

## NASSAU COUNTY EMERGENCY MANAGEMENT

### PROPOSAL SUMMARY

#### Hurricane Simulation and Damage Assessment in Nassau County

#### **Background**

The foundation of all-hazards emergency management planning is an up-to-date comprehensive, detailed and accurate local hazards analysis. A baseline analysis was conducted for the Nassau County Local Mitigation Strategy. However, in order to continue the level of planning, preparedness and resource identification and allocation necessary to effectively respond to a widespread disaster, such as a hurricane, a more in-depth and detailed analysis must be conducted. The University of Florida, School of Building Construction (UF/SBC) has the capability of conducting a Hurricane Simulation and Damage Assessment using the Federal Emergency Management Agency (FEMA) HAZUS-MH simulation software, which is the accepted standard for this analysis. UF/SBC will coordinate the project elements with a project committee made up of representatives from appropriate Nassau County departments and agencies. A post-2004 Hurricane assessment conducted by the State of Florida, FEMA and the U.S. Army Corps of Engineers included recommendations to

- Identify and prioritize HAZUS-MH analysis to support hurricane impact assessment and response;
- Incorporate HAZUS-MH analysis into the CEMP functional planning; and
- Incorporate HAZUS-MH operations and analysis into hurricane response training and exercises.

**Project Cost:** \$10,625.00 (Funded in FY 2005/2006 - \$7,000; FY 2006/2007 - \$3,625).

**Funding Source:** Emergency Preparedness (EMPA Base Grant) - #01253525

**Project Period:** June 1, 2006 (or upon full execution) – December 30, 2006

**Deliverables:**

1. Monthly Status Reports
2. Final Report

**Project Overview:** HAZUS-MH is simulation software that contains models for estimating potential losses from large-scale natural and man-made hazards. Loss estimates produced by the models are based on current scientific knowledge of the effects of wind load, seismic activity, air blast and chemical, biological and radiological release. It uses state-of-the-art geographic information system (GIS) software to map and display hazard data and the results of damage and economic loss estimates for buildings and infrastructure. (See list of Deliverables –Attached.)

**Principal Investigator (University of Florida):** K.R. Grosskopf, Ph.D., CEM  
M.E. Rinker Sr., School of Building Construction  
University of Florida  
336 Rinker Hall

Gainesville, FL 32611-5703  
Phone 352-273-1158;  
Fax 352-392-9606  
[kgro@ufl.edu](mailto:kgro@ufl.edu)

**Project Manager (Nassau):**

Nancy Freeman  
Emergency Management Director  
Nassau County, Florida  
96135 Nassau Place, Suite 2  
Yulee, FL 32097  
904-548-4980  
904-491-3628 (fax)  
[nfreeman@nassaucountyfl.com](mailto:nfreeman@nassaucountyfl.com)

## Hurricane Simulation and Damage Assessment in Nassau County

To: Nancy Freeman  
Nassau County Emergency Management  
96135 Nassau Place  
Yulee, FL 32097  
(904) 548-4980  
[nfreeman@nassaucountyfl.com](mailto:nfreeman@nassaucountyfl.com)

From: K.R. Grosskopf, Ph.D., CEM, Principal Investigator (PI)  
M.E. Rinker Sr., School of Building Construction  
University of Florida  
336 Rinker Hall  
Gainesville, Florida 32611-5703  
(352) 273-1158 Fax (352) 392-9606  
[kgro@ufl.edu](mailto:kgro@ufl.edu)

Proposed is use of Federal Emergency Management Agency (FEMA) HAZUS-MH simulation software to predict hurricane damage and economic loss in Nassau County. Specifically, the University of Florida will provide hurricane simulations and damage assessments to Nassau County, and, assist Nassau County in developing and updating public outreach programs and mitigation plans. The objective of this effort is to assist Nassau County in obtaining and allocating resources that will maximize disaster preparedness, response and recovery effectiveness for the citizens of Nassau County.

### Overview:

HAZUS-MH contains models for estimating potential losses from large-scale natural hazards such as hurricanes, earthquakes and floods as well as human-caused or technological hazards such as major accidents and acts of terrorism. Loss estimates produced by HAZUS-MH are based on current scientific knowledge of the effects of wind load, seismic activity, air blast and chemical, biological and radiological release. HAZUS-MH uses state-of-the-art geographic information system (GIS) software to map and display hazard data and the results of damage and economic loss estimates for buildings and infrastructure.

### Hurricane Simulation:

A Hurricane Wind Preview Model has been developed for communities in Atlantic and Gulf coast regions to assess hurricane winds and compute basic estimates of potential damage to residential, commercial, and industrial buildings as well as critical infrastructure and services based on the quantities and types of buildings. HAZUS-MH includes an enhanced Building Inventory Tool (BIT) that allows users to import building data and is most useful when handling large datasets, such as tax assessor records. A Flood Information Tool (FIT) is designed to process available flood information (e.g., ground elevations, flood elevations, and floodplain boundary information) and calculate damage from storm surge and inland flooding.



FEMA HAZUS-MH software simulation of Hurricanes Frances and Ivan, 2004.

HAZUS-MH also provides feedback on evacuations, shelters, hospitals and other emergency services requirements. This type of assessment allows better planning, coordination and positioning of emergency management assets specific to storm track and severity as well as the expected damage and debris likely to be generated within each county census tract. It also enables modeling of pre-storm mitigation measures that will reduce damage, debris and economic loss in terms of both reconstruction and loss of income.

**Proposed Task(s):**

Proposed is a reimbursable services contract to provide FEMA HAZUS-MH storm simulation and technical support to include, but not be limited to, one or more of the following activities as directed by the Nassau County Emergency Management Director:

1. Define probabilistic and “worst case” hurricane scenarios, including multiple storm tracks and severity, sequential storm strikes, storm surge and inland flooding, etc.
2. Simulate damage, debris and economic loss to local building stock using county property appraiser datasets (age, value, size, location, type of construction, etc.) and USGS geographical, topographical and tree canopy census data.
3. Simulate loss reduction of various hazard mitigation strategies.
4. Update FDEM/FEMA mitigation plans including shelter requirements and evacuation planning, asset management and pre-positioning, mutual aid agreements, staffing and personnel requirements, debris removal and recovery fund estimating.
5. Compare simulations and damage estimates to TAOS and Memphis simulations and actual 2004-05 hurricane event data (where appropriate).
6. Develop targeted public outreach programs and implementation strategies with emphasis on underrepresented populations.

**Deliverables:**

1. Monthly status report(s)
2. Final report

**Performance Period:**

1. NTE the lesser of six (6) months or 640 billable hours from date of award.

**Budget:**

<b>Category</b>	<b>Cost</b>
Faculty Salaries and Benefits	\$ 0.00
Graduate Research Assistantship(s)	\$ 8,000.00
Supplies	\$ 500.00
Equipment	\$ 0.00
Travel	\$ 0.00
Indirect Costs and Overhead	\$ 2,125.00
<b>Total Funding Request</b>	<b>\$ 10,625.00</b>

**Resources:**

Nassau County provided: relevant published data and staff liaison support, as necessary.

University/State provided: graduate research staff support; faculty supervision, equipment, office and laboratory space, as necessary.

**Institutional Qualifications:**

The PI is faculty in the Center for Collective Protection in the Built Environment, Rinker School of Building Construction, University of Florida. The PI founded the Center in 2002 to develop technology, planning and design guidance to enhance the Nation's ability to mitigate the consequences of natural and human-caused hazards within the built environment. The Center is located in a new, state-of-the-art building on the University of Florida campus providing ample space, computer equipment, and other necessary support to conduct the research described in this proposal. The University of Florida is a Top 20 public research institution.

**PI Qualifications:**

Education:

Florida A&M University	B.S.	1992	Construction Engineering Technology
University of Florida	M.S.	1993	Building Construction
University of Florida	Ph.D.	1998	Architecture

Related Experience:

2002-2005 School of Building Construction, University of Florida  
1999-2002 Gainesville Regional Utilities (GRU)  
1995-1999 U.S. Department of Defense (DoD)  
1993-1995 Applied Research Associates (ARA), Inc.

### Related Research and Publications:

- Grosskopf, K.R., W.S. Shepherd and P. Oppenheim. "Assessing the Financial Feasibility of Utility Provided Back-Up Power During Site Planning," Journal of Energy Engineering. American Society of Civil Engineers (ASCE). Vol. 132, No. 1. Reston, VA. April 2006.
- Grosskopf, K.R. "Ultra-High Pressure (UHP) Water Mist for Next Generation Fire Protection," Proceedings of the 2006 World Conference on Accelerating Excellence in the Built Environment. Birmingham (UK). 2006.
- Grosskopf, K.R. "Airblast and Wind-load Safety Films: A Case Study in All-Hazard Building Codes," The American Professional Constructor. Journal of the American Institute of Constructors (AIC). Vol. 29, No. 2. Alexandria, VA. October 2005.
- Grosskopf, K.R. "Assessing the Effectiveness of Hazard Mitigation: A Case Study of Manufactured Housing and the 2004 Hurricane Season," Journal of Emergency Management. Vol. 3, No. 5. Weston, MA. September/October 2005.
- Grosskopf, K.R. "Protective Window Safety Films: A Case Study in ASTM All-Hazard Building Code Standards," Journal of ASTM International (JAI). Vol. 2, No.7. ASTM International. West Conshohocken, PA. July 2005.
- Grosskopf, K.R. "Hurricane Survivability for Underrepresented Populations Living in Manufactured Housing: A Case Study in Post 1994 HUD Code Methods," Proceedings of the CITC-III: Construction in the 21<sup>st</sup> Century: Advancing Engineering, Management and Technology. National Technical University of Athens (NTUA). Athens (Greece). September 2005.
- Grosskopf, K.R. "Hurricane Survivability for Underrepresented Populations Living in Manufactured Housing," Proceedings of the Institute of Industrial Engineers 2005 Annual Conference. Atlanta. May 2005.
- Kibert, C.J. and K.R. Grosskopf: "Comparison of the Unified Florida Building Code and the South Florida Building Code Product Approval Systems," Final Report to State of Florida Department of Community Affairs (DCA), Tallahassee, September 1999.
- L. Circeo, R. Gregory and K.R. Grosskopf, "Processing and Treatment Systems for Solid, Biological, and POL Wastes," Proceedings of the CIB International Conference on Construction Modernization and Education, Beijing (China), October 1996.
- Butz, J.R., R. W. Marmaro, R. Tetla, and K.R. Grosskopf. "Fine Water Mists for Suppression of Class B Fuel Fires," Proceedings of the Halon Alternatives Technical Working Conference, Albuquerque, May 1994.

### **Contact:**

K.R. Grosskopf, Ph.D., CEM  
M.E. Rinker Sr., School of Building Construction  
University of Florida  
336 Rinker Hall / PO Box 115703  
Gainesville, FL 32611  
(352) 273-1158 Fax (352) 392-9606  
[kgro@ufl.edu](mailto:kgro@ufl.edu)

**SEND NOTICE OF AWARD TO:**

The University of Florida  
Office of Research and Graduate Programs  
PO Box 115500 / 219 Grinter Hall  
Gainesville, FL 32611-5500  
Phone: (352) 392-1582  
Fax: (352) 392-9605

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Title of Proposal: Hurricane Simulation and Damage Assessment

Submitted to Sponsor: Nassau County, Florida

Sponsor Code: 11245

**UNIVERSITY ENDORSEMENTS:** The attached proposal has been examined by the officials whose signatures appear below. The principal academic review of the proposal is the responsibility of the **Department/Center and College**. If additional space is needed for signatures, please provide them on a separate sheet of paper.

**Principal Investigator: (Project Director)**

[Signature] 1/23/06  
NAME: K.R. Grosskopf, Ph.D., CEM  
TITLE: A. Professor  
UFID #: 5526-1380 TELEPHONE #: 3-1158  
CAMPUS ADDRESS: 336 Rinker Hall  
DEPARTMENT: Building Construction

**Dean or Director: (If more than one)**

[Signature] 1/24/06  
NAME: Paul Zwick, Ph.D.  
TITLE: Associate Dean for Research

**Co-Principal Investigator: (If Applicable)**

NAME: \_\_\_\_\_ DATE \_\_\_\_\_  
TITLE: \_\_\_\_\_  
UFID #: \_\_\_\_\_ TELEPHONE #: \_\_\_\_\_  
DEPARTMENT: \_\_\_\_\_

**Other Endorsement (If Needed):**

NAME: \_\_\_\_\_ DATE \_\_\_\_\_  
TITLE: \_\_\_\_\_

**Department Head:**

[Signature] 1/23/06  
NAME: Abdol Chini, Ph.D., P.E.  
TITLE: Director  
DEPARTMENT: Building Construction

**Vice-President for Agricultural Affairs**  
(For all projects involving IFAS Personnel)

NAME: \_\_\_\_\_ DATE \_\_\_\_\_  
TITLE: \_\_\_\_\_

**Department Head: (If more than one)**

NAME: \_\_\_\_\_ DATE \_\_\_\_\_  
TITLE: \_\_\_\_\_  
DEPARTMENT: \_\_\_\_\_

**Vice-President for Health Affairs**  
(For all projects involving JHMHC Personnel)

NAME: \_\_\_\_\_ DATE \_\_\_\_\_  
TITLE: \_\_\_\_\_

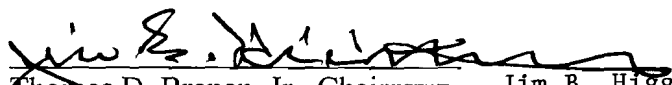
**Dean or Director:**

NAME: \_\_\_\_\_ DATE \_\_\_\_\_  
TITLE: \_\_\_\_\_

**Vice President for Research**

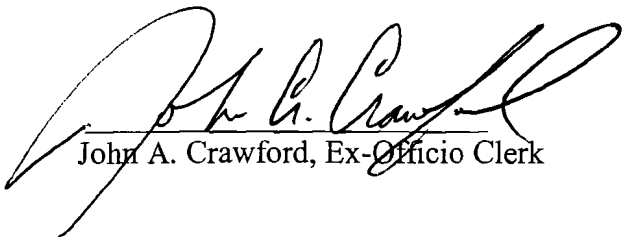
[Signature]  
NAME: **Brandi K Bonface** DATE \_\_\_\_\_  
TITLE: **Assistant Director of Research**  
Office of the Vice President for Research and Graduate Programs

Board of County Commissioners

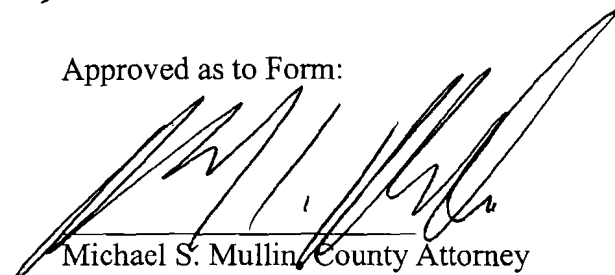
BY:   
~~Thomas D. Branan, Jr., Chairman~~ Jim B. Higginbotham, Vice Chairman  
Nassau County, Florida  
Board of County Commissioners

Date: 4/12/06

ATTEST:

  
John A. Crawford, Ex-Officio Clerk

Approved as to Form:

  
Michael S. Mullin, County Attorney