02/02/06

9903/DG-1143 Review

70FR5694

March 22, 2006

(1)

Dear Mr. Buslik:

Attached hereto are my comments concerning your Draft Regulatory Guide R.G. DG1143 on tornadoes.

Please advise if you require any clarification of these comments.



E-RIDS = ADM-03

Add = A. Buslik (AJB)
J. Goo (JSG)

SISP Review Complete

Template = ADM-013

**REVIEW RESPONSE**

**TO NRC R.G. DG-1143**

March 22, 2006

Gentlemen:

I hereby comment on your Draft Regulatory Guide DG-1143, "Design Basis Tornado and Tornado Missile for Nuclear Power Plants.

A. General

1. The Draft guide covers only tornadoes and tornado missiles. While it is appreciated these phenomena generally envelop other extreme wind design phenomena, the Guide should be expanded to indicate it covers all extreme wind loads which might control design to include hurricanes and straight-line winds.

2. It is not clear why a $10^{-7}$/yr tornado probability of exceedence level is chosen. This probability level is significantly less than earthquake probability levels of $10^{-4}$/yr mean or $10^{-5}$/yr median design defined for the shutdown earthquake in R.G. 1.165 when earthquake design basis loads are considered. This is particularly true when the acceptance criteria for both earthquake and tornado loading phenomena; hence, conditional probabilities of failure given the events are the same.

3. It is appreciated that tornado wind and missile loads in the past have been used to envelope loads from other postulated external hazards such as a small airplane crash not otherwise considered explicitly. However, it is not obvious that a 200 mph wind and a 77 mph automobile missile, as defined in Table 2 for the Region III tornado hazard considered as a design basis, would encompass the effects of a small airplane crash particularly for typically exposed safety-related equipment such as emergency generators, tanks and ventilation equipment. If you still wish to use an extreme wind as a surrogate for other external hazards, you might define two regions as was done in SECY Letter. 93-087 Item II.F, but with Region I at 275 mph and Region II at 230 mph.

4. The effect of the new automobile missile in particular will have a very significant impact on increasing the design requirements for Category I Structures Systems and Components (SSC). In SRP Section 3.5.1.4, Rev. 2 dated July 1981, in the B spectrum, an automobile missile has a velocity of 0.2 x 360 x 88/60 = 106 ft/sec for Region I. In your proposed revision of R.G. 1.76 in Table 2, that missile velocity is increased to 170 ft/sec or 170/106 = 1.60 times the current criteria. Since missile impact loads are a function of the missile velocity squared $(1.60)^2$ = 2.57 times the current missile design input load. This new conservatism, plus the fact that the automobile missile will no longer be limited to within 30 feet of grade, will dramatically increase the reinforcement requirement and possibly wall

thickness of all NPP Category I structures; except the containment building. It would also bring into question the tornado safety of all existing NPP SSC structural adequacy outside containment and may have undue severe economic impacts on the private sector with little or no increase in necessary safety.

Before these new automobile tornado velocities are adopted by the NRC, it is strongly urged that this issue be reviewed by a panel of technically qualified experts before the recommendation of a single set of authors that you reference (i.e., Simiu and Scanlan) are adopted for regulatory purposes. The new automobile missile will have a major impact on design and costs of new NPP structures and exposed nuclear safety-related systems and components other than containments. It is strongly recommended that the ASCE Standard Task Committee on Wind Loads, who prepared the wind load portion of ASCE Standard 7-05, be contacted to obtain their input on the NRC revision of R.G. DG-1143; particularly as it relates to hurricane loads and missile phenomena and as discussed below, the use of the new Enhanced Fujita Damage Scale. In Particular ASCE 7-02 Section 6.5.4 and commentary to Section 6.5.4 and Table C.6.3 and Section 6.5.9 and Commentary to Section 6.5.9 should be considered. While the ASCE-7 data is not generally applicable for return periods greater than 500 years (i.e., probability of exceedence levels less than $2x10^{-3}$), an extension of the hurricane data for the Gulf of Mexico and Atlantic Coast regions to 1000-year return periods ($1x10^{3}$/yr probability of exceedence level) would exceed 200 mph wind speed. The extension of hurricanes to the $10^{-7}$/yr probability of exceedence level could very well exceed both the Region III and the Region II wind speed levels particularly when it is recognized that hurricanes per year typically affect a one to two order of magnitude larger area than do tornadoes in the Continental U.S.

5. There is also a need to define different wind loads for RISC Category 3 SSC which are part of a NPP, but do not involve a potential release from the reactor core or fresh spent fuel storage at NPP sites. This would be consistent with R.G. 1.143 type facilities where for example, reduced safe shutdown basis earthquake loads are defined for design purposes.

B. Application of the New Enhanced Fujita Wind Speed Vs. Damage Scale

As I am sure you are aware, the old Fujita scale, which correlated damage to wind speed, is being replaced by the Enhanced Fujita, EF scale (see attachment). The new EF scale significantly reduces the wind speeds at which a particular damage occurs. Tornado design of nuclear power plant SSC are based on analysis using postulated wind speeds converted to equivalent loads. Using the old Fujita scale these loads are being significantly over estimated. For example, the Fujita wind speed of 360 mph would be reduced to about 265 mph using the correlation developed for the EF scale. This means loads equivalent to a Fujita 360 mph wind should use a .265 mph 3 second gust wind speed with the EF scale. A 300 mph Fujita wind speed should be 225 mph in the EF

scale. This recognition would significantly reduce the tornado wind pressure design loads as well as missile loads.

The use of the EF scale would also tend to place greater emphasis on hurricane wind loads in the design of NPP's. Unlike tornadoes, the speeds of winds in hurricanes have been accurately measured directly. For an upper bound Category 4 hurricane at the 154 mph level would have equivalent damage to a Fujita scale 183 mph wind speed.

The ASCE-7 standard for hurricanes defines the 50 year return period wind speed at 150 mph with a 1.07 increase for each doubling of the return period up to 500 years.

| | |
|---|---|
| 50 yr | 150 mph |
| 100 yr | 150 x 1.07 = 160.5 |
| 200 yr | 160 x 1.07 = 171.7 |
| 400 yr | 171.7 x 1.07 = 183.8 |
| 800 yr | 183.8 x 1.07 = 196.6 |
| 500 yr | 196.6 – 183.8 = 12.8 x ¼ = 3.2 |
| | 183.8 + 3.2 = 187 mph |

While in general hurricane wind speeds would not continue to increase at the rate of 1.07 multiples for every doubling of the return period, it is obviously at a very low probability of exceedence rate of $10^{-7}$/yr hurricane wind speed in the Atlantic and Gulf regions would approach or exceed tornado wind speeds particularly where it is recognized that hurricanes typically have damage areas one to two orders of magnitude greater than tornadoes per year.

In summary, the proposed R.G. DG-1143 appears to be a band-aid on extreme wind design of NPP. It ignores the loading effects of hurricanes, which at the extremely low probability level of $10^{-7}$/yr may control design in Atlantic Ocean and Gulf of Mexico coastal regions and the revised criteria would result in higher loads due to wind pressure than is warranted by the use of the more correct EF scale and would certainly result in a major increase in the design loads coming from a design basis automobile missile.

Sincerely,

John D. Stevenson
Consulting Engineer

**E:MAIL FROM STRUCTURAL ENGINEERING INSTITUTE - MARCH/APRIL 2006 SEI UPDATE**

SEIUpdateMarchApril 2006 BODY { background-color:rgb(255,255,255); font-family: Verdana, Arial; font-size: 9pt; color: #000000; } .style1 {font-size: 11px} .style3 { font-family: Arial, Helvetica, sans-serif; font-size: 16px; } .style4 { font-family: Verdana, Arial, Helvetica, sans-serif; font-size: 12px; } .style9 {font-size: 12px} .style10 { font-family: Arial, Helvetica, sans-serif; font-style: italic; } .style11 { font-family: Verdana, Arial; color: #335555; font-weight: bold; }
The Structural Engineering Institute of ASCE 1801 Alexander Bell Dr. Reston, VA 20191 1.800.548.2723 March/April 2006 Of Interest Ask the Experts

--> Letter from the Director New Tornado Rating SEI/ASCE News Civil Engineering: The Dagu Bridge Hurricane Katrina Woodframe Case Studies Committee News Seismic Rehabilitation Standard Public Comment Wind Tunnel Testing Standard Public Comment Committee Meetings Honors and Awards

--> Structural Condition Assessment Structural Applications of Steel Cables Telecommunications Facilities Fiber Composites and Polymers SEI/ASCE Publications ASCE 7-05: Minimum Design Loads Bracing Cold-Formed Steel Structures ASCE 24-05: Flood Resistant Design and Construction Journal of Structural Engineering: April 2006 ASCE Publication Lists Seminars 2005 AISC Specification/Manual Seminar BIM Seminar, June 2006 ASCE Structural Seminars Conferences 2006 Structures Congress and Pre-Congress Workshops, May 18-20, 2006 1906 San Francisco Earthquake Anniversary Conference, April 18-22, 2006 Restoration of Heritage Masonry Structures Conference, April 24-27, 2006 Electrical Transmission Conference, October 15-19, 2006 Call For Papers 2007 Structures Congress, May 16-19, 2007 10th North American Masonry Conference, June 3-6, 2007 SEI's Continuing Education Initiative ASCE Continuing Education Opportunities Miscellanea Blind Prediction Contest In Memoriam: Professor Arthur Chiu

--> Letter from the Director 2006 Structures Congress St. Louis, MO An Opportunity to Learn and to Learn from Failures By James A. Rossberg, P.E. Katrina and September 11th are two events that have deeply affected the engineering profession and, in some quarters, shaken the public's unspoken confidence in the profession to provide for their safety. Fortunately, the explanations offered, the studies conducted, and the historic performance of our infrastructure appears to have satisfied many of the concerns raised by these disasters. But frankly, we need to do more. As a profession we need to fully understand these failures and then make judgments on how best to prevent recurrences in the future. SEI has designed two

special sessions at this May's Structures Congress in St. Louis to help us do just that. On Wednesday evening, May 17th, a special 2-hour session has been organized to present the results of several studies that were conducted in the aftermath of Katrina. An examination of the wind-field analysis, a study by NIST on infrastructure failures including the levees, and a study by a team from FEMA on the performance of buildings compared to current building codes will be included in this presentation. Understanding what occurred structurally during Katrina is the first step towards improving performance. When it comes to September 11th, we as a profession are a bit further along in understanding what occurred. After significant studies by many entities including the ASCE/SEI/FEMA report and the 3-year NIST investigation, I feel that the profession has a solid understanding of failure mechanisms and can now move on to focus on what can be done for the future. As has been reported widely, NIST has issued 30 recommendations, many of which are targeted towards modifying the building codes and which may impact the design of all buildings. A concurrent special session on Wednesday evening, moderated by Jon Magnusson, P.E., will explore the potential impact of these recommendations and seek the views and concerns of the audience. SEI is heavily engaged in the debate over the future of the structurally-related NIST recommendations and very much wants to hear from you on these issues. At the moment, NIST has drafted a prescriptive approach to preventing progressive collapse in buildings within an ad hoc committee of the ICC. It is the position of the SEI Board of Governors that provisions pertaining to progressive collapse should: a) not be prescriptive as that impinges upon the creativity and inventiveness of structural engineers; and b) should be developed through a consensus process - not directly prescribed in the building codes. SEI has voiced these concerns previously and will continue to do so in a wide range of different forums. In addition, the Executive Committee of the Technical Activities Division recently approved the establishment of a new committee to focus specifically on the development of guidelines for dealing with progressive collapse. Anyone interested in being involved in the committee should contact me directly at jrossberg@asce.org. As professionals, we are obligated to learn from failures and do our best to minimize the possibility of future tragedies. As an organization, SEI remains committed to helping the profession meet this obligation and we look forward to seeing everyone in St. Louis at the Congress. You can view the entire 3-day, 90+ session program by visiting www.SEInstitute.org and clicking on "2006 Structures Congress." Return to top NOAA and NWS Implement New Tornado Rating The National Oceanic and Atmospheric Administration's (NOAA) national Weather Service (NWS) has announced plans to implement the Enhanced Fujita (EF) Scale to rate tornadoes, replacing the original Fujita (F) Scale. The EF Scale will continue to rate tornadoes on a scale from zero to five, but ranges in wind speed will be more accurate with the improved rating scale. The NWS will continue to use the F scale to rate tornadoes until implementation of the EF Scale is complete. The NWS expects implementation of the EF Scale to be complete by February 2007. Training of NWS field personnel is expected to begin in Fall of 2006. The EF Scale was developed by the Texas Tech University Wind Science and Engineering (WISE) Research Center, along with a forum of wind engineers, universities, private companies, government organizations, private sector meteorologists and NOAA meteorologists from across the

country. The EF Scale refines and improves the original F Scale. Limitations of the original F scale may have led to inconsistent ratings, including possible overestimates of associated wind speeds. the EF Scale incorporates more damage indicators and degrees of damage than the original F Scale, allowing more detailed analysis and better correlation between damage and wind speed. The original F Scale historical database will not change. Since ratings in both scales are based on damage and estimates of wind speeds, a tornado rated by the original F scale would have the same EF scale number, but the estimated wind speeds would be more accurate. A correlation between the original F Scale and the EF Scale has been developed, and can be found at: http://www.spc.noaa.gov/efscale. More information will become available as the NWS moves forward with the EF Scale implementation over the next year. Return to top Civil Engineering: The Dagu Bridge An effort to revitalize an older section of the city of Tianjin, located about 120 km east of Beijing, included plans for an iconic bridge over the Hai River. But the region's susceptibility to seismic activity and the river's soft soils precluded the use of piers in the water, limiting the design options. The bridge was to be 106 m long and more than 30 m wide and have a maximum allowable girder depth of only 1.3 m. Because of the high span-to-girder-depth ratio, a girder-type bridge would not be possible, further narrowing the possibilities. T. Y. Lin International of San Francisco moved beyond these limitations with a unique, pile-supported, tied-arch bridge that employs particularly slender, asymmetrical, inclined arches that offer the city a signature structure.

The Dagu Bridge, as it is called, is a three-dimensional structure with two planes of suspenders attached to each arch rib—one at the edge of the roadway, the other at the outside edge of the pedestrian paths located on either side of the roadway. With two inclined planes of suspenders tying each arch rib to the deck, the ribs were able to be very slender, yet still possess the required stability. The width of the top plate of the larger rib varies from 1.3 m at the crown to 2.2 m at either end, and the depth varies proportionally. The top plate of the smaller rib is 1.3 m wide and the depth is 1.3 m along the entire length. The arch ribs provide the vertical stiffness for the structure, the deck provides the lateral stiffness, and the cables combine the two to form a compact system.

Please see the March 2006 issue of Civil Engineering for the full article on the Dagu Bridge. Return to top Hurricane Katrina Woodframe Case Studies Available on the Web By John W. van de Lindt, PhD, Colorado State University, M. ASCE. As you may recall, in September a team of ASCE members visited the Mississippi Gulf Coast following hurricane Katrina. The team members were John W. van de Lindt, PhD, Thomas Skaggs, PhD, PE, Andy Graettinger, PhD, Rakesh Gupta, PhD, Steve Pryor, PE, and Ken Fridley, PhD. An initial report was released and is available at the project website at: http://www.engr.colostate.edu/~jwv/hurricane-Katrina-woodframe.htm

Case studies of woodframe damage during hurricane Katrina are also available on the project website at: http://www.engr.colostate.edu/~jwv/CaseStudies.htm and include the results of cause-of-failure discussions during site visits, satellite photos, and thumbnail photo suites for each case study. An example of a single case study is shown below.

There will be a session at the structures congress from 1:30-3:00, May 19, entitled "Natural Hazards-Induced Damage to Woodframe Structures" with presentations focusing on earthquake and wind effects including a Katrina-related damage presentation. Hope to see you there! Collection of Perishable Data on Woodframe Residential Structures in the Wake of Hurricane Katrina Case Study # 7 Name Assigned: Porch collapse and veneer cracking Address: Unknown Coordinates: N30d26'39.9"/W089d05'20.8" Structure Description: The house had an in-line two car garage with a central pier. The center pier, as well as the rest of the house, was finished with brick veneer. The pier was not attached to the foundation with an anchor bolt. Failure Description: The pier between the two car garage was pushed in by the hurricane. This resulted in severe cracking of the brick veneer. Also, the front covered porch dormer that spanned about six feet had posts that were bearing directly on the concrete with no attachment to the concrete. The posts were lost during the storm, perhaps from the uplift of the porch, and the porch collapsed. Once the porch collapsed, the rest of the home was vulnerable to further wind pressurization, resulting in additional loss of sheathing as well as rain infiltration. Return to top Committee News ASCE/SEI announces Public Comment Periods: Seismic Rehabilitation of Existing Buildings

The newly-developed ASCE/SEI Seismic Rehabilitation of Existing Buildings Standard opened for a 45-day Public Comment beginning February 3, 2006. ASCE 41 represents the most current, state-of-the-art knowledge in earthquake engineering and will be a very useful tool for the engineering profession and the public to improve building performance in future earthquakes.

Anyone wishing to participate in the Public Comment Period should contact ASCE Standards Administrator Eileen Boeing at eboeing@asce.org for instructions on how to participate. The comment period will be open from February 3, 2006, until 5:00 p.m. (EST), March 21, 2006.

January 2006 Committee summary Wind Tunnel Testing

ASCE/SEI's newly developed Wind Tunnel Testing Standard will open for public comment on February 27, and remain open until April 13, 2006.

The new standard will provide minimum requirements for wind tunnel tests to determine wind loads on and responses of, buildings and other structures and will consider such loads as wind loads for main wind-force resisting systems and for individual structural components and cladding. The loads produced by these tests will be suitable for use in building codes and other standards, and will satisfy the requirements for wind-tunnel testing in ASCE 7, Minimum Design Loads for Buildings and Other Structures.

The public comment period is one of the final stages of the consensus standards development process, and will be conducted using ASCE's Web-based balloting system. Anyone wishing to participate in the public comment period should contact Eileen Boeing, ASCE standards administrator, at eboeing@asce.org, for specific instructions. Return to top Committee Meetings ASCE/SEI Structural Condition Assessment and Rehabilitation of Buildings Standards Committee May 17, 2006, St. Louis, Missouri The ASCE/SEI Standards Committee for Structural Condition Assessment and Rehabilitation of Buildings plans to meet during the SEI Structures Congress in St. Louis, Missouri, on May 17, 2006. The committee will consider revisions and additions to SEI/ASCE 11 and SEI/ASCE 30, both of which are being updated. For more information, contact Committee Chair Carl Baumert, P.E., at cab@keasthood.com. For more information on the SEI Structures Congress, visit the SEI Web site at www.SEInstitute.org. ASCE/SEI Structural Applications of Steel Cables for Buildings Standards Committee May 18, 2006, St. Louis, Missouri The ASCE/SEI Standards Committee for Structural Applications for Steel Cables for Buildings plans to meet during the SEI Structures Congress in St. Louis, Missouri, beginning at 10:00 a.m. on May 18, 2006. The committee plans to review the seventh draft of the standard and commentary. For more information, contact Committee Chair Dr. Charles Birnstiel, P.E., at cbirnstiel@hardesty-hanover.com. For more information on the SEI Structures Congress, visit the SEI Web site at www.SEInstitute.org. Return to top ASCE/SEI Telecommunications Facilities Committee Meeting Friday May 19, 2006, at the 2006 Structures Congress Adam's Mark Hotel, St. Louis, Missouri. The ASCE/SEI Telecommunications Facilities Committee, dedicated to research of key structural issues in connection with the design, upgrading, and maintenance of self-supporting and guyed lattice and pole structures, will be meeting on May 19, 2006, to identify, discuss, and prioritize research topics and their funding. Proposed issues would include wind loading on complex appurtenances, interaction of appurtenances and tower elements during wind loading, connection design, splices, foundations, design for earthquakes, software, etc. The meeting will be held between 8:30 A.M. and 11:00 A.M. on Friday May 19, 2006, at the 2006 Structures Congress at the Adam's Mark hotel in St. Louis, Missouri. Please direct all questions related to this meeting to Simon Weisman, Chairperson, (416) 736 7453

or simon@weisman-consultants.com.

The work of this committee is particularly important in view of the new TIA Standard 222 G, which took effect on January 1, 2006, as it introduced many new requirements, which have little published data supporting them. Anyone wishing to participate, either as a member of the committee or through committee sponsored research, should contact Simon Weisman. This is a good opportunity for researchers at universities to develop interesting programs of research for undergraduate and graduate studies, which may be sponsored by stakeholders in the broadcasting and wireless industries.

ASCE/SEI Fiber Composites and Polymers Standards Committee May 20, 2006, St. Louis, Missouri The ASCE/SEI Fiber Composites and Polymers Standards Committee plans to meet during the SEI Structures Congress in St. Louis, Missouri, on May 20, 2006. The committee plans to review the status of the standard; funding options; committee membership; assign subcommittee responsibilities; and approximate the schedule. For more information, contact Committee Chair Dr. Max Porter, P.E., at mporter@iastate.edu. For more information regarding the SEI Structures Congress, visit the SEI Web site at www.SEInstitute.org. Return to top Minimum Design Loads for Buildings and Other Structures SEI/ASCE 7-05 The ASCE Standard 7-05, Minimum Design Loads for Buildings and Other Structures, provides requirements for general structural design and includes means for determining dead, live, soil, flood, wind, snow, rain, atmospheric ice, and earthquake loads, and their combinations that are suitable for inclusion in building codes and other documents. This Standard is a revision of ASCE/SEI 7-02. This Standard includes revised and significantly reorganized provisions for seismic design of structures, as well as revisions in the provisions for determining live, flood, wind, snow, and atmospheric ice loads. Also included is Supplement No.1, which is a detailed commentary containing explanatory and supplementary information to assist users of this Standard. Structural engineers, architects, and those engaged in preparing and administering local building codes will find the structural load requirements essential to their practice. Errata for ASCE 7-05 is available at www.SEInstitute.org (under publications/errata).

View the Table of Contents Order ASCE/SEI 7-05 online or by phone at (800) 548-ASCE. Return to top

Bracing Cold-Formed Steel Structures: A Design Guide edited by Thomas Sputo, PhD, PE and Jennifer L. Turner Bracing Cold-Formed Steel Structures: A Design Guide documents the current practices related to bracing cold-formed steel structure elements and systems. For many engineers the design of structures using cold-formed steel is seen as a daunting task. This report seeks to

remove some of the perceived mystery by providing readily useful information for bracing these structures. Heavy on applications and examples, this book contains design examples illustrating bracing design for various types of cold-formed steel structures, as well as an extensive list of primary reference sources. This report is presented as a design guide and will assist the practicing engineer in designing cold-formed steel structures with greater levels of reliability, safety, and economy. Topics Include: • Introduction to Bracing Design • Cold-Formed Framing • Cold-Formed Steel in Metal Building Systems • Miscellaneous Cold-Formed Steel Elements and Systems .

View Table of Contents Order online or by calling (800) 548-ASCE. Return to top Flood Resistant Design and Construction ASCE/SEI Standard 24-05

The newly-revised ASCE/SEI Standard 24-05 Flood Resistant Design and Construction has just been published and is available for purchase. This is the updated version of the initial Standard 24-98 which had been adopted by reference in both the IBC and NFPA Building Codes, and which has been the primary reference for designers, educators and building officials concerned with design and construction of structures located in flood hazard areas. The requirements established in the Standard are applicable to both coastal and riverine flood areas. The standards committee has worked diligently for more than two years in developing this new edition in accordance with the rigorous ANSI consensus process used by ASCE for all published Standards, and it incorporates many new requirements governing design and construction for new structures and for work classified as substantial repair or improvements to existing structures not designated as historic structures.

View the Table of Contents To order ASCE/SEI Standard 24-05, please call (800) 548 ASCE or from the ASCE online Bookstore. Return to top Journal of Structural Engineering April 2006 The April 2006 issue of the Journal of Structural Engineering sees published a special issue on Cold-Formed Steel Structures guest edited by Benjamin W. Schafer. The majority of the papers that appear in this issue are expanded from presentations made at the Seventeenth International Specialty Conference on Cold-Formed Steel Structures, held in Orlando, Florida in October 2004. Those papers included from the conference have been specially selected by members of the SEI-ASCE Committee on Cold-Formed Steel.

Behavior and design of cold-formed steel members remains an active area of research, and the issue begins with five papers covering experimental and numerical examinations of cold-formed steel members, with particular emphasis on the distortional buckling limit state. Distortional buckling, where the compression flange buckles as a

group of plates instead of as individual plates, has only recently begun to work its way into governing design specifications around the world.

The second group of papers (six in total) cover cold-formed steel walls, shear walls, and frames, while the third group (comprised of three papers) covers research on cold-formed steel trusses. Cold-formed steel trusses may be constructed from conventional plain channel and lipped channel sections, or may use proprietary shapes designed specially for providing strength against local buckling and convenient locations for connections as diagonals frame into chords. The special issue concludes with two technical notes relating to cold-formed stud wall systems used in Australian Residential construction, and distortional buckling of cold-formed steel members in the Brazilian code for distortional buckling.

Read full description

improve their quality and efficiency and now architects are embracing the use of emerging BIM products for commercial and institutional projects. Such firms are requesting that their consultants collaborate with them and other design team members using BIM. This will change the structural engineer's process and deliverables. Are you and your firm ready? Do you have a plan for the transition to BIM? CASE and SEI seek to help their membership prepare for BIM technology by jointly sponsoring a half-day seminar entitled, "Building Information Modeling - An Introduction for Practicing Structural Engineers." The seminar will focus on getting the structural engineering firm up to speed on BIM by presenting the building information modeling concept, what some firms are doing today, and available software and emerging technologies. Hear directly from practitioners using BIMs on real projects as they share what has worked well and what software has not worked as well. Attendees will learn what their firms can, and perhaps should, be doing today to prepare for clients requesting BIM collaboration. To receive additional details about this seminar, please contact Cathy Cardno at ccardno@asce.org. ASCE Structural Seminars ASCE offers a full range of structural seminars, which offer CEUs, and take place each month across the nation. For a full listing of these seminars, please click here. Return to top 2006 Structures Congress: Structural Engineering and Public Safety May 18-20, 2006 St. Louis, MO Click here to view the full Preliminary Program for the 2006 Structures Congress in St. Louis. Early bird registration ends April 15th : click here to register now. The Structural Engineering Institute is putting on two pre-Congress workshops immediately preceding the 2006 Structures Congress in St. Louis. Both workshops are on Wednesday, May 17th from 1:00pm - 5:00pm at the Adam's Mark Hotel. The cost for either is $75 for early bird registration, and $95 after April 15. "Structural Design for Blast Effects" is being run by Dr. Sam Kiger and Dr. Stan Woodson. "I Could Have Made that Mistake" is being run by Ron Hamburger, S.E., Dr. Jacqueline R. Mesaros, Larry Borda, attorney, and John Tawresey, P.E. Register for either Workshop and the full conference at: http://www.asce.org/conferences/structures2006/ Return to top 100th Anniversary Earthquake Conference: Commemorating the 1906 San Francisco Earthquake April 18-22, 2006 San Francisco, CA The 1906 Earthquake left many legacies for California, including anticipation of the next, inevitable, great quake. The 100th Anniversary Earthquake Conference will bring together earthquake professionals from around the world - scientists, engineers and preparedness experts - in San Francisco on April 18-22, 2006, to commemorate the 1906 Earthquake, review what we have learned, and discuss what we can do to further preparedness. Conference Highlights include: 100+ sessions and tutorials covering critical issues to earth scientists, building owners, emergency managers, earthquake engineers, policy makers, and business continuity planners. 30+ tutorials developed for teachers, the business community, and design professionals. 25 exciting field trips illustrating seismic safety achievements. Over 40 sub-plenary sessions highlighting the latest advances in science, engineering, and seismology led by world-renowned experts and scholars. A scenario that looks at how the San Francisco Bay Area would fare if a 1906 earthquake hit us today. Earthquake professionals' Top Ten Actions for Northern California.

To register for the conference and field trips, please visit www.1906EQconf.org.

Early Bird registration ends March 18th and field trips are filling up fast, so register soon! Return to top Restoration of Heritage Masonry Structures First International Conference Cairo April 24-27, 2006 Dr. Ahmad A. Hamid with the support of an international committee are launching the First International Conference on Restoration of Heritage Masonry Structures April 24-27, 2006 in Cairo, Egypt . The conference will be dedicated to the evaluation, assessment and retrofit/restoration of all types of historic and heritage masonry structures. The first conference will be held in Cairo, Egypt. With its rich history and its fabulous ancient masonry structures that are still standing after thousands of years, Egypt is a very attractive location for an international conference on historic masonry structures. The tentative program includes dinner on a Nile river cruise in Cairo and guided technical tours to the Great Pyramids of Egypt and the Sphinx. Optional post-conference clinics and trips include a Nile cruise clinic and trips to historic sites in Upper Egypt, including Abo Simble, Aswan, Kom Ombo, Edfo, and Luxur. Register soon! Details are available at www.hmc-cairo2006.com. Return to top

Electrical Transmission: Structural Reliability in a Changing World Birmingham, AL October 15 - 19, 2006 REGISTER NOW

Join the Structural Engineering Institute of ASCE and fellow engineers in Birmingham, Alabama, October 15 - 19, 2006 for "Electrical Transmission: Structural Reliability in a Changing World."

More information on the ETS Conference

Return to top 2007 Structures Congress May 16-19, 2007 Long Beach, CA

You are invited to submit session requests and/or paper abstracts for the 2007 Structures Congress in Long Beach, California. Proposals should focus on topics consistent with the Congress theme: New Horizons and Better Practices. Session Requests should include the session title, session abstract, and name of proposed session chair and contact information (including email address), as well as each author's name and contact information (including email address), and

each paper's title and abstract. Please indicate your topic area from the list of topics published in this announcement.

Paper Abstracts must include each author's full name, credentials, affiliation, location, and contact information (including email address). Any special comments, such as session, track, or topic for which the paper is best suited, should be written at the bottom of the abstract page.

Authors Whose Abstracts Are Accepted and who submit a final paper are expected to attend the 2007 Structures Congress, pay appropriate fees, and make their presentation(s) in person.

All Expenses related to preparing and presenting the papers, including camera-ready manuscripts and illustrations, are the responsibility of the authors and co-authors.

To submit your session requests and/or paper abstracts, please visit http://www.asce.org/conferences/structures2007/ and click on "Abstract Submission." All session requests and paper abstracts should be no more than two printed pages per abstract.

Sessions by and under the sponsorship of the various SEI Technical Committees are encouraged. Return to top 10th North American Masonry Conference CFP Abstracts on masonry are being sought for the upcoming 10th North American Masonry Conference (NAMC), which will be held in St. Louis, Missouri from June 3-6, 2007. Technical Papers and General Interest Papers on masonry related topics on a broad range of masonry topics will be considered for the conference.

Call for Papers

For more information, please see http://www.masonrysociety.org/NAMC/index.html

Return to top Call for Course Proposals SEI's Continuing Education Initiative

The Structural Engineering Institute is developing a continuing education program of its own for members and the profession. SEI's Administrative Committee on Continuing Education (ACCE) is separate and distinct from ASCE Continuing Education courses in several important ways: The ACCE seminars will be delivered primarily through SEI Local Activities Division, local SEI committees or similar organizations (state structural engineering association, local SECA structural committees, etc.) rather than through a centralized structure. The cost and schedule will appeal to practicing engineers. SEI intends that the cost will be nominal ($50-$250 depending on the length and content) or free. The course content will be tightly focused on the practical application of recent knowledge (technology transfer as opposed to discussions of recent research or overviews of broad topics). Some courses will be highly portable to enable local expects to present the material with minimal preparation.

If you or the committee on which you serve has one or more ideas for such seminars, the next step is to submit a short proposal to SEI's Cathy Cardno at ccardno@asce.org. Please include a copy of your resume with your application. Proposal Form. Return to top ASCE Continuing Education Opportunities

ASCE is currently looking for professionals willing to develop and present 2- or 3- day seminars in all disciplines within the Civil Engineering profession and in management training. If you are interested in creating a seminar for the professional engineer, an application packet and more information is available here. ASCE offers the prestige of a nationally recognized program, monetary compensation, travel reimbursement and an opportunity to improve the civil engineering profession. Return to top Miscellanea Seven-Story Building-Slice Earthquake Blind Prediction Contest

UC San Diego has recently completed a large outdoor shake table and has just completed testing on a vertical slice of full scale reinforced concrete shear wall building. The results have not yet been published, and the School of Engineering at the University of California at San Diego (UCSD), the Portland Cement Association (PCA) of Skokie, IL., and the NEES Consortium Inc. (NEESinc) are pleased to announce a blind prediction contest associated with the structure. The contest is open to teams from the practicing structural engineering community, the academic and research community (including graduate students), and the undergraduate engineering student community (with graduate student or faculty advisors).

The prediction contest will be "blind" and compare analytical response "predictions" with those measured during experimental testing. All predictions are due on May 15, 2006. Winning teams in each of the three categories will receive $2500 from PCA, while

NEESinc will also reimburse a representative of the winning team from each of three award categories allowable travel expenses to attend the NEES Annual Meeting that will be held in Washington D.C. June 21-23, 2006.

More information on this contest. Return to top

In Memoriam

It is with regret that the Structural Engineering Institute announces that Professor Arthur Chiu passed away January 30, 2006. A member of ASCE for 54 years, Dr. Chiu was an emeriti professor in the Civil and Environmental Engineering department at the University of Hawaii - Manoa and Honorary Member of ASCE at his passing.

ASCE Honorary Members are engineers who have attained acknowledged eminence in some branch of engineering or in the arts and sciences related thereto. These engineers of distinction are elected by the ASCE Board of Direction and since 1853 only 545 engineers have been honored thusly.

Active in the profession and on campus until the very end, Dr. Chiu suffered a stroke on January 27 and passed away a few days later. Return to top

Please forward this message to your friends and colleagues who share an interest in Structural Engineering and would like to hear from the Structural Engineering Institute of the American Society of Civil Engineers. Encourage your friends and colleagues to join SEI and receive all the benefits of being an SEI Member.

Check out our new sitemap! SEI has revamped its website at www.seinstitute.org. Visit us to learn more about upcoming conferences, calls for papers and presenters, and a variety of other information. Our website is updated weekly with new information.

The SEI Update is compiled and edited by Cathy Cardno. If you have any questions or comments, ideas for articles, announcements, book reviews, columns, or other information that you would like to see in a future issue of the e-newsletter, please email me at ccardno@asce.org.

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**From Website: FEMA For Kids**

Hurricane Classification

Hurricanes are classified into five categories, based on their wind speeds and potential to cause damage.

* Category One -- Winds 74-95 miles per hour
* Category Two -- Winds 96-110 miles per hour
* Category Three -- Winds 111-130 miles per hour
* Category Four -- Winds 131-155 miles per hour
* Category Five -- Winds greater than 155 miles per hour

In the U.S., the official hurricane season is from June 1 to November 30, but hurricanes can happen any time of the year. Hurricanes are named by the National Weather Service. Some past hurricanes have been named: Opal, Andrew, Marilyn, Hugo and Fran.

Important terms to know:

Hurricane Watch -- A hurricane is possible within 36 hours. Stay tuned to the radio and television for more information. The Hurricane Center is tracking the storm and trying to predict where it may come ashore.

Hurricane Warning -- A hurricane is expected within 24 hours. You may be told to evacuate. You and your family should begin making preparations to evacuate. If your area is having an evacuation, remember to take your Disaster Supply Kit. Do not forget to make plans for your pets if you must evacuate.

A Recommendation for an

# ENHANCED FUJITA SCALE
## (EF-Scale)

Submitted to
The National Weather Service
and
Other Interested Users

January 26, 2006
Revision 1

**WIND SCIENCE AND ENGINERING CENTER**
**Texas Tech University**
**Lubbock, Texas 79409**

The exercise was conducted by mail without a formal meeting of the group. The purpose and procedure of the exercise were described in an accompanying letter. Since we were interested in knowing how these experts would rate the DI's and DOD's based on the original Fujita Scale, only one iteration was solicited. They were simply asked to apply a Fujita-Scale rating to the damage description of each DOD for all 28 DI's. The Fujita-Scale ratings were then expressed in terms of the median value of each Fujita-Scale wind speed range. The Fujita-Scale wind speeds were then converted to a 3-second gust frame of reference. The average, estimated Fujita-Scale wind speed of the six experts was then compared with the expected value wind speed from the expert elicitation process for each DOD. A regression analysis was then performed to obtain a correlation between the mean Fujita-Scale wind speed and the EF-Scale expected wind speed for each DOD. Figure 1 is a plot of the points used in the regression analysis. A linear regression function fit the data very well.

$$y = 0.6246x + 36.393 \qquad (1)$$

where y is the EF-Scale wind speed and x is the Fujita-Scale wind speed (both are 3-second gust in mph).

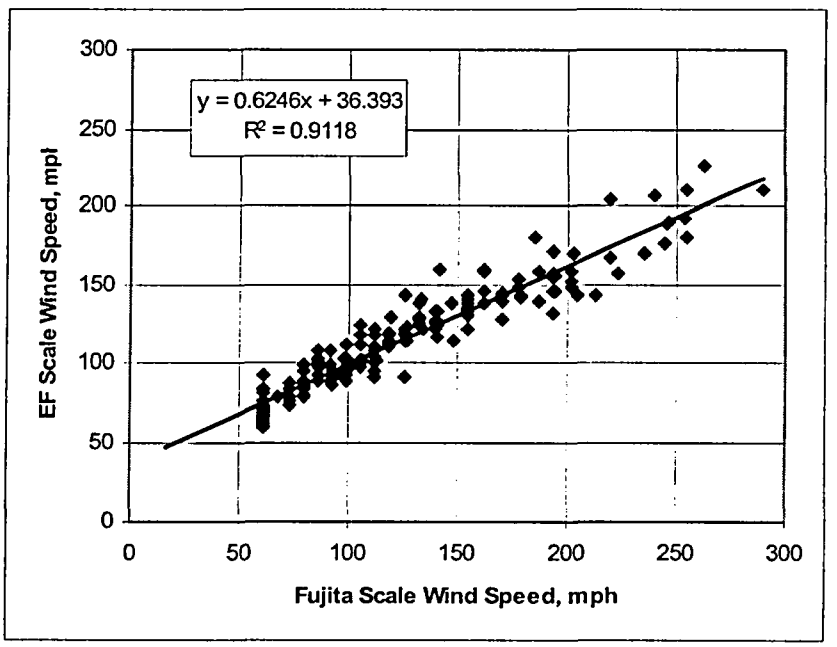


**Figure 1. Correlation of Fujita-Scale and EF-Scale Wind Speeds**

The correlation coefficient is

$$R^2 = 0.91 \quad (2)$$

which represents a very good fit of the data.

**Proposed EF Scale**

The basic wind speed ranges of the proposed EF-Scale are derived from the original Fujita Scale ranges by using Equation 1. The original Fujita-Scale wind speeds are first converted from fastest one-quarter mile to 3-second gust speeds using the Durst curve (Durst, 1960). They are then substituted into Equation 1 to obtain the wind speed ranges of the EF Scale. Table 5 shows the results of these calculations. The recommended EF-Scale wind speeds are shown in Table 6. Values have been rounded to avoid implying more accuracy than justified.

**Table 5. EF-Scale Wind Speed Ranges Derived from Fujita-Scale Wind Speed Ranges**

| Fujita Scale | | | EF Scale | |
|---|---|---|---|---|
| Fujita Scale | Fastest 1/4/-mile Wind Speeds, mph | 3-Second Gust Speed, mph | EF Scale | 3-Second Gust Speed, mph |
| F0 | 40 - 72 | 45 - 78 | EF0 | 65 - 85 |
| F1 | 73 - 112 | 79 - 117 | EF1 | 86 - 109 |
| F2 | 113 - 157 | 118 -161 | EF2 | 110 - 137 |
| F3 | 158 - 207 | 162 - 209 | EF3 | 138 - 167 |
| F4 | 208 - 260 | 210 - 261 | EF4 | 168 - 199 |
| F5 | 261 - 318 | 262 - 317 | EF5 | 200 - 234 |

**Table 6. Recommended EF-Scale Wind Speed Ranges**

| Derived EF Scale | | Recommended EF Scale |
|---|---|---|
| EF Classes | 3-Second Gust Speed, mph | 3-Second Gust Speed, mph |
| EF0 | 65 - 85 | **65 - 85** |
| EF1 | 86 - 109 | **86 - 110** |
| EF2 | 110 - 137 | **111 - 135** |
| EF3 | 138 - 167 | **136 - 165** |
| EF4 | 168 - 199 | **166 - 200** |
| EF5 | 200 - 234 | **>200** |