

# The Wind Engineer

Newsletter of the American Association for Wind Engineering

Jan. 1999

Newsletter Prepared by Michael P. Gaus



**American Association  
for Wind Engineering**

**AAWE**

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## Presidents Message

Greetings! Although somewhat more than 4 months have gone by since I assumed the office of President of AAWE, this is the first newsletter I have found time to assemble. Clearly help is needed to carry on the tasks of AAWE as it is not an organization which should be solely operated by one person but should involve and reflect the efforts and opinions of the individuals who make up the wind science and engineering community. This will be one of the objectives of the next years activity – working on and improving the communication with and between the community and searching for ways to get effective involvement of AAWE members in wind science and engineering knowledge generation and in achieving improved wind hazard mitigation. A first measure has been the preparation of a Membership and Information Directory, which has been distributed to all members of AAWE. The Secretary/Treasurer and Board members were of great help in producing this document.

AAWE did produce some valuable information during the past year including the reports "Wind Engineering: New Opportunities to Reduce Wind Hazard Losses and Improve the Quality of Life in the USA" and "Workshop on Large-Scale Testing Needs in Wind Engineering". A copy of the first report was distributed to all AAWE members and was described in the last newsletter. This report is available through the web at AAWE web sites. The second report will be described more fully in a later section of the newsletter.

The last two years have seen some dramatic impacts from windstorms and the level of damage and impacts have increased awareness to the fact that losses will continue to grow in the future unless action is taken to mitigate predictable future damage and impacts. The year 1999 has started out depressingly like past years with tornado outbreaks in the Southeast U.S., which have caused the usual deaths and destruction. As has been the case in the past a large part of the problem are the large numbers of existing structures which do not have any provision to provide an acceptable level of protection from extreme wind events. The degree to which acceptable protection to populations subjected to tornado winds can and should be achieved is a problem, which has yet to be resolved but should be viewed as a challenge by AAWE members.

The last couple years of catastrophic events has stimulated increased action on the part of several Government Agencies and Code Groups and other involved organizations. A number of valuable programs have been started but a recurring issue is the lack of any reasonably coherent national plan for wind science and engineering research and implementation. A few of these new programs will be described in this newsletter.

This recurring theme – the lack of a coherent national wind hazard mitigation plan – should be taken as a challenge by AAWE. As AAWE can and does represent a broad cross-section of individuals and organizations active in wind hazard mitigation, it should be possible for AAWE to provide leadership and guidance to develop a trial model plan

which could provide a pattern for the discussion and development of an effective national plan. There have been a number of suggestions that Congress simply establish a National Wind Hazard Reduction Act. The difficulty with this is that there is no central focus for construction activities within the US government and the result is that congressional responsibilities are as fragmented as the construction industry itself. Thus it would be presumptuous to expect Congress or other governmental units, who do not have specialized expertise in this area, to develop a national plan. The first attempt at such a plan should come from the profession, working with the agencies and organizations concerned with the problem.

The principal focus of AAWWE in the past has been toward university researchers. Clearly the level of support for this sector needs to be increased but we should also work toward implementing programs that also build support and participation for other sectors including practice, construction, regulation and public awareness. AAWWE is anxious and willing to work with other groups and organizations to achieve goals and to develop a comprehensive program for understanding and mitigating all natural hazards approached as a system.

There are many other issues, which could be discussed, but these will be saved for future issues of the newsletter.

### **Past Presidents Message**

The last four years have passed very quickly, and sadly, I am reporting to you for the last time as President of AAWWE. However, I am pleased to say that the state of AAWWE is excellent. With your help, I have been able to voice the concerns of the wind engineering community through representation at several national and international activities, sponsorship of many international conferences, organization of several workshops, and the initiation of letter writing campaigns to key members of the Congress, the President, the Vice-President and President's Science advisor. These efforts have energized AAWWE, and we are now poised to take the next major stride. Let's keep this momentum going.

During my term, we have been providing you with news and the latest information through the Wind Engineer. Professor Jim McDonald should be commended for his efforts as editor, maintaining the schedule of publication and its timely content. Later, Professor Mike Gaus took over as interim editor and also produced a very informative issue. In addition, we have prepared two major reports which most of you have already received. The first report is entitled: "Wind Engineering: New

Opportunities to Reduce Wind Hazard Losses and Improve the Quality of Life in the USA," and the second: "Workshop on Large Scale Testing Needs in Wind Engineering." These valuable reports would not have been possible without the efforts of Professor Mike Gaus, who served as editor of both documents. Additionally, our members were also afforded reduced personal subscription rates for the new international journal Wind and Structures.

More importantly, AAWWE has begun preparing a national plan for the wind hazard reduction program. To this end, AAWWE has drafted a summary of the research needs in several areas: Extreme Winds, Research and Development in Wind engineering, Education and Technology Transfer and Socioeconomic Issues. However, to realize a national wind hazard reduction program, I must stress the necessity for partnership with federal agencies. I am pleased that Mike is aggressively mounting programs in this area.

Please allow me to take a moment to recognize the efforts of several individuals. Dr. J. E. Cermak should be thanked for his efforts to conduct AAWWE's last election according to the bylaws. I also would like to thank Dale Perry and Kishor Mehta who served on the Election Committee and spent many hours on conference calls to nominate candidates for the election. I would also like to thank Professors Maury Albertson and Paul Wilbur of CSU for their help by serving on the Ballot Counting Committee and the adhoc committee of Past AAWWE Presidents Jack Cermak, Kishor Mehta and Dale Perry who were very helpful in providing important counsel whenever it was needed.. Additionally, I would like to thank NSF for their support of AAWWE activities. Finally, I would like to express my sincere gratitude to the AAWWE Board of Directors and especially to Partha Sarkar, who agreed to serve as secretary/treasurer of AAWWE at the end of my tenure and Dr. Robert Akins who served as AAWWE vice president.

In closing, I am confident that the activities of AAWWE will continue to flourish and serve a vital role in the establishment of the national wind hazard reduction program. (I will be pleased to assist the current board and the new president in reaching these goals.)

### **10<sup>th</sup> International Conference on Wind Engineering**

A proposal requesting travel support for the 10<sup>th</sup> International Conference to be held in Copenhagen, Denmark has been submitted to NSF. If successful, travel support within the budget, would be considered for US persons presenting papers at the conference and possibly for selected

graduate students. Proposal support is always an uncertain thing so we will keep our fingers crossed. If there is a positive result, an immediate announcement would be made through our web pages and possibly by e-mail. Keep tuned.

### **Memorandum of Understanding**

A memorandum of understanding has been signed between AAWE and the Applied Technology Council (ATC) to cooperate in pooling the skills of each organization in working to develop cost effective solutions for the mitigation of wind hazards. Details of this cooperation will be jointly worked out in coming months. This cooperation brings together the resources of ATC which has played an important role in developing state-of-the-art engineering solutions and applications and the management of complex technical projects and the resources of AAWE which has for many years represented wind engineering research, education and practice.

### **1998 Windstorm Activity**

As reported by NOAA, the 1998 wind season will be remembered as one of the deadliest in history including having the strongest October Hurricane on record. There were 14 named Tropical Storms of which 10 became Hurricanes. Three of these reached categories three, four and five on the Saffir/Simpson Hurricane scale. The four-year period of 1995-1998 has a total of 33 Hurricanes, which is an all-time record. Seven of the Tropical storms hit the United States, which is twice the normal average. Total direct US Hurricane damage was estimated at 6.5 billion dollars. This group of Tropical Cyclones claimed an estimated 11,629 lives in 1998 of which there were an estimated 11,000 deaths due to Hurricane Mitch in Central America. This is the largest number of deaths due to an Atlantic Hurricane since 1780.

During 1998 there were also 1,120 reported major tornadoes in the US. This compares to 1,140 for 1997 and 1,239 for 1996. The number of Tornado deaths was 129 in 1998 as compared to 67 deaths in 1997 and 25 in 1996. Of the 1998 Tornadoes, 33 were of a high magnitude, which would place them in the "killer" class. An estimate of the total direct Tornado damage is not yet available but is probably comparable to the losses caused by Hurricanes. For

details go to

[www.nhc.noaa.gov/ftp/pub/forecasts/discussion/MIATWSAT](http://www.nhc.noaa.gov/ftp/pub/forecasts/discussion/MIATWSAT)

### **Workshop on Large-Scale Testing Needs in Wind Engineering**

A workshop on large-scale testing needs for wind engineering was held in Washington, DC in May 1997 which was organized by AAWE with support provided by the National Science Foundation and the National Institute of Standards and Technology. There were 23 participants in the Workshop from 4 different countries. The Workshop participants presented an overview of some of the testing activities in progress around the world and details of some of the experimental facilities currently available. The participants then formed into 5 groups to discuss the role of large-scale testing. These groups were:

- Critical Research Areas Requiring Large-Scale Testing
- Large-Scale Testing in Natural Wind
- Large-Scale Testing in Artificial Wind
- Large-Scale Testing in Modeled Wind
- Testing and Computing for Synthetic Wind Loading

Overall the Workshop did not arrive at any single conclusion or recommendation except that there was overall agreement that some type of questions can only be answered through large-scale testing. Such testing, however, should be an integral part of a well thought out national plan, should take into account work carried on in other countries and possibly in cooperation with other countries and should be subject to both physical and societal cost-benefit analyses and input from an impartial oversight committee. Many approaches toward large-scale testing are possible and both loading and resistance must be considered. Thus some answers may come from large-scale wind tunnel studies but many may also come from other types of load application, computational simulation and real world observation of the performance of facilities.

A limited distribution of the report was made due to high mailing costs. Copies of the report can be furnished to interested parties on request and if there is sufficient interest, the report could be added to an AAWE web site.

### **New Sensors**

Dove Electronics has developed a new line of multifunctional wind/visibility sensors, which measure cross-wind speed, direction and visibility. These sensors are based on scintillometer techniques and provide average cross wind speeds over specified interval as well as peak wind speeds. This makes it possible to measure average wind speed as well as wind gusts over the specified interval. The sensor utilizes an infrared transmitter and can measure winds well in excess of 100mph.

The sensor can output signals in either a digital or analog format. For information contact:

Dove Electronics  
227 West Dominick Street  
Rome, NY 13440  
315-336-0230

### **National Plan**

The need for a national plan for wind hazard mitigation as a part of a national natural hazard mitigation plan is a recurring theme in many reports and studies. A series of reports, have identified needs and benefits for advancing wind hazard mitigation capabilities, but do not provide much guidance on effective ways to actually implement such programs. Unfortunately the wind hazard problem, as is also the case in other hazard areas, is extremely complex as we are dealing with a phenomena which is random in nature, a fragmented design and construction industry, a fragmented governmental and regulatory structure and the public which is generally indifferent to hazard considerations until an event occurs. Add to this the short attention span of both the public and various levels of government and we arrive at our present situation.

Clearly no outside group can dictate to agencies and other organizations how they should allocate their resources and activities but it should be possible to work with these groups to increase awareness that protection against extreme wind events is not hopeless, is not just a warning problem and that significant things can be accomplished to reduce impacts through increased attention to the resistance side of the equation. Of course there is always the problem in working with Congress and other groups in that they demand instant action. The solutions to the wind hazard mitigation problem are not likely to be instantaneous but will require a constant effort over a long period of time from a variety of disciplines. This is particularly true with respect to the large national investment in existing constructed facilities.

One possible approach to developing national plan ideas would be to use the AAWWE web pages to develop a skeleton plan. As ideas are contributed and a plan develops, the web site would provide a dynamic interface, which would continually adapt to suggestions provided. For persons without access to the web, copies could periodically be furnished through e-mail attachments or by paper copies. Send e-mail comments or whatever on member thoughts. on whether or how AAWWE could make a contribution toward moving toward a national plan.

### **Retrofit Technology**

The problem of existing construction has been identified as one of the big issues to be solved in achieving wind hazard mitigation. In a number of cases there has been a hazard due to faulty workmanship or change in standards in attaching roof sheathing to structural framing. Researchers at Clemson University, working with the Institute for Business and Home "Safety have conducted an excellent research project in which they studied the problem of "Holding on to Your Roof". In this project they studied the problem of inadequately fastened roof sheathing and innovative ways in which the connection can be greatly improved using a bead of construction adhesive applied to each side of a roof structural member. In their studies the researchers investigated the degree of strengthening which could be achieved and developed a number of innovative ways in which the strengthening material could be applied in difficult to reach situations. A brochure describing roof sheathing retrofit has been prepared and should be available from Prof. Tim Reinhold at Clemson University or from IBHS. One of the nice features of this project is that an average homeowner on a self-help basis at modest cost could implement the mitigation measures. Now on to "sticky Corners" and a couple of other measures which were speculated on in some previous wind engineering papers.

### **New ASTM Standard for Shingles**

By Tomas L. Smith

In December 1998, a new test standard was approved for measuring the tab uplift resistance of asphalt shingles. ASTM D 6381 should be available from ASTM by this spring. Wind performance of asphalt shingles is greatly influenced by the adhesive that is used to bond the shingle tabs. If the tab lifts, the shingle is very vulnerable to damage. This test method is used to assess the resistance of the bonding adhesive. The test method was developed nearly a decade ago, but it went through several refinements in both equipment modifications and specification language before it was approved. During this time, the bond-strength of the self-seal adhesives used by the shingle manufacturers substantially increased. To determine the minimum required bond strength of the tab adhesive, a calculation procedure developed by Colorado State University can be used. The procedure is based on research that was sponsored by the Asphalt Roofing Manufacturers Association (ARMA). The procedure is presented in "Wind Uplift Model for Asphalt Shingles" by Dr. Jon Peterka et al, which was published in the December 1997 issue of the

Journal of Architectural Engineering. ARMA is continuing with work that enable designers to more easily specify wind-performance criteria for shingles. ASTM D 6381 can be purchased via the ASTM website at [www.astm.org](http://www.astm.org).

### Implementation Ideas

By Michael P. Gaus

A serious problem in implementing new approaches and techniques for wind hazard mitigation, particularly for residential and low-rise construction, is the difficulty in getting small contractors to introduce new ways of providing increased wind loading resistance. Here are a couple of my nutty ideas to chip away at the implementation problem:

1. How do small builders arrive at designs and construction methods? In general it is a combination of trying to satisfy local building codes, carpenter eclecticism (i.e. tradition) and in a majority of cases starts from or uses some form of stock plans. If this is the case, that a majority of house construction originates or is highly influenced from stock plans, one way to try to sneak in improvements would be to go to the stock plan sources and arrange to review or re-work their plans to include structural systems and details which would reflect the results of research programs and the use of new and improved hazard mitigating details. It could be that many of the builders would stick to their old ways and ignore improvements but in many cases the homeowner would be more aware of the fact that current plans may not provide the level of protection which could be available. As many of these plans are discussed in popular magazines, even if the homeowner does not get involved in the actual plans, the prospective homeowners would start asking questions regarding the natural hazard risks in the homes they purchase.
2. Maybe to stimulate action we should get regulatory groups to require warning labels on buildings. If after a review of the structure or proposed plans, it is found that the structure is inadequate a requirement should be made that warning labels should be required at all entrances something like the following:

## WARNING

This building does not satisfy the minimum criteria for wind hazard resistance.

Occupying this building could endanger your life in an extreme windstorm

Of course I do not know what the legal implications of something like the above approaches may be as we always have to worry about the lawyers. We would also have to consider that such warning labels were required on cigarette packages for some time and the impact is not at all clear. The public does not always respond logically.

### In-Residence Shelters

By Michael P. Gaus

There has been an increased interest in the concept of in-residence shelters, first proposed by researchers at Texas Tech University. In particular, Prof. Ernie Kiesling at Texas Tech has been involved with the development of in-residence shelter concept for years. The wind Research Center at Texas Tech University has been receiving numerous calls for information on this concept.

The Federal Emergency Management Agency (FEMA) has released the booklet "Taking Shelter from the Storm." It is based upon research done at the Wind Engineering Research center. It includes information and six sets of plans. In order to obtain a free copy of the booklet please call FEMA at 1-800-480-2520 and request booklet #320, which is called "Taking Shelter from the Storm." Additional information about FEMA can be obtained at [www.fema.gov/MIT/tsfs01.htm](http://www.fema.gov/MIT/tsfs01.htm). The web site of Texas Tech at [www.ce.ttu.edu/wind](http://www.ce.ttu.edu/wind) has additional information on In-residence shelters.

Now that awareness has been aroused, it is time to examine some of the problems in implementing this concept. Current suggestions involve innovations in on-site construction to provide the in-residence shelter. Unfortunately this approach suffers from the same problems of all on-site construction – lack of quality control and the high costs associated with the "craftsman" approach to attempting to do everything on the job site. It would appear that this is one area where we could learn from our associates in the manufacturing area. It would seem possible to use a "manufacturing" approach in which a standard group of protection modules are developed which could be factory produced using all of the benefits of modern manufacturing technology and materials

which may need special processing not feasible on a jobsite to develop shelter modules which could be of a size that are transportable and could be dropped into new or existing construction, with appropriate anchorage provisions. By using a mass-produced manufacturing approach it would be possible to provide superior units at much more reasonable costs, which would provide a predictable level of safety improvement. Use of these units could be encouraged through the usual maze of tax incentives (Ugh) or through incentives offered by insurance companies. Comments?

### **AAWE Committee Structure & Publications**

Many professional organizations develop important contributions to their field through a committee structure. At the present time, AAWE does not have any such committee structure. It would seem that there are a number of wind engineering issues, which are not adequately addressed through existing organizations. This is particularly true with respect to implementation. Is there a role for AAWE? As committees generally work on a volunteer basis in engineering, the scope would have to be reasonably limited to take into account that there is only a limited amount of time that individuals can devote to such work unless some type of funding is provided. Comments and volunteers would be appreciated. We will look into posting a "wish list" of possible committees on the web site: [www.civil.buffalo.edu/aawe](http://www.civil.buffalo.edu/aawe).

### **New Government and Industry Programs**

A number of programs have been started by government agencies which reflect the increased interest after the US sustained the highest single natural hazard loss in history from hurricane Andrew. Space will not permit an extensive description of these programs in this issue of the Newsletter but information is available on web sites and from agencies involved. Some internet and other access information is given below for several programs:

#### **Project Impact**

FEMA has launched a new initiative "Project Impact" which introduces a philosophy that the impact of disasters can be reduced by taking action before a disaster occurs instead of waiting until one happens. Project Impact is aimed at changing the way America deals with natural disasters. Information on this program is available on the FEMA website, [www.fema.gov](http://www.fema.gov).

#### **MMC**

The Multihazard Mitigation Committee (MMC), organized by the National Institute of Building Sciences (NIBS) and supported by the Federal Emergency Management Agency, is intended to work toward reducing the total losses associated with natural and other hazards by fostering and promoting consistent and improved Multihazard risk mitigation strategies, guidelines, practices, and related efforts. The MMC will conduct activities and provide the leadership needed to: improve communication, coordination, and cooperation among all entities involved with mitigation; promote deliberate consideration of Multihazard risk reduction in all efforts that affect the planning, design, construction and operation of the built environment; and serve as a focal point for the dissemination of credible information and sage counsel on major policy issues involving Multihazard risk mitigation. Detailed information on MMC can be obtained from the NIBS web site: [www.nibs.org](http://www.nibs.org). A copy of the report prepared by the Ad Hoc Panel on a National Pre-Disaster Mitigation Plan can be viewed at [www.civil.buffalo.edu/nibs](http://www.civil.buffalo.edu/nibs).

#### **Path**

The Partnership for Advancing Technology in Housing (PATH) is an initiative was launched through a White House initiative with administrative responsibility assigned to the Department of housing and Urban Development (HUD). Many other government agencies are partners in the program. Although consideration of natural hazards was not a prominent part of the original PATH rhetoric, the focus on housing is on a segment of constructed facilities which has been responsible for a large percentage of losses in all natural disasters and clearly natural hazards considerations will have to play a role in their activities at some point. The National Association of Home Builders is paying an important role in this program and has established a web site: [www.pathnet.org](http://www.pathnet.org) to provide information on the program.

#### **Dept. of Commerce and NOAA Initiatives**

The Department of Commerce and NOAA have proposed an initiative for natural disaster reduction involving an improved

program of warning, weather prediction, data collection and improved building practices. Details will be furnished in future newsletters as available.

#### INEEL

The Idaho National Environment and Engineering Laboratory has been active in initiating and proposing a number of innovative wind and other natural hazard reduction programs. Of particular interest is the Homesaver Project for Affordable Housing which has been proposed by INEEL. For details see the web site [www.inel.gov/homesaver](http://www.inel.gov/homesaver). For information contact:

Cheryl O'Brien Program Manager  
Partnership for Natural Disaster  
Reduction Idaho National Engineering  
and Environmental Laboratory P.O.  
Box 1625 Idaho Falls, Idaho 83415-  
3605 Ph: (208) 526-4105 FAX (208)  
526-4017 Email: [cco@inel.gov](mailto:cco@inel.gov)

#### PNDR

The Partnership for Natural Disaster Reduction, which has developed from the INEEL program, brings together representatives, many at executive levels, from companies and agencies who are concerned with developing efforts to reduce the impacts of natural disasters. This group provides input from a perspective which may not have been heavily represented in the past and is a welcome addition to natural hazard planning and oversight activities. For current information contact: Suzette Payne, INEEL, 208-526-4293.

#### Recognition of Members

Dr. Richard Marshal received an award at the Boston ASCE annual meeting recognizing his many and constant contributions to wind and civil engineering. Congratulations Dick on this award.

#### American Society of Civil Engineers Committee Activity

We would like to provide a report on the ASCE activities. Can anyone supply?

Wind Loads  
Wind Tunnel Testing  
ASCE 97 Loading Standard

#### National Research Council Study

The National Research Council (an arm of NAE & NAS) has been commissioned by the

Department of Energy to prepare a report on priorities related to the construction of a very large-scale wind testing facility. The report will be available in April of 1999.

#### Next National Wind Engineering Conference

The location and time of the next US National Wind Engineering Conference has not yet been established. If any university or organization has a strong interest in hosting the next National Conference, which should take place in 2001, please contact any officer of AAWE. Although this date is still 2 years away, the location needs to be pinned down so that efforts can be started to locate sources of financial support and other details of the conference.

#### Technology Corner

Would any of our members like to contribute some paragraphs to furnish technical information to their fellow members? Maybe some discussion topics could be:

Pressure Coefficients better explained. (can our members take coefficients from foreign codes or literature and use them with ASCE 97 for example)

Overhangs.

Extracting Design Information from Foreign Building Codes.

Design Wind Velocities in Different Codes & Countries.

Measured maximum wind speeds in Hurricanes.

Effectiveness of modern metal connectors in wood construction.

??????????

#### FEMA Building Performance Assessment Teams

By Thomas L. Smith

In 1998, FEMA deployed two Building Performance Assessment Teams (BPAT) to investigate the performance of buildings and other structures following Hurricane Georges. One team was deployed to Puerto Rico and the other to the Gulf Coast. These investigations were conducted as part of FEMA's hazard mitigation activities. Puerto Rico experienced significant wind damage and serious flooding also occurred in many areas. Flooding was the predominant problem along the Gulf Coast. The preliminary reports can be found at FEMA's website. For the Puerto Rico report: [www.fema.gov/mit/bpat/rpt10.htm](http://www.fema.gov/mit/bpat/rpt10.htm). For the Gulf Coast report: [www.fema.gov/mit/bpat/rpt20.htm](http://www.fema.gov/mit/bpat/rpt20.htm). FEMA also deployed a preliminary assessment

team to North Carolina following Hurricane Bonnie. However, because the storm conditions produced limited damage, a full assessment team was not dispatched.

### **Is There An AAWE Role Related to Collecting Perishable Information After Damaging Wind or Wind-Water Events**

The collection of perishable information after natural disasters has been recognized to be of great value in gaining a better understanding of possible wind speeds and loads and structural resistances after extreme wind events for which little measured information may have been collected during the event. Some degree of coordination was provided, starting in 1964, through a committee of the NAE but this is no longer the case. In addition there is a problem in the archiving of information, particularly visual information, over time. The situation now is difficult as many groups now send out teams (see previous article) after a disaster but there are no standards to try to optimize the information collected, to utilize information collected by news media and others and to provide a central information source which will continue to archive data over time including information on where data is available and the links to this information. In addition it is getting increasingly expensive to dispatch investigators over long distances. This leads to the questions:

1. Are AAWE members willing to participate in a regionally-based effort We can locate members down to a County level using GIS and could ask willing members who may be close to a disaster site to collect information. Of course guidelines and training would be needed. This may decrease response time and cut costs. Anyone interested?
2. What could or should be the role of AAWE in assuring that visual and other information is available over a long-term?

### **Proposed Establishment of a Wind Hazard Mitigation Consortium**

A group of universities have been working together to develop a coordinated Wind Hazard Mitigation Consortium. The following universities have agreed to cooperate in developing the Consortium:

Virginia Tech University  
Clemson University  
Florida International University  
The Johns Hopkins University  
Louisiana State University  
North Carolina State University

Notre Dame University  
State Univ. of NY at Buffalo  
Univ. of Delaware

The consortium has put together a comprehensive plan to develop knowledge and solutions in technical and socio-economic areas. The Consortium is currently seeking support for the proposed comprehensive program. It is hoped that AAWE members will help to encourage the establishment of this increased level of activity in wind engineering.

For information on the Consortium contact:

Dr. H. W. Tieleman  
Professor Emeritus  
Eng. Science and Mechanics Dept.  
Virginia Tech  
Blacksburg, VA 24061  
Phone (540) 231-4190  
FZX (540) 231-4574  
e-mail [tieleman@vt.edu](mailto:tieleman@vt.edu)

### **Interesting & Useful Web Links**

Federal Emergency Management Agency  
[www.fema.gov](http://www.fema.gov)

American Society of Civil Engineers  
[www.asce.org](http://www.asce.org)

Institute for Business & Home Safety  
[www.ibhs.org](http://www.ibhs.org)

National Science and Technology Council  
[www.whitehouse.gov/WH/EOP/OSTP/html/OSTP\\_Home.html](http://www.whitehouse.gov/WH/EOP/OSTP/html/OSTP_Home.html)

National Science Foundation  
[www.nsf.gov](http://www.nsf.gov)

To access data on severe thunderstorms and tornadoes, with daily logs of REPORTED events and monthly totals, go to NOAA's Storm Prediction Center homepage: [www.spc.noaa.gov](http://www.spc.noaa.gov); for a summary of the 1998 Atlantic hurricane season, listed for all named tropical storms and hurricanes, go to NOAA's National Hurricane Center homepage: [www.nhc.noaa.gov](http://www.nhc.noaa.gov) For data requests and a summary of all recent weather-related natural disasters over the U.S. that caused \$1B or more in total damages, go to the NOAA National Climatic Center homepage: [www.ncdc.noaa.gov](http://www.ncdc.noaa.gov)

### **Future Meetings of Interest**

10th International Conference on Wind Engineering  
Copenhagen, Denmark

June 21-24, 1999  
[1cwe99@danmark.dk](mailto:1cwe99@danmark.dk)  
<http://www.danmar.dk/icwe99>

International Conference on Applications of  
Statistics and Probability  
Dec. 12-15, 1999  
Sydney, Australia

Geophysical Hazards: Risk Assessment, Mitigation and  
Warning Systems  
International Union of Geodesy and Geophysics  
(IUGG99)  
July 22-27, 1999  
Birmingham, United Kingdom  
[el-sabh@jafar.uqar.uqubec.ca](mailto:el-sabh@jafar.uqar.uqubec.ca)  
<http://www.bham.ac.uk/iugg99/>

Los Angeles Tall Building Structural Design Council  
Annual Meeting  
May 7, 1999  
Phone 213-362-0707

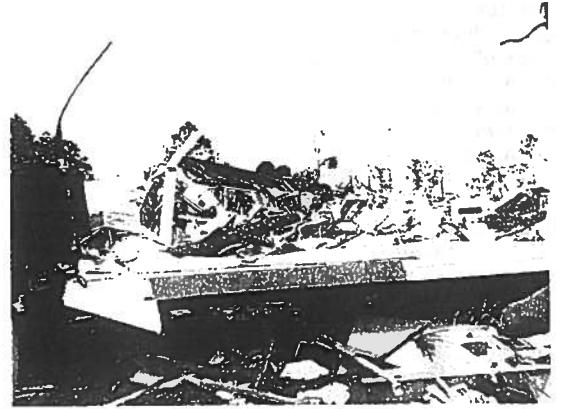
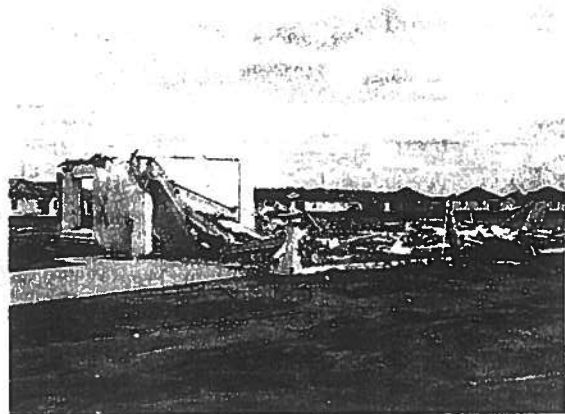
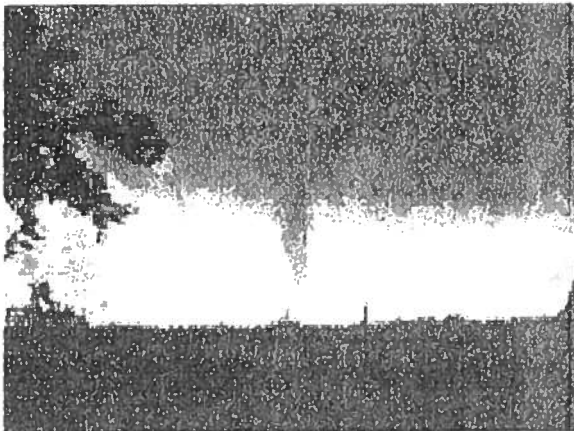
American Institute of Architects National Convention and  
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May 6-9

Dallas, TX  
<http://www.aiaonline.com>

13th ASCE Engineering mechanics Specialty Conference  
June 13-16, 1999  
The Johns Hopkins University  
Baltimore, MD  
<http://rongo.ce.jhu.edu/emd99/>

IABSE Conference on Cable-Stayed Bridges  
June 2-4, 1999  
Malmo, Sweden  
[congrex@congrex.se](mailto:congrex@congrex.se)  
<http://www.congrex.se>

4<sup>th</sup> International Conference of the European Association  
for Structural Dynamic (EURODYN '99')  
June 7-10, 1999  
Prague, Czech Republic  
[eurodyn@itam.cas.cz](mailto:eurodyn@itam.cas.cz)  
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# American Association for Wind Engineering

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