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A man with short dark hair, wearing a grey t-shirt, is seated at a wooden desk in an office. He is looking at two computer monitors. The left monitor displays a 3D architectural rendering of a building with a complex roof structure. The right monitor shows a software interface with a yellow truss structure and a table of data. A keyboard and mouse are on the desk. In the background, there are windows with horizontal blinds. A blue diagonal graphic element is overlaid on the bottom left of the image.

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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.

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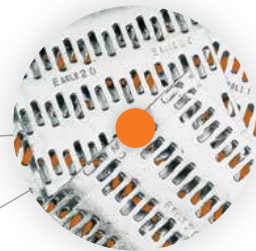
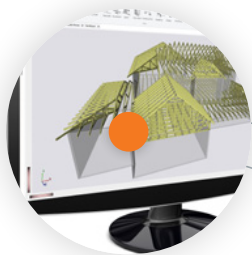
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editor's message

by Rick Parrino

The Long View on Relationships

Here are three examples of how taking the long-term approach to relationship building has resulted in unexpected benefits.



A recent meeting with U.S. Senator Joni Ernst (R-IA) provided an opportunity to discuss some of the challenges facing the construction industry in Iowa, a good example of the positive benefits of establishing relationships with your members of Congress.

at a glance

- Sometimes the benefit of building a relationship is just the sense of camaraderie, but other times, the value can be much more profound for your business.
- Having a close working relationship with your local building officials can not only help you better navigate code changes and jobsite inspection issues, it can help increase market acceptance of your products.
- Forming relationships with your state lawmakers is an easy process, and given their broad connections throughout your community, they're good people to get to know.

You never know how or when a professional relationship will benefit you. If you've read my past articles, you know by now that I spend a fair amount of time building relationships. I don't do it because I expect to gain something specific; I do it because I have learned that, at some point, every relationship has value.

Sometimes I find the value simply in the good conversations and sense of camaraderie as we work through the challenges the construction industry throws our way. Other times, our relationships allow us to accomplish things more collectively by leveraging our combined knowledge, expertise and position. When I think of the latter, a few instances come to mind that might help you appreciate the worthwhile return on the time investment of building a broad collection of professional relationships.

One instance is this building official I've become friends with over the years. He currently serves as the Deputy Building Official for the City of Des Moines, IA. We've gotten to know each other through meetings of the Mid Iowa Construction Code Council (MICCC) and the Iowa Association of Building Officials (IABO). I try to attend as many of those meetings as I can. One, it lets me know a great deal about what building inspectors are looking for in the field and the issues they are having; and two, it gives me advance notice of building code or code enforcement changes.

Early on, I was pretty quiet in those meetings. I just listened and introduced myself to other attendees when I had the chance. Every once in a while, there would be a question related to truss installation, and I would share my opinion, based on either how my company dealt with an issue, or a broader point of view that had been developed through the SBCA Board of Directors. After a few years, when an issue was raised in my area of expertise, they'd immediately ask me for my input. They didn't always agree with me, but at least they asked for my opinion.

Eventually, I became friends with the Deputy Building Official when I argued that the City of Des Moines should avoid adopting the code provision that required gypsum to be installed on unprotected floor assemblies, unless they were constructed of 2x10s (see March 2015 issue of **SBC** where I talk more about this issue). While the City of Des Moines ultimately voted against our industry, the respectful dialogue and sharing of common end goals helped establish that our industry's point of view and perspective are valuable for them to consider on future issues.

Recently, that relationship began to reap benefits for our company, and frankly, our entire industry in Iowa. He asked me for truss layouts, so he could train some new building officials on how to read them. Not only did I provide him with layouts, I also dropped off *BCSI* installation training for the new hires. I even offered to do a training session for their new building inspectors in our market. It was a win-win: They got training, and it saved us a bunch of headaches going forward because these new building officials will know what to look for from the start.

Another example is the relationship I've developed with our local Habitat for Humanity. Many of you have probably worked with this worthwhile organization at one time or another. Recently, I've been involved with Habitat projects as a favor to some of our largest homebuilder customers. We've become

Continued on page 6

Editor's Message

Continued from page 5

someone they know they can contact when they need help coordinating the framing of Habitat homes in the Des Moines area. Because of that, I recently was given the opportunity to provide *BCSI* installation training to a group of Habitat jobsite supervisors.

Not only is it beneficial to have that group knowledgeable about proper truss installation on their many jobsites, but through programs like this, we now have better relationships with a wide variety of framers throughout the metropolitan Des Moines area. One fringe benefit was that I was able to bring in our new truss designers, and a few people from our home plan design team, to go through the bracing and truss installation training at the same time. It was a great way to kill two birds with one stone.

Another good example is my relationship with U.S. Senator Joni Ernst (R-IA). Sen. Ernst was recently elected to Congress, and was actually the first confirmed Senator to give the Republicans official control of the U.S. Senate after the last election. Originally, she was an Iowa State Senator, and her district included Osceola, the town where our manufacturing plant is located. Sen. Ernst used to host a lunch once a month in Osceola, and I always made it a habit to attend.

Over the months, I had the opportunity to talk with her and share my perspective on everything from the economy to our business to the military. She was a Lieutenant Colonel with the Iowa Army National Guard, and as I learned about her service to our country, I shared with her stories of my son's tours of duty overseas. We had a mutual respect and care for our nation's service men and women, and we also got to meet each other at various military-related events.

Recently, Sen. Ernst came back to Iowa and I, along with a small group of Iowa HBA members, was fortunate to have a quick meeting with her (see photo at on page 5). This was a great opportunity not only to catch up with her and learn about her experiences in Washington, DC, but also to talk about some of the challenges we face here with regard to a shortage of production labor, workforce training for skilled labor, and the effect of the code provisions we will need to overcome as Iowa looks to adopt the *2015 International Residential Code (IRC)*, especially affordability in rural areas. Overall, it was great to see her, and to have her assurance she's willing to help us if and when we need it.

Again, you never know when a relationship can prove to be valuable—invaluable even—and you certainly can't forge a new relationship assuming you will get an immediate benefit out of it (people have a tendency of seeing right through that). However, being a good resource for information and common sense always seems to build fast friendships. I can't encourage you enough to take my experiences to heart and make a similar effort in your marketplace.

Start with a building official you work with periodically. Learn their struggles and find a way to help them out. I guarantee, you won't regret the investment. You never know when they'll be in a position to return the favor and help you. **SBC**

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



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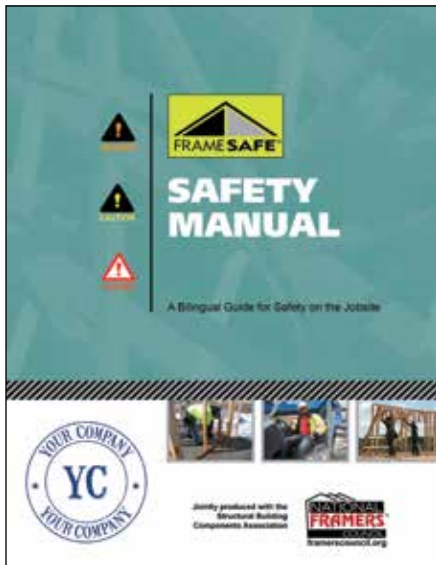
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Why Effective Jobsite Training Does More Than Promote Safety— It Makes OSHA Happy

Creating a culture that promotes jobsite safety requires a methodical approach to training.



Jobsite training is one of the most important things I stress in my business. I care about my workers and their health, plain and simple. Being safe on the jobsite isn't just about reading a safety manual, signing off on it on the first day, and going about the day as usual. I've said it time after time—remembering what one learns in the training process is paramount for jobsite safety, and you must have continuous training in order to make a training system work. Moreover, creating a culture of safety within a company, from the owner on down, is the ultimate goal in my business and the primary goal of the National Framers Council (NFC).¹ The record isn't broken; it's on repeat for a reason.

During the month of June, NFC's long-awaited Site-Specific Fall Protection Plan² will roll out for **FrameSAFE** subscribers. I want to take some time to talk about how the plan should be used. It's important to remember this site-specific plan is just one piece of the **FrameSAFE** manual, and as such, when training employees, begin

Remembering what one learns in the training process is paramount for jobsite safety, and you must have continuous training in order to make a training system work.

by reviewing the entire manual with them. You don't start reading a book in the middle, and the same goes for a safety manual. Reviewing the entire manual allows employers to answer questions and highlight big-picture topics they wish to stress. Furthermore, roles and responsibilities outlined in the fall protection plan are defined earlier in the **FrameSAFE** manual, and understanding those roles and responsibilities is key to complying with the site-specific aspect of the plan.

Once the manual has been covered in its entirety, share the scope of the fall protection plan with employees based on the tasks to be performed on a particular jobsite. We recognize not every framing crew performs the topics covered in the site-specific plan, which is why we've made it a pick-and-choose document to craft for each crew and each jobsite. Employers can select the framing process applicable to their crew and site, while excluding those areas not relevant to them.

Last, but not least, review the terminology used in the manual. This may seem redundant, but after my 40-plus years in the industry, I've learned to never assume a word means the same thing from one general contractor to another. Of concern on today's jobsite is the communication between English- and Spanish-speaking workers. Aside from the obvious differences, many times Spanish-speaking crews begin to use English words interchangeably or even create "Spanglish" versions. The same goes for OSHA terminology³; OSHA talk is not the talk you hear on the jobsite. Overcome this by teaching and re-teaching terms and situational words to make communica-

at a glance

- Effective employee training on jobsite safety requires an approach that combines good information with consistent messages and continuous delivery.
- The NFC's Site-Specific Fall Protection Plan is being added to the already robust **FrameSAFE** program.
- Safety is everyone's responsibility. Effective training is the best way employers can "help their employees help themselves" to work safely on the jobsite.

¹ Visit framerscouncil.org for more information.

² Visit framerscouncil.org/sitespecific for additional details about the program.

³ For additional glossaries of terms, visit osha.gov.



tion on the jobsite and between framing crews and code officials consistent.

The culture of safety I mentioned will lead to fewer accidents and injuries because employees will be aware of safety, communicate well with one another,

and the jobsite will be clean and orderly. The positive side effect of having a safe, clean jobsite becomes apparent when OSHA inspectors pay a visit. All too often, framers overlook the possibility of an inspection, so I want to take a moment to review the standard operating procedure when an OSHA inspector visits a jobsite.

OSHA selects inspection sites based on imminent danger situations, sites with known fatalities or catastrophes, sites with a history of complaints, referrals, follow-ups and pre-planned general investigations. Once on the site, an inspection will follow these steps⁴:

- **Presentation of credentials:** The OSHA inspector will ask to speak with the individual in charge and will identify themselves by supplying their credentials.
- **Opening conference:** The inspector will hold a conference explaining the reason for the inspection and define the scope. The individual in charge of the site will be required to select a representative (or him/herself) to accompany the compliance officer as the jobsite is inspected.
- **Walk-around inspection:** The inspector will visit each of the areas within the scope of the inspection or specific areas of concern. The inspector will also review jobsite records including, but not limited to, permits, licenses, employee training/certification, etc.
- **Closing conference:** The inspector will report any findings with the individual in charge and describe what courses of action must be taken to become OSHA compliant. Citations resulting in financial penalties will be shared and directions will be given with regard to payment.

A common misconception among workers during an inspection is that it's best to just leave the jobsite. You know the drill: "OSHA's coming!? Better get out of here!" Leaving is the wrong thing to do. It looks bad to the inspector, and it costs the employer a day's worth of work. A more productive response is to take the time to clean up the jobsite prior to the inspector's arrival, if it's known the inspector is coming. Put

Continued on page 10

⁴ Visit osha.gov/OshDoc/data_General_Facts/factsheet-inspections.pdf for a more detailed explanation of inspection procedures.

⁵ Visit framerscouncil.org/toolboxtalks to view *How to Handle an OSHA Inspection*.



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Framer Viewpoint

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away unused tools, straighten materials, clear a path for easy access during inspection and address unsafe areas. Above all, be cooperative, patient and pleasant when the inspector is on site; these things make an impression and are viewed favorably. It's just good business to be professional.

Finally, it is a good idea to take the time to review these procedures before an inspector arrives on site.⁵

Being safe is everyone's responsibility, but the only way to help employees help themselves is through training, and training is only as good as its mode of delivery. To that end, looking forward, NFC is working on a new stand-alone supplement called Activity Hazard Analysis. These will be short, one-page summaries of risk assessments of each task to be performed on any jobsite. Known hazards, controlling (limiting) factors, equipment to be used, training requirements, and inspection requirements will be identified, and employees will be expected to review the analysis for each task. This is an easy way not only to capture all the pertinent hazards on a jobsite, but also provide everyone on the site with an overview of what they need to know.

I covered a lot of topics in this month's NFC article, but there's been a lot happening. We've got more coming up, and it's

OSHA Inspection Priorities:

- 1) Imminent Danger Situations:** Compliance officers will request employers correct hazards immediately.
- 2) Fatalities & Catastrophes:** Employers must report catastrophes to OSHA within 8 hours.
- 3) Complaints:** Employees may remain anonymous if they file a complaint against an employer.
- 4) Referrals:** Can be referred by any federal, state or local agency or individuals and organizations.
- 5) Follow-ups:** Check for decrease of violations cited during earlier inspections.
- 6) Planned or Programmed Investigations:** Aimed at high-hazard industries or workplaces with high rates of injuries and illness.

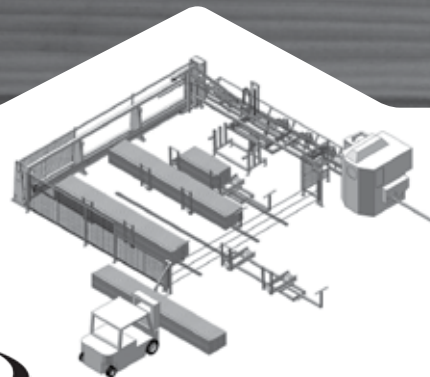
going to be an exciting summer. Let's all do our best to make it one of the safest and most successful seasons ever! **SBC**

Kenny Shifflett owns Ace Carpentry in Manassas, VA, and has been in the framing industry for more than 40 years. He serves on NFC's Steering Committee and chairs the Council's Safety Subcommittee. For more information about the National Framers Council and the FrameSAFE program, visit framercouncil.org.

⁵ Visit framercouncil.org/toolboxtalks to view a sample of NFC's Toolbox Talk entitled *General Jobsite Safety: How to Handle an OSHA Inspection*. All FrameSAFE subscriptions include access to the full library of Toolbox Talks and Safety Posters for ongoing safety training on the jobsite.

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THE BEAUTY OF COMPONENTS

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BY EMILY PATTERSON

SYSTEMS SHINES & LEED PROJECT



THIS WAS THE MOST INTERESTING HOUSE I WAS INVOLVED WITH OVER MY 30-PLUS YEARS [CAREER]. IT WAS A FUN CHALLENGE.”

How does a business go from stick building in the 1960s to a growing component manufacturing operation today? Simple. Establish a solid reputation and embrace customers’ visions for their projects. “We take great pride in what we do,” said Richard Hills, Senior Sales Associate at Windsor Building Systems.

Amwood Homes, based out of Janesville, WI, started out as a stick builder in 1959 and transitioned into component construction in 1972. In 2004, Amwood purchased Windsor and, aside from changing the name slightly, maintained much of Windsor’s business identity. “When we bought Windsor, they had a good name and reputation. We didn’t want to lose the client base,” said Virgil Waugh, President of Amwood.

Frank Lloyd Wright Inspired Home

A good example of Windsor’s focus on meeting client needs is a custom home project located in Madison, WI. Windsor worked with homeowner Pat McCaughey, who also served as the builder/general contractor, on the concept for the house. With the assistance of a local architect from Architecture Network, Windsor helped make McCaughey’s vision a reality.

“This was not a typical project in the least—very much a Frank Lloyd Wright influenced design with many angled walls and a four-story open stairwell,” said Hills. “This was the most interesting house I was involved with over my 30-plus years [career]. It was a fun challenge.” (See Figure 1 on page 14.)



Continued on page 14

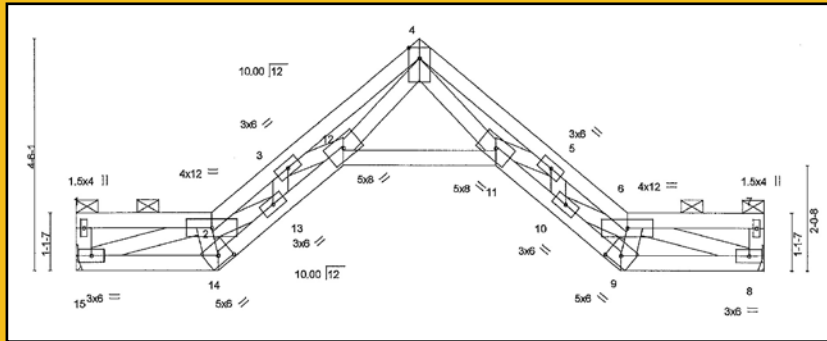
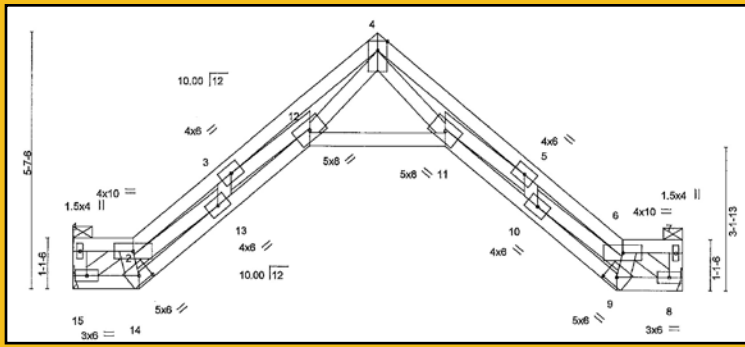


Figure 1. The roof trusses formed an interesting ceiling profile on the top floor of the house, which included a covered deck with a skylight.



Beauty • Continued from page 13

When the owner bought the property, an older home sat on the 3,000 sq. ft. lot. The structure was torn down, and the new house was constructed according to a zoning change, which allowed for a larger house to be built than was previously permissible. While the new home is larger than was possible under the old zoning rules, the new house has a smaller footprint than the previous home.

The owner's unique vision for the house gave Windsor the opportunity to get inventive with its design. "We incorporated steel framing to integrate with our wood components. We had a 40-ft.-tall, almost-solid LVL wall that created the 4-story stairwell wall," said Hills.

Windsor's teams partnered with the cus-

tomers and followed the project from design and production to installation. "Our design team really took an opportunity to shine on this complex project. The shop followed through putting everything together. It was amazing how well it fit on the foundation," said Hills.

LEED Platinum Apartment Complex

The team at Windsor also shone on an approximately 20,000 sq. ft., 20-unit apartment complex in Milwaukee, WI (see Figure 2). One of the goals for the project was to build "the greenest building possible," said Hills. That ambitious goal paid off, and the complex received a LEED Platinum Certified Building rating with the U.S. Green Building Council—the first multi-family project in Wisconsin to achieve such a rating.



"We had to adjust to make LEED work," said Waugh. Windsor designed a 2x8 wall system, to help meet the project's energy conservation requirements. The complex incorporated a 19.95-kilowatt photovoltaic solar panel system on the upper roof, resulting in significant reduced heating and cooling costs for residents.

Many building products, from the windows to the OSB, came from within the state. As it turned out, even the maple flooring was recycled from the high



Figure 2. This 20,000 sq. ft., 20-unit apartment complex received a LEED Platinum Certified Building rating—the first multi-family project in Wisconsin to achieve such a rating.

school that Hills attended. “I walked through the building and thought, “This looks really familiar,”” he joked.

Windsor focused on the details to help ensure the project ran smoothly. “We worked closely with the subcontractors. I made several jobsite visits and attended weekly, and sometimes biweekly, subcontractor meetings. Our design department submitted shop drawings and worked closely with all parties involved,” said Hills.

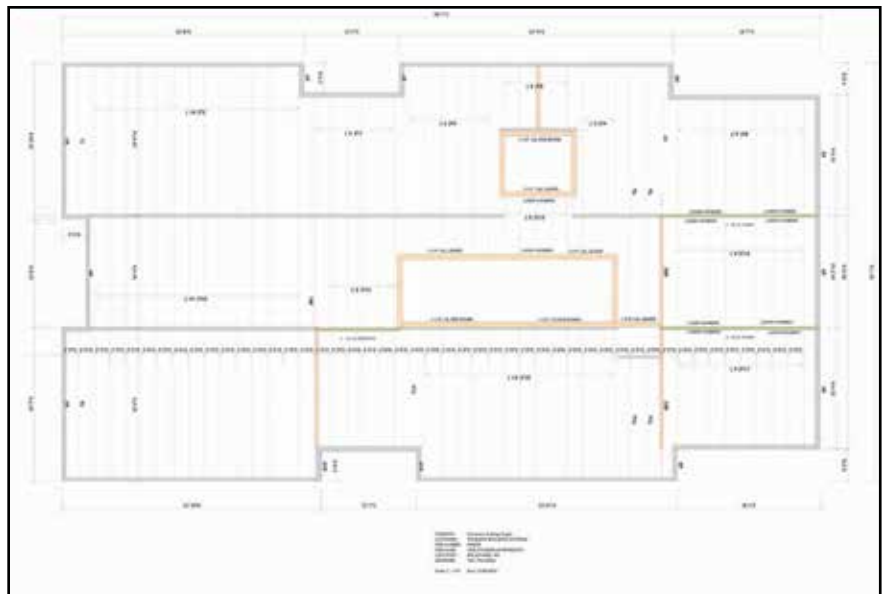


Figure 3. Workers had very limited space to install the trusses on the jobsite (see truss placement diagram, top graphic), with only 4 to 6 ft. between the apartment complex and existing buildings on either side. Windsor used a nearby parking lot to stage trailers of components (see lower graphic, credit: Dominion Properties).

Along with its emphasis on green building, the project presented some demanding jobsite conditions. “We built this in the middle of the winter, and it was a very cold winter,” said Hills. Workers also had very limited leeway on the jobsite, with only 4 to 6 ft. between the apartment complex and existing buildings on either side.

“The biggest constraint we faced was there was no room to park trailers,” explained Waugh. The especially tight space in the middle of a busy city contrasted with many of Windsor’s other jobs, which are located in new subdivi-

sions with plenty of room to spare. For the Milwaukee jobsite, Windsor needed to get creative and make the most of any available space. “We ended up finding a parking lot close by to stage trailers. When they emptied one, we were gone five minutes and filled another trailer.” (See Figure 3.)

Waugh says how the company managed to address these jobsite conditions just goes to show the benefits of component construction. “That’s the beauty of components,” he said. “You can build in any season.” **SBC**



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A man with short, graying hair, wearing a light blue and white checkered button-down shirt with a small MiTek logo on the chest, is looking to the left. He is holding a tablet computer. The background is a blurred industrial setting with wooden beams and machinery. A large blue diagonal shape is overlaid on the bottom right of the image.

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GRAND OPENING FOR WINDSOR BUILDING SYSTEMS



In January 2014, a fire destroyed the truss plant and main office at Windsor's Madison, WI, location. Fortunately, no one was seriously hurt, and the location's wall panel and floor system operations were not damaged. After looking into the possibility of purchasing another facility in the area, the company chose to focus on rebuilding the Madison location.

"After doing our due diligence, we went full speed ahead with rebuilding," said Waugh. The new 28,500 sq. ft. facility gives the company more flexibility to ramp up production and take on more commercial projects.

"We ended up building smaller offices and enlarging production. Our production capacity is considerably larger," said Waugh. Along with the grand opening of the rebuilt facility, the company plans to hire additional design, production and delivery staff. **SBC**

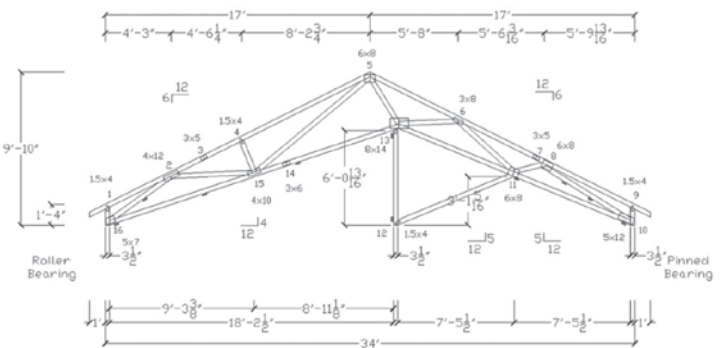
Windsor's rebuilt 28,500 sq. ft. facility gives the company more flexibility to increase production.

SBC MASTERS COMPETITION

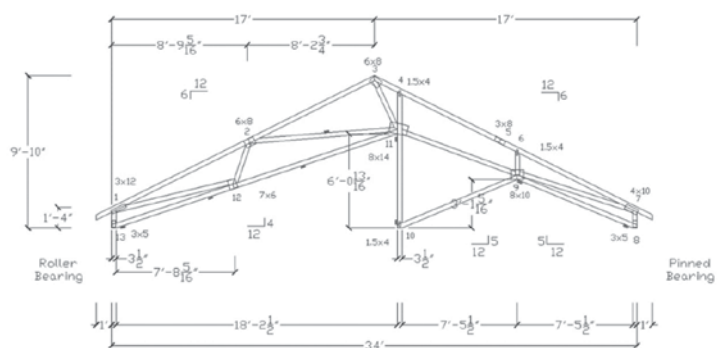


Windsor Building Systems manufactured the trusses for the 2015 SBC Masters Competition. For this year's competition, the Truss Cowboys went head to head with the New Kids on the Block. Each team designed a set of five trusses with the same configuration as shown. The trusses were loaded using the SBCRI wiffle-tree method, which applies loading to the top chord at 2-ft. intervals. Loading included TC live 25 psf, TC dead 12 psf, BC dead 2 psf, no wind, no additional BC storage loading and duration factor.

Congratulations to the New Kids on the Block for winning the 2015 Masters Competition on May 12. This team from Simpson Strong-Tie (pictured above, l to r) included Jack Haagen, Obed Luis, Jason Padilla and Shawn Overholzer. Kudos also go to Dave Raasch (Lloyd Truss Systems), Jack Dermer (American Truss Systems), Barry Dixon (True Truss), Carl Schoening (Eagle Metal Products) and Greg Griggs (ProBuild) for having the closest predictions for the outcome of the testing. A report on the tests will be available via Member-Only Industry News in the near future. **SBC**



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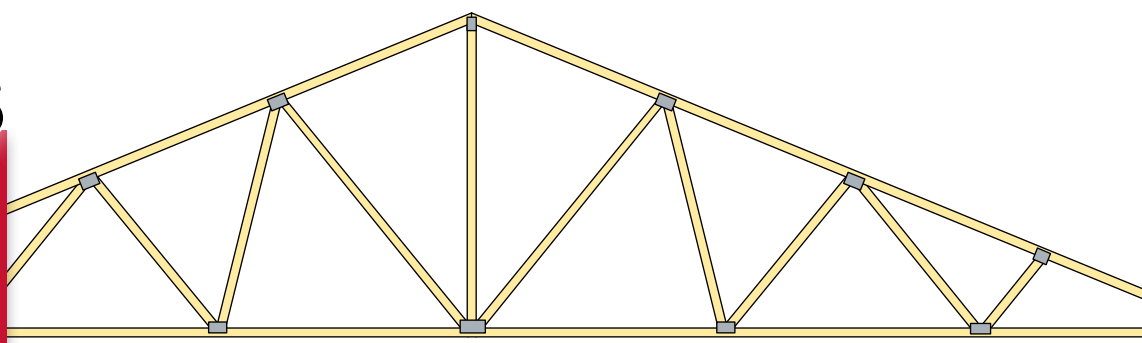
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TRUSS

BLOCKING

PANELS



A FUTURE INDUSTRY TESTING CONCEPT FOR THE SBC RESEARCH INSTITUTE

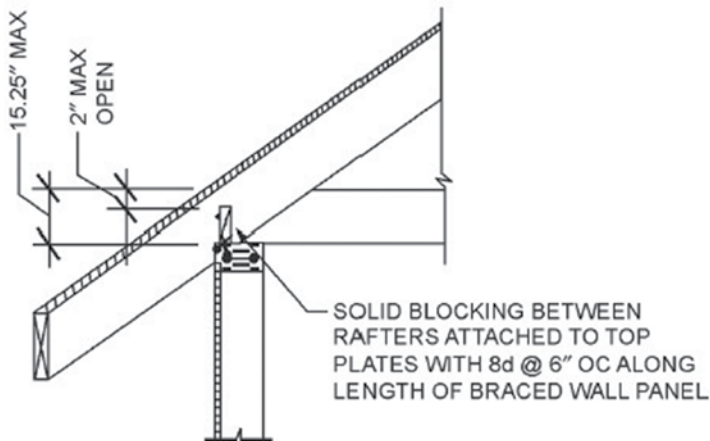
by Daniel Lawless, E.I.T.

A new provision in the 2009 IRC¹, and carried through to more recent versions, is the use of blocking panels between roof trusses to connect the trusses to the braced wall panels below if the heel height is greater than 9¼". For trusses with heel heights less than 15¼", this blocking can be made of solid sawn dimensional lumber as shown in Figure 1A. However, if the heel height is greater than 15¼", a horizontal soffit panel or vertical blocking panel must be used as detailed in Figure 1B or 1C, or a blocking panel must be designed in accordance with accepted engineering practice.

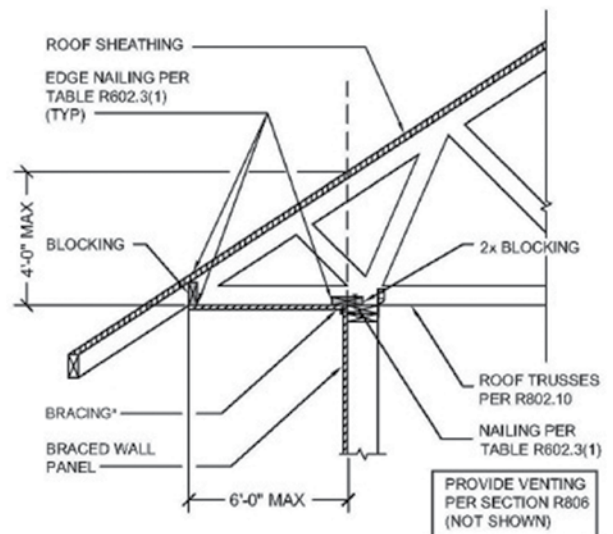
Parallel chord roof trusses and energy heel trusses often exceed a 15¼" heel height and have need for this more elaborate method of blocking.

A set of plans and specifications will often provide the lateral load the blocking must resist and specify that the truss supplier design the blocking to resist that load. Ventilation requirements may be stated on the plans as well. Figure 2 shows an example of this type of blocking detail.

Figure 1 (A-C). A new provision in the 2009 IRC¹, and carried through to more recent versions, is the use of blocking panels between roof trusses to connect the trusses to the braced wall panels below if the heel height is greater than 9¼". (Note: For SI: 1" = 25.4 mm, 1' = 304.8 mm. Methods of bracing shall be as described in Section R602.10.4.)

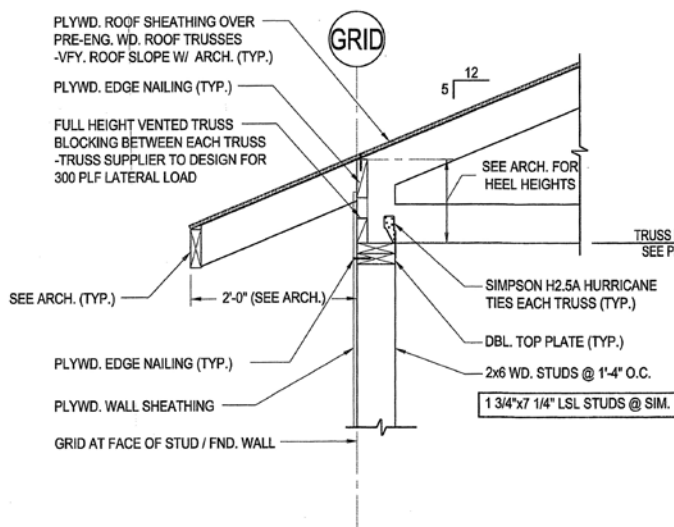


A FIGURE R602.10.8.2(1) BRACED WALL PANEL CONNECTION TO PERPENDICULAR RAFTERS

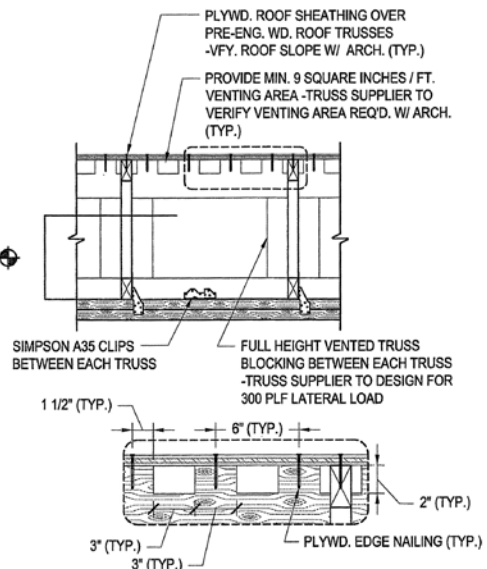


B FIGURE R602.10.8.2(2) BRACED WALL PANEL CONNECTION OPTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

¹ See publiccodes.cyberregs.com/icod/irc/2009/index.htm



2 TYPICAL SECTION @ ROOF
S5 3/4"=1'-0"



3 TYP. TRUSS BLOCKING DETAIL
S5 3/4"=1'-0"

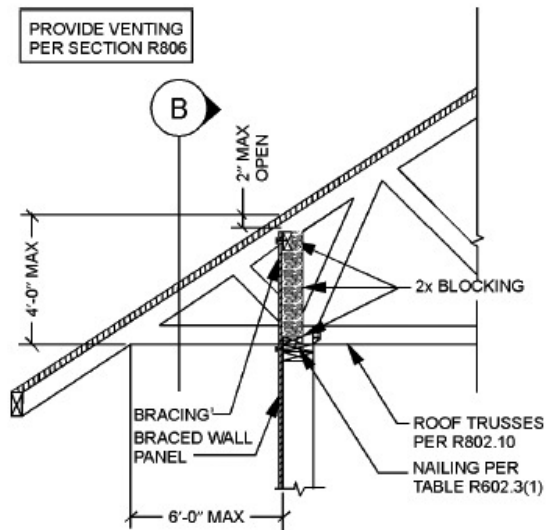
Figure 2. A set of plans and specifications will often provide the lateral load the blocking must resist and specify that the truss supplier design the blocking to resist that load. Ventilation requirements may be stated on the plans.

In the details shown in Figure 2, the blocking is to be designed for 300 plf of lateral load. The detail requires 2"x3" notches in the blocking panel for ventilation and requires the roof sheathing to be fastened to the blocking at 6" on center.

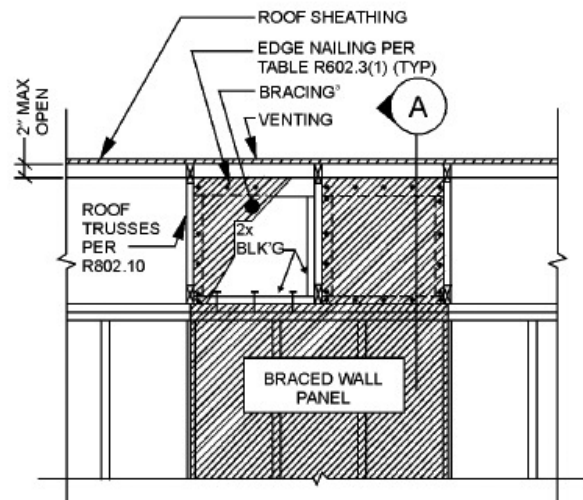
Component manufacturers are faced with two issues: (1) the design of a structural blocking component (aka, blocking panel) to resist the lateral load, and (2) the design of the connection of the structural blocking component to the trusses,

roof sheathing and wall framing to resist that applied load while still maintaining adequate ventilation. These designs are difficult to analyze using engineering mechanics, due to the many different components that must interact to transfer the loads from the roof down to the wall. Componentizing this detail and getting paid for the technical work put into providing proper resistance of the loads is also essential and may be as complicated as the engineering mechanics.

Continued on page 22



A SECTION



B ELEVATION

C FIGURE R602.10.8.2(3) BRACED WALL PANEL CONNECTION OPTION TO PERPENDICULAR RAFTERS OR ROOF TRUSSES

Truss Blocking Panels

Continued from page 21

To address these two issues, testing could be conducted to determine when blocking is necessary and to evaluate the capacity of heel blocks and their connections to the framing. Some of the factors that need to be investigated include the design of the blocking panel, effectiveness of partial height blocking, effect of different heel heights, and various blocking-to-framing fastening methods.

It is also important to think about this detail in the context of the overall building performance. Some of the questions that come to mind include, but are not limited to:

1. Will a properly braced truss roof system actually rotate as suggested by the *IRC* provisions?
2. What is the capacity of the roof and ceiling diaphragm as a system? Does the diaphragm performance change in the context of the interacting assemblies that constitute the building system?
3. How is the lateral load distributed between the roof and the ceiling diaphragm and how much rotational (overturning) force will result from the eccentricity of the lateral load?
4. What effect does gable end bracing have on the rotational restraint of the roof system?

The ideal test setup to evaluate these questions would contain a full roof assembly capable of simulating actual building construction.

Another benefit to testing this connection as part of a roof system would be the ability to define its capacity under loading from different directions such as uplift. The blocking panels will provide additional connections between the roof trusses and the top plate of the wall. These connections could allow a greater uplift force to be resisted.

A truss to top plate connection consisting of three 16d box (3½" long x 0.135" diameter) nails is allowed to resist up to 200 pounds of uplift force per *IRC* Section R802.11.1.

R802.11.1 Uplift resistance.

Roof assemblies shall have uplift resistance in accordance with Sections R802.11.1.2 and R802.11.1.3.

Where the uplift force does not exceed 200 pounds, rafters and trusses spaced not more than 24 inches (610 mm) on center shall be permitted to be attached to their supporting wall assemblies in accordance with Table R602.3(1).

Where the basic wind speed does not exceed 90 mph, the wind exposure category is B, the roof pitch is 5:12 or greater, and the roof span is 32 feet (9754 mm) or less, rafters and trusses spaced not more than 24 inches (610 mm) on center shall be permitted to be attached to their supporting wall assemblies in accordance with Table R602.3(1).

| ITEM | DESCRIPTION OF BUILDING ELEMENTS | NUMBER AND TYPE OF FASTENER ^{a, b, c} | SPACING OF FASTENERS |
|-------------|---|--|--|
| Roof | | | |
| 1 | Blocking between joists or rafters to top plate, toe nail | 3-8d (2½" x 0.113") | — |
| 2 | Ceiling joists to plate, toe nail | 3-8d (2½" x 0.113") | — |
| 3 | Ceiling joists not attached to parallel rafter, laps over partitions, face nail | 3-10d | — |
| 4 | Collar tie to rafter, face nail or 1¼" x 20 gage ridge strap | 3-10d (3" x 0.128") | — |
| 5 | Rafter or roof truss to plate, toe nail | 3-16d box nails (3½" x 0.135") or 3-10d common nails (3" x 0.148") | 2 toe nails on one side and 1 toe nail on opposite side of each rafter or truss ^d |
| 6 | Roof rafters to ridge, valley or hip rafters: toe nail face nail | 4-16d (3½" x 0.135") 3-16d (3½" x 0.135") | — |

TABLE R602.3(1) FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

In *IRC* Table R602.3(1) (above), blocking between roof trusses is required to be fastened to the top plate with three 8d (2½" long x 0.113" diameter) toe nails.

The 200 pounds of uplift force allowed by the *IRC* does not take into account the nailing between the trusses, the blocking and the top plate, when blocking is provided. There is an unquantified load path resistance interaction present. If greater uplift resistance is present, the cost of providing a more complex blocking method may be partially offset by being more creative in applying uplift resistance connection systems.

Testing a full roof system would also allow the capacity of the truss to top plate connection to be evaluated under combined uplift and lateral loading. This loading condition is often evaluated using a unity equation, which takes the sum of the load divided by the capacity for each direction and sets it less than or equal to one, as shown in the following equation²:

$$\frac{\text{Uplift Load}}{\text{Uplift Capacity}} + \frac{\text{F1 Load}}{\text{F1 Capacity}} + \frac{\text{F2 Load}}{\text{F2 Capacity}} \leq 1.0$$

The SBC Research Institute (SBCRI) is unaware of this unity equation being evaluated to verify applicability under combined loading conditions. SBCRI is also unaware of how the assumed wind loading condition applies to the roof structure in the real world and how the real-world loading condition gets resolved through the series of resistance connections that will exist. The applied loads and the resistance interactions seem more complicated than the simplifications that are provided by the code and unsupported by research analytics.

² See strongtie.com/productuse/designer.html, strongtie.com/ftp/catalogs/c-hw12/C-HW12.pdf and strongtie.com/ftp/bulletins/t-01wfc08.pdf

FEEDBACK

REQUEST



SBCA members are requested to provide feedback on the testing concepts proposed in this article. It is anticipated that this testing concept will be further developed and published for comments in the coming months. Input from the industry will be used to develop a test plan, which can be implemented as funding and test scheduling allows.

SBCA members can find more information on the development of industry testing concepts in the **SBC Industry News—Special Edition** article, “TPI/SBCA Joint Industry Testing Concept Development Process,” as well as in Rick Parrino’s **Editor’s Message** from the May 2015 issue of **SBC Magazine**.

Clearly, testing would allow for a better understanding of how combined loading affects the connection capacity and allow for more accurate designs.

SBCRI is working on refining the design for a roof assembly testing fixture that can be used to test structural elements and connections in lateral shear, uplift, and a combination of lateral shear and uplift forces (see Figure 3). This assembly will be ideal for testing different blocking methods. A clear goal will be to fully understand applied loads and resistances. Another goal may be to develop generic tested capacities for

blocking elements that the component manufacturing industry could manufacture and sell to contractors to satisfy the *IRC* requirements. A final goal will be to create industry data defining the true performance characteristics of details like this. Once a better understanding is established, the creativity and innovation that exist in our industry certainly can come up with valuable resistance solutions. Ultimately, this type of information would provide roof trusses an added advantage over prescriptive approaches such as conventional stick framing. **SBC**



Figure 3: End view of a new SBCRI testing fixture that tests uplift and lateral loads.

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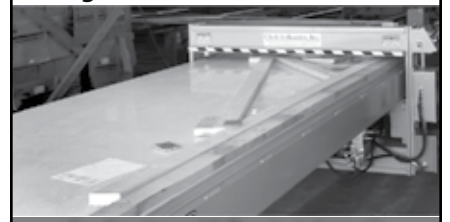
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TRUSS INDUSTRY STANDARD OF CARE ISSUES

by Scott D. Coffman, PE., SECB & Jim Vogt, PE.

PART 5

Production builders and developers began to encourage building material supply (BMS) companies to deliver a “dried-in” framing package in the late 1990s. This presented an opportunity for a BMS to sell manufactured and/or inventoried products and the labor to install them. Many BMSs began to offer “installed sales” as an avenue to capture large-volume customers and increase company revenue. Although the term “BMS” may be synonymous with any organization or company that provides installed sales, in the context of this article, “BMS” is used to reflect the primary audience associated with the wood truss industry offering this service. Additionally, many BMSs have a truss and/or wall panel division or resell truss and wall components that become part of the installed-sale framing package.

It is judicious for BMSs that coordinate building framing and install building components to be knowledgeable of applicable code sections, industry standards and manufacturer instructions. With respect to wood trusses, the *2012 International Building Code (IBC)*¹ contains numerous sections that pertain to metal plate connected wood truss installation. Six sections address the primary standard of care issues that may be unfamiliar to many BMSs. Section 2304.9.6² and 2304.9.7³ address load path and framing requirements.

2304.9.6 Load path.⁴ Where wall framing members are not continuous from foundation sill to roof, the members shall be secured to ensure a continuous load path. Where required, sheet metal clamps, ties or clips shall be formed of galvanized steel or other *approved* corrosion-resistant material not less than 0.040 inch (1.01 mm) nominal thickness.

2304.9.7 Framing requirements.⁵ Wood columns and posts shall be framed to provide full end bearing. Alternatively, column-and-post end connections shall be designed to resist the full compressive loads, neglecting end-bearing capacity. Column-and-post end connections shall be fastened to resist lateral and net induced uplift forces.

Section 2308.10.1 speaks to wind uplift and truss connections.

2308.10.1 Wind uplift. The roof construction shall have rafter and truss ties to the wall below. Resultant uplift loads shall be transferred to the foundation using a continuous load path. The rafter or truss to wall connection shall comply with Tables 2304.9.1 and 2308.10.1.⁶

Section 2303.4, 2306.1, and 2308.10.10 (including associated commentary) reference *ANSI/TPI 1 The National Design Standard For Metal Plate Connected Wood Truss Construction (TPI 1)*⁷ making it part of the building code.

2303.4.6 TPI 1 specifications. In addition to Sections 2303.4.1 through 2303.4.5, the design, manufacture and quality assurance of metal-plate-connected wood trusses shall be in accordance with TPI 1. Job-site inspections shall be in compliance with Section 110.4, as applicable.

2306.1 Allowable stress design. The design and construction of wood elements in structures using allowable stress design shall be in accordance with the following applicable standards:

Truss Plate Institute, Inc.⁸

Editor's Note:

The purpose of this article series is to identify truss-related structural issues sometimes missed due to the day-in and day-out demands of truss design/production and the fragmented building design review and approval process. This series will explore issues in the building market that are not normally focused upon, and provide recommended best-practice guidance. As with the previous articles (November and December 2014, March and April 2015), the objective is to raise awareness of these issues and, ultimately, improve overall quality of truss roof and floor system construction.

¹ publicecodes.cyberregs.com/icod/ibc/2012/index.htm

² publicecodes.cyberregs.com/icod/ibc/2012/icod_ibc_2012_23_par099.htm

³ publicecodes.cyberregs.com/icod/ibc/2012/icod_ibc_2012_23_par099.htm

⁴ publicecodes.cyberregs.com/icod/ibc/2012/icod_ibc_2012_23_par099.htm

2308.10.10 Wood trusses. Wood trusses shall be designed in accordance with Section 2303.4.

Many BMSs may be familiar with *TPI 1* in terms of truss fabrication requirements but unfamiliar with the content of this standard as it pertains to standard responsibilities in the design and application of trusses.

First, Chapter 2 in *TPI 1* contains language applicable to a BMS providing a framing package that includes wood trusses. Specifically, Section 2.3.4 delineates contractor responsibilities with respect to truss installation.

2.3.4 Requirements of the Contractor.

2.3.4.1 Information Provided to the Truss Manufacturer.

The Contractor shall provide to the Truss Manufacturer a copy of all Construction Documents pertinent to the Building Structural System and the design of the Trusses

(i.e., framing plans, specifications, details, structural notes), and the name of the Building Designer if not noted on the Construction Documents. Amended Construction Documents upon approval through the plan review/permitting process shall be immediately communicated to the Truss Manufacturer.

2.3.4.2 Information Provided to the Building Designer.

The Contractor, after reviewing and/or approving the Truss Submittal Package, shall forward the Truss Submittal Package to the Building Designer for review.

2.3.4.3 Truss Submittal Package Review.

The Contractor shall not proceed with the Truss installation until the Truss Submittal Package has been reviewed by the Building Designer.

2.3.4.4 Means and Methods.

The Contractor is responsible for the construction means, methods, techniques, sequences, procedures, programs, and safety in connection with the receipt, storage, handling, installation, restraining, and bracing of the Trusses.

2.3.4.5 Truss Installation.

The Contractor shall ensure that the Building support conditions are of sufficient strength and stability to accommodate the loads applied during the Truss installation process. Truss installation shall comply with installation tolerances shown in *BCS1-B1*. Temporary Installation Restraint/Bracing for the Truss system and the permanent Truss system Lateral Restraint and Diagonal Bracing for the completed Building and any other construction work related directly or indirectly to the Trusses shall be installed by the Contractor in accordance with:

- (a) The Construction Documents, and/or
- (b) The Truss Submittal Package. For Trusses clear spanning 60 ft. (18 m) or greater, see Section 2.3.1.6.

2.3.4.6 Pre-Installation Check.

The Contractor shall examine the Trusses delivered to the jobsite for:

- (a) Dislodged or missing connectors,
- (b) Cracked, dislodged or broken members, or
- (c) Any other damage that can impair the structural integrity of the Truss.

2.3.4.7 Post-Installation Check.

The Contractor shall examine the Trusses after they are erected and installed for:

- (a) Dislodged or missing connectors,
- (b) Cracked, dislodged or broken members, or
- (c) Any other damage that can impair the structural integrity of the Truss.

2.3.4.8 Truss Damage Discovery.

In the event that damage to a Truss is discovered the Contractor shall:

- (a) Ensure that the Truss not be erected, or
- (b) That any area within the Building supported by any such Truss already erected shall be appropriately shored or supported to prevent further damage from occurring and shall remain clear and free of any load imposed by people, plumbing, electrical, mechanical, bridging, bracing, etc. until field repairs have been properly completed per Section 2.3.4.9.

2.3.4.9 Truss Damage Responsibilities.

In the event of damage, the Contractor shall:

- (a) Contact the Truss Manufacturer and Building Designer to determine an adequate field repair, and
- (b) Construct the field repair in accordance with the written instructions and details provided by the Truss Manufacturer, Building Designer, and/or any Registered Design Professional.

2.3.4.10 Responsibility Exemptions.

The Contractor is responsible for items listed in Section 2.3.4, and is not responsible for the requirements of other parties specified outside of Section 2.3.4.

The definition of a contractor as described in *TPI 1* states in part, “The term contractor shall include those **subcontractors** who have a direct Contract with the Contractor to construct all or a portion of the construction” [emphasis added]. In essence, a BMS accepts responsibility to meet building code, industry standards, and manufacturer information when installing trusses. A BMS offering this service is encouraged to read Chapter 2 of *TPI 1* to fully appreciate the building code/law and scope of work responsibilities their organization is undertaking by adding installed truss sales to their business.

The key concept behind the standard responsibilities document, first created by the Wood Truss Council of America (the predecessor to SBCEA) in 1995, is to have precise definitions with respect to scope of work. This precision encourages everyone in the construction market to know the responsibility they are taking and then to get paid fairly for it and its associated risk. As a corollary, it is also important to not allow one’s scope of work to

⁵ publiccodes.cyberregs.com/icod/ibc/2012/icod_ibc_2012_23_par100.htm

⁶ See online version of the article for links to these tables.

⁷ *ANSI/TPI 1-2007*

⁸ tpinst.org

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Standard of Care Issues

Continued from page 25

creep (i.e., increase), while also coming with the expectation that you will do the additional work for free. This is how the industry has often reduced the value of responsibilities performed and increased its risk that it also is not getting compensated for properly.

Second, a BMS that offers and provides installed wood truss sales has a unique opportunity to ensure proper truss bracing, connections and load paths are present. Here is a quick snapshot of some responsibilities a BMS accepts with respect to a truss package when providing this service.

1. The BMS is responsible to satisfy all truss installation requirements located on the truss placement diagram, each truss design drawing, *TPI 1*, *BCSI* and the construction documents. This includes, but may not be limited to:

a) Implementing and/or adhering to all relevant truss installation notes located on each truss design drawing and the construction documents. Examples include truss-to-truss connections, minimum bearing width, strongbacking installation and gable end wall bracing.

b) Proper installation of truss lateral restraint and diagonal bracing as detailed on each truss design drawing, contained within the construction documents or *BCSI* prescriptive methods.

c) Installing truss-to-wall connectors to resist calculated truss uplift reactions as required in *IBC* Section 2308.10.1. Knowledge of wall framing and/or wall panel materials affords the BMS (and truss supplier) to recognize insufficient tie-down connectors. When a reaction exceeds a prefabricated metal connector specified, the BMS has the responsibility to contact and resolve the issue with the building designer.

d) Perform a truss pre-installation check and post-installation check to identify dislodged or missing truss connectors, broken members,

or any other damage that may impair truss structural integrity.


e) Obtain an adequate truss repair, when appropriate, and make the repair in accordance with written instructions.

2. Ensure a gravity and uplift load path (*IBC* Section 2304.9.6) is continuous from the roof to the foundation. This is critical at girder truss reaction points where truss tie-downs align and/or are traced to hold-downs at the foundation. Additionally, blocking and connectors must be installed, as required, to transfer load from one level to the next. Truss and/or engineered wood products personnel employed by a BMS should have the training and expertise to recognize significant loads that must have a load path from the roof to foundation.

3. Ensure adequate connections are made to the structure to resist the maximum horizontal reactions due to lateral loads applied to the trusses.

4. Ensure columns are framed to provide full end bearing (*IBC* Section 2304.9.7). This also includes proper blocking within floor truss cavities as detailed in standard truss installation details available from SBCA.

A BMS has a unique opportunity to enhance building construction quality. The BMS and the people they employ have the knowledge, expertise, means, and methods to effectively communicate and facilitate proper truss installation. This relationship affords a BMS providing installed sales a proficiency not readily available to other contractors, which helps to ensure truss installation meets published standards and relevant building code sections. Additionally, their relationship with suppliers and/or "in-house" building component manufacturing facilities provides them the distinctive advantage of knowledge and expertise to ensure products sold are installed to meet related industry standards and manufacturer installation instructions. This includes all the work needed to achieve better than average building performance. **SBC**



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Production Training

Housekeeping

Safety Communication

Reading Construction Documents

Quality Control

Driver Training

Material Handling

Designer Training

Sales Training

While not essential for producing good product, much like with sales, training key employees on how to reach out and effectively make connections in the market can pay significant dividends in the long run through greater product acceptance and more robust sales opportunities. This is the essence of networking.

The term “networking” is used in many contexts: social networks, business networks, computer networks, media networks, etc. People have networks of associates, friends and contacts on whom they rely each day both for conducting daily operations and for the ultimate success of their businesses.

Given this reliance on networks, the important question to answer is what is a good way to extend those networks to either increase business, increase knowledge or find additional resources (e.g., more employees).

For at least the past 15 years, SBCA and **SBC Magazine** have spent a lot of time encouraging component manufacturers (CMs) to get more involved in their local building official and fire official communities.

Similarly, BCMC educational sessions have focused more and more on how CMs can get involved in building relationships with local high school and technical school career counselors. These efforts to push better networking have been spearheaded by CMs who have gone out, done it and realized the incredible value networking has brought to their businesses.

Networking should be approached as an opportunity to share and learn; you should gain as much from the other individual as you gave with a goal of giving more than you learn (because those are the “go-to” individuals others seek out). Networking can take on several differing facets, and can easily be accomplished through both social media and direct, personal contact. Between the two, direct relationships are the most important and valuable. As a consequence, it’s a good practice to start networking efforts with face-to-face contact.

There are many opportunities to reach out in the marketplace and share our industry’s story. Companies should start by telling their own, individual story. Begin by sharing what makes the company unique and valuable. Share the backgrounds of individual employees. What is it about them and their experience and skills that contribute to the value of the company in the market? Then share the value of the products and services the company provides. How does the company and its employees work to solve the problems faced by the market and the public?

Networking Basics

Where to Start?

A good place to start networking activities is with a blank page. Fill that page with the common headaches faced through the normal course of business:

- Are there too many customer call backs?
- Are there too many truss repairs due to field alterations made by other trades?
- Are building inspectors holding up projects during or after installation?
- Is it difficult to fill customer orders because it’s impossible to find enough designers/production employees/drivers?

Take an opportunity to share & learn

- Are local building codes creating a competitive disadvantage for the company's products?

Once the page is filled with headaches, identify who in the chain can help you address these headaches.

Those are the people that need to become part of the company's network. Start with the most persistent source of headaches, and work down the list.

Before reaching out, remember SBCA has developed a series of excellent tools CMs can use to make opening doors easier. SBCA's Component Technology Workshop (CTW) presentations make setting up and giving presentations to fire and building officials, architects and engineers, and builders and general contractors an easy and straightforward process. These CTW presentations are geared specifically to these audiences and give CMs a chance to help the audience get a quick working knowledge of the component manufacturing industry.

It's a good idea to use these CTW presentations for downstream lunch box meetings where CMs can expand their network and meet new people in the market. A side benefit of this approach to broad industry networking is that it lets people know more about the company and the specific issues the company struggles with that relate to the audience members. SBCA also has a series of tools to help CMs give presentations in a high school, technical college or academic setting, where a company can extol the virtues of pursuing a career in the component manufacturing industry, and more importantly, seeking employment with the company giving the presentation.

Networking Is a Process

Developing long-term relationships can lead to long-term mutual benefits. However, it takes time and won't just happen through emailing or texting, which seems to be the norm today. A contact can start with an email, but at some point, time must be invested in verbal and face-to-face communication. Here are a few considerations:

1. Have patience with the process; it is not easy.
2. Sincerely get to know the individuals you're communicating with. What is their social media profile, their likes, what have they done in the past, what are some common areas of interest?
3. Have you worked together on building projects in the past?

The more a company can grow its network across the component manufacturing industry, the more opportunities that company will have to learn best practices from peers and find a competitive advantage in their local market. Part of developing these long-term relationships has always been helping even when there is no other reason to be involved. Architects, engineers,



builders, building officials, and fire officials all find situations where they need advice on something they may run into with respect to structural components. Taking the time to become part of their network increases the likelihood

they will reach out to the company for information or advice. Companies in that position will also find that, when a new general contractor or builder comes into the area and asks for recommendations on a supplier, companies that take the time and reach out are the ones that get recommended.

Nuances of Networking

Sometimes people think of social networks like LinkedIn or Google+ as a source of building relationships. While these social networking activities can have their place, the real relationship building happens in the local markets a company serves. As a consequence, there is no real substitute for attending meetings, conferences and social events hosted by a local building official, fire service, general contractor, home builder, etc. There is also no better way to find a reliable source of employees than by developing a pipeline with your local educational institutions.

Just like the principle of six degrees of separation, interacting with someone who has nothing to do with the component manufacturing industry or business might lead to an important contact with a potential builder or contractor. It's a good idea to always take the opportunity to make introductions, share your company's goals and learn about their business.

It cannot be emphasized enough that, during the networking process of building relationships, it's important to focus on giving more than receiving. People have lost the art of listening, yet this can be the most effective way to build a good relationship. Most people have a tendency to be self-centered both in person and in their social media practices. Most organizations have a statement to this effect: Listen, contribute, help others. It's a different attitude, but when you approach it from the point of view of how much you can contribute to another, your relationships and influence will expand and, in turn, you will easily gain more in the long run.

It does take time to reap the benefits, but once a company's employees are focused on networking and developing relationships, the amount of knowledge and market opportunities generated by that network is more than worth the initial investment. Sometimes, when quick results do not occur, people give up too quickly. However, with mentoring and practice, companies and individuals can easily reap relationship success. **SBC**

Ben Hershey is a Past President of SBCA and Owner of 4Ward Consulting Group - Experts in Lean Management & Manufacturing.

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Fairbanks Truss Company in Fairbanks, AK, held a plant tour last month for 20 students in the Fire Science Building Construction class at the University of Alaska at Fairbanks. Afterward, the instructor (who is also a Captain at nearby Steese Fire Dept.) said he found it informative and a worthwhile experience for his students by giving them a unique hands-on exposure to modern roof construction.

"It also gave us a great opportunity to talk to them about all our industry knows about the fire performance of wood trusses," said Fairbanks Truss President Jay Williams. **SBC**

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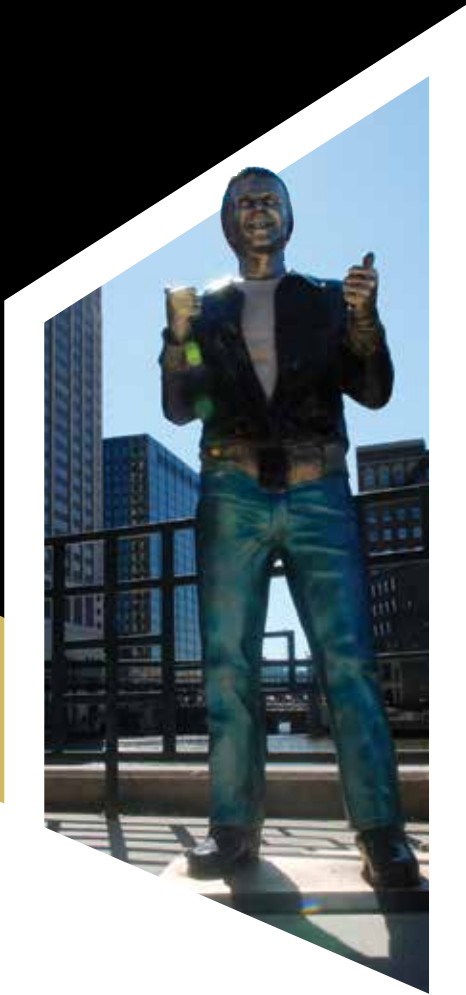
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A man with short, dark hair, wearing a white polo shirt and a dark jacket, is smiling and looking towards the camera. He is positioned in the foreground on the right side of the frame. The background is a large, complex wooden structure under construction, likely a roof or a large interior space, with many wooden beams and trusses. The sky is visible through the structure, showing a blue sky with some clouds. A blue rectangular box is overlaid on the left side of the image, containing white text.

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