Newsletter for the *January 1997*
Light Gauge Steel Engineers Association

INSIDE page

Upcoming Events

Pacific Rim Building Products Expo *Honolulu, HI* *Info: (808) 847-4666*	Mar 5-6
LGSEA Meetings *Las Vegas, NV* *Info: (615) 386-7139*	April 28
Pacific Coast Builders Conference *San Francisco, CA* *Info: (916) 325-9300*	Jun 18-21
LGSEA Meetings *San Francisco, CA* *Info: (615) 386-7139*	Jun 20
METALCON ' 97 *Atlanta, GA* *Info: (617) 965-0055*	Oct 28-30
LGSEA Meetings *Atlanta, GA* *Info: (615) 386-7139*	Oct 27
NAHB Trade Show Dallas, TX Info: (800) 368-5242	Jan 18-19

Prescriptive Approach to Cold-Formed Steel Framing Officially Enters the CABO Code

By Nader Elhajj, P.E. - NAHB Research Center

Cold-formed steel framing prescriptive design has finally been codified. On October 15, 1996 the Council of American Building Officials (CABO) voted to include the prescriptive requirements for cold-formed steel framing in the One and Two Family Dwelling Code.

Cold-formed steel has now been recognized as an acceptable material for use with design methods equivalent to other prescriptive methods in the CABO code. CABO defines conventional construction practices by simplified prescriptive requirements that address the most common situations encountered in the construction of a typical home, using such materials as

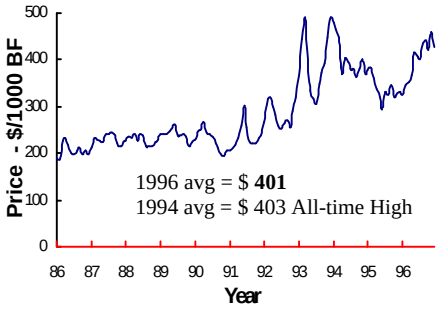
(Continued on page 2)

Understanding Lumber Prices

By Mike Roddy, Green Framing Systems

Lumber price fluctuations probably affect steel framers more than anyone else in construction. Subdivision developers in particular will frequently make a decision on whether to use steel based on current or anticipated framing lumber costs. In order to aid planning, interviews were held with Burrie Elmore, editor of *Random Lengths*, a wholesale lumber trade magazine, and Debra Warren, author of numerous US Government publications on timber inventories and trade issues.

10 Year Lumber Price Trend



The increase in prices in late 1996 is most likely a result of higher than anticipated housing construction this year. Housing starts increased 11% this year, instead of the 3% originally predicted. While NAHB and many others predict higher lumber prices in the future, short term spikes must be treated with caution. In 1993, for example, prices peaked at historic levels in response to concern over the Dwyer Spotted Owl court decision. The next two years, however, saw a steady decline as Canadian producers increased shipments to 37% of US consumption.

Price volatility in the long term is a result of supply and infrastructure weaknesses. Abundant commodities like steel are not vulnerable to sharp

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Newsletter for the

Light Gauge Steel Engineers Association

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Officers

Membership Information

To receive the LGSEA Newsletter and other membership benefits of the ***LGSEA*** *call* ***(510) 439-6645****.*

*(**Prescriptive Approval** -cont. from page 1)*

wood, concrete, and masonry. Prior to the approval of the new standards, houses built with steel were required to be designed by hiring the services of a licensed engineer. The new standards are limited to lower wind and seismic zones and parallel the CABO limits for "conventional" construction methods.

The code, which went into effect on Jan. 1, 1997, represents a major breakthrough for light gauge steel. It establishes a solid foundation for expanding and further refining the prescriptive standards, says Del Boring, *American Iron and Steel Institute* (AISI) director. According to Mike Meyers, market development manager for *U.S. Steel* and chairman of the AISI residential advisory group, this opens up the greater part of the U.S. to the home builder and puts light gauge steel on the same playing field as timber and other prescriptive materials.

The adopted standards include the following major issues:

- steel material and minimum protective coating specifications
- screw fastener specifications
- dimensional limitations for C-shapes
- floor joist span tables
- wall stud tables
- header tables
- shearwall bracing
- connections

Also included in the adopted standards are details to illustrate the assembly of the major cold-formed steel framing components.

The Research Center recently finalized and submitted code changes for the CABO 1997 code cycle which include additional requirements for roof framing (rafters and ceiling joists), new header tables, and wall stud tables for 50 ksi steels.

The NAHB Research Center is also working on other research and testing activities related to steel framing. It is expected that results from this work will improve the engineering assumptions and data that substantiate future code changes related to cold-formed steel framing. Those interested in the CABO code change or research activities of the NAHB Research Center are invited to call Nader Elhajj (301) 249-4000 x 581 at the NAHB Research Center in Upper Marlboro, Maryland.❐

Commercial Messages

For information about placing Commercial Messages in this Newsletter please contact Larry Williams at (615) 386-7139. Products identified or advertised in this publication are not necessarily endorsed by the Light Gauge Steel Engineers Association. Such products are identified or provided only as a service to readers.❐

LGSEA Committee Reports

Larry Williams, LGSEA Managing Director

LGSEA Committees met on September 30 to continue work on several projects and share information on developments in the light gauge steel framing industry. The following is a summary of the main topics discussed in these meetings.

Truss Committee
Chairman: David Willis, P.E.
Alpine Engineered Products
A proposed addendum to *Design Guide for Cold-Formed Steel Trusses* was presented by Dr. Roger LaBoube. It was suggested that the Guide reference camber for dead load deflection, possibly in the context of the truss shape or an aspect ratio.

The task group formed to develop a guide for *Field Installation of Temporary Bracing of Cold-Formed Steel Trusses* is investigating the possibility of adapting a similar document produced by the Wood Truss Council of America by replacing wood truss items with steel truss items.

The LGSEA is providing guidance in the development of an in-plant quality control procedure. Sub-committee members on this project are John Carpenter, Mike Meeks, Troy Williams and Roger LaBoube.

Lateral Load Design Committee
Chairman: Reynaud Serrette, Ph.D
Santa Clara University
The latest version of the AISI Code Change for inclusion in the 1997 UBC was reviewed.

The content of a second *Tech Note* on shear wall design was discussed, and it was decided it should cover load transfer from the horizontal floor or roof diaphragm to the shear wall, and the drag struts -- interior and exterior wall conditions accompanied by details.

The committee also discussed whether the LGSEA should address horizontal diaphragm design. It was decided that work is definitely needed but given limited R & D funding this item was lower on the priority list. However, the committee also agreed that a *Tech Note* should be written to address current state-of-the-art engineering practice on diaphragm design both horizontal floor and roof diaphragms as well as vertical diaphragms (shear walls). Appropriate fastener selection will be discussed and identified in the the *Tech Note.*

Fastener Committee
Chairman: David Nolan, P.E.
ET & F Fastening Systems
After additional review, it was agreed that the general content of the first *Tech Note* on fasteners was an appropriate introductory document.

Suggested topics for additional *Tech Notes* on fasteners included screw fasteners for trusses, sheathing, stud to track and curtain wall applications. *Tech Notes* will also be developed on alternative fastening methods, including clinching systems and pneumatic pins.

The need for a widely accepted specification for fasteners for the light gauge steel framing industry was restated. SAEJ78 was cited in the Prescriptive Method for Residential Cold Formed Steel, but only because it was felt that it was the "best available."

Exterior Finishes Committee
Chairman: George Richards
BORM Associates
The first meeting of this committee opened with the introduction of representatives of several companies which represent each step of the design and installation of exterior finishes on light gauge steel structures.

Tech Note Committee
Chairman: Randy Daudet
Dietrich Industries
Drafts of *Tech Notes* in development were reviewed in other committee meetings. Other *Tech Notes* now being written include:

- Trusses: Permanent Bracing
- Building Inspectors Checklist
- Stud Descriptions/Specifications
- Shear Wall Design: Drag Struts/ Top Plate
- Lateral Load Resisting Elements: Diaphragms ❒

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NAHB Research Center

Technical Exchange Section

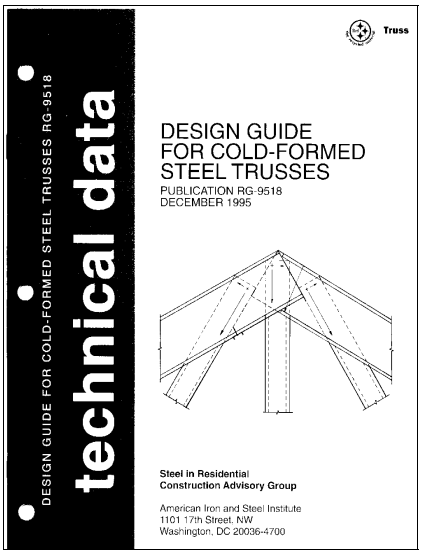
*The Light Gauge Steel Engineers Association needs you and your experience. Please mail or fax your opinions, questions, and design details that are relevant to the light gauge industry (fax to **(206) 941-9939**). Upon editorial staff review your submission may be printed in the Technical Exchange Section of this newsletter.*

Specifying Pre-Engineered Light Gauge Steel Roof Trusses

By Steve Walker, P.E. - Consulting Engineer

Recent volatility in timber prices, quality, and availability have caused many structural engineers, architects, and contractors to look to light gauge steel (LGS) roof trusses as a framing option for light roof construction. How can the framing system specifier know whether or not his design intent is being met? What items must the project specifier (Engineer of Record) include in his construction documents to assure that the specialty roof truss engineer can properly design the component?

These and other issues are the subject of a recent publication by the American Iron and Steel Institute (AISI) *Design Guide for Cold-Formed Steel Trusses* (Publication RC-9518, December, 1995). The publication was prepared by Dr. Roger LaBoube of the University of Missouri-Rolla. It was the product of a three year research program co-funded by the National Science Foundation and AISI. The research work was monitored by the Technological Research Subcommittee of the AISI Residential Advisory Group (RAG). Many members of LGSEA participated in the development and review of the document. The members of LGSEA who reviewed this document formed the nucleus of the LGSEA Truss Committee, currently headed by Dave Willis, of Alpine Engineered Products.



The LGS Truss document contains suggested design criteria to be used by engineers in the design of pre-engineered trusses. It discusses many LGS truss design issues including loads, member strength evaluation, unbraced length, serviceability and suggested load test procedures. It also contains an appendix on *Standard Practice for Cold-Formed Steel Truss Design Responsibilities*. This appendix was adapted with the permission of the Wood Truss Council of America (WTCA), for use in the AISI truss document. The WTCA document was used because of the relatively long and successful history of use of pre-engineered components in the wood truss industry and the similarity of principles for design responsibility.

What items are important to the building designer who is responsible for the project specifications? The specifier should indicate the appropriate building code, all loads, including dead and live loads, snow loads, wind loads, seismic loads, load combination criteria, serviceability criteria and any special loading that may affect truss member design (i.e., drag strut loading of a girder bottom chord under wind load). The project specifier should request, as a minimum, that all submittals (typically referred to as shop drawings) contain information on the truss force analysis and member strength design check. Other items of interest to the project specifier include steel quality submittals and connection technique requirements or limitations. A summary of this information shall be provided for review and approval by the project specifier.

For a complete discussion of all important specifier criteria a *Tech Note* on this topic is currently in progress and should be available to members of LGSEA in the first quarter of 1997. A copy of RC-9518 can be obtained from AISI at 1-800-79 Steel, or (800) 797-8335. ❐

Vibration of Steel Framed Floors - Summary of a Presentation by Dr. Murray

By Professor Reynaud Serrette - Santa Clara University

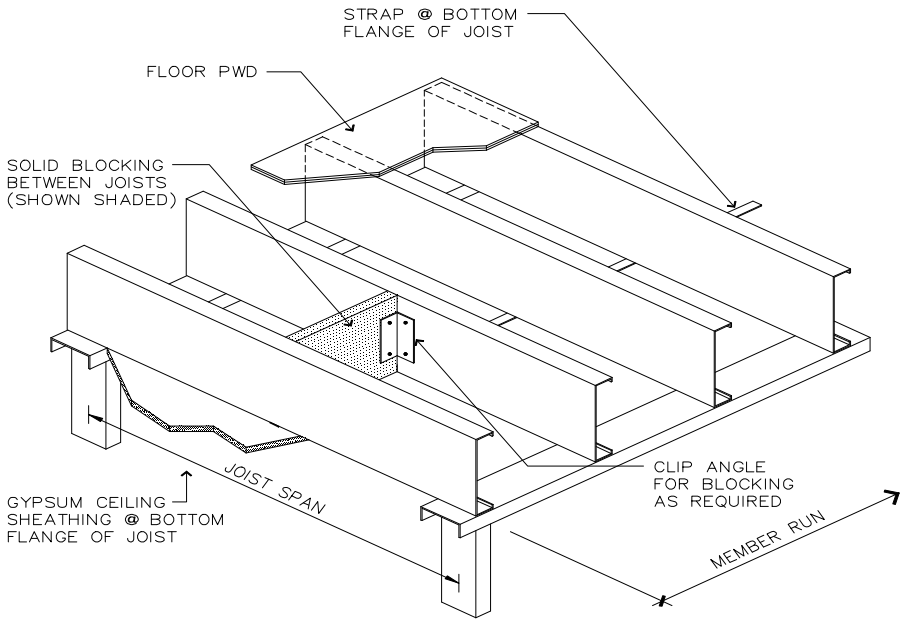
Floor vibration is essentially a serviceability limit state that must be controlled if the structure is to be functional. The prediction of tolerable floor vibration is typically based on three parameters:

- amplitude of vibration
- frequency of vibration
- damping characteristics of the system (that is, how fast the amplitude of vibration decreases).

Thus, to develop guidelines for light gauge steel framed floor systems, these three parameters must be understood.

The following is a summary of a presentation made by Dr. Thomas Murray at the September 1996 Meeting of the LGSEA. Dr. Thomas Murray presented results from a preliminary study of floor vibration requirements in steel framed residential structures. Murray noted that steel framed floor systems have two characteristics that may make them more susceptible to vibrations than equivalent wood systems: lightness and less damping (ability to reduced vibrations).

- The scope of Murray's work included measurement of effective floor stiffness and frequency, the effect of blocking, bottom (tension) flange straps without blocking, GWB attached to the bottom flange, and joist web holes at midspan. The floor systems were designed for uniform load deflection limits of L/360 (for 30 psf), and L/480 and L/720 (for 40 psf). Some of Murray's **preliminary** findings are summarized here:



LIGHT GAUGE FLOOR JOIST ASSEMBLY

- varying the floor assembly condition with blocking, bottom flange straps, GWB attached to bottom flange, or joist web holes at midspan had no effect on the natural frequency of the system.
- floors designed to more strict deflection limitations performed well.
- the effect of subflooring on the joist stiffness is negligible.
- prediction of floor frequencies using a wood framed system model needs to be improved.

Additional information on Murray's study may be obtain by contacting Dr. Murray directly: Department of Civil Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061-0105.❐

Shear Wall Testing - Update

By Professor Reynaud Serrette - Santa Clara University

Testing sponsored by the American Iron and Steel Institute aimed at increasing the available design data on light gauge steel framed shear walls is underway at Santa Clara University. Studies have also been initiated at Santa Clara to study static and cyclic shear wall test data. The goal of this study is to develop, if possible, a technique to predict important cyclic test results from static tests. ❐

Steel Framing Withstands Trial By Fire

One commonly mentioned advantage of steel framing is that it is a non-combustible material, but there are relatively few real-world examples of how well it stands up in an inferno. Last Fall a steel-framed studio/garage in Arizona withstood just such a trial by fire.

The 2,000 sq.-ft. structure which burned was built with a straw bale construction technique called "post and beam" where the weight of the roof is carried by the structural framework and the space between the framing members were filled with straw bales. The framing design utilized 18 gauge studs on 8 foot centers to support the roof trusses, which were also spaced at 8 feet. The wall framing also included 20 gauge studs at 24 inches on-center to support the stacked straw bales which formed the outside of the wall and were used to provide insulation and backing for the stucco finish. Purlins framing elements were made with 20 gauge steel and ran perpendicular to the trusses at 24 inches on-center for attaching plywood sheathing.

According to an American Studco representative, the company who supplied the studs, the fire was started by sparks from a welding operation. Temperatures were estimated to have reached 1,200 degrees and were hot enough to severely crack the underlying post tension slab. To the amazement of everyone, the steel framed structure was still standing when the smoke cleared. Assistant Tucson Fire Chief, Doug Emans, who was at the scene stated that "a similar wood structure would have collapsed under the same conditions." The insurance claims adjuster was also impressed by the performance of the steel framing systems, saying that he has seen countless fires and couldn't believe the entire roof had burned off, leaving the walls and trusses still standing. ❒

LGSEA Forms Hawaii Chapter

The LGSEA took another step forward last November through the formation of the Hawaii Chapter, making it the LGSEA's first local organization recognized by the Board of Directors.

According to LGSEA president George Richards, the decision to form the Hawaii Chapter was driven by three important factors. First, steel framing is being used to build nearly 20 percent of the homes in that state. In addition, the board believes that the exchange of information, often complicated by the geographic distance between the mainland and Hawaii, will be improved by having an organized presence. The board also feels that the 14 LGSEA members located there is large enough to enable the election of officers and support chapter activities.

The first chapter meeting was called for December 5 and a slate of interim officers was named to assist in setting up goals and objectives: Tim Waite, Interim President; Les Negata, Interim Vice President; Sam Galante, Interim Secretary / Treasurer. Election of officers who will begin serving one year terms will be held in April to coincide with the LGSEA Annual Meeting.

Among the first projects the chapter is discussing include establishing a liaison and working relationship with the Structural Engineers Association of Hawaii, membership development, participating in the Pacific Rim Building Products Expo, and monitoring and shear testing research planned by the University of Hawaii.

"We are excited to be the first LGSEA chapter, and believe this gives us an even better opportunity to increase the use of steel framing in Hawaii," says Tim Waite.

The LGSEA Board is also considering a chapter in Florida, where a membership recruitment drive is currently underway.❒

*(**Lumber Prices** -Continued from page 1)*
movements in price. Lumber, on the other hand, comes from areas that are often close to depletion or are subject to increasingly stringent environmental oversight. In the Pacific Northwest, for example, concern over remaining old growth has restricted harvest at a time when only about 10% of it remains.

We must be cautious, however, in interpreting lumber price increase as being indicative of absolute current shortage. At any given time there is lumber available from a variety of sources. Private timberland owners can change harvest schedules to meet demand. Canada still has about 40% of its old growth forests remaining. The Timber Trade agreement of 1995, which set quotas, still allows for the quotas to be exceeded under economic penalties of $50-100 per thousand board feet.

More relevant is the notion of whether it makes sense to plan on current patterns of lumber consumption during the coming decades. There is disagreement among foresters and scientists whether our existing inventories are sustainable at harvest levels necessary to build houses from wood. If the decision is taken to eliminate the small remaining amount of old growth from the picture, however, there is little doubt that private tree farms cannot maintain residential lumber supplies. The Government Accounting Office said as much in a report issued in 1995.

A wild card continues to be Canada. Americans must ultimately decide whether we want wooden houses badly enough to generate the demand to liquidate remaining Canadian old growth, as we have essentially done here. Canadian environmentalists are passionate but less powerful than in this country. Reforestation efforts are weak, and the Northern climate usually means very long rotations and a poor environment for tree farming anyway. The prevailing cut and run logging practices in British Columbia are opposed by the majority of its citizens, but legislation has changed little except stabilization of export levels.

From time to time someone mentions the possibility of lumber imports from Siberia or other impoverished nations as a way to maintain supplies. This wood is marginal quality, however, and since it comes from a boreal forest it produces a smaller fraction of timber per acre than our own forests do. As with Northern Canadian forests, there are also questions about whether these forests can regenerate after clear cutting at all.

Efforts are under way in Congress to reduce timber industry subsidies worldwide through the International Trade Commission as one way to put the brakes on deforestation. If lumber were sold at a price reflecting domestic supplies and reforestation costs, it would cease to be competitive as a building material.

Meanwhile, those involved in the steel framing industry must not get their hopes too high when lumber prices spike. Long term strategy should be first to improve design and construction techniques, especially to reduce labor costs. Members of the *Light Gauge Steel Engineers Association* have already made this commitment.

Second, the home buying public needs to be better educated about the higher quality and environmental sensitivity that a steel framed home provides. When these things occur timber will be more susceptible to its own price swings. ❐

METALCON Sets New Records

The 1996 meeting of METALCON International, held last October in Chicago, broke all previous show attendance records, attracting more than 7,000 visitors from around the world and every facet of the light gauge steel framing industry. METALCON is the only annual exhibition and conference specifically concentrating on the metal construction industry. According to Claire Kilcoyne, METALCON manager, the 1997 show will be held in Atlanta, GA on October 28-30 and is expected to be even more successful with over 500 exhibits and 8,000 attendees. For more information, call (617) 965-0055 or e-mail PSMJ@tiac.net.