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www.sbcmag.info

Publisher
Truss Publications, Inc.
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contents


Quality,
Service
and Support

Editor's Message

Together We Can Turn the Tide

by Steve Stroder

Let me start by thanking our outgoing president for all he has done to lead our association through another tough year. Joe Hikel's strong leadership and guidance has helped SBCA get through one of the most challenging years in our industry's history. In spite of the relentless downward trend in the economy, our association has weathered the storm and made significant progress in several areas. Great job, Joe!

If we embrace the tools we have today, we will be positioned for exponential growth as market conditions improve.

I started out in the building industry 25 years ago and have spent the last 18 years working in structural building components. The positions I've held range from GM of a single manufacturing facility where you do everything from sales, building, designing, shipping and managing to having responsibility for multiple plants nationwide. Over the last several years, working my way up through the ranks, I have done just about every job there is within a component manufacturing facility. I have been active in SBCA since 1993 and for the past eight years I have served as an SBCA board member. I believe these experiences have prepared me for the task of leading this association, and I am looking forward to making great strides together with our SBCA officers and staff in 2012.

This association has come a long way over the years. What started as just a few members in 1962 as TPI's Component Manufacturing Council transformed into WTCA (now SBCA) in 1983 and grew to our peak in 2007 with 827 component manufacturers and 313 associate members. While membership grew, we developed several best practice programs to help members run their companies as safe, productive and risk-free as possible. In 2006, we launched the SCORE program, which ties all of SBCA's best practice programs into a certification program that can be used to promote our individual companies and raise the bar for the entire industry. In 2007, we completed the Structural Building Component Research Institute (SBCRI). This facility allows us to perform systems testing, help our members develop new and innovative products, and conduct research that will propel our industry into the future.

With the downturn in the economy, our membership has declined over the last few years. This economy has taken its toll on us all, but I believe we are in a pivotal time in our industry's history.

Currently, OSHA is keenly enforcing more stringent procedures both in the plant and on the jobsite with fall protection measures, dust control and many other safety issues. We see much stronger enforcement of building codes, and building officials are more interested in learning about our products and how they should be used. The DOE is mandating more energy efficient homes and "green" is the word everywhere we look. I see these as great opportunities for our industry to leap ahead of our competition and expand our market share.

As president of SBCA, I have three main objectives for 2012:

1. Encourage the implementation of SCORE.
2. Leverage the expertise and entrepreneurial spirit that SBCRI can facilitate.
3. Support safe work environments.

The SCORE certification program and the subprograms within it can help to set our industry apart by collectively promoting certified programs to our customers and

Continued on page 8

at a glance

- ❑ Meet SBCA's new president, Steve Stroder.
- ❑ SBCA developed SCORE and other programs to help CMs run their companies as safe, productive, and risk-free as possible.
- ❑ Banding together and implementing these tools not only benefits individual companies, it elevates our industry.

Editor's Message

Continued from page 7

building officials. This united front provides credibility to our industry and encourages our customers and building officials to require this level of performance in the products they use.

SBCRI is an unparalleled resource that will provide assistance in testing new, innovative products and bringing them to market. As a trade association, we can help to evolve the industry through leading edge research and development.

One of the most important things we can do as an organization is to lead the industry in safety. Enhancing and promoting fall protection policies and procedures to create safe work environments for all is a perfect example of how we can provide leadership. Not only is this the right thing to do, but it will support our leadership position and highlight the advantages of using trusses as opposed to stick framing.

These objectives, coupled with our continued efforts toward engaging the supply chain, will guide us through 2012. We've already made progress through our ongoing efforts and relationship building with customer organizations like the Leading Builders of America (LBA) and we will continue to grow that relationship as well as others.

This is a crucial time in our industry's history. The economy will turn around. If we collectively embrace the tools we have today, the industry will be positioned for exponential growth as market conditions improve.

Lastly, I would like to thank the SBCA Board of Directors and our membership for having confidence in me to lead our association through the next 12 months. I will do my best to serve you well. 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.

Industry News & Notes

New Steel Code of Standard Practice

The American Iron and Steel Institute (AISI) will soon release a new standard, AISI S202, Code of Standard Practice for Cold-Formed Steel Structural Framing. SBCA's Cold-Formed Steel Council (CFSC) was a member of AISI's Code of Standard Practice Subcommittee. CFSC staff took the lead on several issues in the development of this standard. In particular, it was important to harmonize this standard practice with the content found in ANSI/TPI 1 Chapter 2 and the IBC/IRC, a challenge given that the AISI standards had existing language and traditional approaches with respect to design responsibilities. In July, the AISI Committee on Steel Framing Standards approved AISI S202, which addresses trade practices for design, fabrication and installation of code-formed steel structural framing products.

For more information, visit steel.org.

Industry News & Notes

Check Out SBC's New Look Online

Remodels aren't just for buildings—the SBC Magazine website has undergone a full renovation. The new look offers a clean design that's easy to navigate, yet filled with the information readers expect to find from SBC. Readers can now comment on articles, participate in polls and discuss industry issues. A new industry forum called ShopTalk rolled out at BCMC to coincide with the show's educational sessions so that the conversation can continue well after the show. The site also brings readers closer to information from the magazine's loyal program advertisers by interspersing their ads throughout the site, with links directly to their websites.

Visit sbcmag.info to see all of these features and participate in a short survey to provide your feedback about the new site. Also remember to submit your industry photos for the SBC 2011 photo contest* (email photos to epatterson@sbcmag.info). Finalists can win SBC swag, and top photos will be posted on the site over the next few months.

*Photos submitted may be used in SBC Magazine or other SBCA materials.

SBCA's Lucky 13th Annual Membership Drive

On September 1, 2011, SBCA kicked off its Annual Membership Drive—the Lucky 13. This year, recruiters can earn double Top Chord Club points in the following ways:

- ~~5~~ 10 points for recruiting a new Design Professional Member who will also begin using BCSI B3
- ~~4~~ 8 points for encouraging a Component Manufacturer to begin buying and supplying JOBSITE PACKAGES
- ~~3~~ 6 points for signing up a new Component Manufacturer or Supplier member to SBCA or an SBCA Chapter
- ~~2~~ 4 points for signing up a new Design Professional Member, or for a Component Manufacturer or Supplier whose SBCA or SBCA Chapter membership has lapsed
- ~~1~~ 2 points for signing up a new Professional Member to SBCA or an SBCA Chapter

For more information, visit sbcindustry.com/memdrive.php.

Congratulations to the 12th Annual Membership Drive Winners!

#1 Component Manufacturer Recruiter: Gary Weaver, Timber Tech Texas, Inc.
#1 Associate Membership Recruiter: Rob Heri, MiTek Industries, Inc.
#1 Recruiting SBCA Chapter: Truss Manufacturers Association of Texas

Technical Q & A

Bearing Area

by SBCA Staff

Examine options for dealing with insufficient bearing width.

Many in the construction industry have run into this problem—not enough bearing. When the forces transferred through the interconnecting triangles of a truss are more than the beam or the top plate of the wall it bears on can handle, this can lead to crushing of the bearing over time. To avoid crushing, the capacity of the bearing must be higher than the compressive force.

Let's look at an example where the top plate of the wall is 2x6 SPF No. 2. Assuming a single-ply truss, the total bearing area of the truss on the top plate of the wall is 8.25 in^2 (1.5 in x 5.5 in). The allowable compression perpendicular to grain of SPF is 425 psi (pounds per in^2). Therefore, the allowable reaction onto this bearing example would be 3,506 lbs (425 psi x 8.25 in^2). If the truss has a higher reaction than 3,506 lbs, then the bearing area is insufficient.

Question

What's the best way to deal with insufficient bearing area?

Answer

When calculating the required bearing length, the Truss Designer should base the calculation on the species of wood for the material that will support the truss. Most truss design software allows the designer to select the lumber grade of the bearing the truss is set on. The Truss Designer calculates the required bearing length and compares this to the length of the bearing indicated in the Construction Documents provided by the Building Designer. It is essential for the Building Designer to provide accurate wall or beam/header information in the Construction Documents in order for the Truss Designer to arrive at the correct bearing length. When the bearing area is insufficient, there are a few options to resolve the issue.

Upgrade Lumber: The species and grade of lumber used in the truss, as well as the lumber used for truss bearing, affects the bearing area requirements. When the bearing width is insufficient, one option is to upgrade the lumber used in the truss or truss bearing. In some instances, the bearing area of the wall or beam may need to be increased. If the bearing material, wall or beam is altered, the Building Designer would need to be involved in making this change.

Add a Bearing Block: Bearing blocks are another way to deal with insufficient bearing area. Adding bearing blocks widens the surface contact, providing more bearing area to distribute forces from the truss. The truss design drawing will call out if a truss requires bearing blocks, along with the proper size, position and nailing pattern. Similarly, adding plies to the truss can increase the contact area (by increasing the width).

Raised Heel Trusses and Compression Parallel vs. Perpendicular to Grain: There is also the possibility of using a raised heel. With the end vertical running up and down through the bottom chord, this option can significantly increase the allowable compressive stress. While this provides a higher crushing value of the truss, it does not increase the crushing value for the bearing material.

See Figure 1, which builds off of the example provided in the introduction to this article. The graphics illustrate the differences between compression parallel to grain and compression perpendicular to grain. In addition, Table 1 lists wall top plate

correction:

Part of the formula for determining flat roof design snow loads was missing from the Sept/Oct **Technical Q&A** on Occupancy Categories. The correct formula is:

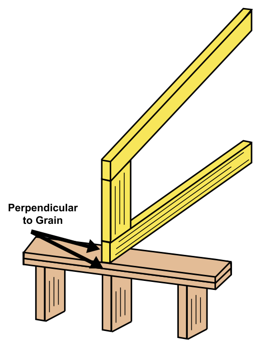
$$P_f = 0.7P_g(I)(C_t)(C_e)$$

at a glance

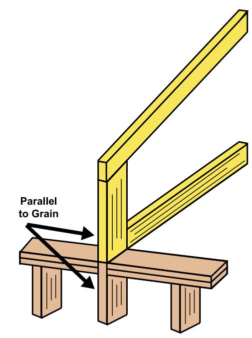
- The Building Designer providing accurate wall or beam/header information in the Construction Documents is essential in order for the Truss Designer to arrive at the correct bearing width.
- There are two key bearing related considerations—bearing capacity of the truss and bearing capacity of what the truss is sitting on; often, the bearing capacity of this material is an unknown and an assumption must be made.
- The options for dealing with insufficient bearing need to be considered and specifically dealt with on a case-by-case basis.

compression perpendicular to gain values for some common construction lumber species. Obviously, these numbers would be different for other materials and sizes.

Given:
Top Plate of the Wall and Truss Material: 2x6 SPF No. 2
Bearing Area: 5½ in x 1½ in = 8.25 in^2
Maximum Truss Reaction Force from the Truss Design Drawing: 8,000 lbs



Compression Perpendicular to Grain
425 psi
425 psi x 8.25 in^2 = 3,506.25 lbs
8,000 lbs > 3,506.25 lbs
☒ Insufficient Bearing Area



Compression Parallel to Grain
1,150 psi
1,150 psi x 8.25 in^2 = 9,487.5 lbs
8,000 < 9,487.5 lbs
☑ Sufficient Bearing Area

Figure 1. Example comparing compression perpendicular to grain bearing capacity to compression parallel to grain bearing capacity. Metal connector plates not shown for clarity.

Common Construction Lumber Species	Wall Top Plate Compression Perpendicular to Grain Stress	2x4 Wall Truss Reaction Load Capacity (lbs)	2x6 Wall Truss Reaction Load Capacity (lbs)
Spruce-Pine-Fir	425 psi	2,231	3,506
Hem-Fir	405 psi	2,126	3,341
Southern Pine	565 psi	2,966	4,661
Douglas Fir	625 psi	3,281	5,156

Table 1. Wall top plate compression perpendicular to grain values for common No. 2 grade construction lumber species.

Use a Bearing Enhancer: Truss bearing enhancers are metal plates that take on load from the truss. These products are available through a number of suppliers in different sizes and configurations. While it's outside the typical scope of work for component manufacturers, some offer bearing enhancers as an add-on, much like supplying hangers to their customers. When using a truss bearing enhancer, it's important to follow the manufacturer's installation instructions and use the correct fasteners and top plate size.

Run Plates Over the Bearing Flush to the Bearing: When designing with TPI 1 2007, Section 7.3.8.3 allows the bearing capacity of the truss lumber to be increased by 18 percent. To take advantage of this increase, the truss must bear on the 1.5 in face of the lumber, and the plates must be no more than ¼ in from the bearing. Again, while this will improve the bearing capacity of the truss, the capacity of the truss bearing must also be considered.

Which Option Works Best?: Choosing the best method to manage insufficient bearing width will depend on the project. Bearing blocks may work well on one project, while bearing enhancers may be the best way to go in another situation. Sometimes it requires a combination of both methods. All of the options above should be considered on a case-by-case basis. **SBC**

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

Fall Protection Made Easy(er)

by Sean D Shields

It's time to get out your winter coats. The bottom line for OSHA's new residential fall protection rules is that framers are expected to make their approach to fall protection much like snowflakes: no two jobsites are exactly alike.

In the run up to enforcement of the new rules on September 16, it appeared that much would have to change in order for framers to comply, but that isn't necessarily true. To understand why, let's look at what OSHA is really requiring (because it hasn't changed how trusses should be installed). Then, let's explore what structural component manufacturers can do to assist the framing community in complying with those requirements.

What OSHA Really Wants

At the heart of it, OSHA wants assurances that framers are more focused on fall protection hazards on residential jobsites. What this really means is they want documentation that a "qualified person" (see sidebar for definition) has looked at each jobsite before erection begins and identified all the fall protection hazards that exist. It's important to note this jobsite hazard assessment (JHA) must be site specific, but that doesn't mean the approach, or a majority of the language in the JHA, can't be uniform.[1]

The new standard may mean for some framing crews that their fall hazard recognition and mitigation training needs to become more robust. Again, OSHA expects this training to be documented, and each framer who ends up working in an area where a fall hazard has been identified in that jobsite's JHA should be able to demonstrate their knowledge of assessing fall hazards.[2]

Finally, if using conventional fall protection (guardrail systems, scaffolding, a safety net system or a personal fall arrest system) on a jobsite is infeasible, or would subject workers to greater risk of falling, a qualified person needs to document it, and spell out an alternate approach to eliminating fall hazards or limiting workers' exposure to those hazards.[3]

Jobsite Packages, B11 & Tags, Oh My!

For a component manufacturer, the first course of action in addressing the new fall protection rules is to include a jobsite package with every component delivery. Including instructions on how components should be handled and installed and braced has always been an industry "best practice." However, now it is imperative to also include instruction on how components should ***not*** be used with regards to fall protection.

Framers will now be implementing a wide range of fall protection measures on jobsites while installing roof component systems. The BCSI B11 Summary Sheet, Fall Protection & Trusses, has been revised to provide specific guidance to framers under OSHA's new regulations. First and foremost, it alerts framers to the fact that individual trusses are not designed to handle the lateral loading that would occur should a worker fall while tied off to a truss (see Figure 1) that's not fully braced in accordance with BCSI or fully sheathed.

A fall protection truss tag (see Figure 2) has been updated to provide the same guidance, and can be attached to each truss near the locations most likely to be used as either an anchorage or tie off point.

qualified person:

Under 29 CFR 1926.503(a)(2) A qualified person is one who should have knowledge, and be able to provide training to others, in the following areas: "the nature of fall hazards in the work area; the correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used; the use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protection to be used; the role of each employee in the safety monitoring system when this system is used; the limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs; the correct procedures for the handling and storage of equipment and materials and the erection of overhead protection; and, the role of employees in fall protection plans."

[1] See 1926 Subpart M Appendix E
[2] See 1926.503(a)(1)
[3] See CFR 1926.501(b)(13) & 29 CFR 1926.502(k)(7)
[4] See 1926 Subpart M Appendix E

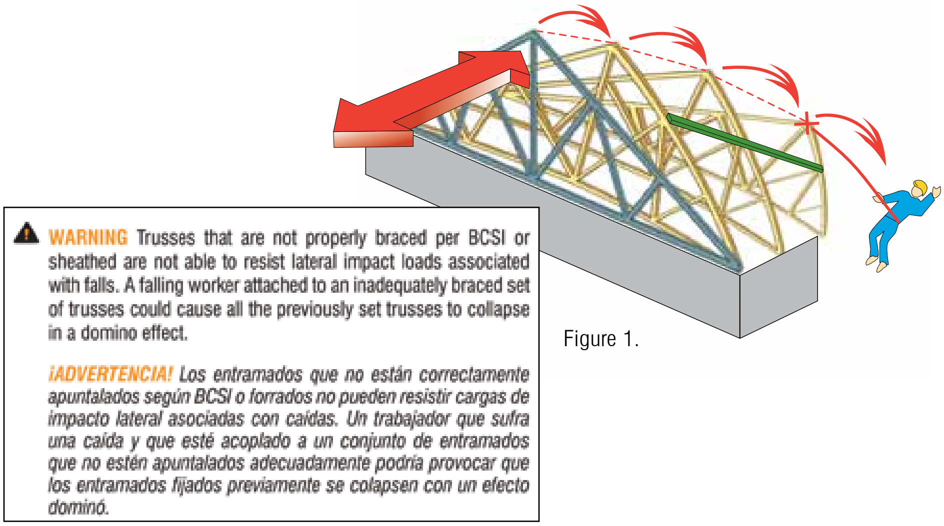


Figure 1.

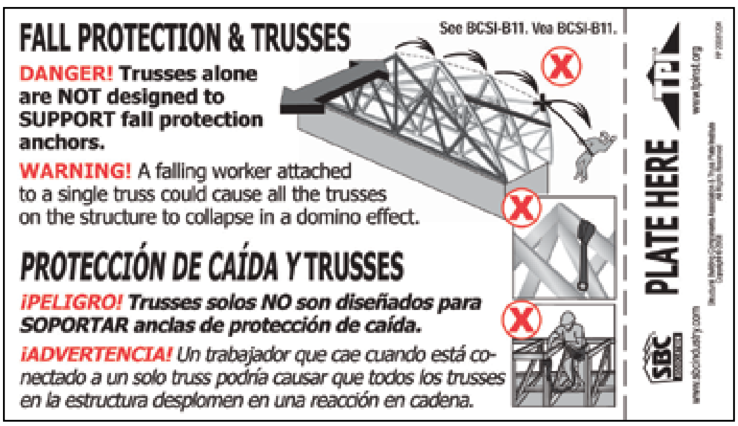


Figure 2.

Further, the B11 warns framers of the dangers associated with utilizing various conventional fall protection equipment systems, and points out that while the equipment may be designed and rated for handling the forces associated with arresting falls, it is up to a qualified person to determine whether the system it is attached to can also withstand those forces.

The Alternate Approach, One Step at a Time

While the jobsite package, the B11 and the fall protection truss tag are all great tools, they don't answer the customer service question, "Well, what should I do about fall protection while setting trusses?"

For the component manufacturer, the first part of the answer to this question is to stress scope of responsibility. The component manufacturer is responsible for designing, manufacturing and delivering a high-quality product; it is the responsibility of the framing contractor to properly handle, install, brace, and restrain the product, which includes utilizing it within a fall protection system. By providing guidance, the component manufacturer needs to be clear they are only providing "best practices" with regard to applying proper fall protection to an installed system of trusses.

The second part of the answer is to point out OSHA accepts that during the installation of an initial group of trusses in a roof system, the use of conventional fall protection may be either infeasible, or would subject workers to a greater risk of a fall.[4]

The framing contractor has two clear choices when installing a roof truss system: they can brace, restrain and/or sheath all (or a portion) of the roof system on the ground; or, they can implement an alternate fall protection plan where they restrain and diagonally brace an initial group of trusses to form a truss system that can be used as a tie off or anchorage point. No matter what approach they take, it has to be identified and detailed in the site specific JHA and fall protection plan.

Continued on page 14

Photo 1. The entire second floor was framed on top of the first-floor decking.

Photo 2. The second floor was then lifted off in three sections and set aside.

Fall Protection

Continued from page 13

During the 2011 BCMC Build project in Indianapolis, IN, a two-story home was constructed using the ground erection method, but with a twist. The entire second floor was framed on top of the first-floor decking (see Photo 1), lifted off in sections (Photo 2), the walls were installed (Photo 3), and finally the roof was craned above the top plate (Photo 4). This is certainly not the only way to frame on the ground, but it is an elegant solution (a time-lapse video of this process can be seen online at youtube.com/user/bcmcbuild).

However, for various reasons, ground erection may not be the best approach, or even feasible, on some jobsites. Fortunately, SBCA has worked with OSHA officials to create an online resource to guide framers through the creation of a common sense alternate fall protection plan for the installation of an initial group of trusses. This step-by-step approach can be found at sbcindustry.com/fp, and provides a comprehensive way to comply with OSHA's fall protection regulations. The 11-step process is as follows:

1. Identify initial installation area, create a Controlled Access Zone (CAZ)
2. Identify competent workers for installation
3. Designate a safety monitor
4. Establish truss installation plan
5. Establish ground bracing procedure and lateral restraint locations
6. Set the first truss
7. Set the rest of the initial group of trusses
8. Install top chord diagonal bracing
9. Work within the trusses
10. Apply sheathing
11. Apply fall protection anchorage

Notice the steps are designed to provide guidance for the installation of an initial group of trusses, not the entire roof. Once the initial group is either fully restrained and diagonally braced according to the guidelines provided in the BCSI B1 and B2 Summary Sheets, or sheathed (the preferred method), only then can the roof truss system be used as an anchorage point for personal fall arrest equipment.

Each step is accompanied by illustrations and photographs, many from the B1 and B2, and all of it can be used by the framing contractor when putting together an alternative fall protection plan. On the first page of the guide, there is a link to OHSA's alternate fall protection plan template. Next to each section of this template, there are hyperlinks to the corresponding online step that explains how it can be implemented.

Document & Differentiate

For component manufacturers, helping the customer (or themselves, if they also install their products) get a handle on how they should install structural components under OSHA's new fall protection standards is not rocket science, but care must be taken.

First, always keep in mind your scope of responsibility. The component manufacturer is responsible for designing, manufacturing and delivering a high-quality product; it is the responsibility of the framing contractor to properly handle, install, brace, and restrain the product, which includes utilizing it within a fall protection system.

Second, provide clear instructions for installation and handling of components (like those found in the SBCA Jobsite Package, B11 Summary Sheet and Fall Protection Tag), and limit your liability in the event of a fall accident. Third, direct framing contractors to SBCA's online step-by-step approach to installing an initial group of trusses.

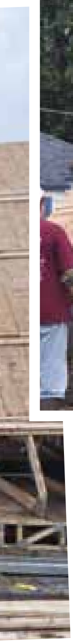


Photo 3. First floor walls were installed on the floor deck.

Photo 4. After the first-floor walls are set, the roof sections were craned above the top plate.

Finally, stress the fact that in the eyes of OSHA, each jobsite is like a snowflake, it's unique. While the step-by-step approach can be used for virtually any residential project, the framing contractor is responsible for documenting their JHA for each site, and the alternate fall protection plan must be tailored to each project. SBC

Braced Wall Revolution

by Kirk Grundahl, P.E. & Larry Wainright

SBCRI's testing and resulting analysis is helping to facilitate a level playing field.

Recently, at the Structural Building Component Research Institute (SBCRI), we have been focusing on clearly defining braced wall panel design values. Why? Because we have found that there's significant confusion in the marketplace, and in the building codes themselves, regarding lateral resistance nominal unit shear capacity (NUSC) values.

Without a full understanding of the true resistance being used in the design process, it is extremely challenging (at best, and impossible, at worst) to undertake new product development that is competitive with existing applications. Our testing and resulting analysis is helping to facilitate a level playing field, allowing for fair and understandable braced wall panel and braced wall line product development.

In August, SBCRI sent our analysis of current and existing braced wall panel data (which has been confirmed by our test findings), along with our recommendations and conclusions, to the American Wood Council (AWC) (Developer of SDPWS, WCFM and NDS), the International Code Council (ICC) and the International Code Council-Evaluation Services (ICC-ES). This work defined what we believe to be a detailed and accurate assessment of what the building codes dictate. SBCRI's correspondence with these organizations, as well as all the supporting background data can be found online at sbcri.info/bwpex.php.

SBCRI has subsequently been involved in an ongoing exchange with AWC to provide greater clarification of braced wall panel resistance as defined by the building code and AWC's design documents. AWC has provided valuable insight into various code provisions, and their assistance has been greatly appreciated. This article will delineate the key concepts of our findings and our current understanding of the resulting data.

A Hypothetical Design Problem

Design Problem: Provide the nominal unit shear capacity (NUSC) for an isolated 4x8 sheet of 3/8" OSB attached using 8d (.131) nails at 6:12. This is a braced wall panel (BWP) in residential conventional construction with studs spaced 16" o.c., interior gypsum wallboard and attached to the foundation with anchor bolts.

Here is the answer:

1. The NUSC value in a wind zone can be one of the following:
    - 872 plf (WFCM 2001, 2011 and SDPWS), or
    - 840 plf (IRC), or
    - 870 plf (IBC).
2. The NUSC value in a low seismic zone[1] can be one of the following:
    - 478 plf (IBC, WFCM 2011 and SDPWS), or
    - 480 plf (WFCM 2001), or
    - 840 plf (IRC).

There are effectively 3 different NUSC values each for wind and seismic calculations depending on the code/standard used. However, resistance = resistance. Common sense says that WSP performance should be unaffected by the code or standard used to define the approach to resisting the applied loads.

[1] Seismic Zones A, B and detached dwellings in C, (from 2009 IRC)

The values listed in this design problem are based on the braced wall panel (BWP) nominal unit shear capacity (NUSC) values defined in either the building code, AWC's Wood Frame Construction Manual (WFCM), or AWC's Special Design Provisions for Wind and Seismic (SDPWS).

at a glance

- The ICC and AWC have published and through code adoption provide as law nominal unit shear capacity values, which are to be applied in accordance with the installation requirements of the building code and/or the code referenced WFCM and SDPWS.
- Our goal at SBCRI has been to provide a technically reasonable foundation upon which to make engineering judgments when designing braced wall panels for lateral load resistance.
- True creative innovation can only take place within the light frame construction industry when there is an accurate technical foundation.

Through correspondence with SBCRI, AWC clarified the BWP (shear wall) NUSC values contained in Tables 1-6 (on pages 18-19) apply to applications with the following boundary conditions (the following is an excerpt taken from a letter dated September 20, 2011, and posted on our website):

> "As for the differences you are mentioning between SDPWS nominal values (what I think you call NUSC values) and test values, the primary reason for the difference is that the SDPWS nominal shear capacities are based on full overturning restraint as required by the ASTM test standards, while many of the recent tests of "braced walls" and "perforated shear walls" are conducted with partial overturning restraint. Again, you can't directly compare fully-restrained shear wall test results with partially-restrained shear wall test results. As we have discussed in the Wind & Seismic Task Committee and workshops many times, the reduced overturning restraint has a direct impact on the shear wall nominal shear capacity. Currently, the only provisions that recognize this reduction in SDPWS is the perforated shear wall design provisions where a holddown is required at each end of the perforated shear wall."

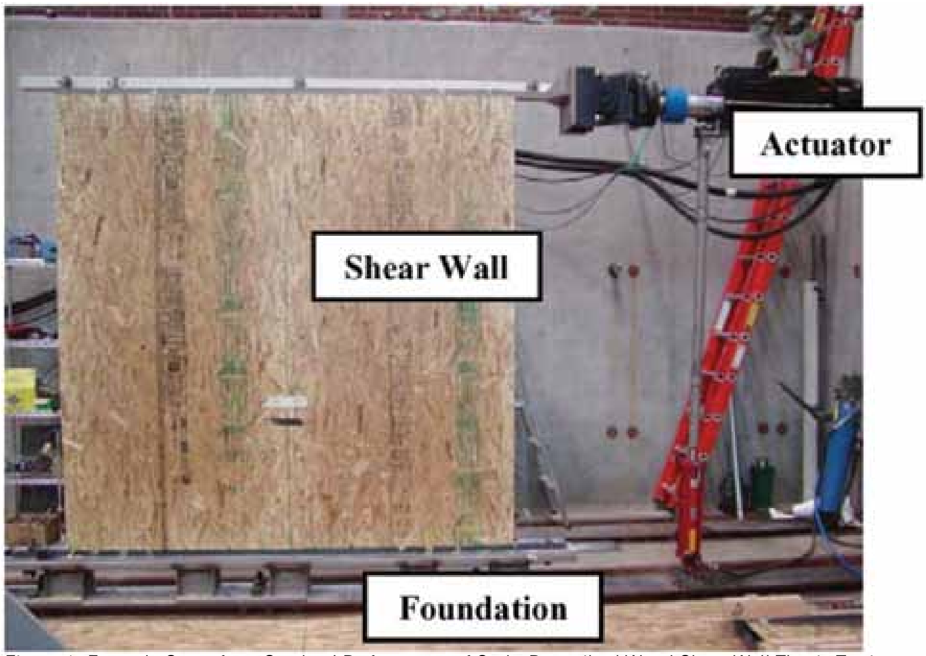


Figure 1: Example Setup from Seaders' Performance of Code-Prescribed Wood Shear Wall Thesis Testing

Key Concepts

Based on this feedback from AWC, the key concepts regarding NUSC values include:

1. As shown in tables 1 through 6, the "design values" provided by the building code, WFCM and SDPWS are essentially the same when compared on a common denominator basis (i.e., using NUSC values).
2. These values are all based on small scale ASTM standards (i.e., E72/E564/E2126) that use full overturning restraint per AWC's feedback.
3. ASTM Standard testing usually has a maximum length of 8 to 10 feet (Figure 1 is provided as an example of a typical ASTM test) although some ASTM E72/E564/E2126 testing extends the length to 20 to 30 feet.
4. Full overturning restraint in the real world means the use of tie-downs or hold-downs at the end of each 8 to 10 foot length of braced wall panel.
   a. This full restraint is necessary to achieve the design values provided in Tables 1-6.
   b. AWC stated in the September 20 letter:
   "As we have discussed in the Wind & Seismic Task Committee and workshops many times, the reduced overturning restraint has a direct impact on the shear wall nominal shear capacity."
5. We have provided a proposal to reconcile the differences between use of full overturning restraint NUSC values (e.g use of hold-downs or other methods to fully resist overturning) and designs using anchor bolts (partial restraint) as defined prescriptively in the IBC's Conventional Light-Frame Construction (section 2308) and the IRC (section R602.10) based on our 12x30 foot building and single element testing (it's available at the website link provided above).

Continued on page 18

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Given the confusion that does exist in the market with respect to braced wall design, we have listed the definitions that the building code and code references provide on our website with the online version of this article.

Tabulated Design Values Per the Building Code for the Most Common Applications of Wood Structural Panel Braced Wall Panels

Table 1 SDPWS Nominal Unit Shear Capacity Values for the Primary WSP Products Used in the Market – SDPWS Serves as our Shear Capacity Benchmark	Fastener	Fastener Spacing	Wind	Seismic	Wind	Seismic
			SPF Framing	SPF Framing	SPF Framing	SPF Framing
			SDPWS Nominal Unit Shear Capacity (PLF)	SDPWS Nominal Unit Shear Capacity (PLF)	SDPWS Nominal Unit Shear Capacity w/GWB (PLF)	SDPWS Nominal Unit Shear Capacity w/GWB (PLF)[2]
3/8" WSP @16" o.c. (sheathing)	6d (2" x 0.113" nails)	6:12	515	368	715	400
3/8" WSP 24" o.c. (sheathing)	6d (2" x 0.113" nails)	6:6[1]	515	368	665	368
3/8", 7/16", 15/32" WSP 16" o.c. (sheathing)	8d (2 1/2" x 0.131" nails)	6:12	672	478	872	478
3/8" WSP 24" o.c. (sheathing)	8d (2 1/2" x 0.131" nails)	6:6[1]	566	405	716	405
7/16" WSP 24" o.c. (sheathing)	8d (2 1/2" x 0.131" nails)	6:6[1]	616	442	766	442
15/32" WSP 24" o.c. (sheathing)	8d (2 1/2" x 0.131" nails)	6:12[1]	672	478	822	478
3/8", 7/16", 15/32" WSP 16" o.c. (structural 1 sheathing)	8d (2 1/2" x 0.131" nails)	6:12	722	515	922	515
3/8" WSP 24" o.c. (structural 1 sheathing)	8d (2 1/2" x 0.131" nails)	6:6[1]	593	423	743	423
7/16" WSP 24" o.c. (structural 1 sheathing)	8d (2 1/2" x 0.131" nails)	6:6[1]	658	469	808	469
15/32" WSP 24" o.c. (structural 1 sheathing)	8d (2 1/2" x 0.131" nails)	6:12	722	515	872	515

[1]Footnote b, IBC Table 2306.3 and SDPWS Section 4.3.7.1 – 6:6 for 3/8 and 7/16" and 6:12 for 15/32" when 24" o.c.

[2]Design values for gypsum wallboard are defined in IBC, section 2306.7 and SDPWS, Table 4.3C. In addition, SDPWS, section 4.3.3.3.2 defines the NUSC for walls with dissimilar sheathing materials on opposite sides of the wall as follows: "4.3.3.3.2 …For shear walls sheathed with dissimilar materials on opposite sides, the combined nominal unit shear capacity, v_{SC} or v_{WC}, shall be either two times the smaller nominal unit shear capacity or the larger nominal unit shear capacity, whichever is greater. **Exception**: For wind design, the combined nominal unit shear capacity, v_{WC}, of shear walls sheathed with a combination of wood structural panels, hardboard panel siding, or structural fiberboard on one side and gypsum wallboard on the opposite side shall equal the sum of the sheathing capacities of each side."

Table 1: SDPWS Nominal Unit Shear Capacity Values for the Primary WSP Products Used in the Market SDPWS Serves as Our Shear Capacity Benchmark

Table 2 IBC Nominal Unit Shear Capacity Values for the Primary WSP Products Used in the Market – Compares Favorably with SDPWS	Fastener	Fastener Spacing	Wind	Seismic	Wind	Seismic
			SPF Framing	SPF Framing	SPF Framing	SPF Framing
			IBC Nominal Unit Shear Capacity (PLF)	IBC Nominal Unit Shear Capacity (PLF)	IBC Nominal Unit Shear Capacity w/GWB (PLF)	IBC Nominal Unit Shear Capacity w/GWB (PLF)[2]
3/8" WSP @16" o.c. (sheathing)	6d (2" x 0.113" nails)	6:12	515	368	715	400
3/8" WSP 24" o.c. (sheathing)	6d (2" x 0.113" nails)	6:6[1]	515	368	665	368
3/8, 7/16", 15/32" WSP @16" o.c. (sheathing)	8d (2 1/2" x 0.131" nails)	6:12	670	478	870	478
3/8" WSP 24" o.c. (sheathing)	8d (2 1/2" x 0.131" nails)	6:6[1]	567	405	717	405
7/16" WSP 24" o.c. (sheathing)	8d (2 1/2" x 0.131" nails)	6:6	618	442	768	442
15/32" WSP 24" o.c. (sheathing)	8d (2 1/2" x 0.131" nails)	6:12	670	478	820	478
3/8", 7/16", 15/32" WSP 16" o.c. (structural 1 sheathing)	8d (2 1/2" x 0.131" nails)	6:12	721	515	921	515
3/8" WSP 24" o.c. (structural 1 sheathing)	8d (2 1/2" x 0.131" nails)	6:6[1]	592	423	742	423
7/16" WSP 24" o.c. (structural 1 sheathing)	8d (2 1/2" x 0.131" nails)	6:6[1]	657	469	807	469
15/32" WSP 24" o.c. (structural 1 sheathing)	8d (2 1/2" x 0.131" nails)	6:12	721	515	871	515

[1]Footnote b, IBC Table 2306.3 and SDPWS Section 4.3.7.1 – 6:6 for 3/8" and 7/16" and 6:12 for 15/32" when 24" o.c.

[2]Design values for gypsum wallboard are defined in IBC, section 2306.7 and SDPWS, Table 4.3C. In addition, SDPWS, section 4.3.3.3.2 defines the NUSC for walls with dissimilar sheathing materials on opposite sides of the wall as follows: "4.3.3.3.2 …For shear walls sheathed with dissimilar materials on opposite sides, the combined nominal unit shear capacity, v_{SC} or v_{WC}, shall be either two times the smaller nominal unit shear capacity or the larger nominal unit shear capacity, whichever is greater. **Exception**: For wind design, the combined nominal unit shear capacity, v_{WC}, of shear walls sheathed with a combination of wood structural panels, hardboard panel siding, or structural fiberboard on one side and gypsum wallboard on the opposite side shall equal the sum of the sheathing capacities of each side."

Table 2: IBC Nominal Unit Shear Capacity Values for the Primary WSP Products Used in the Market Compares Favorably with SDPWS

Table 6 2001 WFCM for WSP	Fastener	Fastener Spacing	Wind	Seismic	Wind	Seismic
			SPF Framing	SPF Framing	SPF Framing	SPF Framing
			WFCM Nominal Unit Shear Capacity (PLF)	WFCM Nominal Unit Shear Capacity (PLF)	WFCM Nominal Unit Shear Capacity w/GWB (PLF)	WFCM Nominal Unit Shear Capacity w/GWB (PLF)
3/8", 7/16", 15/32" WSP 16" o.c. (sheathing)	8d (2 1/2" x 0.131" nails)	6:12	672	480	872	480
7/16" WSP 24" o.c. (sheathing)	8d (2 1/2" x 0.131" nails)	6:12	672	480	822	480
15/32" WSP 24" o.c. (sheathing)	8d (2 1/2" x 0.131" nails)	6:12	672	480	822	480

Table 6: 2001 Wood Frame Construction Manual Nominal Unit Shear Capacity Values for the Primary WSP Products Used in the Market – For Use as Conventional Construction

Braced Wall...

Continued from page 19

Concluding Thoughts

As of July 2011, SBCRI has undertaken 376 12x30 foot building tests, 68 standard single-element ASTM E72/E564/E2126 tests, and 16 CUREE-based 12x30 building seismic tests. Examples of these tests can be seen in the PowerPoint presentations provided at these two websites sbcri.info/bwpppts.php and sbcri.info/ibcirc.php. From these tests, we have collected a significant amount of data showing the true NUSC values for various shear wall methods.

Photo 1.

Photo 2.

At SBCRI, we have discovered that in the realm of full building testing, "real world" building performance fits what common sense suggests would be the outcome for wall performance using anchor bolt-only applications (i.e., partial overturning restraint or no hold-downs), as allowed in the IRC, WFCM and IBC conventional framing provisions. Its actual performance can be seen in Photos 1 and 2.

We have detailed, as clearly as we can, the implications of our test results, as well as recommendations that can be implemented to provide accurate braced wall panel NUSC values for conventional construction applications. For now, the ICC and AWC have published, and through subsequent code adoption provide as law, the values in Tables 1-6 as NUSC values. The values in these tables can be applied in accordance with the installation requirements of the building code, and/or the code referenced WFCM and SDPWS.

The goal of SBCRI's work has been to provide a technically reasonable and equitable foundation upon which to make engineering judgments when using generally accepted engineering methods and accurate NUSC values. Knowing the specifics behind the creation of these NUSC values, and the specific boundary conditions used in their development, will allow all end users to make far better judgments with respect to their use in real world applications and their safety. Only then can true creative innovation take place within the light-frame construction industry. SBC

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Parting Shots

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Deborah Jones (above right), one of the new homeowners, radiated the BCMC Build spirit. "I want to thank all the sponsors, all the builders, Lilly, BCMC, all the volunteers," she said. "I just want to say thank you so much. This is a dream come true for me." (Above left: The roof trusses for Jones' one-story ranch home were assembled on the ground and hoisted into position.)

The brand new BCMC Tri-Tacular brought about some fierce competition on the show floor, as well as some serious trash talking. Eight teams competed in the two-day event and vied for prize money and ultimate bragging rights. Team Awesome comprised of Jess Lohse, Dave Mitchell, Mike Ruede, and Jorge Ruiz lived up to its name and took first place. (Right: Mike Ruede [A-1 Roof Trusses, left] and Rick Parrino [Plum Building Systems, LLC, right] sit poised at the starting line.)

A special thank you to Jess Lohse of Rocky Mountain Truss Co. who served as ***SBC's*** BCMC beat reporter during the show. While the rain and mud proved to be too much for his boots (hence, the flip flops), he persevered and wrote a daily blog, providing the latest updates at the build sites and the tradeshow.

Read more highlights from BCMC in the December 2011 issue of ***SBC***. **SBC**

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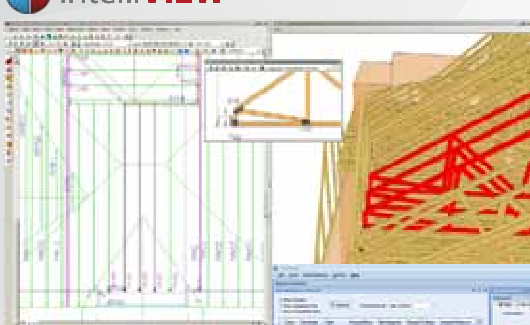

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