2002 AISC *Seismic Provisions for Structural Steel Buildings* Now Available

The AISC *Seismic Provisions for Structural Steel Buildings*, dated 2002, is now available in print from AISC. This is a full revision of the 1997 version of this document, including Supplements Number 1 (dated Feb. 15, 1999) and 2 (dated Nov. 10, 2000).

This American National Standard, developed by the AISC Task Committee 9 on Seismic Design and approved by the AISC Committee on Specifications, is the most current specification in the United States addressing the design and construction of structural steel and composite structural steel/reinforced concrete building systems for seismic demands. The standard includes revisions resulting from new information generated by the FEMA/SAC project and other sources. One major change is related to the referencing of ASCE 7-02, Minimum Design Loads for Buildings and Other Structures, which allows the 2002 Seismic Provisions to be incorporated by reference into both the 2002 NFPA 5000 and the 2003 International Building Code. Both codes use ASCE 7-02 as their basis for design loading. Additional specific changes included in the 2002 Seismic Provisions include the following:

- Clarification to the glossary to verify that chord and collector/drag elements in floor diaphragms are considered to be part of the Seismic Load Resisting System.
- Additional requirements for the toughness of filler metals to be used in complete-joint-penetration groove welds in Intermediate and Special Moment Frame systems.
- A revision to clarify member slenderness ratio requirements and better coordinate with the LRFD provisions.
- Increasing the Moment Frame column splice requirements to reflect the FEMA/SAC recommendations.
- Requiring that splices of columns that are not part of the Moment Frames develop a minimum shear force.
- Clarifying Column Base design demands for various systems.
- Adding a section on the use of H-pile members.
- Clarifying lateral bracing requirements of Moment Frame beams, including the provision of a required stiffness to be consistent with Section 3 of LRFD.
- Increasing SMF web Connection design requirements to be consistent with the FEMA/SAC recommendations.
- Adding a new appendix (Appendix P) that defines procedures to be used in the pre-qualification of moment Connections.
- Incorporating FEMA/SAC recommendations for weld access holes in OMF systems.
- Incorporating FEMA/SAC recommendations for the removal of weld backing and run-off tabs in OMF systems, including grinding surfaces to adequate smoothness.
- Dual units format.

These new provisions are accompanied by a major update to the commentary.

To order this publication, call 800.644.2400 or visit www.aisc.org, and refer to Publication ANSI/AISC 341-02. The complete document can also be downloaded for free from the AISC web site.

Get Ready for NASCC 2003 in Baltimore!

The 2003 North American Steel Construction Conference (NASCC) is set for April 2-5 in Baltimore, MD—and will feature the newest innovations in structural steel engineering, fabrication, detailing and erection. This once-a-year event is an opportunity for design and construction professionals to learn how to apply the latest technology and techniques to everyday work; to discover new product offerings from leading industry vendors; and to network with peers, customers and future employees.

The conference features presentations by industry experts such as Tom Ferrell (on designing with single-plate connections), Linda Hanagan (on building floor vibrations), Jeffrey Packer (on HSS connections), Michael West (on erection stability issues), Emily Bailey (on managing EEO exposure), Michael Lederle (on cambering), and Janine Reid. See the advance program in the December 2002 issue of *MSC*!

The NASCC is also the ideal place to view the tools you use everyday. This year's exhibit hall expects to feature more than 200 booths. Displays will include software (engineering, detailing and fabrication), fabrication equipment, bolts, safety equipment, coatings, and much more.

This year's NASCC features more than 40 technical sessions aimed at practicing structural engineers, fabricators, detailers, and erectors. In addition, the conference features six special events:

- SSRC Stability Tutorial, included with full registration
- Practical Steel Design Tutorial: a 4.5-hour program that provides instruction on basic design from wind and low-seismic conditions; included with full registration.
- Marketing Short Course: a four-hour program that focuses on successful techniques to help increase business, including internal auditing and presentation skills.
- Financial Management Short Course
- Short Course on Correcting/Preventing Common Design & Construction Problems: a four-hour program that focuses on solutions to common problems, and suggestions to prevent the problems from occurring.
- Short Course on Bolting and Welding: a seven-hour program that focuses on both welded connection design and the fundamentals of high-strength bolting.

Join 3,000 of your peers for the steel industry's biggest event! Register online at www.aisc.org.

Educator Session at NASCC Baltimore

A special session for structural educators will be held Wednesday, April 2, 2003 at the North American Steel Construction Conference in Baltimore, MD. Its title is "Successful use by educators of the AISC Steel Building Case Study."

Many structural educators who attended AISC workshops at the University of Kansas now use the material in their steel classes. This Internet-based teaching aid exposes students to the process of proportioning the main structural elements of a three-story steel building in a realistic context.

Come to hear how your colleagues are using this steel teaching aid—register for NASCC 2003 today at www.aisc.org.

Solutions Center Goes Toll-Free

Specifiers can now contact the AISC Steel Solutions Center by calling toll-free to 866.ASK.AISC (275-2472). The Steel Solutions Center offers an immediate source for the most complete, up-to-date information on the use of structural steel. Your questions usually can be answered within one business day! Engineers, architects, contractors, and developers also can email solutions@aisc.org or visit AISC's website at www.aisc.org.

The Steel Solutions Center's staff has access to a wide variety of technical information and project data to help on any structural steel issue. Additionally, they can quickly obtain information from other technical associations, members of AISC's technical committees, and other leading industry experts.

2003 AISC Scholarships and Fellowships Available

AISC announces that it is now accepting applications for its 2003 undergraduate scholarships and graduate fellowships. Different awards are offered for various regions of the country, depending on the location of the applicant's university. A total of $54,500 in awards will be granted, with scholarships of up to $3,000 available to undergraduate students, and fellowships of up to $5,000 available to graduate students. Four undergraduate scholarships and eight graduate fellowships are being offered. All applications are due no later than April 18, 2003.

For more information, please visit the "University Programs" page on the Training and Education section of the AISC web site, www.aisc.org; or contact AISC University Relations Director Fromy Rosenberg (rosenberg@aisc.org), or Coordinator Kelly Mullins (mullins@aisc.org).

2003 Undergraduate Scholarships

AISC/Carolina Steel	$3000
AISC/Southern Association of Steel Fabricators	$2,500
AISC/Associated Steel Erectors of Chicago	5×$3,000
AISC/Indiana Fabricators Association	3×$500

2003 Graduate Fellowships

AISC/Structural Steel Fabricators of New England	$3,000
AISC/US Steel	$5,000
AISC/Kingelhofer	$5,000
AISC/Great Lakes Fabricators and Erectors Association	$5,000
AISC/Southern Association of Steel Fabricators	$2,500
AISC/Rocky Mountain Steel Construction Association	$3,000
AISC/Fred R. Havens	$5,000
AISC/Structural Steel Education Council	$4,000

AISC Continuing Education—Spring 2003 Schedule

Bracing of Steel Structures

(an AISC/SSRC joint seminar)

Featured Speakers: Joseph A. Yura, Ph.D., P.E., University of Texas at Austin, & Todd Helwig, Ph.D., P.E., University of Houston.

March 11 & 12 - Omaha, NE
March 13 & 14 - San Francisco, CA

Seismic Design and the 2002 AISC Seismic Provisions

Featured Speaker: Thomas A. Sabol, Ph.D., S.E., President of Englekirk & Sabol Consulting Engineers, and Adjunct Associate Professor at UCLA.

February
25 - Sacramento, CA
27 - Irvine, CA

March
25 - Waltham, MA
26 - New York City, NY
27 - Atlanta, GA

April
22 - San Diego, CA
25 - Anchorage, AK

May
6 - San Francisco, CA
8 - Pasadena, CA

Practical Steel Design: 2 - 20 Stories

Speakers will vary by location. Check www.aisc.org/seminars for information on the speaker in your area. This seminar will also be featured as a tutorial at the 2003 NASCC, April 2-5, in Baltimore, MD.

February
5 - N. Little Rock, AR
6 - Memphis, TN
11 - Charleston, WV
11 - Honolulu, HI
12 - Pittsburgh, PA
19 - Grand Rapids, MI
25 - South Portland, ME
26 - Concord, NH
26 - Des Moines, IA

March
11 - Batavia, NY
12 - Syracuse, NY
13 - Schenectady, NY
18 - Jackson, MS
22 - Stillwater, OK
23 - Dallas, TX

For more information on AISC continuing education opportunities, visit www.aisc.org/seminars.

Correction

In the "On the Horizon" article in the January 2003 issue of *MSC*, Chris Fischer was incorrectly identified. He is currently the production manager for Schuff Steel Company of Phoenix, AZ.

Engineering Journal Abstracts for Fourth Quarter 2002

A Practical Look at Frame Analysis, Stability, and Leaning Columns

Louis F. Geschwindner
(2000 T.R. Higgins Award Paper)

This paper will briefly review a wide range of analytical approaches including elastic buckling analysis, as well as first- and second-order elastic and inelastic analytical methods. Once these analytical approaches have been presented, the design process will be addressed, including the use of effective length factors. Effective length calculations will be reviewed with particular attention to the approaches presented by Yura, Lim, and McNamara, LeMessurier, and the equations found in the AISC LRFD Commentary. The results from these approaches will be compared to those of an elastic stability analysis for simple frames that have been found in the literature.

Technical Note: Torsion Analysis of Steel Sections

William E. Moore II and Keith Mueller

The equations for θ, θ', θ'', and θ''' for the twelve commonly encountered loading and end conditions, presented in the *AISC Design Guide No. 9, Torsional Analysis of Structural Steel Members*, are given in the Appendix of this paper. The case numbers are consistent with those given in the design guide. These equations contain no dimensional factors and can be used with any consistent set of units. Each set of equations has been tested against a solution using the curves from the AISC *Design Guide No. 9*. Although the additional precision afforded by using the equations (instead of the curves) is of doubtful value, the ease and speed of computation is immensely helpful.

Design Method for the Bolts in Bearing-Type Connections with Fillers

Firas I. Sheikh-Ibrahim

This paper presents a method for the design of the bolts in bearing-type connections with fillers. The method involves a general reduction factor to be applied to the design shear strength of the bolts. The proposed factor can be used for connections with either developed or undeveloped fillers, thus simplifying the design process by eliminating the need to differentiate between the two types of fillers. The factor is based on a mechanistic model, and takes into account the area of the main connected plate, splice plates, and fillers. The factor is verified by a comparison with the results of an experimental program. Finally, two design examples are presented for connections with fillers.

Elastic Design Charts for the Rapid Selection of Web Bolts for Composite Steel Bridge Splices

Firas I. Sheik-Ibrahim

In this paper, elastic design charts for the rapid selection of web bolts are presented along with three design examples. The charts are developed to be used for composite bridge-girder splices at either the strength limit state or the service limit state, but can be used for any other eccentric shear connection. The charts can be used for connections with bolted depths ranging from 900 mm to 2000 mm, eccentricity-to-bolted-depth ratios up to 1.5, design forces applied at 0° to 80° from the vertical axis, a uniform vertical bolt spacing, and a horizontal bolt spacing of 75 mm. The required bolt pattern can be determined directly from the charts for a known bolted depth, eccentricity, vertical design shear, angle of the design-force line of action, and factored resistance of one bolt.

Block Shear and Net Section Capacities of Structural Tees in Tension: Test Results and Code Implications

Howard I. Epstein and Hans Stamberg

Structural tees in tension, bolted to connections only through the flanges, are subject to shear lag. Previous research has shown that shear lag, a reflection of connection length, overall length and the eccentricity to the centroid, strongly influence the efficiency of such connections. This paper reports the results of 50 tests of structural tees. Varying the eccentricity and the connection length produced failures that transitioned from net section to block shear. The tests show that as connection lengths decrease, eccentricities increase, or both, the efficiency of the connections decreases. For net section failures, the decrease is more pronounced than predicted by current AISC Specifications provisions that use the $(1 - \bar{x}/l)$ factor (with a lower limit) to account for eccentricity and connection length. Although not accounted for by current AISC Specifications, eccentricity is also shown to influence block-shear capacity. The primary purposes of this paper are to present test results and possible alternative approaches to dealing with the areas of tension connection efficiency and shear lag.

Suggested Reading From Other Publishers:

ASCE *Journal of Structural Engineering*, Vol. 128, No. 12, December 2002

Advanced Analysis for Performance-based Design of Steel Structures Exposed to Fires

J.Y. Richard Liew, L.K. Tang, and Y.S. Choo

This paper presents an advanced plastic hinge analysis method that can be used to assess the performance of steel structures exposed to fire. The main feature of the analysis is to use as few elements as possible to model each structural member and to obtain a realistic representation of the global nonlinear effects of the structure. Natural fires are simulated using the proposed multizone and radiation models. The transient heat transfer is computed using a finite element method. Bounding surface theory is employed to allow for gradual plastification of steel cross sections. Performance-based assessments are carried out on a multistory car park structure and an arched frame exposed to localized car combustion. The effects of beam span, fire source location, and fire spread on the structural behaviors are investigated.

Database-Assisted Wind Load Capacity Estimates for Low-Rise Steel Frames

Seokkwon Jang, Le-Wu Lu, Fahim Sadek, and Emil Simiu

A comparative study is presented of the estimated wind load capacities of low-rise steel building frames based on loading patterns established from aerodynamic databases and on patterns specified in the ASCE 7 Standard. The estimated capacities are based on the assumption that the most unfavorable wind load occurs at the instant when the peak knee-joint bending moment is attained. Estimates are obtained from detailed inelastic finite element analyses of the frames with ultimate states associated with local and global instabilities. It is shown that the estimates based on the aerodynamic database are more realistic and risk consistent and can therefore lead to safer designs at lower costs. These estimates represent a significant advance over the ASCE 7 Standard-based estimates.