FLORIDA BUILDING COMMISSION

HURRICANE RESEARCH ADVISORY COMMITTEE

REPORT TO THE FLORIDA BUILDING COMMISSION

JULY 11, 2006

Hollywood, Florida

Meeting Design & Facilitation By

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FLORIDA BUILDING COMMISSION

HURRICANE RESEARCH ADVISORY COMMITTEE REPORT

JULY 11, 2006

OVERVIEW

At the January 26, 2005 Commission meeting, Chairman Rodriguez appointed a small coordinating group consisting of Commissioners and other stakeholder representatives, charged with identifying what research is being conducted related to building failure issues resulting from the 2004 hurricanes, identifying any research gaps on key issues identified but not being researched, and finally, to ensure that the Commission is provided with all relevant research findings on each of the major issues, prior to the Commission considering code enhancements resulting from lessons learned.

Following is the chronology of events and subsequent Commission actions resulting from the 2004 hurricanes.

- Commission met in Miami on August 29 – 31, 2004 and staff presented early observations from the storm.
- Hurricane Francis hit on September 6, 2004 over Southern Hutchinson Island, Florida.
- Hurricane Ivan hit on September 16, 2004 between Gulf Shores, Alabama and Pensacola, Florida.
- Hurricane Jeanne hit on September 26, 2004 near Stuart, Florida.
- The Commission met on October 18 – 19, 2004, following three additional hurricanes and presented preliminary data collected from the four storms.
- The Commission met on December 6 – 8, 2004 and a hurricane researchers workshop co-sponsored by the Commission and the Institute for Business and Home Safety, was held on December 6, 2004.
- On January 12, 2005 the Florida Homebuilders Association released an assessment report concerning water intrusion during the 2004 hurricanes.
- At the Commission’s January 2005 Commission meeting the Chair convened a workgroup to assist the Commission by ensuring they have all relevant research on each of the key issues identified during the hurricane assessments to assist the Commission with any needed code enhancements.
- At the Commission’s January 2005 meeting, the Florida Home Builders Association presented findings and recommendations regarding water intrusion.
- On March 16, 2005 the Commission held a joint session with the Hurricane Research Advisory Committee and heard presentations and recommendations on studies related to water intrusion, building code performance, roof tiles, and the design of aluminum structures.
At the May 10, 2005 meeting of the Hurricane Research Advisory Council the committee heard additional presentations and recommendations on water intrusion, and a window assessment failure study. In addition, at the May 10, 2005 meeting of the Hurricane Research Advisory Council, the committee was asked to make the following preliminary determinations relative to the various recommendations: First, based on the studies and related recommendations, do members support the recommendation, and second should the recommendation be recommended for early implementation (as a part of the legislative authorization for expedited code amendment implementation for hurricane related provisions) or should it be reviewed and considered through the regular Commission code amendment process. The HRAC evaluated each of the options and identified a preliminary list of options recommended for expedited code adoption as well as options that were recommended for adoption through the normal code amendment process.

At the June 28, 2005 meeting of the Hurricane Research Advisory Council the committee was asked to further consider those options that received a consensus for the recommendations and a 50% or greater level of support for expedited code adoption. The HRAC evaluated these as well as additional options identified by members. At the conclusion of the June meeting, the HRAC reached consensus on a package of recommendations for submittal to the Commission. The recommendations were for amendments recommend for expedited code adoption.

Hurricane Dennis hit on July 10, 2005 in the Western Florida Panhandle region of the State, between Pensacola Beach and Navarre Beach Florida.

At the August 23, 2005 meeting the HRAC evaluated the issues for consideration during the 2006 annual code amendment process, and identified issues that needed additional information or development prior to developing recommendations and that should be deferred for future code changes.

The Commission adopted a draft package of code amendments following public comment received during the rule development workshop conducted at the August 2005 meeting.

Hurricane Katrina landed on August 25, 2005 near the Miami-Dade Broward County Line in Florida, and on August 29, 2005 hit Plaquemines Parish Louisiana just south of Buras La, and again at the Gulf Coast border of Louisiana and Mississippi.

At the October 10, 2005 meeting members reviewed the results of Commission action regarding expedited code amendments, and reviewed assignments and project status.

The Commission conducted a rule adoption hearing at the October 11, 2005 meeting, and adopted a final package of expedited Code amendments

Hurricane Wilma landed on October 24, 2005 near Cape Romano Florida and crossed the Florida Peninsula just north of Palm Beach.

At the December 6, 2005 meeting, members heard presentations on observations from Hurricane Wilma damage to South Florida.

At the February 6, 2006 meeting, members reviewed the status of Committee proposed code amendments, heard an update on the Panhandle Windborne Debris Study, and voted to recommend DCA seek funding authority to support completion of a wind and water infiltration testing facility, and for conducting testing specific to building code development.
• At the March 21, 2006 meeting members heard an update on the Panhandle Windborne Debris Region Study. Members reviewed the status of the Committee’s hurricane provision recommendations, and identified additional issues that should be evaluated. The Committee offered a list of issues that need additional research and prioritized the issues based on a five-point ranking scale.

• At the July 11, 2006 meeting members reviewed the final results of ARA’s Panhandle Windborne Debris Region Study, and voted to recommend that the Commission continue with Phase II of the windborne debris study, as recommended by ARA, including post hurricane assessments of windborne debris damages resulting from any 2006 storms. The recommendation is to conduct a research study, with the results serving as the basis for a 2008 Statewide implementation of windspeed/terrain-dependent WBD criteria.

MEMBERS AND REPRESENTATION
At the January 26, 2005 Commission meeting, Chairman Rodriguez appointed a small coordinating group consisting of Commissioners and other stakeholder representatives, charged with identifying what research is being conducted related to building failure issues resulting from the 2004 hurricanes, identifying any research gaps on key issues identified but not being researched, and finally, to ensure that the Commission is provided with all relevant research findings on each of the major issues, prior to the Commission considering code enhancements resulting from lessons learned.

Raul L. Rodriguez, AIA, Chair of the Florida Building Commission, has made the following appointments to the Hurricane Research Advisory Council. Members are charged with representing their stakeholder group’s interests, and working with other interest groups to develop consensus package(s) of recommendations for submittal to the Florida Building Commission.

Raul Rodriguez, AIA, Chair
Chris Schulte
Do Kim, P.E.
Nick D’Andrea, CBO
George Wiggins, CBO
Craig Parrino, P.E.
Tim Reinhold, PhD, P.E.
Joe Crum, CBO (President, BOAF)
Jack Glenn, CBO
Dave Olmstead
John Ingargiola

Architects
Roofing contractors
Insurance industry
Building officials
Local government
Product manufacturers (concrete products)
Insurance industry/Researchers
Building officials
Home builders
Product manufacturers (windows)
Federal government (FEMA)
REPORT OF THE JULY 11, 2006 MEETING

The Committee over several months developed a consensus package of recommendations for proposed code amendments. The amendments were recommended for expedited adoption, glitch cycle adoption, or future adoption based on the need for additional research and development.

At the August 2005 meeting, the Commission voted on the Committee’s package of recommended expedited code amendments. At the October HRAC meeting, the Committee reviewed the status of their package of recommendations, including Commission actions related to approved expedited code amendments, amendments deferred to the glitch cycle, and proposed amendments that were not approved or deferred. The Committee also heard an overview from the Panhandle Windborne Debris Region Workshop, and an update on the plan for considering the Exposure C definition issue. In addition, the Committee was asked to review assignments and to identify any additional issues and research and development needs.

At the December 6, 2005 meeting the Committee heard an update on discussions regarding the Exposure C definition, and a status report on the Panhandle Windborne Debris Study. In addition, there were presentations from DCA staff, Miami-Dad County Code Compliance, and the Palm Beach County Building Department on observations regarding the impacts and damage to South Florida from Hurricane Wilma.

At the February 2006 meeting members were provided with an update on the Panhandle Windborne Debris Region Study and the Exposure C definition issue.

The HRAC discussed research and development needs and voted to recommend that the Commission request that DCA seek additional legislative spending authority to provide financing for the wall of wind facility at FIU, and conducting testing specific to building code development. The proposed funding amount is $500,000.00 (300K for the facility and 200K for testing). The Commission will review specific budget and contract requirements once spending authority is granted, and has no obligation to spend the money.

At the March 2006 meeting members identified and prioritized a list of issues that require additional research and/ or development prior to the HRAC evaluation options and making additional recommendations for proposed hurricane related Code amendments. In addition, the HRAC heard an update on preliminary results from the Panhandle Windborne Debris Region Study.

At the July 2006 meeting, members reviewed the final results of ARA’s Panhandle Windborne Debris Region Study, and voted to recommend that the Commission continue with Phase II of the windborne debris study, as recommended by ARA, including post hurricane assessments of windborne debris damages resulting from any 2006 storms. The recommendation is to conduct a research study, with the results serving as the basis for a 2008 Statewide implementation of windspeed/terrain-dependent WBD criteria.

The Committee will meet again at the AUGUST 2006 Commission meeting to receive an update on related projects and status report on Committee issues, and to review member assignments.
Opening and Meeting Attendance
The meeting started at 8:30 AM, and the following Council members were present: Raul Rodriguez (Chair), Joe Crum, John Ingargiola, Dave Olmstead, Craig Parrino, Tim Reinhold, Chris Schulte, and George Wiggins.

DCA Staff Present
Rick Dixon, Ila Jones, Mo Madani, and Betty Stevens.

Meeting Facilitation
The meeting was facilitated by Jeff Blair from the Florida Conflict Resolution Consortium at Florida State University. Information at: http://consensus.fsu.edu/

Project Webpage
Information on the project, including agenda packets, meeting reports, and related documents may be found in downloadable formats at the project webpage below: http://consensus.fsu.edu/FBC/hrac.html

Meeting Objectives

• To Review and Approve Agenda and March, 2006 Report
• To Review Committee Process Plan
• To Review Status Update on Exposure C Definition Legislation
• To Receive a Presentation on FMA Standard Practice for Window Installation
• To Receive a Presentation on AAMA Project on Window Water Leakage Testing for High Wind Areas
• To Review Panhandle Windborne Debris Final Report and Recommendation(s)
• To Discuss Other Research Priorities
• To Discuss RICOWI Report on Hurricanes Charley and Ivan
• To Discuss Recommendations of NIST Report on Hurricanes Katrina and Rita
• To Consider Public Comment

Review and Approval of March 21, 2006 Agenda
The Committee voted unanimously, 8 - 0 in favor, to approve the July 11, 2006 Agenda as presented.

Approval of February 6, 2006 Facilitator’s Report
The Committee voted unanimously, 8 - 0 in favor, to approve the March 21, 2006 Facilitator’s Report as presented.
Status Update on the Panhandle Windborne Debris Issue and Exposure C Definition
Following are the actions taken by the Commission regarding the Panhandle Windborne Debris Region definition and a revised Exposure C definition. These issues/definitions were both folded into the 2006 annual interim amendment process—2006 Glitch Amendments.

Panhandle Windborne Debris Region
The Commission voted to adopt the 130 mph contour as the Windborne Debris Region designation in the Panhandle, including all areas within 1500 feet of the Inland Bays that are not within the 130 mph contour.

Exposure C
Following is the definition proposed regarding a revised Exposure C definition, to be considered by the Commission during the July 2006 rule development workshop on Rule 9B-3.047, the Florida Building Code. (Note: the Commission approved this definition during the rule development workshop.)

1609.4 Exposure category.
Delete definition of Exposure A and all references to it in text: Renumber remaining exposure definitions and change the definition for Exposure C as follows:

2. Exposure C. Means, except in the High Velocity Hurricane Zone, that area which lies within 1,500 feet (457 m) of the coastal construction line, or within 1,500 feet (457 m) of the mean high tide line, whichever is less. On barrier islands, Exposure C shall be applicable to the coastal building zone set forth in Section 161.55(4), Florida Statutes. Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet (9144 mm) extending more than 1,500 feet (457.2 m) from the building site in any quadrant. This exposure shall also apply to any building located within Exposure B-type terrain where the building is directly adjacent to open areas of Exposure C-type terrain in any quadrant for a distance of more than 600 feet (182.9 m). Short term (less than two year) changes in the pre-existing terrain exposure, for the purposes of development, shall not be considered open fields. Where development build out will occur within 3 years and the resultant condition will meet the definition of Exposure B, Exposure B shall be regulating for the purpose of permitting. This category includes flat open country, grasslands and ocean or gulf shorelines. This category does not include inland bodies of water that present a fetch of 1 mile (1.61 km) or more or inland waterways or rivers with a width of 1 mile (1.61 km) or more. (See Exposure D.)

Presentation by FMA on Standard Practice for Window Installation
Freddie Cole, President of the Fenestration Manufacturers Association (FMA), reported on the FMA/AAMA 200-06 Standard Practice for the Installation of Windows with Frontal Flanges for Surface Barrier Masonry Construction standard, and answered Committee member’s questions.
Presentation by AAMA on Window Water Test and Standard Practice for Window Installation
Sigi Valentin, American Architectural Manufacturers Association (AAMA) Southeast Region Director, reported on the progress of a AAMA research project to evaluate the water performance of fenestration products subjected to severe wind driven rain events, and answered Committee member’s questions.

Review of Panhandle Wind Borne Debris Project Report and Recommendation for Additional Study
Dr. Larry Twisdale and Dr. Peter Vickery from ARA presented a PowerPoint presentation on results and recommendations from the Panhandle Windborne Debris Region study and answered member’s questions. The Phase I recommendation has already been adopted by the Commission (130 mph contour as the Windborne Debris Region designation in the Panhandle, including all areas within 1500 feet of the Inland Bays that are not within the 130 mph contour).

The Phase II recommendation is for to conduct a research study, with the results serving as the basis for a 2008 Statewide implementation of windspeed/terrain-dependent WBD criteria.

The HRAC unanimously agreed that an important aspect of ARA’s recommendations is to implement the Phase II recommendation to conduct a research study, with the results serving as the basis for a 2008 Statewide implementation of windspeed/terrain-dependent WBD criteria. The Commission’s decision on the Panhandle windborne debris region designation is an interim step, and the second phase will ensure that the latest science is used as the basis for the windborne debris requirements for the entire State, taking into consideration various terrains and their affects on windspeeds.

Committee Actions:
Motion—The Hurricane Research Advisory Committee voted unanimously, 8 – 0 in favor, to recommend that the Commission continue with Phase II of the windborne debris study, as recommended by ARA, including post hurricane assessments of windborne debris damages resulting from any 2006 storms. The recommendation is to conduct a research study, with the results serving as the basis for a 2008 Statewide implementation of windspeed/terrain-dependent WBD criteria.

Overview of ARA’s Recommendations:

Recommendations
1. Windspeed and terrain dependent WBD criteria should be implemented in Florida and nationally.
2. The Project Phase II should proceed to finalize windspeed and terrain parameters for building code implementation.
3. Hence, we recommend a two-phased implementation approach:
   • Phase I: 2007 Panhandle WBD Region
   • Phase II: 2008 Statewide Implementation of Windspeed/Terrain-Dependent WBD Criteria
   • The Statewide Implementation will address all windspeeds and terrains to ensure maximum cost effective protection where needed
4. We note that the recent NIST report on Hurricane Katrina recommends:
Evaluate the effects of shielded (e.g., wooded or wooded/suburban) exposures and their potential for reducing the wind loads on nearby residential structures and better explaining the variation in observed damage.

**Phase II Research**
- The research would address the limitations of the current study
- Results would be applicable to all of Florida with a unified criteria
- Research would lead to cost-effective and risk balanced building code implementation
- Parallel funding from outside the state would be sought to address national implementation
- The Phase II work will also consider houses built in open-suburban and suburban terrains (not treed terrain) are not exposed to excessive risks.

**Phase II Research Tasks**
1. Treed Terrain Testing
   A. Develop wind tunnel test matrix (w/ UF urban forest experts)
   B. Wind Tunnel Testing (UWO)
      - Terrain transition distance
      - Minimal Tree parameters (numbers, canopy, height)
      - Effects of tree blowdown margin and reduced tree density
2. WBD Transport and Impact Experiments
   - Shingle Transport Experiments (UWO)
   - Shingle Impact on Glazing (UF)
   - Residual Capacity of Protection Systems (UF)
3. WBD Modeling
   - Analyze and incorporate new data from Tasks 1 and 2
   - Update and rerun validations, add new cases
   - Incorporate new hurricane damage data, if available
4. Risk, Benefit, and Cost Analysis
   - Run 100 mph to 140 mph windspeeds
   - Add several new houses to mix
   - Incorporate tree fall on house in loss estimation
   - Consider new code subdivision with no tile roofs
   - Revisit benefits, including adding insurance incentives
   - Revisit costs, including prestorm installation of shutter systems
   - Include results in terms of increase in monthly mortgage payment
5. WBD Implementation Criteria
   A. Develop unified criteria
      - Recommend code implementation language
      - Develop suitable code implementation commentary
   B. Publish papers in peer-refereed journals
Discuss Other Research Issues
The Committee was asked to identify any additional issues that require research. No comments were offered by members.

Discuss RICOWI Report on Hurricanes Charley and Ivan
Rick Dixon noted that the RICOWI Report on Hurricanes Charley and Ivan was available, and web links will be available on DCA’s website. Following is the RICOWI website:
http://www.ricowi.com

Discuss Recommendations of NIST Report on Hurricanes Katrina and Rita
Rick Dixon noted that the National Institute of Standards and Technology (NIST) report and recommendations on Hurricanes Katrina and Rita was available, and web links will be available on DCA’s website. Following is the NIST website:
http://www.bfrl.nist.gov/investigations/investigations.htm

FEMA’s Summary Report on Building Performance—Hurricane Katrina 2005

Public Comments
Members of the public were provided an opportunity to provide general comments. Members of the public addressed the Committee on a variety of issues including the Panhandle Windborne Debris Region definition study report and recommendations.

Adjournment
The Committee votes unanimously, 8 – 0 in favor, to adjourn at 11:05 AM.