricane Alley’** for the 2007 Southeast Builders Conference. The Hurricane Alley section promoted residential construction mitigation to improve the wind resistance of residential structures as well as compliance with the new Florida Building Code. In addition to providing booth space, the hurricane promotion featured qualified speakers and instructors providing presentation and classroom instruction related to the Florida Building Code, residential construction mitigation and disaster preparedness.

**Mitigation Consumer Education** – A total of \$200,000 was awarded to the **Federal Alliance for Safe Homes** to further develop the FLASH web site including the addition of enhanced tools for homeowners including additions to the on-line library, updated FAQs, interactive tutorial. The *One-Stop Hurricane Resources Guide* was updated for distribution before, during and after hurricane season. Four new animated vignettes were developed which provided information on “how to” evaluate opening protection (shutter) options, “how to” identify code-approved wind mitigation products, “how to” understand wind insurance mitigation discount basics, and “how to” conduct a self-guides wind mitigation inspection of a residence.

**Statewide Public Education** – A total of \$200,000 was awarded to **Pro Web Commercials** to improve statewide mitigation education. Pro Web conducted and videotape a Town Hall meeting where residents learned about the latest and most successful wind mitigation techniques used by state officials. Citizens asked emergency preparedness experts about the future and long-range wind mitigation plans. Three wind mitigation Public Service Announcements (in English and Spanish) were created for placement on the Division of Emergency Management 24/7 Video Media Center Website. A Kids Education Forum was developed to promote hurricane and wind mitigation awareness to children. In addition to being broadcasted on the DEM 24/7 Video Media Center Website, the video was distributed to all Florida county school districts to be placed on each school district website. The goal was to spread the news about wind mitigation and preparedness before the 2007 hurricane season.

**Knowledge & Action for Windstorm Mitigation** - A total of \$200,000 was awarded to **St. Lucie County Board Of County Commissioners** to enhance public knowledge of windstorm mitigation techniques. A windstorm mitigation home audit checklist was developed and made available to the public for use in assessing their homes on an annual basis. Workshops, which target the general public as well as Habitat for Humanity Homeowners and SHIP homeowners, were held throughout the Treasure Coast. In addition certifications workshops were held for professional contractors on windstorm resistance.

**Florida Coastal Monitoring Program (FCMP)** – Administered by the **University of Florida**, a total of \$198,345 was awarded to research multiple aspects of continued mitigation research. Research focused on the analysis of the 2005 dataset produced during Hurricanes Dennis and Wilma in addition to upgrading the FCMP roof pressure instrumentation to drastically improve future datasets. The emergence of new wireless data transmission technology greatly increased the potential influences of this research program on residential construction practice.

## II. Comprehensive Planning

The 2007-2008 grant cycle was competitive. Only two projects were submitted under this category and they did not meet the RCMP criteria. No projects were selected for funding in this category.

## III. Market-based, Non-Regulatory Solutions

**Blueprint for Safety** - The **Federal Alliance for Safe Homes (FLASH)** continues to train building trades professionals on the Blueprint for Safety program, which is designed to promote wind mitigation techniques beyond the minimum requirements of the Florida Building Code. Activities for this performance period included maintenance and enhancements of the web site including the additions of an “Ask the Expert” section and development of interactive tutorials and online videos for retrofitting techniques. A new Blueprint component was developed to allow consumers to search the [www.blueprintforsafety.org](http://www.blueprintforsafety.org) website for approved BFS contractors and builders. Builders will be able to submit their blueprints for review and approval and use the BFS seal for marketing and promotional purposes once approved by the program. \$200,000 was awarded for this effort.

**Mitigation Incentives Database** – A total of \$399,991 was awarded to **Applied Research Associates** and **Federal Alliance for Safe Homes** to update the Division’s Mitigation Incentives Database of approved insurance company rate filing data. Comprehensive testing of the website was performed as well as verification testing of the filing data and the website code. Information will be reviewed to ensure that only companies that are continuing to do business in Florida are resident in the database. Additional activities will include a Thoughtscan Analysis of consumer feedback provided through the Mitigation Incentives Database to correlate changes to MID and RCMP web presence with consumer needs and concerns. An educational campaign was also developed which targets property insurance companies to raise awareness of RCMP and the MID.

#### **IV. Residential Mitigation Retrofit Program (Retrofit Program)**

**Retrofit Program** – The RCMP offers grants to Low to Moderate-Income (LMI) homeowners to undertake retrofit measures needed to strengthen their homes and lessen damages from high-wind storms. All work performed will be completed using the Blueprint for Safety Building Techniques. Fully licensed contractors that have attended and successfully completed the Blueprint for Safety Class performed all retrofit work. Individual grants of \$100,000 to \$200,000 each were awarded to seven LMI communities including: **City of Jacksonville, Miami-Dade Community Action Agency, City of St. Petersburg, Santa Rosa County, Tallahassee Urban League, Northeast Florida Community Action Agency and Manatee County.** Projects will utilize annual State Housing Initiatives Partnership program (SHIP), Home Investment Partnerships (HOME) and/or Community Development Block Grant (CDBG) allocations to leverage RCMP funds. A total of \$1,400,000 was awarded to this effort.

#### **V. Program Implementation and Enhancement**

The 2006-2007 grant cycle was competitive. No projects were submitted for funding in this category.

#### **VI. Priority Areas**

Five priority areas were identified in the 2006-2007 Notice of Funding Availability including:

- A) Projects which implement wind mitigation/projects as identified in the State Hazard Mitigation Plan (SHMP)/ applicable Local Mitigation Strategy (LMS) and are clearly identified as projects/programs which can be initiated and completed within the grant contract period.
- B) Projects, which will provide for product testing, measurement or enhancements, which will improve, wind mitigation in residential structures.
- C) Projects that will address effectiveness of wind mitigation programs, projects and measures as specifically related to Florida landfalling hurricanes since the 2004 season and related or subsequent wind events.
- D) Projects, which promote residential wind mitigation through the code, trade or construction industries, including related or affiliated programs and organizations.
- E.) Projects which provide for public awareness about RCMP and its programs including support and maintenance of the RCMP website and on-line applications, including the Mitigation Incentives Database.

**Wind Resistant Florida Residential Construction – University of Florida** was awarded a total of \$142,923 to quantify the vulnerability of residential structures to wind damage and provide a direct measurement of the cost-effectiveness of pre- and post-construction mitigation measures. Candidate houses slated for destruction will be identified through the Flood Mitigation Assistance (FMA) and Hazard Mitigation Grant Program (HMGP) buyout programs.

**Shutter Project** – The **Pinellas Association for Retarded Children** was awarded a total of \$12,591 to wind retrofit the PARC Center Apartment/Shelter Facility by purchasing and installing Exeter Hurricane Barriers. All materials were certified to meet the wind and impact standards of the current local codes.

#### **VII. Manufactured Homes**

**Mobile Home Tie-Down Program** – A total of \$2,800,000 was statutorily allocated to continue the Mobile

Home Tie-Down Retrofit Program, which is administered by the **Tallahassee Community College (TCC)**. Based on legislative direction the Division of Emergency Management provides this funding directly to Tallahassee Community College. By statute, TCC prepares a separate report to the Governor and Legislature on these directives.

## **VIII. Hurricane Mitigation Research**

**Full Scale Simulation of Wind, Water and Structural Interaction** – A total of \$699,349 was statutorily allocated to **Florida International University** to continue various research activities using the Wall of Wind full-scale testing apparatus. Research during 2006-2007 focused on several areas:

*Mitigation of Roof Uplift Through Vortex Suppression Techniques:* In an effort to reduce the catastrophic effects of hurricane-force winds on residential and commercial roof structures, several studies were conducted to observe the effects of surroundings and alternative roof geometries on vortex generation. Utilizing the 6-fan Wall of Wind (WOW) testing apparatus, a test structure instrumented with pressure transducers was equipped with six different modified roof edge geometries and subjected to hurricane-force winds. Results indicated that the use of such mitigation devices resulted in an average reduction in uplift by about 50%, with the largest reduction observed from the Flat Roof AeroEdge Guard which yielded 74% decrease in the worst suction in the corner region. Testing was also performed to identify the wind speeds at which the conical vortices became strong enough to start scouring different types of roof gravel. These results offer new hope for further development in the area of hurricane structural damage mitigation.

*Rooftop Equipment Wind Load and Its Mitigation for Buildings in Hurricane-Prone Regions:* Damage reconnaissance studies conducted during the 2004 and 2005 hurricane seasons witnessed widespread rooftop equipment failures. The aim of this research was to develop mitigation techniques that will reduce the wind loading on mechanical rooftop equipment and the forces transferred to the roof supporting structure by the equipment through the use of aerodynamic retrofits such as the installation of wind screens. Results for a single-story building located in Exposure C open terrain indicated that the difference in wind loading on rooftop equipment for a Category 4 hurricane versus a Category 1 hurricane is approximately 58%. The difference in wind loading on rooftop equipment for a Category 3 hurricane versus a Category 1 hurricane is approximately 38%. Findings also showed that a wind screen has a potential of reducing the effect of wind loading by *two to three hurricane categories* (i.e., Cat 3 to Cat 1 on the Saffir Simpson Hurricane Scale) and thus can prove extremely helpful to reduce rooftop equipment damage.

*Development of Effective Roof-to-Wall Connections for Low-Rise Buildings to Withstand Hurricane Wind Loads – Phase 1:* The objective of this research is to develop a novel, cost-effective, light, strong, ductile, and non-intrusive roof-to-wall connection system using high performance fiber composite materials (as an alternative to conventional intrusive connections) through full-scale testing under simulated hurricane effects and Performance Based Design (a concept well embraced by the earthquake engineering community). During this research cycle faculty and students performed a detailed literature review of intrusive hardware type roof-to-wall connections, concept development for the novel non-intrusive roof-to-wall connections and formulated a methodology for developing the innovative connection system.

*Performance of Tile Roofs Under Hurricane Impact – Phase 2:* In the past few years, the State of Florida has suffered the impact of an unprecedented number of hurricanes, resulting in an immense regional and local economic impact. The damage from some of the rather smaller hurricanes (e.g. Hurricane Wilma) has challenged the building codes in South Florida as they relate to roof covering. While most homes suffered little structural damage, many experienced roof covering failures, and especially a large number of roof tiles. A detailed experimental and analytical study was carried out for field and ridge tiles using a combination of clay or concrete with adhesive-set or mortar-set. The strongest system appeared to be concrete tiles with mortar when subjected to mechanical uplift and simulated wind load testing. While concrete tiles bond to mortar much better than clay tiles, clay tiles adhere better to the foam. In Model 1b (clay tiles with foam), the roof tiles began to fail after being subjected to 120 mph wind speeds for 3.5 minutes. However Model 4 (concrete tiles with mortar); the roof tiles remained firmly attached to the roof with no visible damage to any of the tiles for the same duration of testing. Studies also showed that concrete tiles are 39% stronger than clay roof tiles in

resisting impact by a projectile during a hurricane. The present study does not support recent efforts by the industry to completely ban the use of mortar for all attachments of hip and ridge tiles. However, it is suggested that any such ban on mortar be limited to clay tiles only.

*Computation Fluid Dynamic Modeling to Improve the Performance of the Wall of Wind – Phase:* A computational fluid dynamics (CFD) analysis is needed to determine a more efficient configuration of the WOW system including the size of the rudders and the range of motion necessary to create such turbulence conditions. The IHRC subcontracted with a national expert in CFD at the University of Arkansas to assist with this research. Four separate contraction designs were considered with varying gaps between the Wall of Wind fan units.

## Section II: Project Selection

### Project Selection

For the State Fiscal Year 2006-2007 and 2007-2008 program cycles, staff of the RCMP, based on the success of programs and input from the RCMP Advisory Council in previous state fiscal years, developed a roster of projects based on a competitive process. The listing of ranked projects was presented to the RCMP Advisory Council for review and comment. Ultimately, a final list of projects was recommended for funding.

The six project selection criteria and priority areas used by the program committee in screening potential projects prior to their approval by the RCMP Advisory Council include:

1. Projects that provide assistance to primarily low and moderate income residents which promotes wind mitigation (including retrofits, education, inspections and related activities). All retrofit or other installation of mitigation devices on residential structures MUST comply with the Blueprint for Safety Standard (BFS).
2. Projects that will promote public education and public information about wind mitigation and wind mitigation related areas, including but not limited to maintenance and enhancement of RCMP/wind mitigation on line information availability and program visibility.
3. Projects that encourage and/or increase integration of wind mitigation into comprehensive planning and local mitigation plans and compliance with the State Hazard Mitigation Plan.
4. Projects that will promote market based, non-regulatory approaches to mitigation, including, but not limited to, training in regard to wind mitigation (construction) techniques, products and procedures, codes and standards, and related areas).
5. Projects which enhance program effectiveness, measurement and attainment of project goals and recommendations for improvement.
6. Other projects that will further wind mitigation/RCMP objectives, which have been designated by the Program as priorities in the applicable Notice of Fund Availability/RFP.

#### Priority Areas:

- A) Projects which implement wind mitigation/projects as identified in the State Hazard Mitigation Plan (SHMP)/ (applicable) Local Mitigation Strategy (LMS) and are clearly identified as projects/programs which can be initiated and completed within the grant contract period. The applicant must make clear reference with citations to the applicable sections of the SHMP and provide a copy of the Local Mitigation Strategy priority initiative list reflecting inclusion of their project(s). An endorsement letter from the chair of the county Local Mitigation Strategy Committee or county Director of Emergency Management must be provided. Low/Moderate Income Retrofits are included in this priority area;

'leveraging ' of CDBG, SHIP, HMGP, FMA funds or similar funding streams with RCMP funding shall qualify as a priority point award criteria.

- B) Projects, which will provide for product testing, measurement or enhancements, which will improve wind mitigation in residential structures.
- C) Projects that will address effectiveness of wind mitigation programs, projects and measures as specifically related to Florida landfalling hurricanes since the 2004 season and related or subsequent wind events.
- D) Projects, which promote residential wind mitigation through the code, trade or construction industries, including related or affiliated programs and organizations.
- E.) Projects which provide for public awareness about RCMP, its programs including support and maintenance of the RCMP website and on-line applications, including the Mitigation Incentives Database.

**The RCMP Advisory Council**

The RCMP Advisory Council and its participating entities are established in Section 215.559, F.S. The participating entities recommend potential members to the Director of the Division of Emergency Management for approval. These members serve until replaced by the participating entity. The current member roster for the 2007-2008 State Fiscal Year RCMP Advisory Council includes:

**State Fiscal Year 2007-2008  
Member Roster**

<b>Organization</b>	<b>Representative</b>
Florida Association of Counties Board of Directors	The Honorable Calvin Harris
Federation of Manufactured Home Owners Of Florida Incorporated	Mr. Roy Brewer
Florida Insurance Council Inc.	Mr. Andrew Martinez
Florida Home Builders Association	Mr. Richard Reynolds
Department of Financial Services	Ms. Tami Torres
Florida Manufactured Housing Association	Ms. Janette Weis

The RCMP Advisory Council meets at a minimum of once during the state fiscal year. The Advisory Council addresses a range of considerations, including:

- a status review of the current year projects, and
- the preparation of a roster of recommended projects for funding in the next fiscal year to be presented to the Director of the Division of Emergency Management for approval based upon the program criteria.

Other business related to the management of specific projects is also discussed.

As was the intent of the enabling statute through the broad representation of the Advisory Council's members, the RCMP Advisory Council helps ensure that projects selected for funding represent the full community of interests involved in hurricane loss reduction, in support of the project selection criteria and guiding principles discussed above.

## Section III: Recommendations & Observations

It is essential that the RCMP – both the specific projects and the overall program – address the requirements of section 215.559, F.S., “*to prevent or reduce losses or reduce the costs of rebuilding after a disaster*” (emphasis added). To actively reduce the exposure of insured property in the state, it is critical that the program be administered efficiently and effectively, fund innovative and cost-effective projects, and reflects the input of a broad community of organizations active in the field of hazard mitigation.

### Short Term Recommendations and Observations:

The short term recommendations listed below form the core of an action plan for program staff in the day to day management of the RCMP. Central to these recommendations is the implicit understanding that progress must be made in each area listed by the end of next fiscal year. Continued improvement in project management and program accountability remains a focal point. With these considerations in mind, the following recommendations are provided:

1. Develop a monitoring schedule based on relative monitoring risks and conduct monitoring visits utilizing other Division staff, as appropriate.
2. Continue competitive process and scoring for prospective projects.

### Long Term Recommendations and Observations:

The following goals are focused on ensuring that as the RCMP continues to mature, its efforts are both measurable and defensible, and that through these efforts, hurricane loss exposure is reduced. The following recommendations address these broader concerns:

1. Expand the network of partners working with the RCMP, including subgrantees and contractors, to take advantage of innovations in project identification and implementation.
2. Where possible, leverage RCMP funds with other funds from federal, state, local government or private sources.
3. Continue an aggressive approach at identifying non-regulatory market based solutions to promoting mitigation, including the reexamination of supporting mitigation loans.
4. Continue to promote a competitive grant process that encourages innovative solutions for residential construction mitigation.
5. Continue to document the success of the mitigation innovations funded under the RCMP and promote their continuation through resources of allied programs.

# Appendix A

## Hurricane Loss Mitigation Program Activities for

State Fiscal Year 2007-2008

### Wind Mitigation Public Education & Information:

Partnering Grantee	Project Description	Award Amount
Pro Web Commercials	Statewide Public Education	\$200,000
Hurricane Warning	Demonstration and Education	\$180,000
Federal Alliance for Safe Homes	Mitigation Consumer Education	\$200,000
<b>SUBJECT CATEGORY ALLOCATION:</b>		<b>\$580,000</b>

### Comprehensive Planning:

Partnering Grantee	Project Description	Award Amount
Currently No Projects		\$
<b>SUBJECT CATEGORY ALLOCATION:</b>		<b>\$</b>

### Market-Based Non-Regulatory Solutions:

Partnering Grantee	Project Description	Award Amount
Federal Alliance for Safe Homes	Blueprint for Safety –Year Seven	\$200,000
Applied Research Associates	Mitigation Incentives Database (Single Family)	\$199,600
Applied Research Associates	Mitigation Incentives Database (Multi Family)	\$159,952
<b>SUBJECT CATEGORY ALLOCATION:</b>		<b>\$559,552</b>



# Appendix B

## Hurricane Loss Mitigation Program Activities for

State Fiscal Year 2006-2007

### Wind Mitigation Public Education & Information:

Partnering Grantee	Project Description	Award Amount
Pro Web Commercials	Statewide Public Education	\$200,000
Florida State University	Continued operation and enhancement to the Disaster Control Network	\$200,000
Federal Alliance for Safe Homes	Mitigation Consumer Education	\$200,000
Florida Home Builders Association	Hurricane Alley - Statewide conference outreach and training	\$200,000
St. Lucie BOCC	Knowledge & Action for Windstorm Mitigation	\$200,000
University of Florida	Florida Coastal Monitoring Program - collection of real-time data during hurricane on the strength of regimental structure	\$198,345

**SUBJECT CATEGORY ALLOCATION: \$1,198,345**

### Comprehensive Planning:

Partnering Grantee	Project Description	Award Amount
Currently No Projects		\$

**SUBJECT CATEGORY ALLOCATION: \$**

### Market-Based Non-Regulatory Solutions:

Partnering Grantee	Project Description	Award Amount
Federal Alliance for Safe Homes	Blueprint for Safety –Year Six	\$200,000
Federal Alliance for Safe Homes	Mitigation Incentives Database	\$200,000
Applied Research Associates	Mitigation Incentives Database	\$199,991

**SUBJECT CATEGORY ALLOCATION: \$599,991**

