AMERICAN ASSOCIATION FOR WIND ENGINEERING
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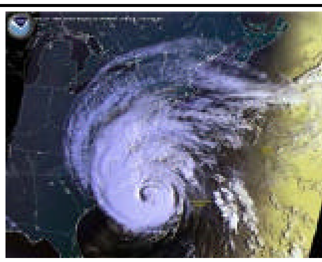
THE WIND ENGINEER

NEWSLETTER OF AMERICAN ASSOCIATION FOR WIND ENGINEERING

May 2004

Participants of Workshop on Unified Performance Algorithms and Data Format for Buildings in the Future Windstorms (see p.5)



2004 Hurricane Forecasts (see p. 8, image - landfall of Hurricane Isabel, Sept. 18, 2003, 7:53 a.m., from NOAA website)

In this Issue:

Florida's Hurricane Shelter Safety Enhancement Program

Danny Kilcollins, FPEM, Aff.ASCE
Florida Division of Emergency Management

In the wake of Hurricane Andrew in 1992, the State of Florida recognized the need to improve the availability and safety of public hurricane shelter space for its vulnerable citizens. The 1993 Legislature enacted a law that created a comprehensive strategy to eliminate the statewide deficit of "safe" hurricane shelter space. This strategy included a hurricane shelter survey and retrofit program, and design and construction of new public school facilities to enhanced "public shelter design criteria." In 1993 the statewide hurricane shelter space deficit was estimated to be about 150,000 spaces. However, the actual status of many of Florida's designated hurricane shelters was unknown.

The Florida Division of Emergency Management (FDEM) was directed to administer a program to survey existing schools, universities, community colleges, and other state, county and municipally-owned public buildings to identify those that are appropriately designed and located to serve as shelters. FDEM was also tasked with annually providing a list of facilities recommended to be retrofitted using state funds. To accomplish these tasks, FDEM needed to develop and implement minimum safety criteria; that is, it had to define "safe." The safety criteria had to be based upon recognized state and national standards, guidelines and "best practices," and achievable within the means and resources available to FDEM and its stakeholder partners. *(continued on page 2)*

Figure 1. Typical retrofitted school building with window and louver protection

The "Three Little Pigs" Project: Testing Full-scale Houses and Light-frame Buildings to Destruction using Realistic, Extreme Environmental Loads

Lizeanne St. Pierre, M.E.Sc., Project Manager, Three Little Pigs Facility
The University of Western Ontario

Damage due to natural hazards has increased dramatically in recent years, incurring losses of life and property around the world. (continued on page 7)

After two years of research and field testing, and in consultation with the University of Florida School of Building Construction, the FDEM recognized the American Red Cross' *Guidelines for Hurricane Evacuation Shelter Selection* (ARC 4496) as the minimum safety criteria. ARC 4496 provides safety criteria for storm surge, rainfall flooding and wind hazards, plus a basic least-risk decision making process. However, to apply the criteria to field conditions and typical building stocks, the FDEM expanded its interpretation of ARC 4496 into a prescriptive least-risk decision making model. The model is qualitative and based largely upon building performance assessments after Hurricane Andrew (i. e., give preference to building qualities, or characteristics, that performed well in Hurricane Andrew, and avoid (or mitigate) those that performed poorly.) A condensed version of the model (i.e., "cheat sheet") can be viewed at the following URL address:http://floridadisaster.org/bpr/Response/engineers/documents/CheatSheet.pdf.

The field survey procedures to implement the safety criteria were then incorporated into a modified version of the Federal Emergency Management Agency's (FEMA) *Natural Hazard Vulnerability Survey Instructions* (FEMA TR-84). This type of survey and evaluation can be performed at relatively low cost by building inspectors, construction technicians, architects and engineers. The average cost per building surveyed ranges from about $500 to $1,500, with an average of about $850.

The Florida Department of Education (FDOE) concurrently developed a public shelter design criterion for use in new school facility construction projects. The FDOE, in consultation with the University of Florida School of Building Construction, appointed a committee to assist in development of the criteria. The committee included representatives from many stakeholder agencies (e.g., state and local emergency management, school board, community college and university officials, ARC, architects, engineers, etc.) The charge to the committee was to develop a set of practical and cost-effective criteria. The final criteria recommended by the committee was consistent with the mass care provisions of the ARC's *Mass Care—Preparedness and Operations* (ARC 3031), and the hurricane safety criteria of ARC 4496.

The recommended wind design criterion was the American Society of Civil Engineers Standard 7 (ASCE 7) with a 40 mile per hour increase in basic map wind speed and an importance factor I=1.00. In addition, the hurricane shelter's exterior envelope (walls, roofs, windows, doors, louvers, etc.) must all meet a basic windborne debris impact standard (i.e., SSTD 12; 9lb 2x4 @ 34 mph). However, school board officials successfully protested the increase in base wind speed, so the minimum wind design criterion was reduced to ASCE 7 at basic map wind speed with an essential facility importance factor I=1.15. The 40 mile per hour increase in base wind speed is still <u>recommended</u> within the code, but not required. The criteria were promulgated into the State Requirements for Educational Facilities in April, 1997. The FDEM's model hurricane shelter evaluation criteria's preferred rankings were adjusted to be consistent with FDOE's public shelter design criteria (also known as the Enhanced Hurricane Protection Area or EHPA criteria).

By 1999, using a combination of in-house staff and engineering consultants, the FDEM had completed about 25 percent of the statewide baseline survey of public hurricane shelters. However, the results of the survey were not encouraging. About 95 percent of the surveyed hurricane shelter spaces could not meet the ARC 4496 criteria. As examples, 45 percent of the shelters had unreinforced masonry walls, 84 percent had unprotected windows, and 50 percent were located in buildings with uncertified long span light weight roofs. The FDEM also found that buildings designed and constructed prior to the mid-1980's rarely met the ARC 4496 criteria, and often would have required major design and retrofit/mitigation renovations to meet ARC 4496. More than half of the hurricane shelters surveyed fell into this group. Modern buildings constructed after the mid-1980s were often designed to ANSI A58 or ASCE 7 wind design standards, and in many cases just needed window protection to meet ARC 4496.

Based upon the findings of the survey, Florida's hurricane shelter capacity dropped from 988,378 spaces in 1995 to only about 186,900 spaces in 1999. By 2000, the statewide deficit stood at more than 1.5 million spaces. For the first time in Florida history, emergency managers, ARC and school board officials could quantify both the safety and available capacity of public hurricane shelters, instead of relying upon anecdotal concerns. Now that the scope of the challenge was known, the FDEM and its partner agencies began to implement an aggressive hurricane shelter deficit elimination program.

To date, the FDEM has completed about 85 percent of the statewide baseline survey. The results of the survey are used by state and local agencies to prepare and implement strategies to reduce, and ultimately eliminate, the deficit of ARC 4496 shelter space. The survey program has not only identified about 25,000 "as-is" spaces, but also directly, or in some cases indirectly, led to creation of more than 70 percent of the state's retrofit capacity. Both state and federal resources have been used to fund the survey program. To date, the estimated total cost of surveys is about $2 million, or about $6.20 per "as-is" or retrofitted space.

In 2000, the Florida Legislature enacted a law identifying an annual funding source to support hurricane shelter retrofitting projects. The retrofit projects are identified through the survey program, and are only recommended when the retrofit can create spaces that meet ARC 4496. Since 1999, Florida has invested about $14 million in state funds to retrofit existing buildings, and the federal Hazard Mitigation Grant Program (HMGP) has invested about $34 million. Through federal and state funding, Florida has created about 298,500 ARC 4496 spaces at an average cost of $160 per space. Figure 1 is an example of a retrofitted school facility.

To reduce the retrofitting cost burden upon local agencies, FDEM and HMGP retrofit/mitigation funds were often "global matched," which eliminated a local cash match. Global matching is the pooling of resources to achieve a common goal. Projects funded by Florida's hurricane shelter retrofit program that can concurrently meet HMGP's benefit-cost and eligibility requirements are used to offset local match requirements for HMGP-funded retrofits. About 162,000 of the 298,500 federal and state funded retrofit spaces were created through global match. Local government and private sector agencies also created about an additional 111,500 spaces through retrofitting. A total of about 410,000 spaces have been created through retrofitting, which accounts for 64 percent of the statewide ARC 4496 space inventory.

The new school EHPA requirement has also had a significant impact upon the availability of ARC 4496 shelter space. Initial progress was slow, with an Auditor General's report in 2001 indicating only about 65 percent compliance. However, EHPA capacity has increased from an average of about 35,000 spaces per year, to about 63,000 spaces being constructed for 2004. Schools are funded primarily by state and local capital outlay funds, and school districts are generally reporting that the EHPA construction cost premium is about two to six percent. Since 1997, EHPA construction has created about 210,000 spaces, which accounts for 32 percent of the statewide ARC 4496 space inventory.

Figure 2. New school facility being constructed to the public shelter design criteria

Another major contributor to reduction of the state's public hurricane shelter space deficit has been reduction in demand. Since 2000, Florida's public hurricane shelter demand has been reduced by about 540,200 spaces. This was accomplished through the use of more precise coastal mapping techniques, improved storm surge mapping, more accurate census data, and improvements in public education and hurricane evacuation study demand modeling. Previous hurricane evacuation studies often indicated that 25 percent or more of a vulnerable population would seek public shelter during an evacuation for a major hurricane, but more recent studies are indicating that only about 15 percent will actually seek public shelter. This is consistent with the findings of recent post-storm assessments, that indicate less than 10 percent of vulnerable populations seek public shelter. With reduced demand, the quantity of required public hurricane shelter spaces is reduced.

Since 1995, Florida has made significant progress towards improving the safety and availability of public hurricane shelter space. This has been accomplished through a comprehensive strategy of surveys, retrofitting, new construction and demand-reduction components. Florida now has 12 counties with a demonstrable surplus of public hurricane shelter spaces. Also, for the first time in recent history, Florida has a region (the South Florida region, which includes Broward, Miami-Dade and Monroe Counties) with a demonstrable surplus of public hurricane shelter space. Based upon current trends, Figure 3 indicates that Florida will eliminate its deficit of public hurricane shelter space around 2011.

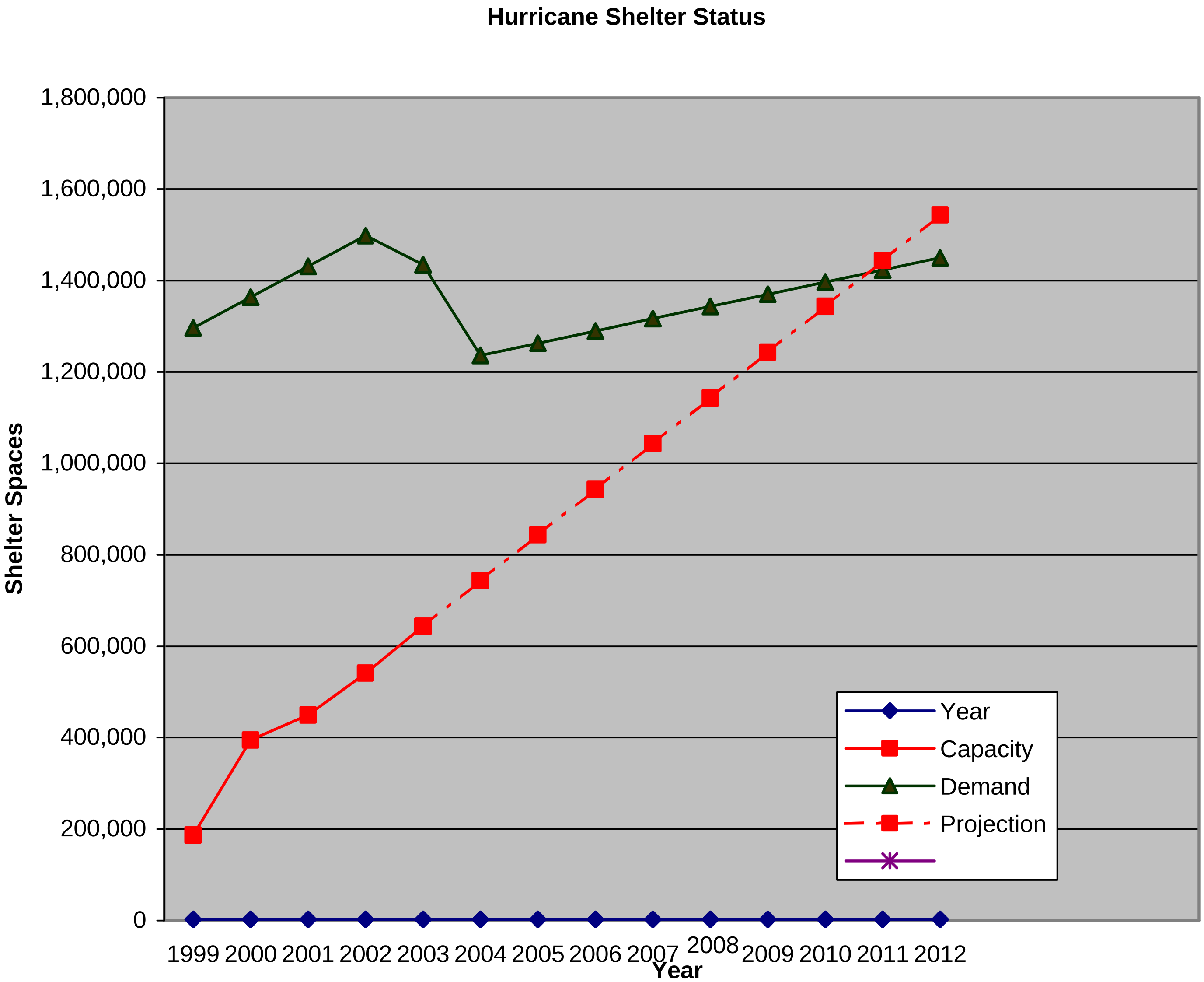


Figure 3. Graph of Florida's progress in reducing the hurricane shelter deficit

Workshop on Unified Performance Documentation Algorithms and Data Format for Buildings in the Future Windstorms

Jianming Yin and Kishor C. Mehta , Wind Science and Engineering Research Center, Texas Tech University, Lubbock, TX

A damage documentation workshop organized by Wind Science and Engineering Research Center (WISE), Texas Tech University (TTU), was held in Dallas on March 4, 2004. As a part of the Wind Damage Mitigation Initiatives cooperative project with the National Institute of Standards and Technologies (NIST), WISE is seeking consensus for a unified documentation algorithm and data format for building performances in future windstorms.

Building performance data collected using this algorithms and data format can be exchanged, shared, and used collectively. The building performance data will be systematic and will broaden the use of the data and benefit communities including academic researchers, governmental agencies, code organizations, wind risk modeling industry and insurance/reinsurance companies.

The intention of the workshop was to solicit expert opinions of the workshop participants and to build a nationwide consensus among the interested public and private organizations and industries on the unified approach to documentation algorithms and data format.

Participants invited to the workshop included wind researchers from universities, government agencies, and other institutions who have been actively involved in wind-induced building damage investigations in the past three decades and represent the state-of-art knowledge in wind-induced building damage investigation. Insurance/reinsurance and wind risk modeling industries were also invited to the workshop for their experience in wind damage surveys and their expectation of the building performance data to benefit their future needs. The workshop also included mathematician to ascertain the mathematical and statistical aspects in the algorithm. The names and organizations of the participants are shown in Table 1.

Table 1 List of Workshop Participants

Participant Name	Organization	Occupation
Bienkiewicz, Bogusz	Colorado State University	Professor
Crandell, Jay	Applied Residential Engg Services	Engineer
Gaus, Mike	Consultant	Professor, retired
He, Hua	WISE	Graduate Assistant
Khanduri, Atul	Applied Insurance Research	Engineer
Lessard, Katie	Institute for Business and Home Safety	Engineer
Levitan, Marc	Louisiana State University	Professor
McCabe, Steve	National Science Foundation	Project director
McDonald, Jim	WISE	Professor
Mehta, Kishor	WISE	Professor
Minor, Joe	University of Missouri – Rolla	Professor/consultant
Reinhold, Tim	Clemson University	Professor
Riley, Michael	National Institute of Standards and Technologies	Research Engineer
Seshaiyer, Padhu	TTU	Statistician
Thráinsson, Hjörtur	American Reinsurance Co.	Engineer
Womble, Arn	WISE	Engineer
Yin, Jianming	MMY Wind Engineers	Engineer

Dr. Kishor Mehta addressed long-term goal of future building performance documentation in his introduction. Workshop participants then introduced themselves and expressed their expectations of the building performance documentation data.

Dr. Jianming Yin presented the unified building performance documentation algorithms and data format. The presentation discussed the damage definition and damage rating tactics, building performance documentation data type, Data Non-uniformity Detection and Alleviation (DNDA), and data format. The proposed documentation algorithm distinguishes site performance documentation for case study from statistical performance documentation for systematic building performance review. The algorithm allows rapid screening surveys as well as exhaustive data documentation.

As integral part of this building performance algorithm, the Data Non-uniformity Detection and Alleviation (DNDA) program was proposed. DNDA is intended to improve the data quality and to detect and alleviate the data non-uniformity problems among surveyors. DNDA uses damage pictures from past survey to train surveyors and to improve data uniformity. DNDA also uses the damage pictures to calibrate the surveyor's skill level in building performance data collection and to alleviate non-uniformity among the data collected by different surveyors.

The idea of using past damage pictures to train and calibrate surveyors is the first in its kind. To explore how realistic this idea is in practice and what damage pictures can be used for this purpose, workshop participants were asked to assign damage categories to some 60 building components shown in 15 pictures selected from the WISE damage documentation archives. This rating exercise revealed the necessary amount of building component damage information needed for reliable damage ratings. This exercise has shown that new pictures are need to be taken for this purpose and an appropriate plan can therefore be set forth for the 2004 tornado and hurricane seasons.

The participants appreciated the efforts by WISE and agreed in general with the approach and the content of the proposed algorithms and data format. The participant also offered many insightful comments and suggestions for WISE consideration in revising the algorithms and data format. WISE is currently incorporating these comments and suggestions and is planning to test the proposed algorithms and data format using a PDA application developed through a joint effort involving Institute for Business and Home Safety (IBHS) and Clemson University, and revised by WISE.

For additional information and a complete report on the workshop, please contact webmaster@wind.ttu.edu.

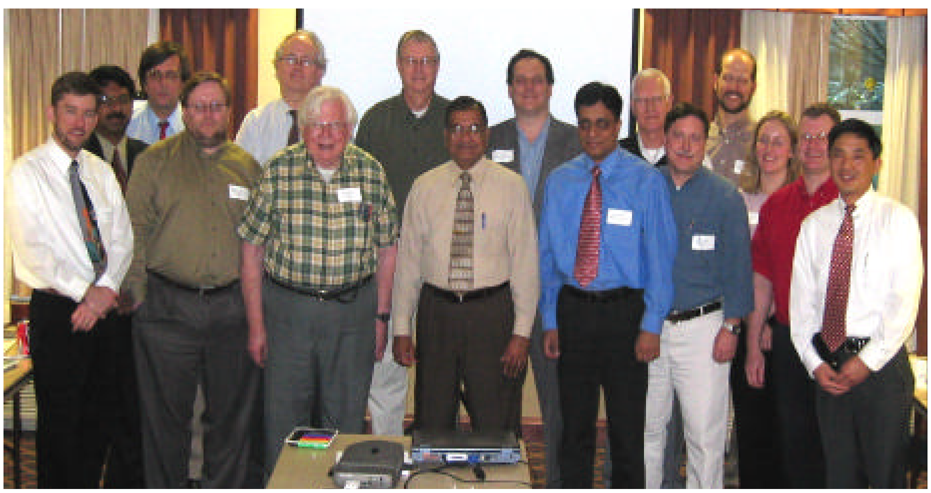


Figure 1. Participants of Workshop (from left to right: Michael Riley(NIST), Padmanabhan Seshaiyer(TTU), Bogusz Bienkiewicz(CSU), Hjörtur Thráinsson(American Reinsurance Co.), Steve McCabe(NSF), Mike Gaus(SUNY Buffalo), Joe Minor(University of Missouri at Rolla) , Kishor Mehta(TTU), Marc Levitan(LSU), Atul Khanduri(AIR-Worldwide Corp.), Jim McDonald(TTU), Tim Reinhold(Clemson), Jay Crandell(Applied Residential Engineering Services), Katie Lessard(IBHS), Arn Womble(TTU), and Jianming Yin(MMY)

The "Three Little Pigs" Project

(Continued from p. 1)

Low buildings, and in particular housing, often bear the brunt of this damage. In 1992, Hurricane Andrew hit south Florida, destroying 20,000 houses and causing US $30 billion in damage. If the storm had tracked 50 km further north, the resulting damage costs have been estimated at over US $100 billion.

Houses and other light-frame structures, in spite of their apparent simplicity, are among the most complex structural assemblies. This complexity comes from the highly redundant yet vaguely defined structural system that is not so much "engineered" as "proportioned" based on experience and historical construction practices. The redundancy of these structures makes it extremely difficult to accurately predict how extreme environmental loads, such as wind-induced pressures and drifting snow loads, are distributed through walls, roofs, floors and all their connection points. Full-scale component tests and static loading of complete structures, which have been done on these structures, do not adequately predict their true behaviour under realistic, transient wind loads. Thus, the precise response mechanisms up to failure are not yet known.

A group of 10 North American researchers has been awarded $2.7M from the Canada Foundation for Innovation (CFI) to construct a facility that will be used to apply simulated and naturally-occurring loads to instrumented full-scale houses and low buildings of light-frame construction to investigate the way in which these structures respond and ultimately fail under these loads. This research facility has been dubbed the 'Three Little Pigs' facility; a rendering of the facility is shown in Figure 1. Two buildings are shown: the test building (on the left side of the figure) and a smaller instrumentation building. The test building will contain the built test 'specimen'. Around this specimen is the reaction frame, to which the loading system will be attached. A 'shell' structure will surround both the test specimen and the reaction frame to protect the loading system from the elements. In order to expose the test specimen to naturally-occurring wind, snow and rain loads the shell structure will be on rails and hence removable; i.e. the house can be loaded with the simulated wind loads under the shell structure, and then exposed to rain and natural wind.

The total cost of the facility is $6.8M. It is anticipated that the Ontario Innovation Trust will match the CFI's contribution ($2.7M) and the remaining 20% ($1.4M) of the total cost is to be obtained from industrial partners. The facility is to be located near the city of London, Ontario, Canada. The principal investigators of the research to be conducted at this facility are primarily from the University of Western Ontario, home of the Alan G. Davenport Wind Engineering Group. These include: F. Michael Bartlett, Ashraf ElDamatty, Jon Galsworthy, Hanping Hong, Diana Inculet, Greg Kopp, Eric Savory, Dave Surry, and Peter Vickery. Dr. David Rosowsky of Oregon State University is also one of the co-Principal Investigators.

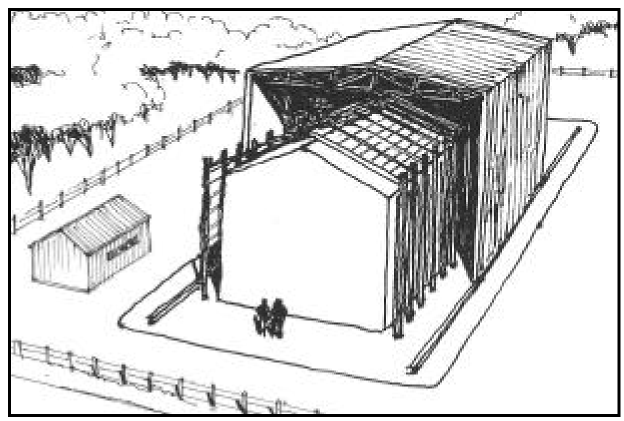


Figure 1. Sketch of the 'Three Little Pigs' facility

Realistic wind loads, which vary both in time and in space, will be simulated in this facility using a novel 'pressure box' system. The fluctuating pressure loads will follow wind tunnel generated time series. The pressure box system will apply fluctuating pressures and suctions to the surfaces of the building specimen, avoiding the need for 'point' anchorages required by a system of hydraulic actuators. The 'pressure box' system will be comprised of up to 100 mini-units similar to the BRERWULF system, which was developed to apply unsteady pressure loading to roofing panels by Dr. Nick Cook, formerly at the Building Research Establishment (BRE) in the United Kingdom. Dr. Cook is part of the team who will develop the new pressure box system for this project. The mini 'pressure boxes' will be attached to the surface of the test building specimen and will vary in size from 2ft x 2ft up to 8ft x 8ft or so.

Rain often accompanies extreme wind events and enters structures through cracks, openings around windows and vents, windows broken by wind-borne debris, or infiltrates through the surface. This is a complex phenomenon that can destroy the contents of the house or lead to mould growth that occurs when water cannot evaporate. The 'Three Little Pigs' facility will be used to assess the factors influencing the ingress of moisture due to wind-driven rain. The quantities of water entering the house through cracks (both artificially created and those arising from severe loading), vents, breached windows, etc., will be determined. The role of internal pressure and their distributions in the different compartments of a house on water ingress into the structure will be investigated under natural wind conditions. The development of mould growth under realistic environmental conditions will also be investigated.

It has been argued that the failure of many structures during extreme storm events is due to poor construction practices. The 'Three Little Pigs' research facility will be used to gather information on the human error during construction, which will then be correlated with the measured performance of the test building as a whole.

Construction of the facility is to begin in Spring 2005 and be fully operational in Fall 2006, when testing of the first house specimen will begin. If you would like any further information about this project, or would like to contact one of the researchers about a specific topic mentioned here, please contact the author at:

Boundary Layer Wind Tunnel Lab
The University of Western Ontario
London, ON N6A 5B9
email: lms.blwtl.uwo.ca.

Funding for the preparation of the CFI proposal and preliminary research for the project was provided by the Institute for Catastrophic Loss Reduction and the Natural Sciences and Engineering Research Council of Canada.

Above-Average Hurricane Activity Forecasted for 2004

Forecast by Team from Colorado State Univ.

Tropical storm researcher William Gray and his hurricane forecast team at Colorado State University have slightly increased their seasonal predictions and call for above-average Atlantic basin hurricane activity in 2004.

"A wide variety of global predictors obtained and analyzed through March continue to point to the 2004 Atlantic basin hurricane season as being an active one," Gray said. "We expect tropical cyclone activity to be about 145 percent of the average season."

As detailed in today's update (April 2), Gray and his colleagues call for a total of 14 named storms to form in the Atlantic basin this year. Of these, eight are predicted to become hurricanes and three are anticipated to evolve into intense hurricanes (Saffir/Simpson category 3-4-5) with sustained winds of 111 mph or greater. The long-term average is 9.6 named storms, 5.9 hurricanes and 2.3 intense hurricanes per year. The team's early December forecast called for 13 named storms, seven hurricanes and three intense hurricanes.

The Colorado State forecast team also warns of the considerably higher than average probability of at least one intense hurricane making landfall in the United States this year. According to the updated forecast, there is a 71 percent chance of a major hurricane hitting somewhere along the U.S. coastline in 2004 (long-term average is 52 percent). For the U.S. East Coast, including the Florida Peninsula, the probability of an intense hurricane making landfall is 52 percent (long term average is 31 percent). For the Gulf Coast from the Florida Panhandle westward to Brownsville, Texas, the probability is 40 percent (the long-term average is 30 percent). The team also calls for above-average major hurricane landfall risk in the Caribbean.

"The United States has been very lucky over the past few decades in witnessing very few major hurricanes making landfall in Florida and along the East Coast, but climatology will eventually right itself and we must expect a great increase in landfalling hurricanes," said Gray. "We don't know when it will happen, but with the large coastal population growth in recent decades, it is inevitable that we will see hurricane-spawned destruction in coming years on a scale many times greater than what we have seen in the past."

On a long term basis, intense hurricanes account for only about a quarter of all named storms but cause about 85 percent of all tropical cyclone-spawned destruction.

The last nine years have witnessed 122 named storms, 69 hurricanes and 32 major hurricanes in the Atlantic basin. During that period, only three of the 32 major hurricanes (Opal, Bret and Fran) crossed the U.S. coastline. Based on historical averages, about one in three major hurricanes comes ashore in the United States. Before Lili made landfall as a category 1 hurricane in October 2002, a record 21 consecutive Atlantic basin hurricanes did not cross the U.S. coastline.

The storm seasons spanning 1995-2003 comprised the most active nine hurricane years on record, and Gray believes that 2004 will follow this active trend. The Colorado State forecasting team believes that the United States is in a new, multi-decadal era for increased storm activity.

Today's report discusses how this new era correlates with a major reconfiguration of the distribution of the Atlantic thermohaline circulation that began in 1995. This change has warmed North Atlantic sea surface temperatures and lowered tropical Atlantic surface pressure, which in turn enhanced Atlantic basin hurricane activity. Despite the El Nino-linked seasonal reductions in 1997 and 2002, the past nine years constitute the most active consecutive years on record for Atlantic basin tropical cyclone activity. The forecast team does not anticipate El Nino conditions in 2004.

The Colorado State forecast team does not attribute changes in recent and projected Atlantic basin hurricane activity to human-induced global warming. For more information please visit: http://typhoon.atmos.colostate.edu.

(based on Press Release by CSU)

Forecast Issued by NOAA

May 17, 2004 — NOAA forecasters are predicting an above-normal Atlantic hurricane season. At a news conference Monday in Houston, Texas, NOAA officials said the season outlook is for 12 to 15 tropical storms, with six to eight systems becoming hurricanes, and two to four of those major hurricanes. Homeland Security's Federal Emergency Management Agency officials joined NOAA in urging Gulf and Atlantic Coast states to be prepared for an active season, which runs from June 1 through November 30.

"NOAA's 2004 Atlantic hurricane season outlook indicates a 50 percent probability of an above-normal season, a 40 percent probability of a near-normal season and only a 10 percent chance of a below-normal season," said retired Air Force Brig. Gen. David L. Johnson, director of the NOAA National Weather Service. Similar seasons averaged two to three landfalling hurricanes in the continental United States, and one to two hurricanes in the region around the Caribbean Sea.

"Last year three tropical storms and three hurricanes affected the United States. Hurricane Isabel caused 17 deaths and more than $3 billion in damages. We cannot stop these storms, but we can take steps to limit our vulnerability. Awareness and preparedness for hurricanes, and even tropical storms, and knowing what to do to mitigate their devastating effects, are our best defense," said undersecretary for Homeland Security Michael Brown.

In the central Pacific, NOAA forecasters are predicting four to five tropical cyclones, which is typical for that area. The central Pacific hurricane season also runs from June 1 to November 30.

The Atlantic hurricane outlook reflects a likely continuation of above-normal activity that began in 1995. Since then all but two Atlantic hurricane seasons (the El Niño years of 1997 and 2002) have been above normal.

NOAA scientists are predicting ENSO neutral conditions (neither El Niño nor La Niña) through July. There is a likelihood these conditions will continue through the peak August-October months of the hurricane season. The main factors in the above-normal outlook are the active phase of the Atlantic multi-decadal signal and a continuation of warmer-than-normal ocean temperatures across the tropical Atlantic. These conditions are associated with circulation patterns that favor an above-normal hurricane season.

NOAA will issue an update to this year's hurricane outlook on Aug. 10, 2004.

The 2004 Atlantic hurricane outlook is a joint product of scientists at the NOAA Climate Prediction Center, the Hurricane Research Division and the National Hurricane Center. NOAA meteorologists use a suite of sophisticated numerical models and high-tech tools to forecast tropical storms and hurricanes. Scientists rely on information gathered by NOAA and the U.S. Air Force Reserve personnel who fly directly into the storms in hurricane hunter aircraft; NOAA, NASA and the U.S. Department of Defense satellites; NEXRAD WSR-88D radars and partners among the international meteorological services.

(from NOAA website, http://www.noaanews.noaa.gov/stories2004/s2225.htm)

President's Corner

Many thanks to all the AAWE members who have renewed their 2004 membership. The response to our 2004 membership renewal reminder campaign (enclosures with the March 2004 issue of The Wind Engineer) was very encouraging. However, we are still waiting for a response from approximately 1/3 of 2003 members who are late with their renewals.

We also need your help in expanding Congressional support for the Wind Bill (H.R. 3980) introduced in U.S. House of Representatives by Rep. Randy Neugebauerger [R-TX] and Rep. Dennis Moore [D-KS], see March 2004 issue of The Wind Engineer. So far 42 Congressmen declared their support for this bill, signing up as Cosponsors. They include: Rep Acevedo-Vila, Anibal [PR], Rep Blumenauer, Earl [OR], Rep Boehlert, Sherwood L. [NY], Rep Brady, Kevin [TX], Rep Brown, Corrine [FL], Rep Burgess, Michael C. [TX], Rep Capito, Shelley Moore [WV], Rep Carter, John R. [TX], Rep Case, Ed [HI], Rep Cole, Tom [OK], Rep Cooper, Jim [TN], Rep Culberson, John Abney 04 [TX], Rep Davis, Lincoln [TN], Rep Deutsch, Peter [FL], Rep Diaz-Balart, Lincoln [FL], Rep Diaz-Balart, Mario [FL], Rep Goode, Virgil H., Jr. [VA], Rep Goodlatte, Bob [VA], Rep Gordon, Bart [TN], Rep Granger, Kay [TX], Rep Hall, Ralph M. [TX], Rep Hart, Melissa A. [PA], Rep Hastings, Alcee L. [FL], Rep Hill, Baron P. [IN], Rep Honda, Michael M. [CA], Rep Jackson-Lee, Sheila [TX], Rep John, Christopher [LA], Rep Johnson, Sam - 4/21/2004 [TX], Rep Lampson, Nick [TX], Rep Lofgren, Zoe [CA], Rep Lucas, Frank D. [OK], Rep Manzullo, Donald A. [IL], Rep McIntyre, Mike [NC], Rep Meek, Kendrick B. [FL], Rep Pearce, Stevan [NM], Rep Price, David E. [NC], Rep Ros-Lehtinen, Ileana [FL], Rep Sessions, Pete [TX], Rep Smith, Lamar [TX], Rep Stenholm, Charles W. [TX], Rep Thornberry, Mac [TX], Rep Udall, Mark [CO].

If Representative from your Congressional district is not listed above, please contact her/his office and encourage this Representative to sign-up as Cosponsor of this important legislature. Contact information for all Representatives can be found at the U.S. House website, http://www.house.gov.

Wind Engineering and Related Conferences - May 2004 Update

FIV2004 – 8th International Conference on Flow-induced Vibrations

Paris, France, July 5 - 9, 2004
http://laum.univ-lemans.fr/FIV2004/fiv2004_home.html
Contact: E. de Langre, Chairman FIV2004, Department of Mechanics, LadHyX, Ecole Polytechnique, 91128 Palaiseau, France
Fax: +33 1 69 33 30 30
E-mail: fiv2004@ladhyx.polytechnique.fr

Fifth International Colloquium on Bluff Body Aerodynamics & Applications (BBAA V)

Ottawa, Canada, July 11 - 15, 2004
http://www.bbaa5.org
Contact: BBAA V, Aerodynamics Laboratory, Institute for Aerospace Research, National Research Council Canada, Montreal Road Building M2, Ottawa, Ontario, Canada, K1A 0R6
Fax: (613) 957-4309
E-mail: bbaa5@nrc.gc.ca

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American Association for Wind Engineering

Membership Application/Renewal

Membership Year: 1 January - 31 December 2004

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Corporate Membership; $500 or more: ___ . Corporate membership can include up to five individual members. Complete one form for each individual member.

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