New York State Codes Available from ICBO

Over a year ago, the State of New York contracted with the International Conference of Building Officials (ICBO) to publish and distribute new building, fire prevention and energy codes, which can be used for building construction projects in New York starting in June 2002. Governor George Pataki announced the adoption of the new state code on March 6, 2002. The Codes of New York State is a collection of eight codes and includes the Building Code of New York State, Residential Code of New York State, Fire Code of New York State, Plumbing Code of New York State, Mechanical Code of New York State, Fuel Gas Code of New York State, Property Maintenance Code of New York State and Energy Conservation Code of New York State. ICBO is currently offering "early bird" discounts to customers who pre-purchase the code before June 30, 2002. For more information or to purchase the code, contact ICBO at 800.284.4406 or www.icbo.org.

Galvanizing News

As hot-dip galvanizing becomes more common as the corrosion protection system for structural steel fabrications, it is essential to understand the considerations for galvanizing welded black steel or for welding on galvanized steel. The American Galvanizers Association (AGA) announces the release of a new publication for those interested in this topic: *Welding and Hot-Dip Galvanizing*. This eight-page publication may be obtained free of charge from AGA by emailing aga@galvanizeit.org, calling 800.468.7732, or by downloading it from www.galvanizeit.org/publications.htm.

As part of the their ongoing commitment to providing accurate and thorough information to designers, detailers and fabricators, AGA has created poster highlighting considerations for designing steel fabrications to be hot-dip galvanized. This poster is intended to be displayed in drafting office and throughout the detailing and fabricating facility in order to provide concise and accurate information to make the job of designing for hot-dip galvanizing effortless. Obtain a copy of this 20" by 25" poster free of charge by calling or emailing the AGA with the contact information above, or by contacting your local galvanizer.

ASCE/SEI Structures Congress and Exposition—Performance of Structures from Research to Design

Taking to the hills, Structural Engineers from around the country rallied in the mile-high city of Denver for the 2002 ASCE/SEI Structures Congress and Exposition. The magnificent mountain backdrop served as the perfect venue to discuss a pressing concept in structural engineering: a return to "Performance-Based Design".

Highly visible in the immutable engineering feats of the ancient world and on the forefront of innovation in modern structural engineering, performance-based design is a movement for engineers to design buildings towards their actual response to the loads imposed upon them, rather than the prescriptive life-safety based code design practices currently in use throughout America. The Pentagon and World Trade Center have become powerful evidence of the need for performance based structural design and were connected with many of the presentations at the Structures Congress.

Performance-based design gives the designer and owner of a building the freedom to assess a building's design criteria based on testing, analysis and detailed conditions assessment of an individual project. The use of performance-based design allows greater freedom to exercise engineering judgment in the design process, by concurrently educating the owner about design goals and explicitly stating the degree of value that a structural design contains.

Performance-based design requires owners to designate the desired level of a building's response to the loads imposed upon it. That response is linked closely with the value that an owner's financing will allow and the level of damage to the structure that they are willing to accept. A response level must be determined specifically for earthquake, wind, fire and blast loadings. The probability of occurrence of these loads is assessed for the project through statistical analysis.

The owner is given a choice of response level for the building based on the likelihood of the load case happening in a set number of years. The building is considered as a whole, with all systems in place (structure, HVAC, sprinklers, partitions, etc.) The building's response to the loading may range from a level of immediate inhabitability of the structure to one of basic life-safety collapse prevention for the building.

Performance-based design has been practiced and adopted in building codes in many European countries. The first steps in the American adoption of performance-based design may be found in FEMA 356, which serves as one of the first performance based standards for the United States.

Performance-based design is a call to the engineering community to respond to the underlying form of their work; to make designs a better response to more realistic conditions of a specific site. Engineers are called upon to push their role even farther into the total design process. We as engineers should rise to this challenge by responding proudly and profoundly to make buildings safer, economically appropriate and functionally practical. Such an increase in quality of engineering services will increase the value of our work will not go uncompensated.

FEMA 356 serves as a groundbreaking step towards a complete performance based code structure. For more information on FEMA 356, access the document online at:

ww2.degenkolb.com/fema273/ps-fema356.html

Or for your free copy by mail, contact:

FEMA Publications
P.O. Box 2012
Jessup, MD 20794-2012

—Christopher M. Hewitt

Public Review of Nuclear Specification Supplement and of AISC Seismic Provisions

AISC is now requesting public review of *Supplement No. 1 to ANSI/AISC N690-1994, Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities (1994)*. This is the first public review cycle.

This standard applies to the design, fabrication, and erection of steel safety-related structures and structural elements for nuclear facilities. The structures or structural elements subject to this specification are those steel structures which are parts of the nuclear safety-related system or which support, house, or protect nuclear safety-related systems or components, the failure of which would impair the safety-related functions of these systems or components. Specifically excluded from this Specification are pressure retaining components, e.g., pressure vessels, valves, pumps, and piping.

AISC also requests public review and comment on the *Seismic Provisions for Structural Steel Buildings*. This is the third public review cycle.

These specifications are available for downloading on the AISC web site at www.aisc.org. Copies are also available (for a $12 nominal charge) by calling 312.670.5410.

Please send your specific comments to Cynthia J. Lanz, Director of Specifications, at lanz@aisc.org or by fax to her attention at 312.644.4226. Negative comments must be accompanied by reasons for the objection. Comments on either specification must be received by June 15, 2002 for consideration.

Ken Iverson, Steel Industry Icon, Dies at 76

CHARLOTTE, N.C., April 15—F. Kenneth Iverson, the man who took a failing nuclear instruments company and turned it into a revolutionary steel manufacturer, died Sunday, April 14, 2002. He was 76.

Iverson built Nucor with an entirely non-union workforce, rewarding his workers through generous production bonuses. In an industry entrenched in blast-furnaces, Iverson decided to have Nucor manufacture steel entirely from relatively small factories using recycled steel scrap. Thus, Nucor sparked the boom in "mini-mills," which now produce more than half of all steel made in the United States.

Born in 1925 in Downers Grove, Ill., he served in the U.S. Navy from 1943-46, and earned a bachelor's degree in aeronautical engineering from Cornell University and a master's degree in mechanical engineering at Purdue University.

Iverson worked at several companies and was a promising engineer when a Phoenix-based conglomerate called Nuclear Corporation of America hired him in 1962 to run Vulcraft, its new acquisition that made steel joists and steel deck. Over the next three years, as Vulcraft tripled sales and profits, the rest of nuclear corporation was losing money and headed toward bankruptcy. In 1965, Sam Siegel, a corporate accountant for the company, resigned but sent a telegram to the Board saying he would reconsider if the board named him treasurer and Iverson president. The Board, desperate to save the company, agreed. Iverson and Siegel, along with a manager from Vulcraft named David Aycock, together would lead Nucor over the next three decades.

Almost immediately, Iverson moved the company to Charlotte and jettisoned its money-losing operations to focus on Vulcraft. He and the board soon decided the company would make its own steel to insulate itself from steel price and supply fluctuations.

Under his leadership, Nucor created a joint venture with a Japanese Steelmaker in the mid-1980's, soon to become the dominant producer of wide-flange beams for construction in the United States. In 1999, Iverson received the prestigious *Robert P. Stupp Award for Leadership Excellence* from the American Institute of Steel Construction for his significant contributions to the structural steel industry.

Ken Iverson's legacy to the steel industry will endure for generations to come. "All of us at Nucor are a product of his vision," said Daniel R. DiMicco, Nucor's vice chairman, president and chief executive officer. "The best thing we can do is to continue following that vision."

AISIBEAM 3.0 Aids Short-Span Steel Bridge Design

The American Iron and Steel Institute's short span, steel-bridge package, AISIBEAM 3.0, comes complete with plans and software and offers engineers and transportation agencies one road to fast-track solutions.

AISIBEAM 3.0 is designed to aid transportation agencies and engineering firms in their efforts to create quality, cost-effective single span bridges quickly. At $245, the package is an affordable design and engineering tool. Other bridge design packages offering the same basic design function can cost as much as $5,000.

The latest version of AISIBEAM—the 3.0 upgrade—was released in February 2001. It is compatible with Windows 95, 98 and 2000, as well as NT, and provides designs and details for simple span, plate girder and rolled beam steel bridges. The software incorporates AASHTO's 1999 Load Factor Design specifications, including deflection and constructability criteria. It can be used to generate both preliminary design alternatives and final designs in either metric or English units.

AISIBEAM 3.0 designs bridges based on user-specified roadway classification, road width, girder spacing, steel grade, concrete strength, live load, vehicle type and other criteria. Inventory and operating ratings are in accordance with Section 6.5 of the AASHTO Manual for Condition Evaluation of Bridges. A help manual is also incorporated into the software. The package also provides plans and details for over 1,100 designs for non-skewed, single or multiple simple span bridges, with individual spans ranging from 20' to 120'.

Engineers may download a 30-day trial version of the AISIBEAM software at:

www.steel.org/infrastructure/bridges/order.htm

For answers to specific questions about the software's capabilities, contact Dan Snyder, AISI technology transfer program manager, at 202.452.7217.

Engineering Journal Abstracts for First Quarter 2002

Tension Field Action in Hybrid Steel Girders

By Michael G. Barker, Austin M. Hurst and Donald W. White

With the advent of HPS70W (70 ksi) steel, several bridges have been built, and many more will be built, using hybrid design provisions. One limit with hybrid girder design, which decreases the beneficial aspects, is that tension field action (TFA) is not allowed when determining the shear capacity. This is a severe shear capacity penalty for using hybrid girders. This paper proposes that tension field action should be allowed for hybrid girders and presents a modified moment-shear interaction. Hybrid tension field action would allow shear capacities well above what is currently allowed by AASHTO. With an increase in shear capacity, fewer transverse stiffeners will be necessary. A decrease in stiffeners allows for a more economical design of hybrid plate girders, substantial cost savings in material and fabrication and fewer fatigue details. The paper also presents planned experimental and finite element studies that are expected to verify the development of tension field action in hybrid girders and the capability of the proposed modified moment-shear interaction equation as a lower bound strength estimate.

Story-Based Effective Length Factors for Unbraced PR Frames

By Lei Xu and Yuxin Liu

This paper proposes a practical method to evaluate the effective length factor *K* for compressive members in unbraced partially-restrained frames under elastic buckling. In light of story-based buckling and the introduction of the end-fixity factor to characterize the beam-to-column connections of partially-restrained frames, the lateral stiffness of columns with consideration of the effect of axial load is derived. The formulations and procedure of calculating story-based column effective length factors are presented. Numerical examples are then presented to illustrate the effectiveness of the proposed procedure. With the adoption of the end-fixity factor, different member end rotational conditions can be readily modeled by derived formulations. Therefore, the proposed approach is comprehensive and can be applied for both unbraced partially and fully-restrained frames.

Flexural Capacity and Ductility of HPS-70W Bridge Girders

By Aaron J. Yakel, Patrick Mans and Atorod Azizinamini

The development of High Performance Steel (HPS), which boasts high yield strengths (70 and 100 ksi), while maintaining ductility and toughness combined with an available weathering finish offers many potential opportunities to steel bridge design. Many of these benefits have yet to be realized due to the limitations in design specifications placed on the use of steels with yield strength above 50 ksi. This paper reports on the experimental results and associated finite element analysis of four girders intended to address the limitations placed on girders in negative bending, e.g., girders spanning over a pier in multiple span bridges. All of the girders tested were able to attain their predicted strength as determined using the AASHTO *LRFD Bridge Design Specifications* (AASHTO, 1998). However, the compact section tested did not exhibit the amount of ductility implied by the equations. Based on the results of the tests and analyses performed, the limitations with regards to strength could be removed while the compact provisions allowing moment redistribution may require additional investigation.

Effect of Compound Buckling on Compression Strength of Built-up Members

By Lian Duan, Mark Reno and Chia-Ming Uang

Two types of built-up members are commonly used for steel construction. Laced or battened members with widely spaced flange components fall in the first type, and closely spaced steel shapes interconnected at intervals by welds or connectors form the second type. The compressive strength of both types of members is affected by the shearing effect. The compressive strength of built-up members may also be affected by the "compound" buckling due to the interaction between the global buckling mode of the member and the localized flange buckling mode between lacing points or intermediate connectors. In this paper, a factor b was developed to consider the effect of compound buckling. Numerical values of b, that are a function of the global slenderness ratio, local slenderness ratio of flange components, out-of-straightness ratio, and separation factor, are presented in charts. A proposed revision to the 1999 AISC *LRFD Specification* is also presented.

Perfobond Shear Connector for Composite Construction

By Sara B. Medberry and Bahram M. Shahrooz

A new type of shear connector for composite construction, called the Perfobond shear connector has recently been developed to eliminate some of the problems and difficulties associated with standard shear studs. A coordinated experimental and analytical study was undertaken to further examine the behavior of composite members utilizing the Perfobond shear connectors, and to develop a reasonably simple, yet reliable design equation. The experimental data and observations indicate that Perfobond connectors are a viable alternative to shear studs. For composite beams utilizing reinforced concrete slabs, Perfobond shear connectors exhibit adequate ductility and substantially higher capacities.