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May 2011

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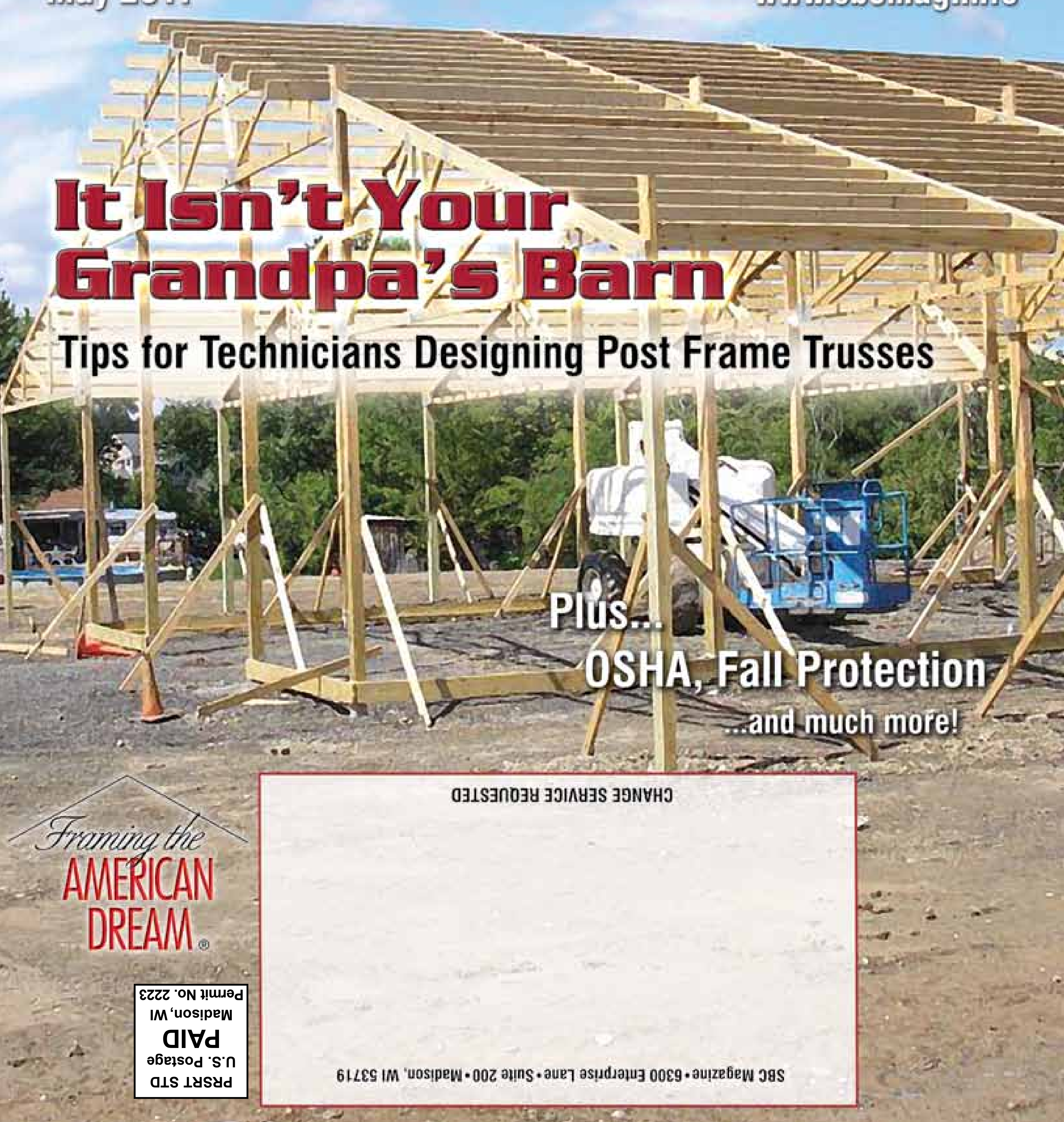

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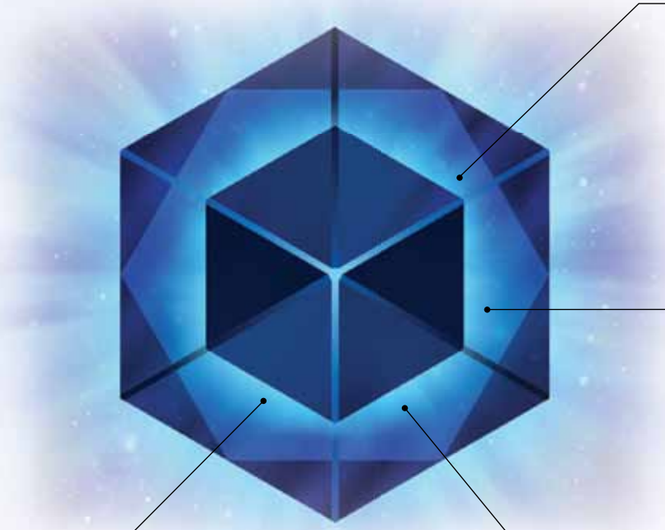

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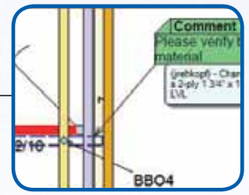

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contents

The mission of *Structural Building Components Magazine (SBC)* is to increase the knowledge of and to promote the common interests of those engaged in manufacturing and distributing structural building components. Further, *SBC* strives to ensure growth, continuity and increased professionalism in our industry, and to be the information conduit by staying abreast of leading-edge issues. *SBC's* editorial focus is geared toward the entire structural building component industry, which includes the membership of the Structural Building Components Association (SBCA). The opinions expressed in *SBC* are those of the authors and those quoted, and are not necessarily the opinions of Truss Publications or SBCA.

Editor's Message

Uncovering the Value Proposition of Component Design

by Joe Hikel

Using component design to drive your business strategy

Design is something we do in order to solve our customers' problems. We typically convert customers' plans into shop drawings as we operate software provided by our connector plate suppliers. We then take those shop drawings and use them to manufacture components to match what we have designed. Seems simple enough, doesn't it? Not so fast. In my opinion, the big challenge is nailing down the value proposition of the dollars we spend doing design.

The first great challenge I see is that our customers want to treat our products as commodities, but we as suppliers think we add value to the construction process largely through design. I would venture to say that in almost every bid situation several component manufacturers will propose very different solutions that our customers want to treat as the same. Our salespeople can easily feed back how our proposal stacks up in terms of price, but very rarely can they see how one of our design strategies stacks up against the rest of the competition.

We don't always acknowledge that our technicians have a major impact on the success or failure of a project as it runs through our facilities. But we should, as they have significant effect on material and labor costs with their knowledge and diligence in the design process.

There is commonly wide variation in these strategies from manufacturer to manufacturer because of the estimating process employed. Some of us design jobs as close to shop-ready as we can. This is done to optimize the component designs so we can provide as competitive a bid as we can without leaving anything to chance. Some of us have established estimating tools that crank out bids quickly so we don't have to spend valuable resources on jobs we don't get. Some bid jobs with minimum scope of work to make their base bid price as low as possible. Others offer proposals that cover more than the construction documents specify to help the customer use components to the fullest extent possible, maximizing value for both vendor and customer. Other variables include software differences from a brand perspective as well as settings in the same software.

Experience and ability varies from designer to designer. Lately I have seen proposals that include drawings that do not meet the latest code requirements. This could have serious ramifications for the individual component manufacturer and builder who chose to cut the corner. It also has the potential to hurt the industry as a whole if a failure would occur or some type of construction defect case were filed after the fact.

We don't always acknowledge that our technicians have a major impact on the success or failure of a project as it runs through our facilities. But we should, as they have significant effect on material and labor costs with their knowledge and diligence in the design process. Mistakes can have liability consequences as well if the wrong loads are taken off and applied or the designer makes other omissions. Remember the engineer who seals our drawings is only certifying that the individual drawing will resist the loads that are shown on that drawing. If the wrong loads are applied it is our risk, unless we confirm that these are the loads the engineer of record or the building owner desire to have applied. Some EORs criticize our

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at a glance

- ❑ The fact that ten truss technicians may come up with ten completely different designs for the same project is evidence that components are not commodities.
- ❑ It is very important to confirm that the applied loads are the loads that the EOR or building owner has specified.
- ❑ Using unique ways to share design best practices is a great way to develop skills and build strong teams.

Editor's Message

Continued from page 7

industry for taking on responsibilities requested by our customers, yet not communicating back through the chain so that those responsible for the design know that their design concept has changed.

Additionally, how many of us have technicians stepping too far into the area of project design by designing connections and sizing beams, joists and rafters, yet do not ensure that there is a customer review and approval process in place? In these cases, the responsibility for code compliant load paths is placed where they belong and acknowledged. These concepts are worth some thought by everyone in our industry.

So far I have described some significant challenges our industry faces relating to design—without many solutions. I do have some recommendations:

- **If your client tells your salesperson your price is too high, don't believe the client at face value.** I'm not suggesting you call them a liar. What I mean is be mindful that there very well may be other factors at play aside from the price. This is the easiest reason for a client not to buy from you! There could be a relationship in place with your competitor and the client, his owner, the architect or engineer giving him or her preference. Don't lower the price until you dig a little deeper. Schedule a meeting with you, your salesperson and the client where you thoroughly review your scope compared to the competitions'. These are hard meetings to get done in this electronic age, but it is my opinion that this is a crucial step in finding out where you are in your clients' buying process. It also gives you an opportunity to add value to the process by pointing out how much knowledge you have about your clients' project, business and how much you can help.
- **Best practices in design.** Another idea I have may help to transfer best design practices among technicians in your organization. I recommend assigning the same project to every technician on your team, and then have a meeting to decide the best solution to your customers' problem. We did this in our organization and it really was an eye opener. Don't make the mistake of assuming the experiences and abilities of your designers are necessarily the same!
- **Start a dialogue between design staff and production staff.** It helps a technician to understand what production challenges they have potentially created if he or she spends a day on the line actually helping to manufacture the product they have designed. Talk to your software provider for potential training and use SBCA's Truss Technician Training tools to get your team moving in the right direction. I also suggest getting your technical staff to BCMC this year to participate in the design track and interact with yours and other software vendors. Encourage them to seek out any other opportunity to see how others are dealing with the same challenges you are.

I hope you are having a good spring. Get out there and make something happen! SBC

SBC Magazine encourages the participation of its readers in developing content for future issues. Do you have an article idea for a future issue or a topic that you would like to see covered? Email your thoughts and ideas to editor@sbcmag.info.

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Technical Q & A

Revisiting the Top Resources for Your Technical Library

by Ryan J. Dexter, P.E.

The right tools for the job

Nearly eight years ago ***SBC Magazine*** published an article referencing the top ten books all technical departments should own (see December 2003 issue). It's amazing how the digital age has revolutionized publishing; most publications now offer digitally searchable copies of these technical resources. While some of us "old school" folks still like to reach for a real book off the shelf, digital reference materials may be an economical option for companies with users at many different offices. Similar to the 2003 article, the following expanded list of 15 resources includes a brief description of each reference along with ordering information.

Top 15 Technical Library Resources

1. **Building Codes:** You want to make sure your designs conform to the building code in the project's jurisdiction. The International Building Code (IBC) and International Residential Code (IRC) provide the minimum guidelines for the design, analysis, and construction of commercial and residential buildings. Most jurisdictions adopt the IBC and IRC with few changes. They generally post codes or amendments online depending on public compliance needs. When in doubt, contact your local building department. The IBC and IRC identify numerous other documents and standards which may become part of the code by reference (IBC Section 102.4 / IRC Section R102.4).[1] The IBC and IRC are available from the International Codes Council (www.iccsafe.org).

The following structural building component industry standards and documents round out our top 15 references.[2] The resources listed are the editions referenced by the 2009 codes. SBCA believes that it is best to use the latest standard/code requirements when designing a structure, as they include changes based on the most current research. So you may want to check to see that your department has the most up-to-date versions of these resources as you read. However, designing a structure to an older version of a code or standard generally will provide a sufficient degree of safety. Ultimately, the editions of the codes and standards that are used on a given project are up to the authority having jurisdiction to decide.[3]

2. **SBCA Load Guide Version 1.03: Guide to Good Practice For Specifying & Applying Loads to Structural Building Components:** The SBCA Load Guide is a resource to help users more easily understand, define and specify design loads applied to structural building components. This load calculation tool is used by a very wide variety of professionals: building designers, code officials, truss designers and truss technicians. Free download available at: www.sbcindustry.com/loads.php.

3. **ASCE/SEI 7-05 Minimum Design Loads for Buildings and Other Structures:** This document describes the loading requirements for live, dead, and environmental loads. Sections of this document are included in the IBC. SBCA's Truss Technician Training (TTT) Level II online course spends quite a bit of time reviewing these loading procedures. This is available from the American Society of Civil Engineers (ASCE) (www.pubs.asce.org). References to ASCE 7 are throughout SBCA's Load Guide as well.

4. **Building Component Safety Information (BCSI) Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses:** Produced by the Truss Plate Institute (TPI) and SBCA's Wood Truss Council (WTCA), BCSI is the wood truss industry's guide for jobsite safety and truss performance. For details visit: www.sbcindustry.com/bcsi.php.

5. **Building Component Safety Information (BCSI) Guide to Good Practice for Handling, Installing, Restraining & Bracing of Cold-Formed Steel Trusses:** SBCA's Cold-Formed Steel Council (CFSC) has developed a similar guide for cold-formed steel trusses (CFSBCSI). All are available from CFSC: www.cfsc.sbcindustry.com/cfsbcsi.php.

6. **Metal Plate Connected Wood Truss Handbook:** This is the only textbook on the market written specifically for the truss industry. In its third edition, the handbook contains loads of information on all aspects of truss design, manufacturing, installation details and bracing. It is a tremendous resource for any technical department. You can order online from SBCA: www.sbcindustry.com/pubs/HB3-D.

7. **AISI Documents: 2007 North American Specification for the Design of Cold-Formed Steel Structural Members (S100), S200-07 North American Standard for Cold-Formed Steel Framing – General Provisions, and S214-07 North American Standard for Cold-formed Steel Framing – Truss Design:** If you design and manufacture cold-formed steel trusses, these are your main resources. The design of cold-formed steel trusses for load carrying purposes in buildings is done in accordance with S100 and S200, except as modified by the provisions of S214. S214 also applies to manufacturing, quality criteria, installation and testing as they relate to the design of cold-formed steel trusses. All AISI documents are available through the Steel Framing Alliance (SFA) and the Cold-Formed Steel Engineers Institute (CFSEI): store.steelframingalliancestore.com.

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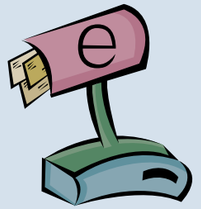
[1] **2009 IBC 102.4 / 2009 IRC R102.4 Referenced codes and standards.** The codes and standards referenced in this code shall be considered part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

[2] The following standards/documents are specifically referenced by the IBC/IRC for inclusion in the code: AISI documents, ASCE 7, BCSI, NDS, SDPWS, TPI 1 and WFCM.

[3] SBCA Load Guide Version 1.03: Guide to Good Practice For Specifying & Applying Loads to Structural Building Components (www.sbcindustry.com/loads.php).

at a glance

- Every component design department should have a small reference library of important technical documents.
- It is generally best to make sure your designs conform with the most current versions of the IBC and IRC.
- However, building code adoption is at the discretion of the authority having jurisdiction.



Readers Respond

Dear *SBC*,

I'd like to make a few comments regarding your Technical Q&A column in the March issue regarding trusses used in corrosive environments.

In response to the writer's question regarding metal plate connected trusses used in a salt storage building, you indicated that if the building has free-flowing air there are no precautionary measures that would need to be taken to protect the metal connector plates. Our experience at ITWBCG has been that connector plates in salt storage and fertilizer storage facilities susceptible to condensation are at risk of corrosion. The presence of moisture in the form of condensation results in the salt and fertilizer dust on the connector plates going into solution and this creates the mechanism for corrosion.

Air flow, whether sufficient or insufficient, has not been found to be a factor in deterring corrosion in these types of structures. The dust finds a way onto the plates and thus creates the potential for corrosion. We have always recommended the TPI-prescribed paint coatings for these types of storage facilities.

You define hot dip galvanization as the process of adding an additional coating of zinc to a metal connector plate. Hot dip galvanization is actually the process by which the zinc coating is applied to the sheet steel before the steel is shipped to a plate stamping facility. The sheet steel is fed through a zinc bath, allowed to cool, and then coiled up for shipment. Re-galvanizing takes place after the connector plates have been stamped. The stamped plates are sent out to a facility that handles re-galvanization. The original zinc coating is stripped off the connector plates and then a new, heavier zinc coating is applied.

Typically connector plates are re-galvanized with an excess of 2 ounces of zinc per square foot of plate surface, compared to the original 0.60 ounces per square foot (G60) on the sheet steel when it is shipped to the stamping plant. Except for zinc-rich paint coatings, I am not aware of any process that applies an additional layer of zinc to a metal connector plate on top of the original G60 coating that was present on the plate at the time of stamping without first stripping off the original G60 zinc coating.

Bruce Feldmann, P.E. • Chief Engineer - Earth City • ITW Building Components Group, Inc.

Technical Q&A

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8. **ANSI/TPI 1-2007 National Design Standard for Metal Plate Connected Wood Trusses:** If you design and manufacture wood trusses in the U.S, this is your main resource. The truss design software you use is also based on it. TPI 1 also contains the industry's standard design responsibilities and in-plant quality control requirements. Individually available from the Truss Plate Institute (www.tpinst.org) or order the Metal Plate Connected Wood Truss Handbook (see suggested resource 6) and TPI 1 together in a hard copy or digital package from SBCA (www.sbcindustry.com/pubs/HB3-ED+ANSI).

9. **NDS-05 National Design Specification (NDS) for Wood Construction-with 2005 Supplement:** The NDS provides design values and equations for engineering a variety of wood products and metal fasteners. Many of TPI 1's design principles are derived from the NDS since trusses are a specialized case of lumber and fastener engineering. NDS is available from the American Wood Council (www.awc.org).

10. **ANSI/AF&PA SDPWS-08 Special Design Provisions for Wind and Seismic:** Also from the American Wood Council, SDPWS covers materials, design, and construction of wood members, fasteners, and assemblies to resist wind and seismic forces (www.awc.org).

11. **WFCM-08 Wood Frame Construction Manual for One- and Two-Family Dwellings:** The WFCM provides engineered and prescriptive requirements for wood frame residential construction based on dead, live, snow, seismic and wind loads derived from the IBC. Also published by the American Wood Council (www.awc.org).

12. **Truss Connector Catalog:** Make sure this is the most up-to-date version available. Most connector companies update these annually and have them online. Read the fine print and make sure your technical department understands the fastener capacities and what load duration factors they are based upon.

13. **Timber Construction Manual:** This is "the handbook for heavy timber design." It includes technical data for dimension lumber, timbers and glued laminated timber and current timber design methods for beams, columns, arches and timber trusses. Another useful feature is the capacity tables for simple span beams up to 40'. Available from the American Institute of Timber Construction (www.aitc-glulam.org).

14. **Lumber Guides and Span Charts for Dimensional Lumber and Engineered Wood Products:** These are important when structures mix conventional and component construction. The guides contain span charts, strength properties, adjustment factors and installation details that every designer needs to consider. Most of these are available online. The four primary organizations to contact for wood: the American Wood Council (www.awc.org), Canadian Wood Council (www.cwc.ca), Southern Pine Council (www.southernpine.com), and Western Wood Products Association (www.wwpa.org). For EWP guides, contact the specific manufacturer.

15. **SBCRI's Roadmap to Code Compliance:** It is important for your technical department to understand how products comply or can comply with the building code. Through Technical Evaluation Reports (TER), the Structural Building Component Research Institute (SBCRI) has provided a roadmap for product code compliance: www.sbcri.info/codecompliance.php. SBC

To pose a question for this column, email technicalqa@sbcmag.info.

It Isn't Your Grandpa's Barn

Tips for Technicians Designing Post Frame Trusses

by Mike Momb, The Pole Barn Guru

They say a life best lived is one that is about the journey and not the destination. In my case, my journey has sent me on paths I had no idea I would take (or even existed).

My Dad and his five brothers were sons of a building contractor, and became framing contractors. Growing up, my cousins and I worked for our fathers during the summers. As one of the "gofers" on the job, I didn't learn much, but I set enough trusses to know they were always placed every two feet.

The natural progression led me into architectural school in college. Fresh out of school in 1977, a friend got me a job as a sawyer at a local truss company. Strange things occur in the truss industry. Three weeks after being hired, I was offered the position "truss designer and sales force" at a nearby truss plant partially owned by the same folks who first hired me.

One thing I had learned while framing with my father and uncles carried me a long way in my new career—trusses were set 24 inches on center. Then one day, life changed. A rather scraggly sort came into the sales office. He was ready to place a truss order (good, we liked orders). But here was the shocker to my system. He was planning to put two trusses every 12' on center. I looked at my boss, my boss looked back at me, and we had a serious gut busting laugh at our poor customer's expense. Neither of us had ever heard of such a thing. After we picked ourselves up off the floor from laughing hysterically, we said, "Sure, why not"? We ran a design, gave him a price and took his money.

Author's Note:

I am not a registered design professional. The information contained in this article is provided merely to make the reader aware of the possibilities and to be thought provoking. It is not intended to replace the advice of a licensed professional.

Over 100,000 "pole barn" trusses later, it is no longer a laughing matter. The pole barn industry represents a nice segment of the engineered building industry. My personal post frame truss experience now spans three decades. While I entered the truss industry as a jack-of-all trades, I ended up owning two truss plants for 17 years. I was a registered general contractor in four states, managing as many as 35 post frame building construction crews at once. For a time I was back in the industry as a truss technician. Over the past nine years, I have purchased trusses in nearly every state and resold them as components of complete post frame building packages. All of these experiences have blessed me with the unique advantage of having been on all sides of the industry.

Being in the business as long as I have, there are several things that seem to challenge truss technicians when designing post frame trusses. I've been asked to share them with you.

A Few Challenges to Consider

The first "challenge" to overcome with pole barn or post frame trusses is the same one I first encountered over a generation ago: spacing. Truss companies have told me their policy is to space trusses no further than 4', 6' or 8'. Then there is the ever popular, "the engineering program will not design them," or "we cannot get the engineer to seal them." The building components industry needs to open its eyes to different design possibilities that may seem laughable at first. The fact is, trusses can be designed for almost any spacing desired as long as the framing between them is taken into consideration. This is an area in which the industry has a significant opportunity to increase its market share.

A good truss technician has to be a world class juggler. The balancing act can be quite involved. Designs must make for efficient use of available lumber grades and dimensions, truss plate sizes in inventory, as well as practical to fabricate. Not to mention your boss, the project engineer, architect, building inspectors and consumers each expect truss designs that will not fail. And, of course, the purchaser wants prices that are competitive in the marketplace. If you "over design" them, your price will cost you the job. But "under design" them and even worse things could happen.

Let's talk realities here. Truss spacing does not have much bearing on lumber and connector plates (no pun intended). It is as simple as this—apply a given set of loads at a given spacing and come up with a design which does not exceed the CSI of 1.00. In the end, a total load of 30 psf on trusses 12' apart is the same as a total load of 90 psf 4' apart.

One truss plate manufacturer's preliminary drawings say "Maximum allowed spacing exceeded" if spacing is over 12' on center. If your truss design program says they will otherwise work, a manual engineering review needs to be asked for in order to get seals.

When your current truss design software was set up, chances are the sales rep from your plate company input the default values that are used by your truss technicians day in and day out to design and quote jobs. The occupancy category, snow and wind loads, and every other variable needed were all ready to go and seemingly worked just fine—as long as residential trusses every 24 inches were being quoted.

However, because default truss design software settings are not always the most appropriate for designing post frame trusses, truss technicians should be aware of which factors and settings to change when designing components for these buildings. Altering these settings in accordance with the governing building code will ensure proper loading of the components and maximize material efficiency. This, in turn, will reduce material cost. The following considerations should be addressed when designing post frame buildings.

Continued on page 16

TABLE 7-2 EXPOSURE FACTOR, C_e

Terrain Category	Exposure of Roof[a] Fully Exposed	Partially Exposed	Sheltered
B (see Section 6.5.6)	0.9	1.0	1.2
C (see Section 6.5.6)	0.9	1.0	1.1
D (see Section 6.5.6)	0.8	0.9	1.0
Above the treeline in windswept mountainous areas.	0.7	0.8	N/A
In Alaska, in areas where trees do not exist within a 2-mile (3 km) radius of the site.	0.7	0.8	N/A

The terrain category and roof exposure condition chosen shall be representative of the anticipated conditions during the life of the structure. An exposure factor shall be determined for each roof of a structure.

[a]Definitions: Partially Exposed: All roofs except as indicated in the following text. Fully Exposed: Roofs exposed on all sides with no shelter[b] afforded by terrain, higher structures, or trees. Roofs that contain several large pieces of mechanical equipment, parapets that extend above the height of the balanced snow load (h_b), or other obstructions are not in this category. Sheltered: Roofs located tight in among conifers that qualify as obstructions.

[b]Obstructions within a distance of $10h_o$ provide "shelter," where h_o is the height of the obstruction above the roof level. If the only obstructions are a few deciduous trees that are leafless in winter, the "fully exposed" category shall be used. Note that these are heights above the roof. Heights used to establish the terrain category in Section 6.5.3 are heights above the ground.

Table 7-2 from ASCE 7-05, Exposure Factor, Ce

It Isn't Your Grandpa's Barn....

Continued from page 15

Snow. The International Codes (IBC and IRC) identify the appropriate Ground Snow Load (Pg) to use on a building based on its location. The ground snow loads identified in these codes are taken from the referenced standard ASCE 7. Your truss design program will calculate the roof snow load using Pg as the basis and multiplying it by several factors. This is the relationship between the ground snow load and the roof snow load:

$$p_s = 0.7 C_s \, CeCt \, I \, pg$$

where:

Cs= sloped roof factor Ct= thermal factor

Ce= Exposure factor I= Importance factor

The formula above shows how the ground snow loads are adjusted by several factors to get to a Top Chord Live Load. The ones to be most aware of with post frame construction are the Importance factor (derived from the nature of the occupancy), Exposure Factor and Thermal Factor.

Your default setting for occupancy is probably Category II (shown as "Is" or "Importance" factors on truss design drawings). Most post frame buildings will not result in the loss of human life if there are serviceability issues given the majority are used in the agricultural/industrial arena. Because of this, post frame buildings are occupancy Category I. This alone can reduce the roof snow load by 20 percent as compared to residential, office or manufacturing-type structures.

The Exposure Factor (Ce), is normally defaulted to 1.0, but can vary from 0.7 to 1.2 and can make huge differences in both design and price. The best examples of how to determine Exposure Factor can be found in Table 7-2 of ASCE 7-05 (referenced in IBC Section 1608.1; see above).

The Thermal Factor (Ct) is normally defaulted to either 1.0 or 1.1. However, most post frame buildings are not heated year round, so the factor should be 1.2. This will increase the roof snow load, and therefore increase the design load the trusses must withstand.

Metal roofs are assumed to be slippery surfaces unless the presence of snow guards or other obstructions prevent snow from sliding. Do not automatically assume there will be no snow guards, even if they are not shown on the building plans. A roof slope factor (Cs) is calculated based on whether the roof is warm or cold, the nature of the roofing material, and slope of the roof. With heated, steeply sloped and/or slippery roofs, these reductions can be significant. If the building plans do not specify the values of these factors, consult with the registered design professional in charge or ask the owner for the loads and factors. It is best to get the values in writing or send them written notification that you will consider the loading assumptions are accurate unless they tell you otherwise.

Will the building be in an area with little or no snowfall? Don't forget area reductions. If the truss span times the truss spacing is over 200 sq ft, a reduction is in order. This calculated value can reduce the roof live load (Lr) to as little as 12 psf. Further, if Lr is greater than Ps (sloped roof snow load), the Duration of Load for roof loads is now 1.25, instead of the 1.15 typical default value.

Wind. Fairly straightforward right? You enter the wind speed and go! It is not that easy; the wind exposure must be correct to match the building site (B, C or D). ASCE 7/IBC specify that Exposure B shall be assumed unless the site meets the definition of another exposure. This does place some onus on the technician to ensure that the person building the trusses provides information so that proper exposure category is used in the design. Loosely defined, Exposure C is open terrain with scattered obstructions, while Exposure D is flat, unobstructed areas exposed to wind flowing over open water for a distance of at least one mile. Exposure D is excluded in hurricane prone regions.

Nature of Occupancy affects wind designs, as Iw (Importance factor for wind). The standard default of Category II results in Iw = 1.0, however most post frame buildings are low risk and Iw = 0.87, so a reduction factor of 0.87 is applied for wind (0.77 in hurricane prone regions where wind speed is over 100 mph).[1]

Older codes usually define the Duration of Load for Wind as 1.33. The International Codes and NDS now use a value of 1.6.

Where is the truss located on the roof? Trusses located in the "end zone" require a higher wind load than those located in "interior zones." For most buildings the end zone extends from the corner of the building a distance equal to ten percent of the building width. For example, if the building is 60 feet wide, the end zone extends 6' in from the corner of the building. With widely spaced trusses, often only the end truss is in an end zone. Making the wrong wind choices can result in the need for larger or higher graded truss members as well as increased bracing requirements.

[1] ASCE 7-05 Table 6-1

Dead loads. Using artificially high dead loads can create the possibility of severe serviceability issues. You may be asking what this means. A light gauge steel roof over purlins creates a Top Chord Dead Load of about 2.5 psf. It is more than conservative to use 3.3 psf. Depending on the truss spacing and the lumber used in the trusses, with no ceiling or sprinklers, a Bottom Chord Dead Load of 1.0 psf is usually adequate. Building design professionals use the uplift values from your truss drawings to design the uplift connections for the trusses. Even though they can only use 60 percent of the dead loads to resist uplift, if the truss is designed for dead loads of 10 psf on both the top and bottom chords, the uplift resistance from dead loads is 12 psf. Using the actual dead load the resistance is only 2.58 psf. Designing with the higher dead loads inappropriately results in an uplift calculation that is not conservative because dead loads that are not present are assumed to be resisting a portion of the uplift. This could easily result in lumber distress and/or cracking of the connection during a high wind event.

Often overlooked is the effect of end overhangs on the end trusses. An example is placing trusses every 10' with an 18-inch end overhang. The end trusses need to support half the distance to the first truss (5') *plus* the distance of the overhang for a total supported load of 78".

Drop Preconceived Notions, Find Success

There are two keys to success in designing trusses for post frame buildings. First, approach the design solution with an open mind, leaving behind preconceived notions of spacing and loading. Second, take the extra time to gather the correct load criteria from the registered design professional or building owner and input it right the first time. Alternatively, provide all your loading conditions and assumptions to the RDP or owner with your submittal drawings for approval.

I hope I have opened your eyes to the post frame market and its design nuances. Your clients listen to everyone's favorite radio station WII-FM (What's In It For Me). Armed with the information in this article, you can now point out how you have looked out for their best interests. When your customer realizes you are protecting his pocketbook with efficient designs, and his safety with the correct load combinations, you will win both his loyalty and his order. SBC

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Some component manufacturers use the Load Guide as an efficient way to get loading assumptions on a project confirmed by the building designer or project owner. One method to ensure loads are confirmed is to send the Load Guide worksheets with the approval package with a note stating that these are loads you have assumed for this project, and unless you hear otherwise, the worksheets will be assumed as confirmation of the applied loads used.

Who can use it? Anyone: truss technicians, building designers, truss designers, building officials and anyone else in the building design process. The goal is to enhance uniform interpretation of the code so that the proper loads are applied to a structure.

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OSHA Isn't Just a Four-Letter Word

by Sean D. Shields

When you ask for an emergency contact on your employment form, it's a bad sign when your employees write, "a very good doctor." Contrary to that attempt at humor, workplace safety is nothing to joke about. Just ask your local Occupational Safety and Health Administration (OSHA) inspector. They are taking inspections and enforcement to a whole new level under the Obama Administration. In 2008 and 2009, OSHA conducted a total of 38,450 and 39,004 inspections respectively. Halfway through 2010, OSHA had already performed 21,522 inspections, an even higher rate of inspections than the previous two record years.[1] With new rules on combustible dust, proposed rules on hearing protection, and suggestions of new rules on forklift operations, the odds you will have an OSHA inspection in the next few years is greater than ever.

The good news is that with a little preparation and communication with your employees, an OSHA inspection doesn't have to be a bad experience. In this article we will explore what OSHA is looking for when they conduct an inspection and what you should expect to happen during one. We will also explore steps you can take to prepare for an inspection (hint: it starts with creating a strong safety culture among your employees). Further, there are several things you can do during an inspection to ensure it goes as smoothly as possible.

Lions & Tigers & OSHA Inspectors, Oh My!

By federal statute, OSHA is authorized to conduct workplace inspections and investigations to determine whether employers are complying with standards issued by the agency for safe and healthful workplaces.[1] Inspections are generally conducted without advance notice. A recent ***SBC One Minute Poll*** confirmed as much, ninety percent of the respondents indicated they had little to no notice an inspection would occur.

There are five overriding priorities that determine when and where OSHA inspections occur[3]:

1. imminent danger,
2. catastrophes and/or fatal accidents involving three or more employees,
3. formal complaints filed by employees,
4. programmed inspections aimed at specific high-hazard issues or industries, and
5. follow-up inspections.

History tells us that component manufacturers are more likely to be inspected for item four than any of the others. For example, 63 percent of the inspections conducted in 2009 were the result of OSHA programs that target industries or facilities with high incident rates.[4]

Every OSHA inspection will have three components[5]:

- **Opening Conference:** Before the inspection begins, the OSHA compliance officer/inspector should explain how the company was selected and what the likely scope of the inspection will be. It is a good idea to have one or two representatives who are familiar with both OSHA requirements and your safety record who can attend this meeting and walk around the facility with the inspector.
- **Walkthrough:** The inspector has authority to determine the route and duration of the inspection. While talking with employees, the compliance officer is supposed to make every effort to minimize work interruptions. Be as accommodating as possible. They may start out looking at small things, but if they don't find anything wrong, you may find they soon move through your plant more quickly.
- **Closing Conference:** The inspector should review with the employer all unsafe or unhealthful conditions observed during the inspection and indicate violations for which they may issue or recommend a citation or a proposed penalty. Have your company in-plant safety paperwork available. Giving them a well-organized set of safety-related documents will go a long way in making the case you take safety seriously.

Know Thine Enemy

Remember that unsafe working conditions are your nemesis—not the OSHA inspector. Not only does it lower morale in the workplace, but it can lead to higher incident rates, more missed days of work, and ultimately, higher workmen's compensation claims and premiums. One Midwestern component manufacturer suggested, "go to the OSHA website. They have a list of the top ten safety issues they are focused on. Make sure your safety program addresses all the applicable issues."

Another approach is to get into the head of the OSHA inspector. Some component manufacturers have gone the route of hiring a third-party OSHA expert to conduct a mock inspection at their facility and point out all the things an OSHA inspector would likely issue a citation on. The problem with this approach is that you may end up paying a lot of money for information that is readily available at no charge.

Many state OSHA offices offer voluntary inspections, with the promise that no citations are issued as a result of the inspection. This approach is at no cost, but be aware you are inviting a regulatory agency into your facility. There is no guarantee they will not come back for an official follow-up inspection.

One component manufacturer in North Dakota had yet another alternative. "We coordinated with Bismarck State University, which had a program to train safety compliance officers," said Chris Lange (Northland Truss). "Their students had an opportunity to conduct a 'real world' inspection, and we benefited by having a list of safety concerns to work on."

Documentation Is Key

OSHA is placing special importance on posting and recordkeeping requirements. After the walkthrough, the inspector is required to inspect records of deaths, injuries, and illnesses that the employer is mandated to keep.[6] It is also likely the inspector will request a copy of your Hazard Communication Program as OSHA requires employers to establish a written, comprehensive communication program that includes provisions for container labeling, material safety data sheets, and an employee training program.[7]

OSHA finds an average of 3.1 violations per inspection, and more than half are related to a lack of documentation or hazard communication. OSHA's focus on the generation, collection and disposal of combustible dust in the workplace is a good example. OSHA conducted 1097 combustible dust inspections from October 2007 to June 2009, and over 25 percent were in woodworking facilities.[8] From those inspections, OSHA cited 4,926 violations[9]; 27 percent of the citations related to inadequate documentation.

Those numbers point to one underlying fact: OSHA wants you to have a formal hazard communication and training program, and they want it documented. A Wisconsin component manufacturer put it succinctly, "One of the outcomes of having a strong safety culture is that you end up documenting the [heck] out of everything. When our OSHA inspector left, he was overwhelmed with the four-inch binder of information we gave him."

A component manufacturer from Minnesota also related this story, "The compliance officer was looking at a safety log, and I was concerned about his reaction to an entry where one of our employees was hurt on the job when he made a mistake. The inspector wasn't concerned about it because the documentation showed we had taken the issue seriously and taken appropriate steps to correct it." In other words, document. Then document your documentation.

Kill 'Em with Kindness

Every component manufacturer interviewed for this article had a different experience during their inspection, but they all had the same advice: remain calm, treat the inspector with respect and don't try to hide anything from them.

These behavioral guidelines are consistent with the top do's and don'ts compiled by two OSHA inspectors at a recent safety conference[10]:

1. Don't make me wait. It just tells me you're not ready. Nothing you can do at the last minute is going to make much difference anyway.
2. It's best to be open with me.
3. Don't try to block my line of site by bringing a bunch of employees along on the walk-through. I'll wait until I get to see what I want to see.
4. Be prepared to answer questions. Have all required OSHA documents, including those outlining safety plans, ready for me.
5. Don't discourage employees from talking to me. I'll talk to them one way or another. I find ways to slip employees my business card, and once I do, they usually call. If necessary, I'll get a subpoena to talk to your employees.
6. Don't lie to me. That makes me angry.
7. Think about hazards, not just standards, when you evaluate your workplace for safety. I look for hazards, not standard violations.
8. Have your training documents in order. I do look at them.

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SBC Industry One Minute Poll

68% had an OSHA inspector conduct an inspection two or more times in the last five years

75% had no advance warning the inspector was coming

71% reported no pre-existing reason for the inspection

64% said their inspection lasted 1-4 hours

46% were fined between $1 and $5000 for their citations

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OSHA Isn't Just a Four-Letter Word

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The inspector should point out to the employer any unsafe working conditions they observe. At your request, the inspector can simultaneously suggest possible corrective actions.[11] Make sure these conversations are civil. Resist the temptation to argue, become defensive, or attempt to point out how their suggested abatement techniques won't work. Lange explained, "If you attempt to work with the inspector and make their job easier, you will get a lot more leeway than if you point out how they are wrong."

During the closing conference, you are allowed to produce records to show compliance efforts and provide information that can help OSHA determine how much time may be needed to fix any alleged violations.[12] Use this opportunity to showcase how your company has worked to establish a strong safety culture.

Know Your Rights

All of the above advice is sound, but always remember that OSHA is a governmental entity, and any citations or warnings they issue carry the weight of law. This means that you have important legal rights you should be aware of during an inspection. For example, never verbally or in writing admit to any violations or unsafe working condition. Further, everyone at your company has the right not to speak with an OSHA representative, unless they have a court-issued subpoena or deposition notice. In addition, everyone has the right to have legal representation of their own choosing if they agree to voluntarily give a statement. Exercising these rights may not have a positive impact on your relationship with the OSHA inspector, but they are important legal protections for you and your employees.

Conclusion

"The real key is to foster a focus on safety. If employers show that they are committed to a safe work environment, it improves morale by showing you care about their well-being," said Lange. "Getting your employees to buy in to a safety culture is important because ultimately they are the ones responsible for maintaining it in the plant."

Whether it's through regularly scheduled safety meetings (on pay day, for example) or through a formal safety program like SBCA's Operation Safety, now is the time to renew your commitment to workplace safety. The numbers don't lie, OSHA inspections are at an all-time high, and the component manufacturing industry is a target. Not to mention, as things begin to pick up, and you find yourself hiring several new employees, maintaining a safe working environment will become a greater challenge without an active program in place.

If you are doing all you can to foster a safe work environment, you won't have to dread the appearance of an OSHA inspector. Who knows, you might even get to joke around with them. SBC

Fall Protection: OSHA GOES RETRO

by Sean D. Shields

OSHA announced that as of June 16, 2011, it would remove interim guidelines regarding residential fall protection and begin to enforce the existing standards it put in place in 1994. These regulations are contained in Subpart M at 29 CFR 1926.501(b)(13), and require fall protection (usually conventional fall protection, i.e., guardrail systems, safety net systems, or personal fall arrest systems) for work 6 feet or more above lower levels.

Further, OSHA is modifying its interpretation of "residential construction" under this standard. They are combining two elements—both of which must be satisfied for a project to fall under this provision: "(1) the end-use of the structure being built must be as a home, i.e., a dwelling; and (2) the structure being built must be constructed using traditional wood frame construction materials and methods." It is important to note, however, that under this definition the use of cold-formed steel studs and limited structural steel does not disqualify the structure from being considered residential.

This change in policy and enforcement will have a significant impact on residential construction. The interim compliance policy, in place since December 1995, permitted employers engaged in certain residential construction activities to use specified alternative procedures instead of conventional fall protection. These alternative procedures could be used, "without a prior showing of infeasibility or greater hazard, and without a written, site-specific fall protection plan." In essence it removed the teeth out of the original rule.

In its press release announcing the change, OSHA stated, "The National Association of Home Builders (NAHB) recommended rescinding the 1995 directive, as did OSHA's labor-management Advisory Committee for Construction Safety and Health; the AFL-CIO; and the Occupational Safety and Health State Plan Association." OSHA contends, "personal fall arrest systems generally can be used safely and effectively in residential construction, including for roofing work. OSHA is convinced that fall arrest systems can be used with commercially-available anchors that can be installed without increasing the duration of exposures to fall hazards or impeding production schedules."

With a return to the original standard, OSHA will allow the use of a fall restraint system in lieu of a personal fall arrest system. OSHA explains in the announcement, "a fall restraint system may consist of a full body harness or body belt that is connected to an anchor point at the center of a roof by a lanyard of a length that will not allow a worker to physically reach the edge of the roof."

This creates a serious concern for the structural building components industry, given that the anchor point of choice for most framers will be the peak point of roof trusses. In fact, OSHA even states explicitly in its announcement that, "fall restraint systems can be used effectively to prevent falls by tethering workers to structural members, such as braced trusses and studs." Further, OSHA encourages the use of personal fall restraint systems in situations in which it might be problematic to use personal fall arrest systems.

Under this standard, employers can use guardrail systems or safety net systems, as well as having their personnel work from ladders, scaffolds, or aerial lifts in lieu of complying with the requirements of 1926.501(b)(13). However, it remains to be seen how cost-effective these solutions will be on residential jobsites compared to personal fall arrest systems.

As a consequence, the Structural Building Components Association (SBCA) will review the fall protection guidelines contained in B11 Summary Sheet, "Fall Protection & Trusses," as part of the *Building Component Safety Information Guide to Handling, Installing and Bracing of Metal Plate Connected Wood Trusses (BCSI).* B11 will continue to stress the fact trusses alone are not designed to support fall protection anchors or to resist the lateral impact loads associated with roof anchors and tether devices attached to them without adequate lateral restraint. It will also stress that in order for peak anchors or other fall protection devices to be used with roof trusses, a group of trusses must first be installed and diagonally braced or fully sheathed using a method that does not require fall protection attached to the trusses under the OSHA standard.

It is also important to note that under 29 CFR 1926.503, the employer must ensure each employee who might be exposed to fall hazards on the residential jobsite has been trained by a "competent" person. In addition, the employer must verify the training of each employee by preparing a written certification record which OSHA inspectors will require at the time of a jobsite inspection.

For more information and guidance on how framers can comply with the "new" fall protection requirements, OSHA has created an educational website: www.osha.gov/doc/residential_fall_protection.html. The BCSI B11 Summary Sheet can be found on the SBCI website: www.sbcindustry.com/B11. SBC

Parting Shots

Share your stories and photos with us! Send submissions to **partingshots@sbcmag.info**.

A winter of hundreds of roof collapses in the U.S. and Canada resulting from heavy snowfalls sure reinforces the importance of snow loads. But that's not apparent to everyone. Steve Kennedy, E.I. (Lumber Specialties) sent in this photo recently taken at a rural Iowa property. "One of our salesmen was called to this jobsite to measure for what the customer described as a simple order that required no additional loading." An out building once attached to the barn had collapsed (you can see the outline of the shed in brown), and the owner was making plans to rebuild it.

"When the salesman arrived on site, it was obvious that snow drifting around the barn would require additional snow loads. Yet it had never occurred to the owner," Kennedy said. The salesman explained why snow drifting should be considered, and Lumber Specialties moved forward with the job.

What caused the shed to collapse in the first place? Ironically, snow drifts on its roof. SBC

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