SBC ASSOCIATION
Structural Building Components Association
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January 24, 2013

Mr. Ed Elias
Mr. BJ Yeh
Mr. Tom Skaggs
Mr. Ed Keith

APA - The Engineered Wood Association
7011 S. 19th Street,
Tacoma, WA
98466-5333

Dear BJ, Ed, Ed and Tom,

Thank you so much for hosting our meeting on January 3rd, and sorry for the delay in getting this thank you note to you. As discussed, design values and the value of engineering are very important issues to our industry. Going forward, this is going to be a serious top priority for SBCRI and SBCA based on all our association discussions on this topic in 2012. As you probably have a good feel for, we represent about $5 billion in structural building component sales currently. As we grow back to a more demographically oriented housing start equilibrium of 1.2 to 1.4 million housing starts, our sales should begin to return to the $12 billion range that we saw in 2006. As stated during our meeting, we are in a key evolution period for our industry given the sophistication of the software we use and the migration to a BIM type of engineered design foundation. 3D processing of plans along with the coordinate geometry based building material take-off process is here today. While all design is still performed on a single element basis, the loads are increasingly being applied to the coordinate geometry shell and then transferred automatically to be applied to the resisting elements. This is phase 1 of the creation of a building design process that can be as automated as possible. We are headed toward 3D systems design progressively.

Inherent in this evolution is an increasing need for transparent, accurate and reliable raw material design properties. To that end, we have had a long-standing industry policy in this regard. Please see Appendix A below. This is in the process of being updated because it has become very clear to the SBCA Executive Committee that this policy is central to our long-term success as an engineering based industry. We sincerely believe that the structural building component industry will increasingly become the “center of the universe” of structural framework engineering and with that goes our desire to increase the market value of engineered design. This could even evolve into being the center of the majority of building design.

BJ Yeh articulated, in a very elegant and forthright manner, our industry’s primary concern using the following words to reflect the point of view he expressed, which is a concept we have all heard many times; the prescriptive code is based on historical performance and essentially fundamental engineering does not really “apply” or “work” because structures built using traditional and conventional methods have a good resistance track record. By definition, this devalues engineered design particularly when the engineered

design yields a more conservative design outcome than the prescriptive design outcome. When this happens the default engineered solution is the prescriptive design and generally the engineered design is not economically competitive. Logic suggests that engineering should at worst be competitive and at best much more economic because it should be much more precise.

Our industry believes that engineering mechanics and engineering resistance should be completely understandable with respect to its derivation and consistent no matter what the application is (i.e. braced wall, drag element, etc.) or where the application takes place (i.e. Wisconsin, California, Washington, Florida, etc.). Applied load Resistance should be resistance and easy to understand.

We need to be able to work from the base of transparent resistance and any associated factors that have been applied to that resistance. If we, do then when one is using prescriptive engineering or engineering mechanics based engineering, the engineering judgments that may be needed for proper resistance of the applied loads can be transparently made for any given design situation. If we do this well engineering evolves into having increasing value to the market.

Ed Keith created a really nice depiction of the issue at hand. This is found below in Appendix B. He also provided a great quote in an article that he and I exchanged emails with respect to that is provided in Appendix C.

Given all of this, SBCA would appreciate the opportunity to work with APA to review the engineering mechanics involved in developing nominal unit shear capacities for WSPs. In doing so, and by defining both the fundamental properties and all associated resistance factors so that they are easy to understand and use, the use of WSP in SBC industry software will be easier, more accurate and more reliable. We believe that this will prepare the WSP manufacturers for greater use of WSPs along with setting a foundation for creative and innovative WSP engineered solution evolution.

Since Ed captured this vision below quite nicely, and he and I are both old guys with he not looking near as old as me, we'd love to work with Ed on a draft of an approach that would serve the end use SBC industry purchasers and engineers well, in the context of the above goals and objectives. Once we have a draft developed, we'll then arrive at a consensus with respect to the concepts created between our two organizations.

Thanks again for meeting with Hardy, Kevin and me. I believe that the discussion was very valuable and look forward to getting your thoughts on our proposed set of next steps.

Respectfully Yours,

Kirk Grundahl, P.E.
Executive Director

cc: Hardy Wentzel
Kevin Blau

Appendix A

Structural Building Components Industry Truss and Component Raw Material and Construction Products Design Properties Policy

Raw Material and Construction Product Purchasers, Resellers and Users Depend on Design Properties in the Raw Materials and Construction Products to be Accurate and Reliable.

Resistance of load by the structural framework of any building and its assumed factor of safety are predicated on accurate and reliable raw material and construction products fundamental design values, application factors and related engineering properties ("Design Properties"). These Design Properties are in turn used in span tables, lateral resistance tables, connection resistances, and engineering equations utilized through engineering software and otherwise.

Truss and component manufacturers currently purchase billions of board feet of lumber and wood construction products each year. When a manufacturer purchases lumber for use in the manufacture of trusses and components, it is effectively purchasing and relying upon the published lumber Design Properties. This means a purchase of Southern Pine No. 2 grade 2x4 is essentially a purchase of 1050 psi of fiber in bending in addition to other published lumber strength properties (see *Supplement No. 9 to the Southern Pine Inspection Bureau 2002 Grading Rules Effective June 1, 2012*). The same concept holds true for framers, carpenters, builders and other users of lumber who purchase and use lumber to resist loads through traditional building code adopted span tables, which span tables are based on published lumber Design Properties. Therefore, all lumber purchasers and users are purchasing and using lumber for its load resisting Design Properties and depend on the Design Properties to be accurate.

These concepts likewise apply to the purchase and use of other wood construction products that are regularly re-sold by truss and component manufacturers (such as OSB, plywood, LVL, PSL, glulam, and I-joists) as well as with the metal connector plates that are used in the manufacture of trusses and hardware and fasteners that are re-sold by truss and component manufacturers. The Design Properties for such wood and other construction products, through the utilization of engineering software or otherwise, must be accurate and the users of such products are relying on the published Design Properties.

Regular Testing and Analysis of Construction Raw Materials and Construction Products is a Necessity.

Truss and component designs are supported by historical testing and analysis. Likewise, testing of all types of lumber species and grades regularly occurs and ensures that the published Design Properties in the lumber being utilized in the manufacture of trusses and components (and upon which truss and component design software is based) and otherwise in all construction, continue to be accurate. Similarly, the design properties published for OSB, plywood, LVL, PSL, glulam, hardware and other wood and miscellaneous construction products must be accurate as they are input into engineering software programs where the output is expected to represent the safe resistance of all applied loads. Therefore, these types of construction products should be tested regularly as well.

Where any design is not supported through the use of accurate Design Properties or by engineering mechanics based Design Properties development testing, but rather is deemed to comply based on someone's "judgment" or because the design is prescribed by the building code through tradition and the code consensus process, the load resistance analysis that is provided in the end-use application is neither accurate nor reliable. This view, that because the historical performance has been acceptable and there is therefore no need to otherwise verify through testing and analysis, is simply flawed.

This in fact is the case with certain building code adopted wood product prescriptive applications. If prescriptive designs for these wood and other products are only supported by historical reference and cannot be supported by clear and understandable engineered design or testing, they must be replaced with designs that are in fact supported by transparent and recurring testing and analysis. This fact not only has life safety ramifications, but furthermore potentially places the trusses and components manufactured by SBCA member companies in a non-competitive technical and marketplace position, as their product designs are based on current Design Properties and are otherwise supported by testing and analysis. It is therefore in the best interests of both the construction industry at large, as well as the truss and component manufacturing industry in particular, that engineering and thus construction, be entirely based on tested and accurate raw material load resistance data. This will not only improve construction performance that is based on engineering and is therefore safe, but will further allow for future engineering innovation.

As the use of engineering software becomes more sophisticated and accounts for flow of loads from one structural element to the next and full structure systems effects, the engineering reliability demands on the raw materials and wood or other products that are utilized will certainly increase. By way of example the International Building Code ("IBC"), which becomes law when adopted by a jurisdiction, states the following:

> "**IBC Chapter 16, Section 1604.4** Load effects on structural members and their connections shall be determined by methods of structural analysis that take into account equilibrium, general stability, geometric compatibility and both short- and long-term material properties.
>
> Members that tend to accumulate residual deformations under repeated service loads shall have included in their analysis the added eccentricities expected to occur during their service life.
>
> Any system or method of construction to be used shall be based on a rational analysis in accordance with well-established principles of mechanics. Such analysis shall result in a system that provides a complete load path capable of transferring loads from their point of origin to the load-resisting elements."

Reliable and safe building performance is predicated upon accurate Design Properties, engineering precision and a complete understanding of raw material engineering considerations needed for successful application or installation. The suppliers of these products are responsible to ensure that there is easy access to this understanding along with any relevant factors that should be considered in that design process. It is furthermore the responsibility of building officials to review and ensure all designs comprehensively comply with the latest published Design Properties that are based on testing and generally accepted engineering practice.

Utilization of Published Design Properties.

When new Design Properties for lumber are published, they become the current standard or "state of the art" and must be adopted and utilized upon the published effective date by all manufacturers, sellers, specifiers, purchasers and users of such lumber. When Design Properties for wood and other construction products (such as OSB, plywood, LVL, PSL, glulam, metal connector plates, hardware, and fasteners) are likewise published, they also become the current standard or state of the art and must be adopted and utilized upon the published date by all manufacturers, sellers, specifiers, purchasers and users of such products. Building officials should furthermore monitor and require such utilization.

For example when SPIB issued its *Supplement No. 9* setting forth new design values effective June 1, 2012 for visually graded Southern Pine and Mixed Southern Pine (sized 2" to 4" wide and 2" to 4" thick in No.2 Dense and lower grades), all designs (truss or otherwise) that utilized such Southern Pine grades after June 1, 2012 must have used the new lower Design Properties to be compliant with current standard or the state of the art. Any truss design that utilized the previously published lumber Design Properties prior to June 1, 2012 was compliant and conforming to the then current standard or state of the art. The only exception to the use of the published new lumber Design Properties after June 1, 2012 would be with the consent of the building engineer of record and assurances of no responsibility on the part of the person or entity undertaking such design, as the

engineer of record is otherwise intimately aware of the design of the structure of the building and the margins of safety that exist with respect to such building design.

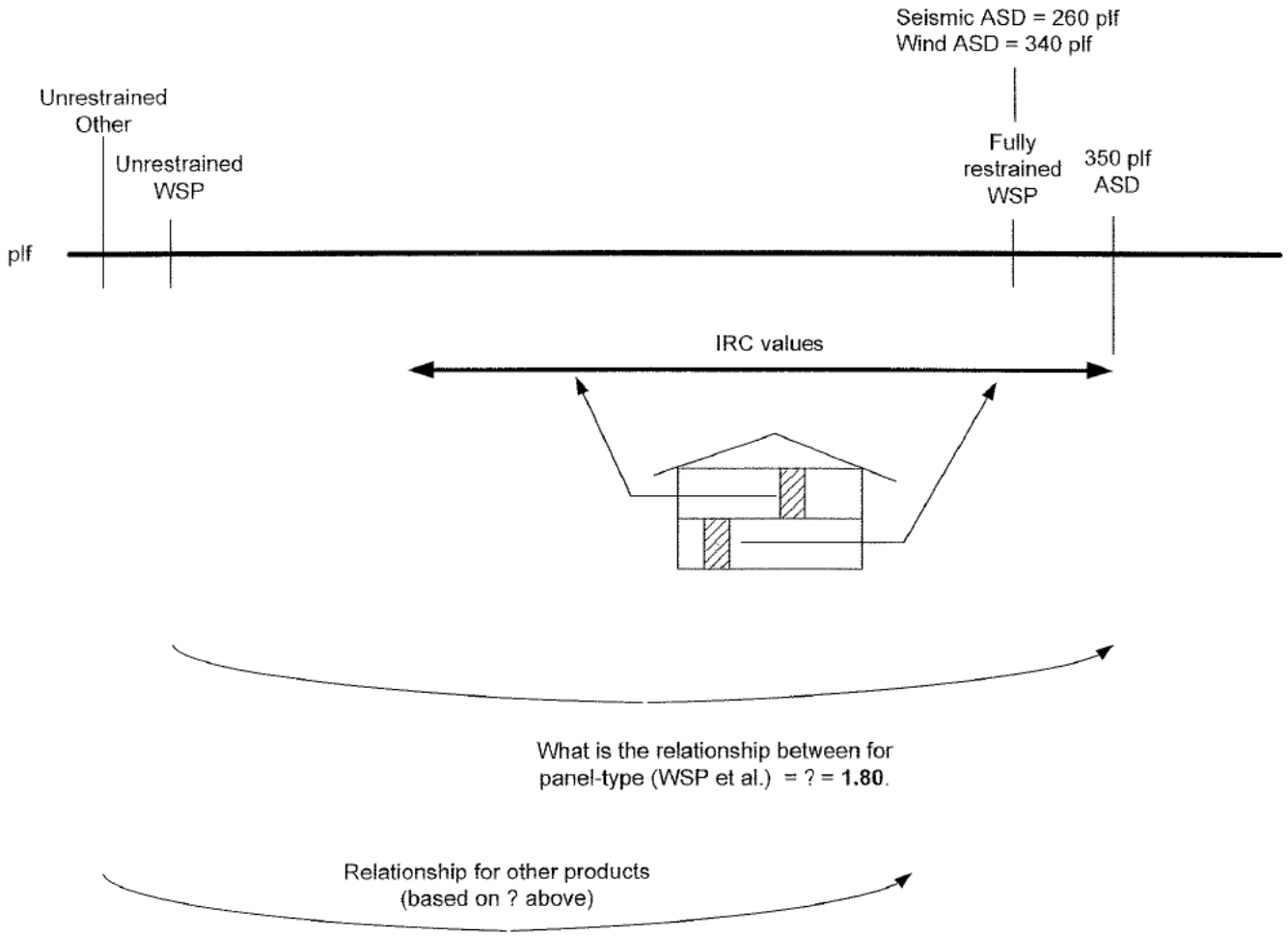
Irrespective of whether a building official chooses to enforce the June 1, 2012 published lumber Design Properties in a particular jurisdiction, if a lumber purchaser or user relies on an outdated lumber span table that was based on lumber Design Properties that existed prior to the June 1, 2012 new published Design Properties, subjects that purchaser of the lumber, the Contractor and the Owner to potential legal responsibility as each are not utilizing the current standard or state of the art.

It would furthermore be an error for a lumber purchaser or user to rely on a specific Building Code reference that studs be of a "minimum No. 3, standard or stud grade lumber" irrespective of the change in lumber Design Properties for No. 3 Southern Pine that resulted in a decrease in compression and bending strength of ___% as of June 1, 2012 because of the SPIB published *Supplement No. 9*. It is difficult to understand how a prudent lumber purchaser or user could rely upon the Building Code reference to a grade mark and ignore the same lumber's new Design Properties without resulting legal responsibility.

For any person or entity to ignore the use of newly published lumber Design Properties or the Design Properties of any other construction product, wood or otherwise, subjects that person or entity and perhaps others in the chain of distribution, as well as building owners, to legal responsibility as the current standard and state of the art is not being followed.

SBCA Mission Statement:
SBCA supports research, development and testing of structural building components – trusses, wall panels, and related structural components – to root the industry in sound engineering and improve the quality, efficiency and cost-effectiveness of our products, for the purpose of achieving greater product acceptance. Therefore, SBCA promotes the consistent, safe, economic, and structurally sound design, construction and use of all structural building components, thereby increasing engineering innovation.

Appendix B



Appendix C

From: Ed Keith [mailto:ed.keith@apawood.org]
Sent: Thursday, November 15, 2012 10:17 AM
To: Kirk Grundahl
Subject: RE: Ed Great Article *** See Highlighted Items ***

Kirk:

I received your e-mails and will respond soon. I have made a promise to get my IRC code change proposals to BJ by Thanksgiving so he can review over the holidays. That has me pretty much wrapped up as I have over 40 changes to complete. Be communicating soon.

Ed

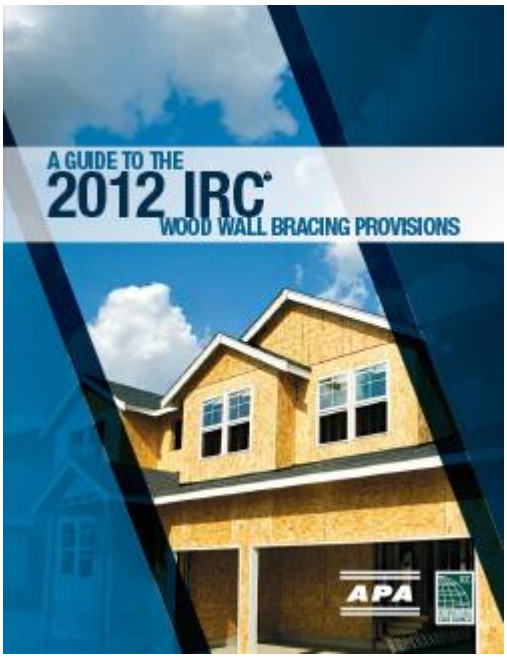
From: Kirk Grundahl [mailto:kgrundahl@qualtim.com]
Sent: Monday, November 12, 2012 3:52 AM

To: Ed Keith
Subject: Ed Great Article *** See Highlighted Items ***

Ed, assuming that you mean what you say, I am going to send you several emails as your expertise applied to the perspective that we have would be valuable. It is clear that I should have copied you on all of this before. Hope all is going well with you.
Kirk
608-217-3713

APA and ICC Team to Publish IRC Lateral Bracing Guide

Third edition of the book aims to improve understanding and application of the 2012 IRC lateral bracing requirements.



A new illustrated book, co-published by theInternational Code Council (ICC) and *APA—The Engineered Wood Association*, provides an explanation of the lateral bracing provisions of the *2012 International Residential Code*(IRC). The *Guide to the 2012 IRC Wood Wall Bracing Provisions*, the third edition in the series, details the correct application of the code-bracing requirements, explores the history and theory behind wall bracing, and provides real-world bracing examples. The book is now available in hardcopy and digital format.

"Bracing is one of the most critical, yet most misunderstood, safety elements in one- and two-family dwellings and townhouses constructed under the IRC," says Mark A. Johnson, ICC Executive Vice President and Director of Business Development. "The*Guide* is an important and helpful resource for inspectors, plan checkers, builders, designers and others involved in residential construction. The ongoing collaboration between APA and ICC benefits public safety and the industry. We are pleased to build on a long-standing relationship with APA."

The IRC contains numerous prescriptive lateral bracing provisions intended to help residential structures resist lateral loads that can result from wind and seismic events. The type and amount of bracing required for a given structure depends on many factors, including location and size of the structure, and the location of bracing segments within the structure. Bracing must be applied correctly and consistently to sufficiently protect the building from lateral loads, according to ICC and APA.
"Most of the buildings in the U.S. are residential, and most of them are built to the IRC. Wall bracing is what makes those buildings perform well against wind and seismic loads," says co-author Ed Keith, Senior Engineer for the APA Technical Services Division. "So I would say that the bracing provisions are very important."

"These provisions are complex, given the great number of aesthetic, cultural, economic and energy-related variables that factor in," says Keith. "This guide makes these provisions easy to understand."

A Guide to the 2012 IRC Wood Wall Bracing Provisions addresses bracing options available to the builders and designers, the amount of bracing required with adjustments and variations, rules for the use of bracing, the new simplified wall bracing provisions, whole house bracing considerations and many other related topics. The full-color book features numerous specific examples and more than 200 figures, tables and photos.

While a portion of the book's content was adopted from the previous edition, *A Guide to the 2009 IRC Wood Wall Bracing*, Keith says that the 2012 version reflects several refinements to the 2009 provisions. He also notes that the book was reformatted extensively to better accommodate the user in search of specific code references. "In the book, the bracing provisions are explained

in the same order as they appear in the IRC, and the top of each page is annotated with the page content, so looking up a specific provision of the code is much simpler."

"The book is written to help the more causal user understand the bracing provisions," Keith adds, "but we have also provided plenty of background information and theory to clarify the principles of bracing to engineers, architects and building officials."
The International Code Council is a member-focused association dedicated to helping the building safety community and construction industry provide safe and sustainable construction through the development of codes and standards used in the design, build and compliance process. Most U.S. communities and many global markets choose the International Codes.

Based in Tacoma, Washington, APA is a nonprofit trade association representing North American manufacturers of plywood, oriented strand board, glued laminated timber, wood I-joists, structural composite lumber, and other structural engineered wood products. Its primary functions are product certification and testing, applied research, and market support and development.
A Guide to the 2012 IRC Wood Wall Bracing Provisions is available for purchase in hardcopy for $42.00 ($33.50 for ICC Members, Product ID #7102S12) or digital PDF form for $39.95 (Product ID #8799P12) directly from the ICC. The 2009 edition of the guide is also available. Visitwww.iccsafe.org for more information.