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Yields Important Market Development Data for Component Manufacturers

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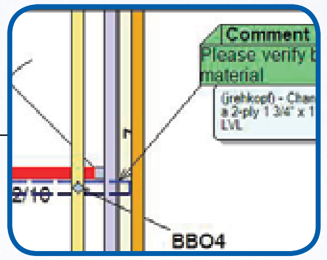

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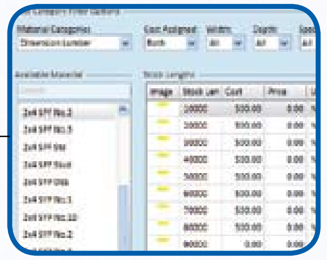

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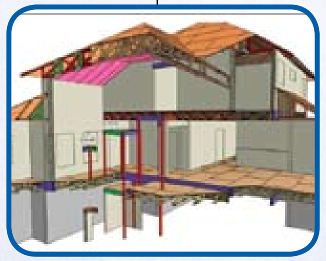

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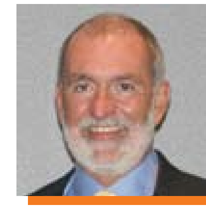
contents

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



Editor's Message

It's 2011. What Will You Do Differently?

by Joe Hikel

Price pressure makes wall panels a tough sell in today's market. Is it time to explore other products?

Our industry has been trying to add value to its offerings to the builder for many years. Most component manufacturers (CMs) started out by making roof trusses and many still focus on that product. Others have been trying to get more market share by offering floor trusses or engineered wood products for floor systems and beam applications. Some CMs have expanded to making wall panels, subcomponents, and distributing or manufacturing proprietary shear wall products for wall applications. Others have combined loose lumber supply or field labor to component packages to provide turnkey framing solutions. Our software providers are trying to advance the state of the art by providing value engineered whole house designs that optimize material. They feel that the CM is in the best position to add value by saving material and eliminating waste by controlling the entire material list using the tools they are developing.

The challenge for all CMs is developing the business model that works for today and tomorrow's market. These days, predicting tomorrow's market is a tremendous feat. Being a vertically integrated turnkey framer that employs the latest technology is an endeavor that creates the need for many more skills than the average truss manufacturer has. How do we proceed? Do we try to acquire the skills? Do we form strategic alliances to bring different skill sets together? Will the customer actually pay us for the value we create? The answers to these questions are ever-changing and finding the "sweet spot" for your business will be the key to your success.

Let's talk about the first step in expanding the product offering for many CMs: wall panels. To give you some perspective I think it is important to understand my experience with panels. The first job I had in the industry was working on the sheathing side of a Triad panel table in 1975. The company I worked for was a lumber yard that provided roof trusses, floor trusses, wall panels, pre-hung doors, loose lumber, interior and exterior trim, windows, siding, and anything else a builder might need from a lumber yard. We made panels for production builders that were designed by hand. When we opened Shelter in 1976 we started with roof and floor trusses and quickly added wall panel capability by 1979.

The biggest obstacle in selling panels then and now at a profitable price is getting the builder and the framing contractor to recognize the value the product creates. I remember my dad telling me stories of framing contractors actually coming after him with a hammer at the thought of getting the customer to use panels instead of stick framing. The framers need to give a credit of somewhere between 25-40% in order to compensate for the labor, freight and profitability of the wall panel manufacturer. The value proposition to the builder has been more speed and less waste on the jobsite. Another attribute of panelized construction is that the crew on the site can be more productive with fewer "less skilled" staff. Yet another feature is the concept of the walls being built in more controlled conditions in a plant that has sophisticated equipment and ensures better quality. The framer who doesn't want wall panels will say that any advantage they give is quickly negated by the fact that the manufacturer can't be as flexible as he can be in the field when conditions change, especially if the foundation isn't dimensionally accurate. I know some framers who love panels because they enable them to be more productive as they have trained crews to be

Continued on page 8

at a glance

- The biggest obstacle in selling panels has always been getting builders framers to recognize the value.
- Different market segments require unique skill sets just like different products do.
- Given the ultra-competitive market, strategic planning is critical for component manufacturers in 2011.

Editor's Message

Continued from page 7

panel setters. They also rarely give back all the credit for panels enabling them to pocket some additional margin. I know many others who give little or no credit, which puts a squeeze on manufacturers' margins. I believe this margin fight is the main reason that panelization has not been more widely accepted across the building community. Some panelizers have decided to go into the framing business to mitigate the margin fight by managing the whole process.

Today's economy and the downward pricing pressure it has created exacerbates the margin squeeze panelizers feel. Anecdotal evidence suggests that panels are losing market share as cheap labor is plentiful incentivizing some former panelized customers into switching back to stick framing and making it even harder to convert the stick framers to try panels. Even though panel manufacturers face many challenges, there are many builders that have embraced panelization and are committed to the process. There are several vertically integrated large builders that have their own manufacturing facilities and there is a panelized paradigm within a loyal group of customers.

Alternatives to panels in some markets include subcomponents and precut framing packages. Both products offer some of the technological advantages of wall panel without the freight intensity or field flexibility disadvantages. Subcomponents include window and door rough openings and wall intersects known as tees and corners, while precut framing packages leverage the technology many of us have in our plants in the form of a linear saw that can cut and mark wall members in an automated process.

The overall reason we are discussing potential additional product offerings is to consider increasing market share especially when there is less market available. Another strategy to increase share is to get more customers. Perhaps changing the distribution channels you have been using is an option. Or go after different market segments as well. If you are used to approaching single family builders direct, why not consider a relationship with a lumber yard? How about commercial or multifamily? Different market segments require different skill sets just like different products do.

What we are really talking about here is strategic planning for your business. In many ways, today's market is the best time and place to explore options you may not have in the past. What markets do you want to attack? Who are your target customers? How will you differentiate your business from your competition to meet their needs? How does your manufacturing and design expertise match up with your targeted customers? How will you reinvent your business for the new era we are operating in today and how nimble will you be at making the necessary changes as demand increases? Don't forget that your participation in SBCA and the discussions you have in Business Solution Groups, chapter meetings, and at BCMC will help answer these question by benchmarking and sharing ideas with colleagues. **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.

Technical Q & A

Building Official Approval of Alternative Materials, Designs & Methods of Construction

by SBCA Staff

The process of obtaining building code approval for a new product is clarified.

New proprietary construction materials become available to the marketplace every day. These products could include anything from a new connector, a new framing method, a new composite truss chord member or truss plate. Manufacturers whose products are not already approved within the building code process in some manner must provide evidence that the new product being marketed "is at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.[1]" Exactly how the process works, the building code requirements for compliance, and who can provide an approval package for building official review and acceptance is the subject of many questions within our industry.

Question

What is the process for getting approval of a new product that is not currently addressed by the building code?

Answer

Design guidance for new products cannot be found directly within the code. Therefore, products that have a span table or design values not listed inside the IRC and/or IBC (basically anything other than a nail or lumber) need to have specific design values for use with the intended application. Design information that provides foundation for the product to be considered equivalent to that required by the code has to come from testing. This testing is generally performed by an independent testing facility where the product is evaluated to ASTM or ANSI testing procedures or some combination thereof. The facility will produce design values based on this testing.

There is confusion in the marketplace with building officials, builders, architects and engineers at times about what criteria must be met to approve the use of a new product in the intended application as meeting the requirements of the code. The good news is that the process is actually less complicated than it seems.

First, the product must be evaluated or tested to meet application and building code requirements using the standards and specifications referenced in the building code. This work is generally performed by a third party (i.e., independent professional engineer, test lab, etc.) to develop design values that allow for design to be performed in the context of the code requirements. Many independent testing agencies are available to test new products. After a product is tested, the testing facility will issue an evaluation report of the test data and create design values and other information pertaining to the product's performance. The next step is getting building official acceptance to use the product in a particular building application.

The checklist on page 11 outlines the process a building official follows to determine if the product complies with the code. If all the criteria in the checklist are met, the product or material should be accepted as an alternative material per IBC Section 104.11 and/or IRC Section R104.11. In this instance our checklist references Testing and Engineering Reports (TER) that are authored by SBCRI. To get a good

Continued on page 12

[1] International Building Code (IBC) 104.11 and International Residential Code (IRC) R104.11

at a glance

- There is often confusion in the marketplace about what criteria must be met to accept a new product and approve it for use in the intended application.
- The IBC and IRC require products not approved within the code to be "at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety."
- Manufacturers of products that do not have span tables or design values listed inside the IRC and/or IBC must provide design values for their products through independent testing.
- Building officials should follow the checklist provided her to determine if a new product complies with the code.

TER Testing & Engineering Report

BUILDING OFFICIAL'S ALTERNATIVE PRODUCT CODE-COMPLIANCE CHECKLIST

Key Code Requirements Summarized

- ☐ **Submitted construction documents propose use of an alternative product.[1]**
- ☐ **An attached SBCRI/Qualtim Product Submittal Package documents that the proposed design is satisfactory and complies with the intent of, and is at least equivalent to the purpose intended by, the provisions of the code.[2]**
- ☐ **The SBCRI/Qualtim Product Submittal Package includes a Testing & Engineering Report (TER). TER No. ______________ provides a code-compliance evaluation for this product and application.**

  This TER has been authored by SBCRI/Qualtim, Inc. (an approved independent agency[3]) and shall be reviewed and approved by the building official. "If it is determined that the evidence submitted is satisfactory proof of performance for the use intended … the *building official* shall approve the use of the material or assembly subject to the requirements of this code," per *IBC* Section 1703.4.1.

  The Product Submittal Package also includes the following code-compliance documentation:

  - TER No.1009-04: *Building Official Approval of the Use of Alternative Materials, Design & Methods of Construction*
  - TER No.1011-02: *TER Code Compliance Evaluations*
  - TER No.1011-03: *SBCRI is an Approved Agency*
  - TER No. 1011-05: *Acceptance Criteria (e.g. AC-369, etc.) Are Not Consensus Standards and Therefore Are Not Required for Code Compliance*
- ☐ **The Building Official reviews the construction documents, and the alternative product application conforms to the provisions of the building code, relevant laws, ordinances, rules, and regulations.[4]**
- ☐ **The alternative product is approved and the permit is issued.[5]**

  If disapproved, please provide the specific section(s) of the building code or local ordinance(s) that are violated, so that changes can be expeditiously made to provide a product application that conforms:

  ____

  ____

A Brief Summary of the Typical Alternative Product (or Design) Approval Process:

1. The registered design professional (RDP) for the building designs a project that uses an alternative product that has been evaluated for code compliance via a specific Testing and Engineering Report (TER) issued by SBCRI (an approved agency).
2. The RDP for the building justifies the use of the alternative product to resist the code-prescribed loading conditions.
3. The building department then reviews and approves the construction documents, which include the alternative product, and issues a building permit.

[1] Proposed for use in accordance with *IBC* Section 104.2 / *IRC* Section R104.2 submitted & prepared in accordance with *IBC* Section 107.1 / *IRC* Section R106.1
[2] *IBC* 104.11, *IBC* 1701.2 & *IRC* R104.11
[3] *IBC* 104.11.2, 1702.1, 1703.1 and *IRC* R104.11.1
[4] *IBC* 104.2 & *IBC* 107.2.1
[5] *IBC* 104.2, *IBC* 104.11 & *IRC* R104.11

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Technical Q&A

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feel for the process and how compliance with the building code or adopted law works, it is best to review the TERs in this order:

1. TER No.1009-04: *Building Official Approval of the Use of Alternative Materials, Designs & Methods of Construction*
2. TER No.1011-02: *TER Code Compliance Evaluations*
3. TER No.1011-03: *SBCRI is an Approved Agency*

These TERs can be found at www.sbcri.info/codecompliance.php.

The summary of product approval process using a TER compliance approach follows:

1. The registered design professional (RDP) for the building designs a project that uses an alternate product that has been evaluated for code compliance via a specific Testing and Engineering Report (TER) that contains test data, engineering evaluations of that test data and resulting design values and an evaluation of how the product complies with the building code requirements.
2. The RDP for the building has evaluated and performed calculations to define the applied loads and required resistance to those loads and has justified the use of the alternate product to resist these code prescribed loading conditions.
3. The product design is sealed by a product engineer and incorporated into the building design through the construction documents which are then sealed by the RDP.

The building department then reviews the product use for compliance with the intent of the building code and approves the construction documents that include the alternate product and issues a building permit. **SBC**

To pose a question for this column, call the SBCA technical department at 608/274-4849 or email technicalqa@sbcmag.info.

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Braced Wall Panel Testing Project in SBCRI

Yields Important Market Development Data for Component Manufacturers

by Kirk H. Grundahl, P.E.

Sometimes subjects we don't have much knowledge of seem far more complex than they really are. When this is the case we can be baffled by what was described as being "foggy bottomed" by Professor Lee Crandell in our engineering economics class 32 years ago. Structural engineering principles are not very complex:

- If one knows exactly how load travels, providing resistance to that load is easy.
- Stiffness attracts load; the stiffer the element, the more load it will accumulate.

These concepts are best shown in Figure 1 and the following photos of wall bracing tests in SBCRI.

Figure 1 compares SBCRI data (pink line) and AWC WoodWorks data (blue line) on load paths in braced shear walls. The load cells are shown in green at the bottom of the wall line. The lines in the graph below represent the reactions of the SBCRI test data and the RISA (FEA) engineering analysis output using the same applied load; the pink line shows the SBCRI test data; the blue line is the American Wood Council (AWC) WoodWorks RISA Finite Element Shear Wall engineering program's analysis of this wall.

Photo 1 (below left). A 4'x8' sheet of stiffness was added to this braced wall line and is shown by the major humps in the lines.

Photo 2 (below right). The end view of the 4'x8' sheet of stiffness and its impact on the wall top plate and truss bottom chord.

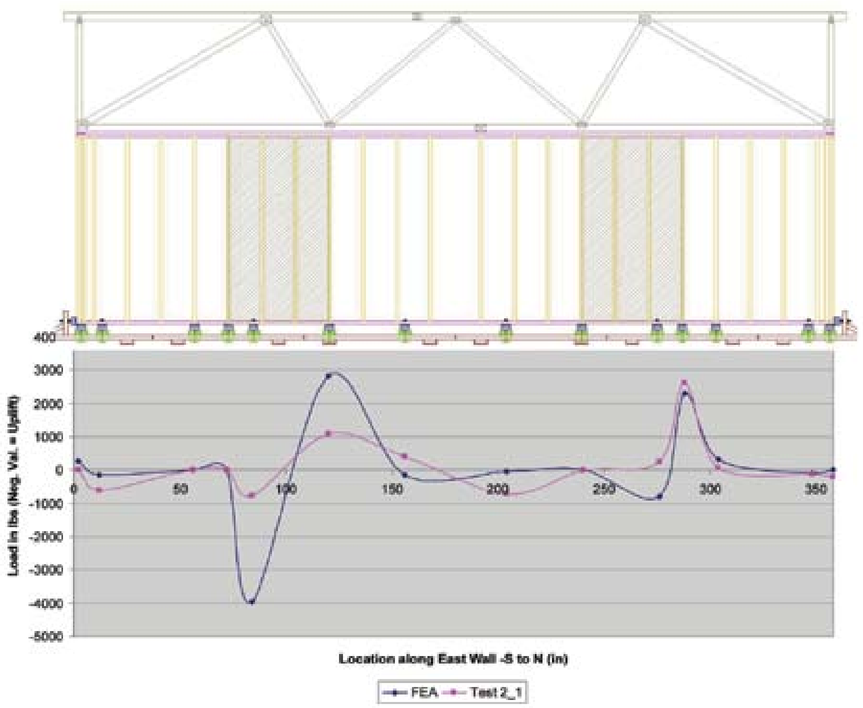


Figure 1 (see caption above). Blue line is WoodWorks FEA. Pink line SBCRI test data.

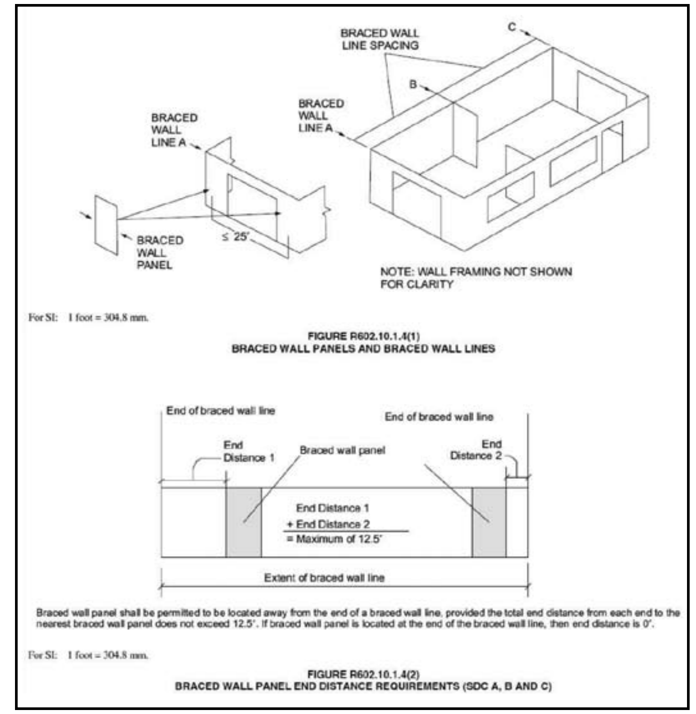


Figure 2. Maximum Braced Wall Panel End Distance Requirements per IRC Figure 602.10.1.4(2)

With this understanding in mind, SBCRI (through funding by Qualtim*) conducted wall bracing tests in 2009 and 2010. Given our strong desire to understand load and resistance accurately, SBCRI constructed a standard comparative equivalency test structure—a 12'x30' single-story building, in this case built in accordance with prescriptive requirements of the IRC. Figure 2 is from the IRC and depicts how a typical braced wall panel can be applied and still comply with the IRC and as built in our test structure.

Photos 3-10 illustrate the dimensions and set-up information for the equivalency structure. Continued on page 16

Photo 3. For SBCRI's 3/8" wood structural panel (WSP) test, the braced wall panel consisted of two 4x8 sheets (8' of bracing) and the braced wall line was 30' long.

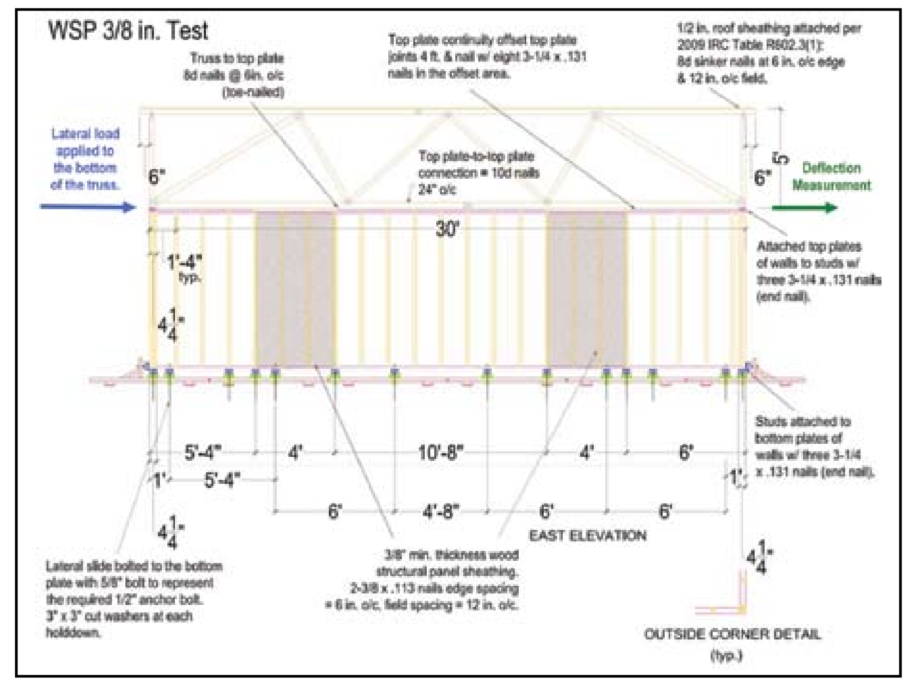


Figure 3: Side construction detail of SBCRI *IRC* conforming 12'x30' test structure, showing locations of applied lateral load, deflection measurements and how the entire structure sits on load cells to accurately measure load path

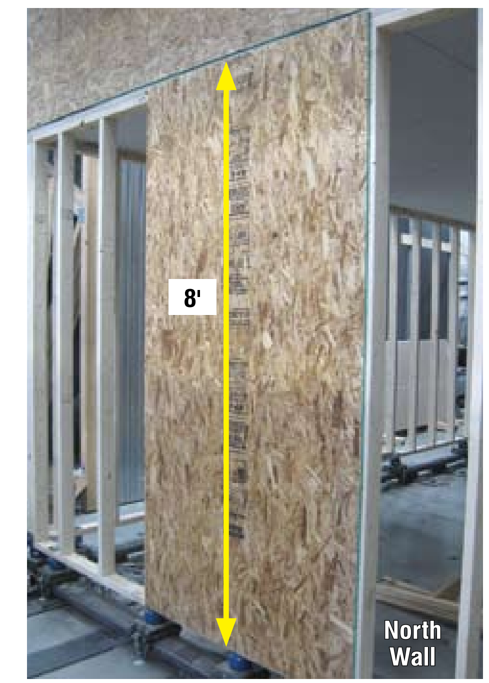


Photo 4: The wall height was 8'.

Editor's Note: As of this writing, we are undertaking IRC/SDPWS (AWC) equivalency testing and will report on our findings as soon as it is completed. We intend for this data to fill in some of the knowledge gaps in Tables 1-4 on pages 18-19. Please visit www.sbcri.info/testresults.php for updates as they are created. Watch SBC Industry News Top Headlines for future updates as well.

*For a more detailed understanding of the relationship between Qualtim and SBCRI, please contact Suzi Grundahl at 608-310-6710 or sgrundahl@qualtim.com.

Braced Wall Panel Testing Project in SBCRI...

Continued from page 15

Test Results

When SBCRI staff analyzed the our test results, they were compared to similar tests conducted by other organizations including AWC, NAHB Research Center, Forest Products Laboratory, APA–The Engineered Wood Association and others.

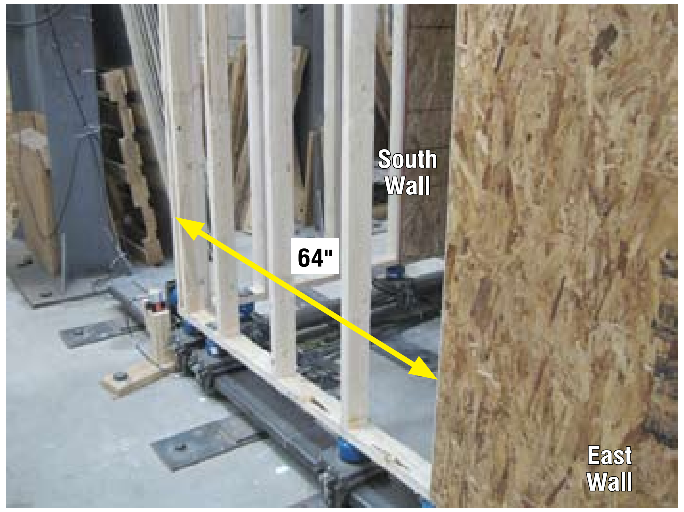


Photo 5. Due to the 16" typical wall panel stud spacing available to SBCRI at the time of this test, the first 3/8" OSB braced wall panel was installed 64" from the south end of the wall. The OSB panel on the north end of this braced wall line was set 72" from the end of the wall.

Photo 6. In the first baseline IRC test, no gypsum was applied on the inside of the 30' wall. This was our approach to replicate the IRC defined 500 plf and AF&PA's SDPWS 515 plf braced wall panel design.

Photo 7. As defined by the IRC, there was no OSB corner return deployed, and the end walls had a single sheet of OSB in the center of the 12' wide wall on both the exterior and interior faces. This was intended to provide end wall bracing support only and did not affect the braced wall line performance.

Photo 8. End wall WSP centered on 12' wall to provide end wall stability only.

Photo 9. Anchor bolts were applied per the IRC. Overturning restraint was provided by sole plate anchor bolts, and by the roof truss assembly built so that the real dead load would be applied to the wall assembly as a real 12x30 building would apply it.

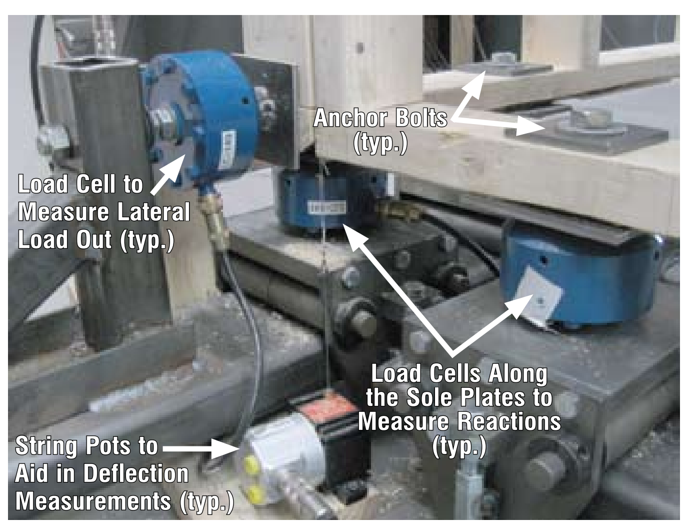


Photo 10. Close-up of Anchor Bolts, String Pots and Load Cells

Figure 1 represents a side-by-side comparison of the SBCRI testing and the RISA-3D 9.0 software program, which accommodates three approaches to shear wall design in wood buildings, which engineers use today to design braced wall lines. This program has been created in concert with the testing and analysis that AWC has available to it and which is incorporated into its Special Design Provisions for Wind and Seismic (SDPWS) design specification. Clearly there is a marked difference between the engineering analysis using the current state-of-the-art engineering judgments and the actual test data. This is the value of SBCRI testing and where opportunity exists for the building components industry through the information that we gain. The axiom that will easily apply is that we'll make much better engineering judgments through more precise knowledge.

AWC prepared a presentation in 2008 called DES130: Lateral Load Resisting Systems for Wood Structures. This is a complimentary eCourse on the AWC website that can be viewed or downloaded from their eCourses page: www.awc.org/helpoutreach/ecourses/index.html. In it, AWC discusses the IRC's prescriptive wall requirements and bracing.

Pages 69-70 of the presentation state that relative shear strength of bracing models is unknown: "We're not sure exactly what resistance to lateral loads are being provided by prescriptive bracing." They've based their modeling approach on the best data that they have available to them and engineering judgment (see Figure 4). Given the uncertainty that exists, the judgments have to be conservative. What is different about SBCRI testing is that we now DO know the resistance that a braced wall panel in a braced wall line provides to an applied load in a real IRC compliant 12x30 building. SBCRI data show us the performance of the wall in a visual manner and the path of the load to the foundation in a very precise manner. This testing work has provided SBCRI significant depth of knowledge of braced wall panel performance.

Wall Bracing Materials & Methods

Bracing Method	Estimated Allowable Shear
1. Let-in diagonal 1x4	0-100 plf?
2. 5/8-in. diagonal boards	300 plf?
3. 3/8-in. WSP	220 plf?
4. 1/2-in. fiberboard	180 plf?
5. 1/2-in. gypsum board	100 plf?
6. 1/2-in. particleboard	140 plf?
7. 7/8-in. PC stucco	180 plf?
8. 7/16-in. hardboard	Unknown?

"In a formal shearwall, design, we can quantify the shear resistance in bracing material; in fact, the code provides those numbers for everything but let-in bracing. But because the overall resistance to racking in conventional construction isn't completely understood, we don't know exactly what shear resistance is being provided by the bracing material itself. Here are some estimates of the shear strength of the 8 allowed bracing materials applied according to the IRC. The widely varying numbers explain why different materials must be provided in different amounts."

Figure 4 (from 2008 AWC presentation, DES130: Lateral Load Resisting Systems for Wood Structures).

What follows on pages 18 and 19 is a summary of the SBCRI testing data that we have and that allows us to make direct comparisons to SDPWS/IRC design values and existing public domain test data.

The data presented in these tables clearly illustrate Dr. A. R. Dykes' engineering philosophy in his 1946 Chairman's Address to the Scottish Branch of the Institution of Structural Engineers (IStructE).

> Structural engineering is the art of modeling materials we do not wholly understand into shapes we cannot precisely analyze so as to withstand forces we cannot properly assess in such a way that the public at large has no reason to suspect the extent of our ignorance.

The USDA Forest Products Laboratory (FPL) further emphasizes in its 1983 report about ASTM E72 and E564 testing the fact that certain wall test approaches are inaccurate:

> ABSTRACT: Standard methods of testing the racking capacity of light-frame walls are inefficient and may give erroneous estimates of shear wall performance. This study is concerned with improving the data base for racking resistance of light frame walls with plywood and gypsum sheathings……

Further, FPL shear wall testing provided additional insight into these concepts:

> **Test Procedures**
>
> The information and design tools available for the evaluation of wall racking performance

Continued on page 18

Key: White = previously tested • Gray = Values used in IRC or SDPWS • Yellow = E72-E564-E2126 (Other test facility data)

TABLE 1

Report #	Test Method	2:1 4' Wide Panels, Studs 16" o/c, No Gyp, No HD	Fastener	Fastener spacing	Stud spacing	Species	Test PLF	Test Ultimate Load SPF Basis	Test Adjusted to SPF PLF
IRC	ICC Ad Hoc Wall Bracing Committee	3/8" OSB, No Gyp, No HD	0.113 x 2" (6d)	6:12	16	SPF	400[2]	3200[1]	400
SBCRI-09-0104.1	E564	WSP 3/8 Test w/o Gyp 6 ft from corner	0.113 x 2-3/8"	6:12	16	SPF	367	2,936	367
SBCRI-09-0104.2 (3 tests)	E564	WSP 7/16 Test w/o Gyp 6 ft from corner	0.131 x 2-1/2"	6:12	16	SPF	415	3,317	415
SBCRI-09-0104.9	E564	WSP 7/16 Test w/o Gyp @ corner	0.131 x 2-1/2"	6:12	16	SPF	426	3,404	426
IRC	ICC Ad Hoc Wall Bracing Committee	7/16" OSB, No Gyp, No HD	0.113 x 2" (6d)	6:12	16	SPF	400[2]	3200[1]	400
HUD/NAHB 2003	E564	WSP 7/16" w/o Gyp, No HD	0.113 (8d) WSP Pneumatic	6:12	16	SPF	160	640	160
WMEL 2002-03	E2126-SPD Hysteresis (seismic)	WSP 7/16" w/o Gyp, No HD	0.131x2.5" (8d) WSP	6:12	16	SPF	175	700	175
HUD/NAHB 2003	E564	WSP 7/16" w/o Gyp, No HD	0.131x2.5" (8d) WSP	6:12	16	SPF	190	750	190

TABLE 2

Report #	Test Method	2:1 4' Wide Panels, Studs 16" o/c, No Gyp, No HD	Fastener	Fastener spacing	Stud spacing	Species	Test/Code Based PLF	Test Ultimate Load SPF Basis	Test Adjusted to SPF PLF
IRC	ICC Ad Hoc Wall Bracing Committee	3/8" OSB, No Gyp, with HD	0.113 x 2" (6d)	6:12	16	SPF	500	4000[1]	500
SDPWS	Wind	WSP 3/8" w/o Gyp, with HD	0.113 x 2" (6d)	6:12	16	DF	560	4120	515
SDPWS	(seismic)	WSP 3/8" w/o Gyp, with HD	0.113 x 2" (6d)	6:12	16	DF	400	2944	368
PEI 2005-911	E72-98	WSP 3/8" w/o Gyp, with HD	0.112 x 2"(6d)	6:12	16	SPF	448	3585	448
PEI 2005-911	E72-98	WSP 3/8" w/o Gyp, with HD	0.112 x 2"(6d)	6:12	16	SPF	490	3922	490
PEI 2005-911	E72-98	WSP 3/8" w/o Gyp, with HD	0.112 x 2"(6d)	6:12	16	SPF	520	4157	520
APA 154	E72	WSP 3/8" w/o Gyp, with HD	16 ga. x 1-3/8" staple	3:6	16	DF	954	7632	878
APA 154	E72	WSP 3/8" w/o Gyp, with HD	16 ga. x 1-3/8" staple	3:6	16	DF	1066	8528	981
APA 154	E72	WSP 3/8" w/o Gyp, with HD	16 ga. x 1-1/2" staple	3:6	16	DF	854	6832	786
APA 154	E72	WSP 3/8" w/o Gyp, with HD	16 ga. x 2" staple	3:6	16	DF	903	7224	831
APA 154	E72	WSP 3/8" w/o Gyp, with HD	15 ga. x 1-1/2" staple	3:6	16	DF	1128	9024	1038
HUD/NAHB 2003	E564	WSP 7/16" w/o Gyp, with HD	0.113 (8d) WSP Pneumatic	6:12	16	SPF	330	1570	330
WMEL 2002-03	E564	WSP 7/16" w/o Gyp, with HD	0.131 x 2.5" (8d)	6:12	16	SPF	628	2510	628
WMEL 2002-03	E2126-SPD Hysteresis	WSP 7/16" w/o Gyp, with HD	0.131x2.5" (8d) WSP	6:12	16	SPF	553	2210	553
IRC	ICC Ad Hoc Wall Bracing Committee	WSP 7/16", No Gyp, with HD	0.113 x 2" (6d)	6:12	16	SPF	500	4000[1]	500
SDPWS	Wind	WSP 7/16", w/o Gyp, with HD	0.131 x 2-1/2" (8d)	6:12	16	DF	730	5368	671
SDPWS	(seismic)	WSP 7/16", w/o Gyp, with HD	0.131 x 2-1/2" (8d)	6:12	16	DF	520	3824	478
HUD/NAHB 2003	E564	WSP 7/16" w/o Gyp, with HD	0.131x2.5" (8d) WSP	6:12	16	SPF	560	2240	560
SBCRI-09-0104.17	E564	WSP 7/16 Test w/o Gyp 6 ft from corner w/ HD			16	SPF	626	5010	626

Braced Wall Panel Testing Project in SBCRI...

Continued from page 17

are of limited value. The majority of available wall racking test data were generated using a standard test procedure published by ASTM (2). This test was established to evaluate the relative performance of sheathing materials. However, additional information is needed regarding effects of other construction variables as well as design limitations.

Construction variables include framing, windbracing, door and window openings, wall length, and wall interaction with floor and ceiling diaphragms....

The test procedure used to evaluate these factors is an important consideration. Currently two ASTM standards describe test procedures for the racking resistance of lightframe walls; ASTM E 72-77 (2) and ASTM E 564-76 (1). Standard E 564 is similar to E 72 except that it was intended for testing walls rather than evaluating panel performance. For this reason, it permits variation of wall frame configuration and boundary conditions to simulate construction practice.…

Studies sponsored by gypsum manufacturers and conducted by private testing laboratories have covered a range of 8- by 8-foot wall fastening details. These tests were conducted in accordance with ASTM Standard E 72 (2). Underwriters Laboratory tests of walls with 1/2-inch gypsum, glued both sides of 2 by 3 framing members, spaced 16 inches O.C., indicated a shear capacity of 880 lb/ft (File MH 9733). Similar tests conducted by Pittsburgh Testing Laboratory using 2 by 4 framing showed average ultimate loads of 730 lb/ft (75). Tests of 1/2-inch gypsum, nailed to one side of a 2 by 4 frame, conducted by IIT Research Institute (IITRI) gave an average of 660 lb/ft (9). Assuming that nailing gypsum to both sides of the frame would double the ultimate load, the IITRI results suggest nailed shear wall capacities exceeding 1,300 lb/ft. This exceeds test values obtained for walls with glued gypsum board. Comparison of such test results suggests a weakness in the E 72 test procedure, which makes the comparison of data collected from various laboratories confusing.

Key: White = previously tested • Gray = Values used in IRC or SDPWS • Yellow = E72-E564-E2126 (Other test facility data)

TABLE 3

Report #	Test Method	2:1 4' Wide Panels, Studs 16" o/c, Yes Gyp, No HD	Fastener	Fastener spacing	Stud spacing	Species	Test PLF	Test Ultimate Load SPF Basis	Test Adjusted to SPF PLF
SBCRI-09-0104.6	E564	WSP 7/16 Test w/ Gyp 6' from corner			16	SPF	939	7508	939
SBCRI-09-0104.10	E564	WSP 7/16 Test w/ Gyp @ corner			16	SPF	807	6458	807
IRC	ICC Ad Hoc Wall Bracing Committee	WSP 3/8", Yes Gyp, No HD	WSP-0.113 x 2" (6d) GYP-5d cooler nail, 0.086 diameter, 1-5/8" long, 15/64 head	6:12-WSP 8:16-GYP	16	SPF	560[3]	4480[1]	560
WMEL-2002-03	E2126-SPD Hysteresis (seismic)	WSP 7/16" w/Gyp, No HD	0.131x2.5" (8d) WSP, 0.120x1.5x 3/8 head roofing nail, gyp	6:12 WSP, 7:16 GYP	16	SPF	193	770	193

TABLE 4

Report #	Test Method	2:1 4' Wide Panels, Studs 16" o/c, Yes Gyp, Yes HD	Fastener	Fastener spacing	Stud spacing	Species	Test PLF	Test Ultimate Load SPF Basis	Test Adjusted to SPF
IRC	ICC Ad Hoc Wall Bracing Committee	WSP 3/8", Yes Gyp, Yes HD	WSP-0.113 x 2" (6d), GYP-5d cooler nail, 0.086 diameter, 1-5/8" long, 15/64 head	6:12-WSP 8:16-GYP	16	SPF	700	5600	700
SDPWS	Wind	WSP 3/8", Yes Gyp, Yes HD	WSP-0.113 x 2" (6d), GYP-5d cooler nail, 0.086 diameter, 1-5/8" long, 15/64 head	6:12-WSP 7:7-GYP	16	DF	760	5720	715
SDPWS	(seismic)	WSP 3/8", Yes Gyp, Yes HD	WSP-0.113 x 2" (6d), GYP-5d cooler nail, 0.086 diameter, 1-5/8" long, 15/64 head	6:12-WSP 7:7-GYP	16	DF	600	4544	568
SDPWS	Wind	WSP 7/16" ,Yes Gyp, Yes HD	WSP-0.131 x 2-1/2" (8d), GYP-5d cooler nail, 0.086 diameter, 1-5/8" long, 15/64 head	6:12-WSP 7:7-GYP	16	DF	930	6968	871
SDPWS	(seismic)	WSP 7/16" ,Yes Gyp, Yes HD	WSP-0.131 x 2-1/2" (8d), GYP-5d cooler nail, 0.086 diameter, 1-5/8" long, 15/64 head	6:12-WSP 7:7-GYP	16	DF	720	5424	678
WMEL-2002-03	E564 (seismic)	WSP 7/16" w/Gyp, with HD	0.131x2.5" (8d) WSP, 0.120x1.5x 3/8 head roofing nail, gyp	6:12 WSP, 7:16 GYP	16	SPF	760	3040	760
WMEL-2002-03	E2126-SPD Hysteresis (seismic)	WSP 7/16" w/Gyp, with HD	0.131x2.5" (8d) WSP, 0.120x1.5x 3/8 head roofing nail, gyp	6:12 WSP, 7:16 GYP	16	SPF	693	2770	693

[1] Assumed based on using 8' long specimens [2] 500 plf adjusted for partial restraint [3] 700 plf adjusted for partial restraint

Conclusions regarding the effects of variations in wall configuration should, therefore, not be drawn on the basis of results reported from different testing laboratories until a test procedure is developed which will give consistent results independent of the test location.….

Values derived from this test are not representative of the performance of walls used in actual building construction. This standard does not provide for testing effects of wall length or building component interactions. Tests are confined to one wall frame configuration.*

Tables 1–4 confirm what FPL reports here. Hence SBCRI is committed to testing actual code complying full scale building construction to provide fundamental engineering data because these limitations in regard to testing and design value development constrain the use of structural building components. As such, we cannot as effectively deploy accepted engineering practice.

The value of the SBCRI wall bracing tests is the potential of making wall panels as cost effective and efficient an engineered solution as possible for braced wall line applications. What trusses are to joist and rafter replacement of the 1950s this will be for wall panels. We're embarking on reenacting the 1960s, this time for wall panels using SBCRI knowledge to gain an accurate and safe performance. SBC

* *Contribution of Gypsum Wallboard to Racking Resistance of Light-Frame Walls*, Ronald W. Wolfe, United States Department of Agriculture Forest Service Forest Products Laboratory Research Paper, FPL 439, December 1983, Pages 17 & 19.

One component manufacturer is cashing in on the green remodel market.

Selling Advanced Framing

by Libby Maurer

Every time you hear about green building being over-rated and over-priced, it seems there's another headline promoting its staying power in the market. In August, the annual Green Living Pulse survey by the Shelton Group found that interest in green homes decreased from 47 to 43 percent between 2009 and 2010. Then in October, real estate research and consulting firm RCLCO noted its data suggest green building will be a long-term housing trend once the economy recovers. But component manufacturers don't have to wait to see how these predictions will play out to get in the game.

The idea that a home is "green" only with solar panels that come with a 20-year payback or a wallet-busting geothermal heating system is a misconception. Do you have to supply expensive, high-tech building products to build a green home? The answer is no; there are plenty of affordable green building techniques component manufacturers can incorporate into their product lines to make a difference in home performance.

SBCA member Foremost Industries has successfully aligned its product offering with a critical cornerstone of green building—advanced framing. "We're working with two different builders that are very much into 'green' or advanced framing," says Tom Carr, Foremost sales rep. In addition to selling components to single family home builders, the southern Pennsylvania company is also a modular home manufacturer. One of its most important growth areas is in custom single family and modular homes, and supplying components with advanced framing specifications is a popular request for its builder customers.

Advanced framing techniques encompass a broad range of framing options ultimately designed to reach greater energy efficiency with fewer materials. These practices are commonly seen in wall framing, where studs in corners and Ts are positioned to allow for more insulation. Advanced framing can also be found in roof trusses with raised or "energy" heels that also increase a home's R-value with extra insulation.

Incorporating advanced framing gives Foremost an added sales tool it finds more and more handy. The company has a partnership with Bethesda Bungalows, a custom builder that's carved a niche in the DC metro area with its focus on green building. "They're very green sensitive. So we've structured our sales approach according to their needs," says Carr. Bethesda looks to Foremost to supply pre-insulated wall panels and raised heel roof trusses to serve home buyers' desire for greater energy efficiency.

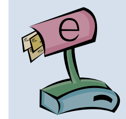
Carr says the consumer is asking for it. "It seems on the custom end, home buyers are extremely literate and knowledgeable about their options. They understand that certain structural elements will get them a step closer to a more efficient home," says Carr. The same is true for the company's interactions with modular home buyers. What's more, Bethesda's Brad Beeson says consumers' desire for more efficient homes is part of a bigger movement. "There's a huge environmental movement here," said the Bethesda director of marketing.

The drive to conserve energy and other resources is tied to the availability of land in the area. Very little new land is available for development inside the beltway, so building out isn't an option. In many cases, Bethesda does a gut rehab—remove the existing roof and walls and reframe the entire house—or even a complete tear-down. Homeowners will often opt to add a second story to increase square footage. Remodels like Bethesda's are perfect opportunities to use framing practices aimed at reducing energy loss.

The companies' most recent project is a custom single family home in suburban DC built with advanced framing and other typically "green" materials. (See photos on page 20.) "The homeowners asked us to build them the ultimate green home," says Beeson. The home has earned Bethesda a lot of press, including a seven-part series chronicling the building process in *EcoHome Magazine.* Though the home is expected to earn LEED Silver status, the advanced framing within the house could easily be incorporated into any new home without the price tag and hoops LEED certification brings.

Getting building materials into tight infill lots creates a big challenge in their niche market. "The ability to get panels on site and set on the day we need them is a huge benefit," says Beeson. "There's many occasions when we're getting the products to the site on a just in time delivery schedule," says Carr.

Tying to a homebuilder that offers green solutions opens the door to a new market segment for Foremost—a segment that will likely grow as housing rebounds. Does supplying advanced framing necessarily make Foremost more profitable? Carr says, "It's too early to tell. But for now, it's another service that helps us sell our product." **SBC**



Readers Respond

Dear *SBC Magazine,*

The article, "Design Competition Leads to Advanced Framing & Energy Efficiency," in the Sept/Oct 2010 issue offered excellent insight into some emerging, innovative ideas that are buzzing through our industry. It offered some possible answers to questions that are currently nagging in the minds of many of our industry leaders.

It also pointed to one path that might help restore the relevancy of wall panels in the homebuilding paradigm at a time when many builders perceive value only by bottom line costs. How do we reduce costs and increase real value to the point where panelizing becomes a no-brainer for builders? How can we heighten the perceived value of wall panels in the minds of intelligent consumers who are beginning to understand exactly what it means to be "green"? Today, stick framing costs have shrunk to unprecedented low levels, triggering a growing perception that panelization just adds unnecessary cost to the framing process. So, how do we restore the real value of panelization to unprecedented high levels? I think the answer lies in dealing with the total framing system. The new advanced framing and green building ideas, as outlined in the aforementioned article, just may be pointing toward an answer to all those questions.

Adding to all this, Florida is not the only state mandating drastic reductions in energy consumption. Virtually every state in the lower 48 is considering (or already has in place) legislated energy reduction policies. The paradigm is changing in our industry. It has to change. Maybe, we've just seen a glimpse into the future.

—Phil Zurawski • PFS Framing Systems • Charlotte, NC

Parting Shots

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

In early 2006, the Missouri Truss Fabricators Association (MTFA) received a simple request for a truss education program at the Johnson County Contractor's Licensing Spring Educational Seminar in Kansas City. The chapter's first four-hour seminar for building officials and contractors was such a success that they were invited back to give an eight-hour presentation for the fall conference, and they have been returning ever since! By April 2008, the Johnson County Building Officials (JOCOBO) committee unanimously recommended that a partnership be formed with the chapter to conduct a series of training classes, formalizing MTFA's position as a reliable source for educational programs in the marketplace.

This November, the chapter received a letter of praise and thanks for its continuing efforts. As stated by Sean W. Reid, C.B.O., Program Manager, Johnson County Contractor Licensing Program, "I consider our work together over the past four years to represent the perfect marriage of the regulatory and manufacturing sides of the construction industry. By working together to provide relevant, professionally presented education, we benefit our community and industry beyond measure.... The positive result of this work will be enjoyed by building inspection departments, truss manufacturers, and builders utilizing component construction for years to come." SBC