

## RB204-06/07

### R602.10.5

**Proponent:** Edward L. Keith, APA-The Engineered Wood Association

**Revise as follows:**

**R602.10.5 Continuous structural panel sheathing.** When continuous wood structural panel sheathing is provided in accordance with Method 3 of R602.10.3 on all sheathable areas of all exterior walls, ~~and interior braced wall lines, where required,~~ including areas above and below openings, bracing wall panel lengths shall be in accordance with Table R602.10.5. Wood structural panel sheathing shall be installed at corners in accordance with Figure R602.10.5. The bracing amounts in Table R602.10.1 for Method 3 shall be permitted to be multiplied by a factor of 0.9 for wall with a maximum opening height that does not exceed 85 percent of the wall height or a factor of 0.8 for walls with a maximum opening height that does not exceed 67 percent of the wall height.

**Reason:** While this change contains some technical content, its purpose is to clarify the intent of the code.

The proposal eliminates the language "*and interior braced wall line, where required*" that was added through the floor amendment process in 2002. The purpose of the floor amendment was to clarify the language of the original proposal. In doing so, however, the requirement to fully sheath all exterior walls was extended to include interior braced wall lines as well as all exterior wall lines. In the original research conducted by the NAHB, this was not the case and there is no reason to believe that the normal interior braced wall support requirements as specified by Table R602.10.3 are not sufficient. There is no requirement in the code that the interior braced walls be constructed by the same method as the exterior walls, nor is there a requirement that interior bracing walls to be as strong and stiff as exterior walls. In addition, the use of interior walls of differing strength and stiffness of exterior walls is unlikely to bring about overall structural eccentricities, as they tend to be evenly distributed. Note the common practice of using Method 5 (gypsum) interior walls with Method 3 (wood structural panel) exterior walls, for both bracing and in designed shear walls.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee:	AS	AM	D
Assembly:	ASF	AMF	DF

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## RB205-06/07

### R602.10.5

**Proponent:** Kelly Cobeen, Cobeen & Associates, representing the IRC Sheathing Task Group

**Revise as follows:**

**R602.10.5 Continuous wood structural panel sheathing.** When continuous wood structural panel sheathing is provided in accordance with Method 3 of R602.10.3 on all sheathable areas of all exterior walls, and interior braced wall lines, where required, including areas above and below openings, braced wall panel lengths shall be in accordance with Table R602.10.5. Wood structural panel sheathing shall be installed at corners in accordance with Figure R602.10.5. In addition to bracing amount adjustments specified elsewhere in this code, the bracing amounts in Table R602.10.1 for Method 3 shall be permitted to be multiplied by a factor of 0.9 for walls with a maximum opening height that does not exceed 85 percent of the wall height or a factor of 0.8 for walls with a maximum opening height that does not exceed 67 percent of the wall height.

**Reason:** To clarify that existing bracing amount adjustments for continuous structural panel sheathed braced wall lines are cumulative with other bracing amount adjustments, including:

- Heavy roof plus ceiling assembly weight – Section R301.2.2.2.1, Exception
- 12 foot wood wall stud height – Section R301.3, Item 1 Exception
- Light wall assembly weight – Table R602.10.1, Footnote d
- Increased bracing length for cripple walls – Section R602.10.2.1 Item 1
- Increased cripple wall bracing where interior braced wall lines do not have a continuous foundation – Section R602.10.11.1
- Stone and masonry veneer – Section R703.7.

This change proposal was developed at a meeting of the IRC Sheathing Task Group.

**IRC Sheathing Task Group – Participants in Favor:**

AFA – Louis Wagner  
AF&PA – Brad Douglas  
APA – The Engineered Wood Association – Ed Keith, B.J. Yeh, Zeno Martin  
City of Tacoma – Scott Beard  
Dow Chemical – Greg Bergtold  
Fairfax County, Virginia – Brian Foley, Chris McArtor  
Georgia Pacific – Ed Price  
James E. Russell  
Kelly Cobeen  
Knight Ind. Fiberboard – Craig Christianson

LP Corporation – Taylor Blake  
Covalence Coated Products – Brad Allshouse, Edward Chan  
NAHB Research Center/ NAHB – Vladimir Kochkin, Ed Sutton  
Norbord – John Haluska  
PIMA / API– Lorraine Ross  
Simpson Strong-Tie – Steve Pryor, Randy Shackelford, Shane Vilasineekul  
Temple-Inland – Dave Geisler  
USP Structural Connectors – Greg Greenlee  
WTCA – Will Warlick  
Weyerhaeuser – Dave Gromala, Scott Robertson  
XPSA – Susan Herrenbruck

**Ad-hoc IRC Sheathing Task Group – Participants Opposed and Reason:**  
None

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
Assembly: ASF AMF DF

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## **RB206–06/07**

### **R602.10.5**

**Proponent:** Edward L. Keith, APA-The Engineered Wood Association

**Revise as follows:**

**R602.10.5 Continuous wood structural panel sheathing.** When continuous wood structural panel sheathing is provided in accordance with Method 3 of Section R602.10.3 on all sheathable areas of all exterior walls, and interior braced wall lines, where required, including areas above and below openings, bracing wall panel lengths shall be in accordance with Table R602.10.5. Wood structural panel sheathing shall be installed at corners in accordance with Figure R602.10.5.

**Exception:** For continuous structural panel sheathing, the braced wall panel shall be permitted to begin no more than 12.5 ft (3810 mm) from each end of the braced wall line provided both of the following are satisfied:

1. A continuous double top plate shall be provided from the intersecting braced wall line to the first braced wall panel.
2. The end of each braced wall panel closest to the corner shall have a tie-down device fastened to the stud at the edge of the braced wall panel closest to the corner and to the foundation or framing below. The tie-down device shall be capable of providing an uplift allowable design value of at least 1800 lb (816.5 kg). The tie-down device shall be installed in accordance with the manufacturer's recommendations.

The bracing amounts in Table R602.10.1 for Method 3 shall be permitted to be multiplied by a factor of 0.9 for wall with a maximum opening height that does not exceed 85 percent of the wall height or a factor of 0.8 for walls with a maximum opening height that does not exceed 67 percent of the wall height.

**Reason:** To provide the designer/ builder with the maximum latitude in using the continuously sheathed method while not compromising the structural integrity of the resulting prescriptive structure.

The purpose of R602.10.5 is to provide walls with continuous structural panel sheathing that are at least as stiff and strong as walls fabricated in accordance with the Wall Bracing Table R602.10.1. As similar performance can be expected from continuously sheathed structural panel walls, it is logical to permit the same limitations as conventionally braced walls, provided that the structural capability of the walls with continuous structural panel bracing is not compromised. The purpose of the proposed exception is to permit the continuously sheathed wall to start 12.5 ft (3810 mm) from an intersecting wall as is allowed in Section R602.10.1 for conventionally framed braced wall lines. Because the corner connection detail is important to the performance of the walls with continuous structural panel sheathing, we provided the requirement for a tie-down device at the end of each braced wall panel closest to the corner. As it is difficult to calculate the exact holddown capacity required for the prescriptive corner detail, the capacity of this holddown was taken from Exception 2 of Section R602.10.11. As the capacity is for anchoring the ends of bracing units in SDC D1 and D2, these values are conservative for the lower SDCs covered in R602.10.5. Future research may justify lower numbers at a later date.

In addition, a continuous top plate was specified from the continuously braced wall to the corner to insure load transfer into the continuously braced wall.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
Assembly: ASF AMF DF

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## **RB207–06/07**

### **Table R602.10.5, R602.10.5, R602.10.5.1 (New), R602.10.5.2 (New), R602.10.5.3 (New)**

**Proponent:** Edward L. Keith, APA-The Engineered Wood Association

**1. Revise table footnotes as follows:**

**TABLE R602.10.5**  
**LENGTH REQUIREMENTS FOR BRACED WALL PANELS IN A CONTINUOUSLY SHEATHED WALL<sup>a,b,c</sup>**

(No change to table entries)

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479kPa.

- a. Linear interpolation shall be permitted.
- b. ~~Full-height sheathed wall segments to either side of garage openings that support light frame roofs only, with roof covering dead loads of 3 psf or less shall be permitted to have a 4:1 aspect ratio.~~
- c. ~~Walls on either or both sides of openings in garages attached to fully sheathed dwellings shall be permitted to be built in accordance with Section R602.10.6.2 and Figure R602.10.6.2 except that a single bottom plate shall be permitted and two anchor bolts shall be placed at 1/3 points. In addition, tie-down devices shall not be required and the vertical wall segment shall have a maximum 6:1 height-to-width ratio (with height being measured from top of header to the bottom of the sill plate). This option shall be permitted for the first story of two-story applications in Seismic Design Categories A through C.~~

**R602.10.5 Continuous wood structural panel sheathing.** When continuous wood structural panel sheathing is provided in accordance with Method 3 of Section R602.10.3 on all sheathable areas of all exterior walls, and interior braced wall lines, where required, including areas above and below openings, bracing wall panel lengths shall be in accordance with Table R602.10.5. Wood structural panel sheathing shall be installed at corners in accordance with Figure R602.10.5. ~~The bracing amounts in Table R602.10.1 for Method 3 shall be permitted to be multiplied by a factor of 0.9 for wall with a maximum opening height that does not exceed 85 percent of the wall height or a factor of 0.8 for walls with a maximum opening height that does not exceed 67 percent of the wall height.~~

## 2. Add new text as follows:

**R602.10.5.1 Required bracing.** The bracing amounts in Table R602.10.1 for Method 3 shall be permitted to be multiplied by a factor of 0.9 for walls with a maximum opening height that does not exceed 85 percent of the wall height or a factor of 0.8 for walls with a maximum opening height that does not exceed 67 percent of the wall height.

**R602.10.5.2 4:1 aspect ratio segments at garage door openings used with continuous structural panel sheathing.** Full-height sheathed wall segments to on either side of garage openings that support light frame roofs only, with roof covering dead loads of 3 psf or less shall be permitted to have a 4:1 aspect ratio. For purposes of calculating the percentage of panel bracing required by Table R602.10.1, the width of the full height sheathing segment shall be equal to its measured width.

**R602.10.5.3 6:1 aspect ratio segments at garage door openings used with continuous structural panel sheathing.** When continuous wood structural panel sheathing is used, full-height sheathed wall segments at openings in garages shall be permitted to have a maximum 6:1 aspect ratio (with height being measured from top of the header to the bottom of the sill plate) providing: Walls on either or both sides of openings shall be built in accordance with Figure R602.10.5(2). Anchorage to the foundation shall be as shown in Figure 602.10.5(2). This option shall be permitted for the first story of two-story applications in Seismic Design Categories A through C. For purposes of calculating the percentage of panel bracing required by Table R602.10.1, the width of the full height sheathing segment shall be equal to its measured width.

**Reason:** To make code easier to use. At present these two important provisions are essentially hidden in the footnotes of Table R602.10.5. This proposal moves them to the text of the code but with minimal changes in content of the existing provisions and no technical content. This is basically an editorial change.

The text starting with the words "The bracing amounts..." in R602.10.5 was moved to new Section R602.10.5.1. The "bracing amount" issue was a departure from the rest of the content in Section R602.10.5.

The proposed change moves the existing provisions in Footnote b of Table R602.10.5 to the proposed R602.10.5.2. The provisions in Footnote b provide for an aspect ratio of 4:1 for certain specific applications, are independent of the content of the table, and better placed in the text of the Code in the section addressing continuous structural panel sheathing.

In the proposed R602.10.5.2 a statement has been added clarifying what value to use for the width of the bracing segment when calculating the bracing wall percentage as required by Table R602.10.1. In the case of the proposed R602.10.5.2, it is appropriate to use the actual width of the corner-bracing panel.

This proposal also moves Footnote c of Table R602.10.5 to Section R602.10.5.3. Footnote c permits an aspect ratio of 6:1 if a modified version of the portal frame (Section R602.10.6.2) is used in conjunction with the fully sheathed exterior walls. In addition to moving the language, the proposal adds a figure describing the 6:1 aspect ratio frame used in conjunction with fully sheathed exterior walls. Previously, the footnote referenced a figure and then enumerated exceptions to that figure, making it difficult to use the provisions. Note that the joint must still occur within the middle 24 inches of the vertical leg.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

# RB208-06/07

## R602.10.5

**Proponent:** Edward L. Keith, APA-The Engineered Wood Association

### Delete and substitute as follows:

~~**R602.10.5 Continuous wood structural panel sheathing.** When continuous wood structural panel sheathing is provided in accordance with Method 3 of Section R602.10.3 on all sheathable areas of all exterior walls, and interior braced wall lines, where required, including areas above and below openings, bracing wall panel lengths shall be in accordance with Table R602.10.5. Wood structural panel sheathing shall be installed at corners in accordance with Figure R602.10.5. The bracing amounts in Table R602.10.1 for Method 3 shall be permitted to be multiplied by a factor of 0.9 for wall with a maximum opening height that does not exceed 85 percent of the wall height or a factor of 0.8 for walls with a maximum opening height that does not exceed 67 percent of the wall height.~~

**R602.10.5 Continuous wood structural panel sheathing.** When the continuous wood structural panel sheathing option is used, all sheathable areas of the exterior wall or walls including areas above, below, and adjacent to window and door openings, including the gable end walls if any, shall be sheathed with wood structural panels. The continuous wood structural panel sheathing option shall be permitted on any story or stories regardless of the bracing methods used on other stories. Continuous wood structural panel sheathing shall be permitted on any wall line. When continuous wood structural panel sheathing is used on only a selected wall line or lines, all other exterior braced wall lines on the same story shall be Method 3, or continuous wood structural panel sheathing.

Continuous wood structural panel braced wall lines shall be provided with a minimum of 2-foot length wood structural panel at both sides of a corner at the ends of a braced wall line and shall be constructed in accordance with Figure R602.10.5.

**Exception:** In lieu of the 2-foot wood structural panel corner return, a tie-down device shall be fastened to the stud at the edge of the continuously sheathed braced wall panel closest to the corner and to the foundation or framing below. The tie-down device shall be capable of providing an allowable uplift design value of at least 1800 lb (816.5 kg) and anchored to the foundation. The tie-down device shall be installed in an approved manner.

Braced wall panel lengths shall be in accordance with Table R602.10.5. The amount of bracing required for a continuous wood structural panel sheathed wall line shall be equal to the bracing amounts, based on Method 3 percentages in Table R602.10.1, multiplied by a factor of 0.9 for walls with a maximum opening height that does not exceed 85 percent of the wall height or a factor of 0.8 for walls with a maximum opening height that does not exceed 67% of the wall height.

**Reason:** To clarify the intent of the code. This specific section of the code has been interpreted a number of different ways by jurisdictions around the US. Several jurisdictions have either modified this section for local use or even adopted a previous version of the code to avoid the confusion caused by this section.

After the debacle at the last code hearing over bracing issues, a number of organizations representing a wide range of industries and interests formed a committee – The IRC Bracing Committee (a committee NOT formed under the auspicious of the ICC) – coordinated by Dr. Dan Dolan. This committee has met twice to resolve the contentious issues associated with the bracing provisions and has future meetings planned to continue with this resolution. This specific proposal is one of this committee's action items. The committee was not unanimous on this issue, and the list below represents the committee participants and their organizations/interests that supported the proposal. At the end of the reason statement is a similar list of the opponents and their reasons for opposing the proposal. Per his specific request, Jay Crandall of ARES Consulting has been left off of both lists.

#### **Organizations supporting the proposal:**

Louis Wagner – American Fiberboard Association  
Brad Douglas – American Forest and Paper Association  
Ed Keith, B.J. Yeh, Zeno Martin - APA – The Engineered Wood Association  
Scott Beard - City of Tacoma  
Brian Foley, Chris McArtor - Fairfax County, Virginia  
Ed Price - Georgia Pacific  
James E. Russell - Engineer  
Dave Gromala – Weyerhaeuser  
Taylor Blake, Ping Cheng – Louisiana Pacific  
David Geisler – Temple-inland

#### **Reasons supporting proposal:**

- It places the word "option" in the second line of the R602.10.5 text. – This word was placed at the request of a number of members of the IRC Bracing Committee to emphasize the fact that the continuous sheathing method was just one option of a number of bracing options available to the user. The concern was that it could be misread to say that it was a requirement when using Method 3 bracing.
- It eliminates the "all exterior walls" requirement for the continuously sheathed method. – The committee found that there was little technical justification for requiring all exterior walls to be continuously sheathed. Based on the original research it was felt that each level could be analyzed by itself, and that any wall in a given level could be continuously sheathed and not all walls on that level would have to be so sheathed. The term "all exterior walls" was eliminated and additional language added later in the change to make this clarification clear to the user.

- It eliminates the necessity to use Method 3 sheathing on all interior braced walls. – The committee also determined that interior braced wall lines did not have to be made out of the same material as the exterior wall lines. It was never intended that all interior braced wall lines need to be Method 3 (wood structural panel) just because a continuously sheathed wall bracing was selected for the wall bracing on the exterior walls. It is common practice to use the gypsum party walls/braced walls between units in multifamily housing as the interior braced walls regardless of the type of exterior wall bracing used.
- It restricts all remaining wall bracing on a story where one or more continuously sheathed braced wall lines is used. – The methods of bracing permitted in the IRC have significantly different strength and stiffness properties and until a method can be established on how to appropriately combine them is determined, the most prudent solution is to limit the choice of methods used along other wall lines in that story that may be combined with continuous sheathing to the same material: wood structural panels. The majority of the committee felt that this was an appropriate way to minimize damage through prescriptive language.
- A new paragraph is added which defines what is required for the return wall on a continuously sheathed wall. This is the wall depicted in Figure R601.10.5 that has the prescribed corner nailing for a continuously sheathed wall system. This fills a hole in the current code. – The 2-foot return was added to the IRC when using a continuously sheathed wall, as that is the basis of the developmental work done by the NAHB Research Center. Initial work by the NAHB was conducted on both 2 and 4 ft return walls. The 4 ft wall was found to provide only a little more resistance to uplift than the 2 ft wall. The majority of the committee felt that the 2 ft return wall would provide adequate resistance while providing greater architectural flexibility. Equally important was to cover the circumstance when the prescribed corner detail could not be used at a specific corner. The committee agreed on the use of an 1800 lb holddown at that location in lieu of the prescribed corner.

**Organizations opposed to the proposal:**

Greg Bergtold - Dow Chemical  
Edward Chan, Brad Allshouse – Covalence Coated Products  
Susan Herrenbruck – Extruded Polystyrene Foam Association

**Reasons for opposition:**

Greg Bergtold – Products meeting the acceptance criteria of AC 269 will be allowed to utilize the continuous sheathing method of design for perforated shear walls. The current proposal, as written, would instruct builders and the design community to use continuous sheathing on all braced wall lines where the continuous method was implemented, or use Method 3 wood structural panels on the remaining walls. By example builders using fiberboard products meeting AC 269, and wanting to utilize the continuous sheathing method, would be required to use the fiberboard classified product in a continuous method on the remaining wall lines for that floor or use wood structural panels per Method 3. This second condition of mixing a Method 4 product used in the continuous sheathed method with Method 3 wood structural panels on the remaining walls violates the argument the proponents of this code are making regarding stiffness incompatibility of different bracing methods. This proposal does not serve to eliminate confusion and will result, again, in non-uniform enforcement. This section needs to recognize alternate bracing methods and new products in order to meet builder and code officials' requests.

Current bracing table percentages, with modifiers, were established to approximate equitable bracing resistance among the different bracing methods. This design intent should allow for mixed methods within a given story or, in certain cases, within a given braced wall line without causing concern of failure if the individual bracing method percentages with code required modifiers and rules are followed for any given braced wall line. No data has been presented to the committee by the proponents of this code proposal to show various bracing method combinations have significant differential stiffness to cause design concerns. In fact a continuously sheathed wood wall will have a different stiffness and resistance than the remaining Method 3 braced walls.

Mixed bracing methods within a braced wall line was deleted from Proposal 3&4 submitted by Kelly Cobeen. It is now being re-introduced in the reason statement of 602.10.5 for interior wall/exterior wall combinations. That paragraph should be removed from the reason statement and is in conflict with previous statements of mixed bracing methods made within the same section.

When full committee discussion around Kelly Cobeen's proposal #5, and specifically removing language allowing only bracing Method 3 to be permitted as an alternate when implementing 602.10.5, the discussion was stopped and the proposal was withdrawn from the table without a full discussion. Statements regarding majority opinion are solely the viewpoint of the proponent. No vote or action was ever taken as the proposal was withdrawn and this specific proposal was never discussed as submitted.

This proposal does increase the cost of homes by eliminating competing products as well as energy saving materials.

Edward Chan – Is opposed but was unable due to prior commitments to generate an opposing statement at this time.

Susan Herrenbruck - Is opposed but was unable due to prior commitments to generate an opposing statement at this time.

**Cost Impact:** The code change proposal will decrease the cost of construction over the current code provisions because it permits the continuous sheathed method to be used on any single wall on any floor.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

**RB209–06/07**

**R202, R602.10.5, R602.10.5.1 (New), R602.10.5.2 (New), R602.10.5.3 (New), R602.10.5.4 (New), Table R602.10.5**

**Proponent:** Ed Sutton, National Association of Home Builders (NAHB)

**1. Add new definition as follows:**

**SECTION R202  
GENERAL DEFINITIONS**

**BRACED WALL LINE, CONTINUOUSLY-SHEATHED.** A braced wall line with structural sheathing applied to all sheathable surfaces including the areas above and below openings.



## 2. Delete and substitute as follows:

~~**R602.10.5 Continuous structural panel sheathing.** When continuous wood structural panel sheathing is provided in accordance with Method 3 of R602.10.3 on all sheathable areas of all exterior walls, and interior braced wall lines, where required, including areas above and below openings, braced wall panel lengths shall be in accordance Table R602.10.5. Wood structural panel sheathing shall be installed at corners in accordance with Figure R602.10.5. The bracing amounts in Table R602.10.1 for Method 3 shall be permitted to be multiplied by a factor of 0.9 for walls with a maximum opening height that does not exceed 85 percent of the wall height, or a factor of 0.8 for walls with a maximum opening height that does not exceed 67 percent of the wall height.~~

### **R602.10.5 Continuously-sheathed braced wall line using Method 3 (wood structural panel).**

## 3. Add new text as follows:

**R602.10.5.1 Continuously-sheathed braced wall line requirements.** Continuously-sheathed braced wall line shall comply with all of the following requirements:

1. Structural sheathing shall be applied to all exterior sheathable surfaces of a braced wall line including areas above and below openings.
2. Only full-height braced wall panels shall be used for calculating braced wall amount in accordance with Table R602.10.1.
3. Different bracing methods shall not be permitted within a continuously-sheathed braced wall line.

**R602.10.5.2 Braced wall panel length.** In a continuously-sheathed wood structural panel braced wall line, the minimum braced wall panel length shall be permitted to be in accordance with Table R602.10.5.

**R602.10.5.3 Braced wall panel location and corner construction.** A braced wall panel shall be located at each end of a continuously-sheathed braced wall line. A minimum 24-inch wood structural panel corner return shall be provided at both ends of a continuously-sheathed braced wall line in accordance with Figure R602.10.5. In lieu of the corner return, a tie-down device with a minimum uplift design value of 800 lb shall be fastened to the corner stud and to the foundation or framing below.

**Exception:** The first braced wall panel shall be permitted to begin 12 feet from each end of the braced wall line in Seismic Design Categories A, B, and C and 8 feet in Seismic Design Categories D<sub>0</sub>, D<sub>1</sub>, and D<sub>2</sub> provided one of the following is satisfied:

1. A minimum 2-foot wood structural panel is provided at both sides of a corner constructed in accordance with Figure R602.10.5 at the braced wall line ends, or
2. The braced wall panel closest to the corner shall have a tie-down device with a minimum uplift design value of 800 lb fastened to the stud at the edge of the braced wall panel closest to the corner and to the foundation or framing below.

**R602.10.5.4 Braced wall amount.** Braced wall amounts for Method 3 from Table 602.10.1 shall be permitted to be multiplied by a factor of 0.9 for a braced wall line with a maximum opening height that does not exceed 85% of the wall height and by a factor of 0.8 for a braced wall line with a maximum opening height that does not exceed 67% of the wall height.

## 4. Revise table footnote as follows:

**TABLE R602.10.5  
LENGTH REQUIREMENTS FOR BRACED WALL PANELS IN A CONTINUOUSLY SHEATHED WALLa, b, c**

(No change to table entries)

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479kPa.

- Linear interpolation shall be permitted.
- Full-height sheathed wall segments to either side of garage openings that support light frame roofs only, with roof covering dead loads of 3 psf or less shall be permitted to have a 4:1 aspect ratio.
- Walls on either sides of openings in garages that are part of a continuously-sheathed Method 3 braced wall line shall be permitted to be built in accordance with Section R602.10.6.2 and Figure R602.10.6.2 except that a single bottom plate shall be permitted and two anchor bolts shall be placed at 1/3 points. In addition, tie-down devices shall not be required and the vertical wall segment shall have a maximum 6:1 height-to-width ratio (with height being measured from top of header to the bottom of the sill plate). Corner returns at the ends of the garage opening wall shall be a minimum of 2-feet in length and shall be in accordance with Figure R602.10.5. This option shall be permitted for the first story of two-story applications in Seismic Design Categories A through C.

**Reason:** The proposed re-write of R602.10.5 is intended to clarify the language related to application of this section. It further deletes the requirement to have all walls of a house to be fully sheathed with wood structural panels. This change makes the requirements consistent with 2000 IRC language and with the technical basis for the IRC bracing provisions. The continuously-sheathed bracing option is intended to provide performance equivalent to a Method 3 braced wall line. IRC does not require Method 3 for all braced wall lines in a house. Therefore, the continuously-sheathed bracing method should not be required for the entire structure.

A definition of continuously-sheathed braced wall line is added to Chapter 2 to provide the code users with a meaning of the term. This term has become very common since its introduction in the 2000 IRC. Adding a definition will facilitate interpretation of the bracing requirements.

Section R602.10.5 is divided into subsections that address specific requirements.

A minimum corner width of 24 inches is included based on the minimum segment width in Table R602.10.5. As the purpose of the corner is to provide overturning restraint, it is allowed to be replaced with a tie-down device. The allowable uplift design value of 800 lb is based on uplift loads measured during testing of shear walls with corners. It is clarified that the first braced wall panel shall be located at the corner or the requirement of the exception should be followed. The exception is consistent with IRC provisions for Method 3 for location of the first braced wall panel. Exception (c) in Table R602.10.5 is modified for consistency with Section 602.10.5.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
 Assembly: ASF AMF DF

## RB210-06/07

### R602.10.5

**Proponent:** Paul Lautrup, Covalence Coated Products

**Delete and substitute as follows:**

**R602.10.5. Continuous structural panel sheathing.** When continuous wood structural panel sheathing is provided in accordance with Method 3 of Section R602.10.3, including areas above and below openings, braced wall panel lengths shall be in accordance with Table R602.10.5. Wood structural panel sheathing at corners shall be installed in accordance with Figure R602.10.5. The bracing amounts in Table R602.10.1 for Method 3 shall be permitted to be multiplied by a factor of 0.9 for walls with a maximum opening height that does not exceed 85 percent of the wall height or a factor of 0.8 for walls with a maximum opening height that does not exceed 67 percent of the wall height.

**Reason:** To return the current code provisions of R602.10.5 to language that is consistent with the 2000 IRC.

The current code language of IRC 2006 Section R602.10.5 requires that the entire structure be sheathed using Method 3 (wood) when the continuous sheathing method (R602.10.5) is used for a braced wall line. Section R602.10.5 of the IRC 2000 language required the use of Method 3 continuous sheathing only on the braced wall line and subsequent corner illustration given in the section. The language that requires the use of Method 3 continuous sheathing on all the walls of the structure (beyond the specific braced wall line and stated corners) has not been technically substantiated, and places undue restrictions on the normal competitive use of other bracing materials. This proposal returns Section R602.10.5 to language that is consistent with the technical considerations used to develop the 2000 IRC language of R602.10.5.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
 Assembly: ASF AMF DF

## RB211-06/07

### Table R602.10.5

**Proponent:** Edward L. Keith, P.E., APA – The Engineered Wood Association

**Revise table as follows:**

**TABLE R602.10.5**  
**LENGTH REQUIREMENTS FOR BRACED WALL PANELS IN A CONTINUOUSLY SHEATHED WALL<sup>a,b,c</sup>**

MINIMUM LENGTH OF BRACED WALL PANEL (inches)			MAXIMUM OPENING CLEAR HEIGHT NEXT TO THE BRACED WALL PANEL (% of wall height)
8-foot wall	9-foot wall	10-foot wall	
48	54	60	100%
32	36	40	85%
24	27	30	65% 67%

(Footnotes do not change)

**Reason:** To clarify the intent of the code.

1. We were asked by the ICC staff to submit this part of the code change. The existing wording has been interpreted by users to mean the height of the window above the floor line. The intent of the code is that the height refers to the vertical dimension of the window opening. ICC Staff recommends the use of "opening clear height" as a better descriptor of the code intent.
2. The 65% represents a 5-ft window opening in an 8-ft wall. In Section R602.10.5, 67% is used as the same representation – a 5-ft window in an 8-ft wall. Changing one of the two values would make the code consistent and selecting the 67% would permit the rough window opening to be slightly larger, giving the builder a little additional leeway during framing. We therefore recommend that the change be made as proposed.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
 Assembly: ASF AMF DF

## RB212-06/07

### Table R602.10.5

**Proponent:** Richard E. Bartell, Hanover County, VA, representing the Virginia Plumbing and Mechanical Inspectors Association/Virginia Building and Code Officials Association

**Revise table as follows:**

**TABLE R602.10.5  
 LENGTH REQUIREMENTS FOR BRACED WALL PANELS IN A  
 CONTINUOUSLY SHEATHED WALL<sup>a,b,c</sup>**

MINIMUM LENGTH OF BRACED WALL PANEL (INCHES)			MAXIMUM OPENING HEIGHT NEXT TO BRACED WALL PANEL (%) OF WALL HEIGHT
48	<del>54</del> 48	<del>60</del> 48	100
32	36	40	85
24	27	30	65

(Footnotes do not change)

**Reason:** To eliminate a discrepancy with Section 602.10.4.

Section 602.10.4 says the minimum length of braced wall panel using method 3 is 48 inches for 8, 9 and 10 foot walls regardless what the adjacent wall line is made up of – wall or opening. The table R602.10.5 for continuous Method 3 requires 9 foot walls to have 54 inch panels and 10 foot walls to have 60 inch panels.

It seems logical that if 48 inch panels are satisfactory for intermittent braced wall panels using method 3, it should be equally satisfactory for continuous braced wall panels using method 3.

This proposal is intended to correct this discrepancy.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
 Assembly: ASF AMF DF

## RB213-06/07

### Table R602.10.5

**Proponent:** Scott Beard, SE, City of Tacoma, WA

**Revise as follows:**

**TABLE R602.10.5  
 LENGTH REQUIREMENTS FOR BRACED WALL PANELS IN A CONTINUOUSLY SHEATHED WALL<sup>a, b, c</sup>**

(No change to table entries)

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479kPa.

- a. Linear interpolation shall be permitted.
- b. Full-height sheathed wall segments to either side of garage openings that support light frame roofs only, with roof covering dead loads of 3 psf or less shall be permitted to have a 4:1 aspect ratio. This option is limited to one wall of the garage only.
- c. Walls on either or both sides of openings in garages attached to fully sheathed dwellings shall be permitted to be built in accordance with Section R602.10.6.2 and Figure R602.10.6.2 except that a single bottom plate shall be permitted and two anchor bolts shall be placed at 1/3 points. In addition, tie-down devices shall not be required and the vertical wall segment shall have a maximum 6:1 height-to-width ratio (with height being measured from top of header to the bottom of the sill plate). This option shall be permitted for the first story of two-story applications in Seismic Design Categories A through C.



**Reason:** When this provision was created, the writers did not envision using it for a drive-through garage. Even though this particular provision is packaged as a continuously sheathed item, it is really powered by diaphragm in rotation. The 2 ft wide panels next to the garage door are primarily providing stiffness so that the rotational analysis will work.

Placing another large door with narrow panels in any other wall will make this mechanism fail to work. This wasn't intended, we need to plug the hole.

**Cost Impact:** The code change proposal will increase the cost of construction. (But not much. This is a small impact item.)

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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## RB214-06/07

### Table R602.10.5, Figure R602.10.5(2)-(New)

**Proponent:** Edward L. Keith, APA-The Engineered Wood Association

**Revise table footnotes as follows:**

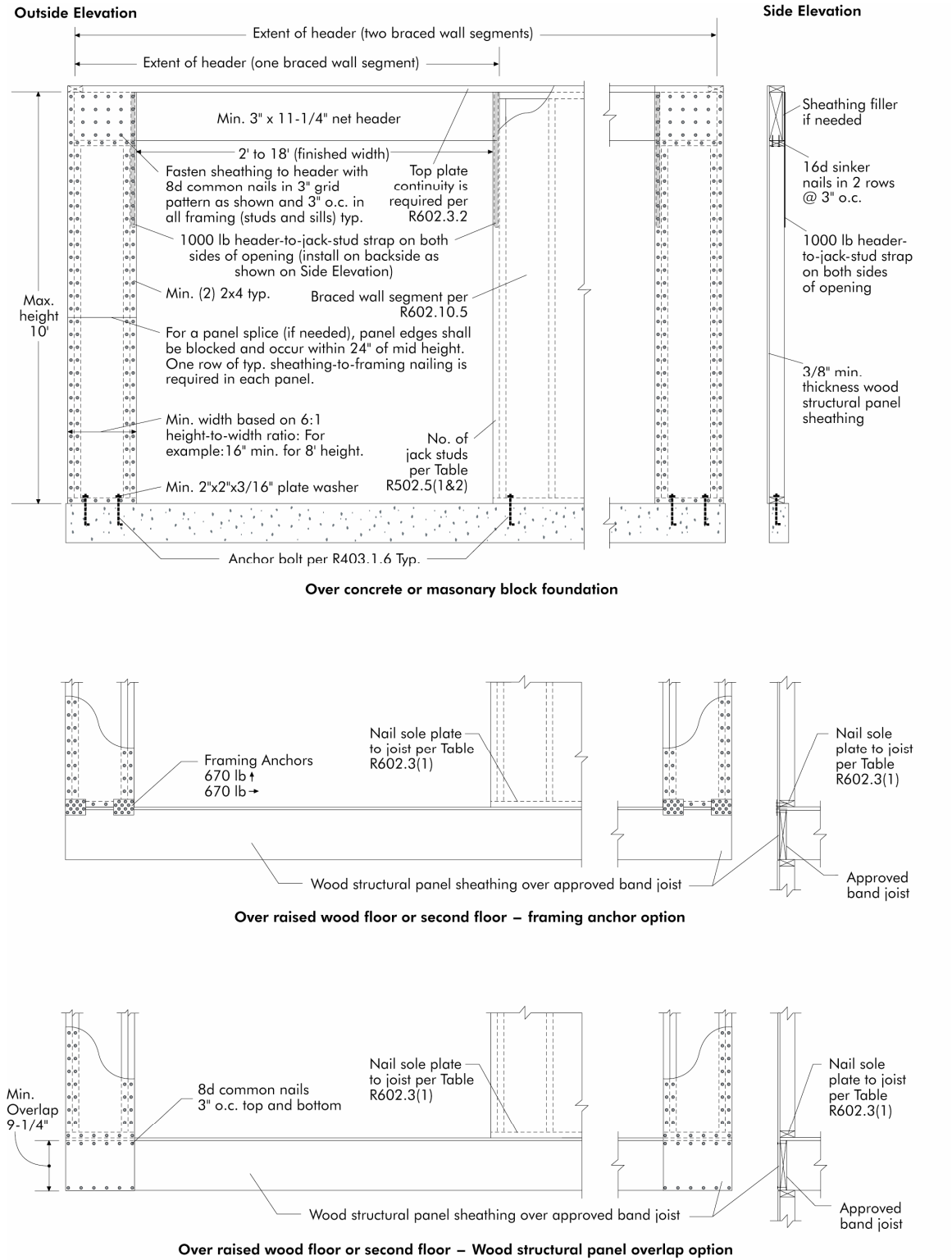
**TABLE R602.10.5**  
**LENGTH REQUIREMENTS FOR BRACED WALL PANELS IN A CONTINUOUSLY SHEATHED WALL**<sup>a, b, c</sup>

(No change to table entries)

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479kPa.

- a. Linear interpolation shall be permitted.
- b. Full-height sheathed wall segments to either side of garage openings that support light frame roofs only, with roof covering dead loads of 3 psf or less shall be permitted to have a 4:1 aspect ratio.
- c. Walls segments having a maximum 6:1 height to width ratio ~~on either or both sides of openings in garages attached to fully sheathed dwellings shall be permitted to be built in accordance with Section R602.10.6.2 and Figure R602.10.6.2 R602.10.5(2) except that a single bottom plate shall be permitted and two anchor bolts shall be placed at 1/3 points. In addition, tie down devices shall not be required and the vertical wall segment shall have a~~ The maximum 6:1 height-to-width ratio is based on (with height being measured from top of header to the bottom of the sill wall segment bottom-plate). This option shall be permitted for the first story of two-story applications in Seismic Design Categories A through C. For purposes of calculating the percentage of panel bracing required by Table R602.10.1, the width of the full-height sheathing segment shall be equal to its measured width.

**2. Add new figure as follows:**



Not to scale

**FIGURE R602.10.5(2)**  
**WALLS WITH 6:1 ASPECT RATIO USED WITH CONTINUOUS WOOD STRUCTURAL PANEL SHEATHING**

**Pacific A 1**

**Reason:** The purpose of this proposal is to add to the content of the code by permitting a narrow segment bracing option to give more flexibility for builders to meet wall-bracing requirements.

Footnote c currently permits an aspect ratio of 6:1 if a modified version of the portal frame (Section R602.10.6.2) is used in conjunction with wood structural panel continuously sheathed walls. This proposal adds a figure describing the 6:1 aspect ratio wall segment. Previously, the footnote referenced another figure and then enumerated exceptions to that figure, making it difficult to use the provisions.

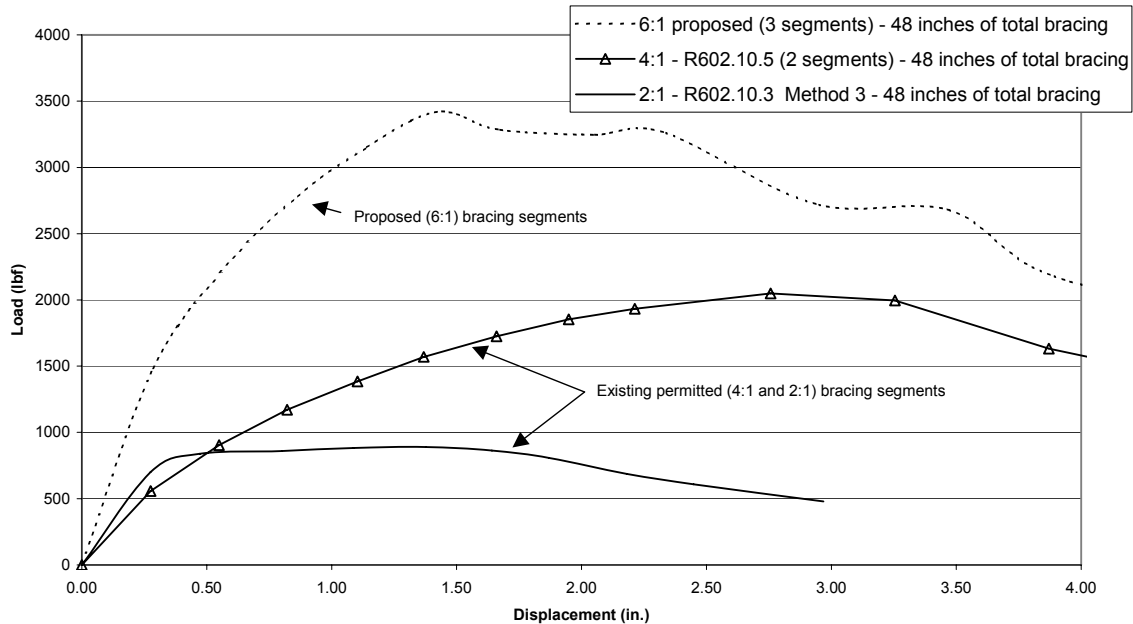
The proposal also does not limit these provisions to use over a concrete footing at garage openings nor to Seismic Design Categories A-C. Extensive testing has been completed that shows the proposed 6:1 segment performs significantly better compared to existing permitted bracing which can be used in raised floor applications, in all story locations, and in all Seismic Design Categories. More than 50 cyclic tests have been conducted in the last 4 years to support this proposal. Testing has been conducted under a wide range of different boundary conditions, including on raised wood floors with supporting joists parallel and with joists perpendicular to the bracing segment, with solid sawn and engineered joists, with nailed bottom plates, on rigid foundations, with bolted bottom plates, with bottom plate washer nuts finger tight + ¼ turn, with and without any end restraint on the segments, with and without gypsum on the backside of the segments, for braced wall heights of 12-ft, and for braced wall heights of 8-ft. Figures 1, 2 and 3 summarize test results with a low degree of end restraint (no load head, no dead loads, no hold downs, and nuts where used on plate washers were finger tight + ¼ turn).

This proposal is very conservative based on each of the following facts:

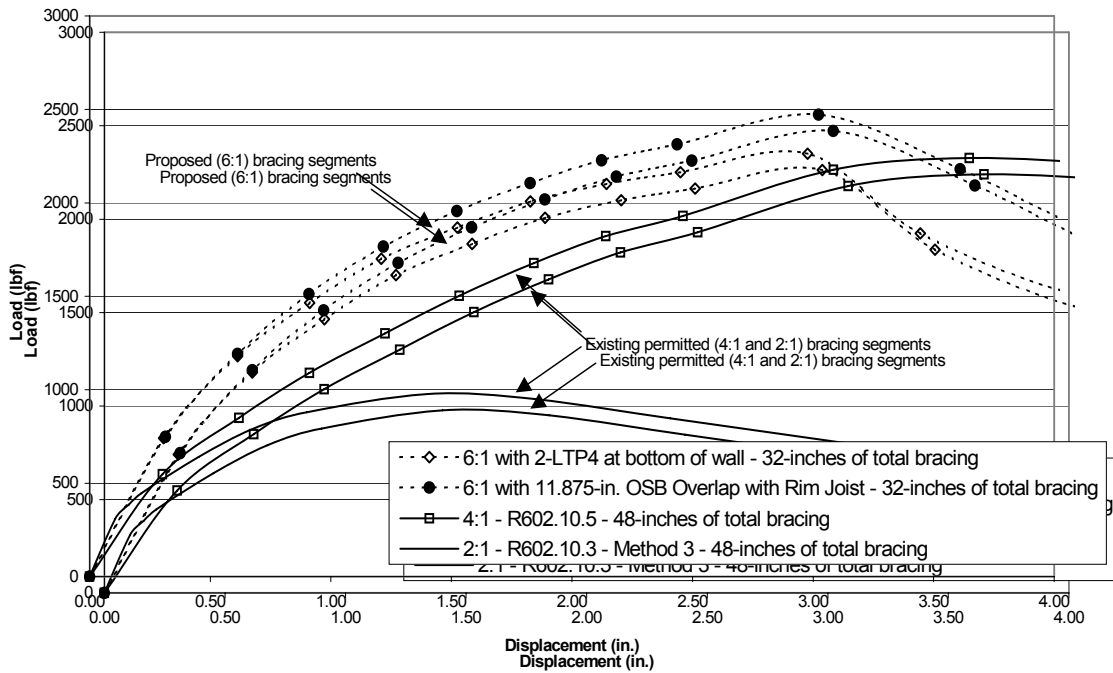
- 1) When equal amounts of bracing are compared, the proposed performs significantly better than currently permitted bracing, as shown in Figure 1. The proposed requires three 16-inch wide segments to equal the same bracing amount as one single 48-inch wide segment or two single 24-inch wide segments.
- 2) The performance of only 32" of total bracing of the proposed is approximately equal or better compared to 48" of currently existing permitted 4:1, and 2:1 height to width ratio bracing segments (as shown in Figures 2 and 3).
- 3) Testing shown in Figures 1, 2 and 3 uses conservative boundary conditions. If the structure is assumed to impose any degree of end restraint to the wall segments, testing shows that the 6:1 segment improves considerably more than the existing permitted 4:1.
- 4) A braced wall line using 4:1 segments is currently permitted a 20% reduction in total bracing amount required (in accordance with 2006 IRC Section R602.10.5). It is not proposed to extend this 20% reduction in total amount of bracing required to a wall line with 6:1 segments.
- 5) The proposed 6:1 segment may only be used in a wall line continuously sheathed with wood structural panels. Unlike isolated 48-inch wide bracing, such as Method 3, where minimal isolated bracing segments are often all that is present, the continuous wood structural panel braced wall line realistically often has much more structural capacity and redundancy because the wall requires continuous wood structural panel sheathing.
- 6) The proposed is aspect ratio based, meaning that as the wall becomes taller the segment becomes wider. Few other currently permitted bracing segments, except those in wood structural panel continuously sheathed walls, have a similar requirement.

Almost all of the above facts are cumulative, meaning that as you add them together the proposed becomes a very safe alternative compared to currently permitted bracing segments. This proposed bracing segment option provides much needed flexibility and a very significant, unprecedented amount of testing has been conducted to establish and confirm the safety of this proposal.

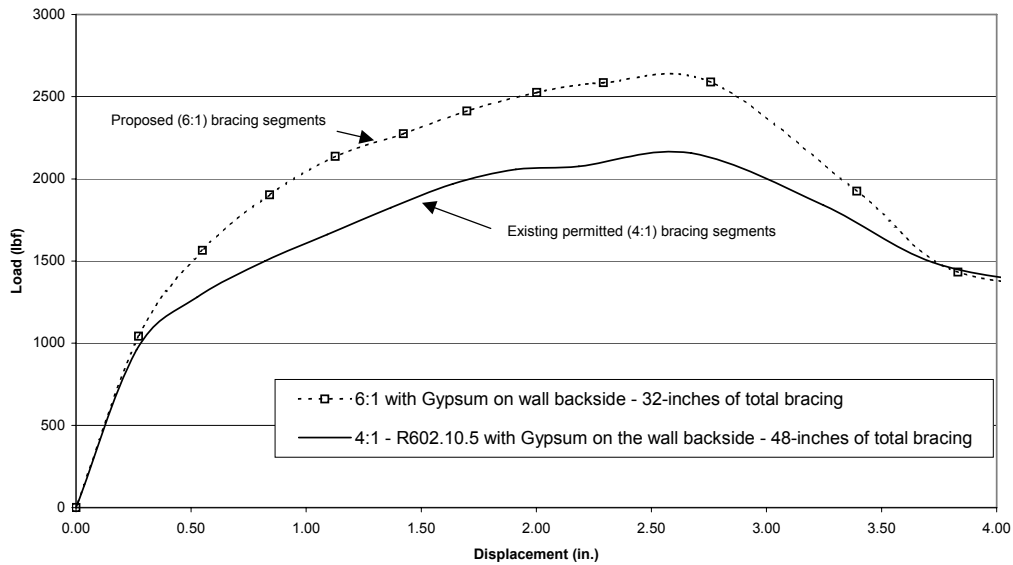
**Figure 1.** Load-displacement backbone curves of proposed 6:1 bracing compared to existing permitted 4:1 and 2:1 bracing segments. All segments shown were tested with no hold downs, no end restraint and plate washers finger tight plus ¼ turn.



**Figure 2.** Load-displacement backbone curves of proposed bracing compared to existing permitted 4:1 and 2:1 bracing segments tested on a raised floor support condition. Note that the existing permitted total bracing length is 48-inches compared to only 32-inches of the proposed, a very conservative comparison because the existing permitted bracing in this graph is 50% more bracing length than the proposed. If using the proposed, more bracing would be required elsewhere to provide an equal amount. Comparisons of equal amounts of bracing are shown in Figure 1.



**Figure 3.** Load-displacement backbone curves of proposed bracing compared to existing permitted 4:1 bracing segments with gypsum on wall backside. Note that the existing permitted total bracing length is 48-inches compared to only 32-inches of the proposed, a very conservative comparison because the existing permitted bracing in this graph is 50% more bracing length than the proposed. If using the proposed, more bracing would be required elsewhere to provide an equal amount. Comparisons of equal amounts of bracing are shown in Figure 1.



**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
 Assembly: ASF AMF DF

# RB215-06/07

## Table R602.10.5

**Proponent:** Jay H. Crandell, P.E., ARES Consulting, representing Foam Sheathing Coalition

**Revise table footnotes as follows:**

### TABLE R602.10.5 LENGTH REQUIREMENTS FOR BRACED WALL PANELS IN A CONTINUOUSLY SHEATHED WALL<sup>a, b, c</sup>

(No change to table entries)

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound per square foot = 0.0479kPa.

- a. Linear interpolation shall be permitted.
- b. Full-height sheathed wall segments to either side of garage openings that support light frame roofs only, with roof covering dead loads of 3 psf or less shall be permitted to have a 4:1 aspect ratio.
- c. Walls on either or both sides of openings in garages ~~attached to fully sheathed dwellings~~ shall be permitted to be built in accordance with Section R602.10.6.2 and Figure R602.10.6.2 except that a single bottom plate shall be permitted and two anchor bolts shall be placed at 1/3 points. In addition, tie-down devices shall not be required and the vertical wall segment shall have a maximum 6:1 height-to-width ratio (with height being measured from the top of the header to the bottom of the sill plate). Corners at the ends of garage opening walls using this option shall be constructed in accordance with Figure R602.10.5. This option shall be permitted for the first story of two-story applications in Seismic Design Categories A through C.

**Reason:** This proposal coordinates with a similar change by the proponent to delete the "all exterior walls" requirement in Section R602.10.5. The portal frame system addressed in footnote 'c' of Table R602.10.5 was tested at two extreme conditions of end restraint (with hold-downs and with no restraint by a corner or hold-down) to show equivalence to 24" wide panels at a garage opening wall per footnote 'b' of Table R602.10.5 (based on APA Report T2003-1). In both extremes of restraint in the testing, the portal frame was found to perform better than comparable garage opening walls constructed per footnote 'b' of Table R602.10.5. Evidently, this finding was appropriately used as the basis for adding footnote 'c'. However, this test data for the portal frame garage opening option does not support the requirement that the entire building be fully sheathed as stated in footnote c. The reason is explained as follows. In the original Section R602.10.5 of the IRC 2000, continuous sheathed braced walls were tested as individual braced wall lines with corners per Figure R602.10.5 at the ends, not requiring that the method be used only with buildings that are fully sheathed. Similarly, footnote 'b' of Table R602.10.5, which allows a 24" wide garage opening panel, was intended to be used with panels at the corners of the garage opening also in accordance with Figure R602.10.5. Never was this intended to require that the whole building be fully sheathed for the sake of using a 24" wide panel at the garage opening. Because the portal frame testing simply demonstrated equivalence to continuous sheathed garage opening walls per footnote 'b' of Table R602.10.5, it too should not require that the entire building be fully sheathed. Instead, all that should be required for sake of consistency is sheathing at the corners of the garage opening wall in accordance with Figure R602.10.5. Beyond that requirement, any other approved bracing method should be permitted on other braced wall lines of the garage or the building it is attached to. Therefore, this proposal removes an exclusionary specification for wood structural panels by deleting the "fully sheathed dwellings" language. It also establishes a corner framing requirement that is applicable to Section R602.10.5 in general and footnotes b and c of Table R602.10.5 in specific.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

# RB216-06/07

## Table R602.10.5

**Proponent:** Randall Shackelford, Simpson Strong-Tie Co.

**Revise table footnotes as follows:**

### TABLE R602.10.5 LENGTH REQUIREMENTS FOR BRACED WALL PANELS IN A CONTINUOUSLY SHEATHED WALL<sup>a, b, c</sup>

(No change to table entries)

- a. and b. (No change to current text)
- c. Walls on either or both sides of openings in garages attached to fully sheathed dwellings shall be permitted to be built in accordance with Section R602.10.6.2 and Figure R602.10.6.2 except that a single bottom plate shall be permitted, ~~and~~ two anchor bolts shall be placed at 1/3 points, ~~and in addition, one~~ tie-down devices ~~shall not be required on each side of the opening.~~ The tie-down device shall be fastened to the studs at the end of each wall panel closest to the corner, and shall have an uplift capacity of not less than 3000 lb (1361 kg). ~~and~~ ~~†~~The vertical wall segment shall have a maximum 6:1 height-to-width ratio (with height being measured from top of header to the bottom of the sill plate). This option shall be permitted for one story and the first story of two-story applications in Seismic Design Categories A through C.

**Reason:** Strengthen code by adding new requirements. This code change modifies the 6:1 narrow wall allowed on either side of garages by adding one 3000 pound tie-down device (holdown) on each side of the opening.

The purpose of the 3000 pound tie-down requirement is to:

1. Provide a high degree of end restraint which increases the capacity of the 6:1 portal frame to a level that is comparable to the minimum bracing requirements found in the 2003 IRC,
2. Ensure a high degree of end restraint when the return wall has a net uplift acting on it,
3. Ensure a high degree of end restraint when the wall is loaded at an angle, which causes uplift on both corner walls, preventing any anchorage from the corner return wall, and
4. Reduce the sensitivity of the 6:1 portal frame to installation errors and ensure that field built walls will perform similarly to those constructed in the lab.

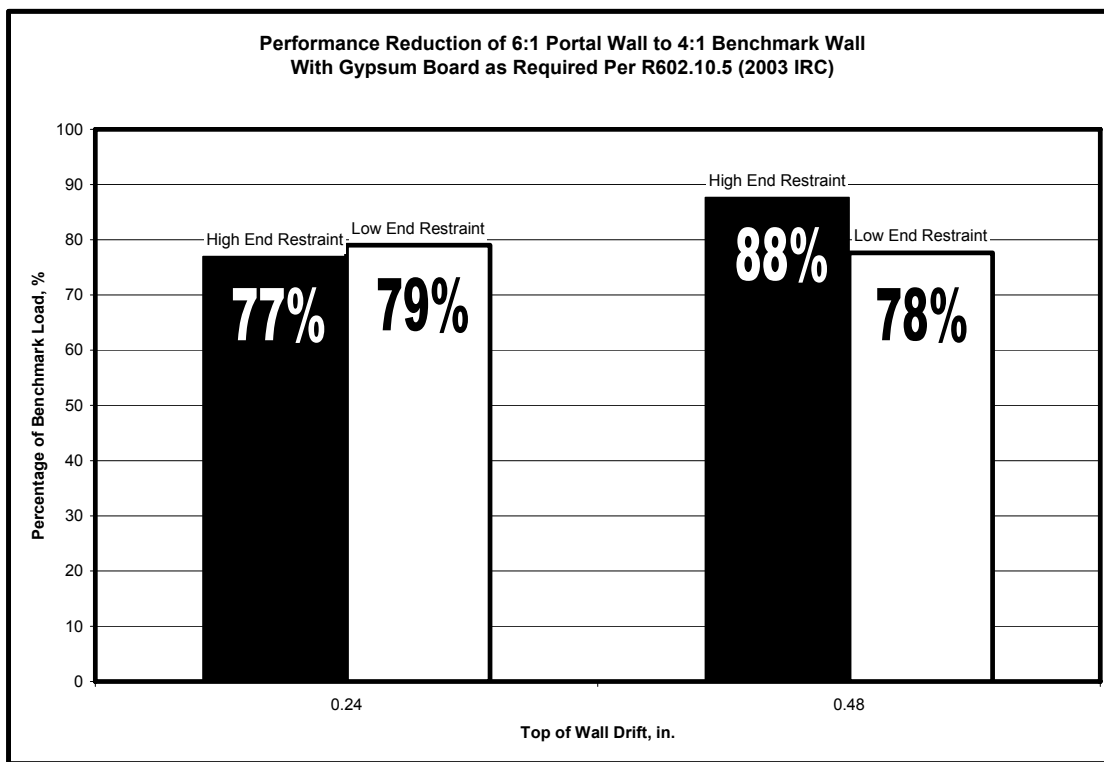
As currently permitted, the 6:1 wall does not provide the same bracing capacity as the wall it is supposed to replace. There are two primary reasons for this:

1. The 24-in braced wall panel that was tested by APA and used as a baseline for determining equivalence is not representative of the requirements of R602.10.5.
2. The test setup and construction methods used by APA result in overstatement of the capacity of the 6:1 portal frame wall.

The original testing that was submitted to justify inclusion of the 6:1 wall compared its performance to that of the minimum wall panel permitted in the IRC, a 24-in wide panel as used in the continuously sheathed method. In these tests, the code minimum braced wall panel test specimen did not include gypsum wall board installed on the interior of the wall as required by Figure R602.10.5 (2003 IRC). This lowers the capacity of the minimum wall, making it easier for the alternate wall to be shown to have “comparable performance”, in the words of the proponent.

Due to the lack of testing data available for comparisons of walls that were properly built, Simpson Strong-Tie undertook a testing program to evaluate the effects of gypsum on the 4:1 and 6:1 walls.

Figure 1 summarizes the results of this testing. As indicated in the figure, the performance of the 6:1 portal frame with gypsum falls below the 4:1 baseline wall with gypsum. Aside from the addition of gypsum on the interior, the walls tested by Simpson match the installation details of the walls tested by APA in T2003-48.



## Pacific A 2

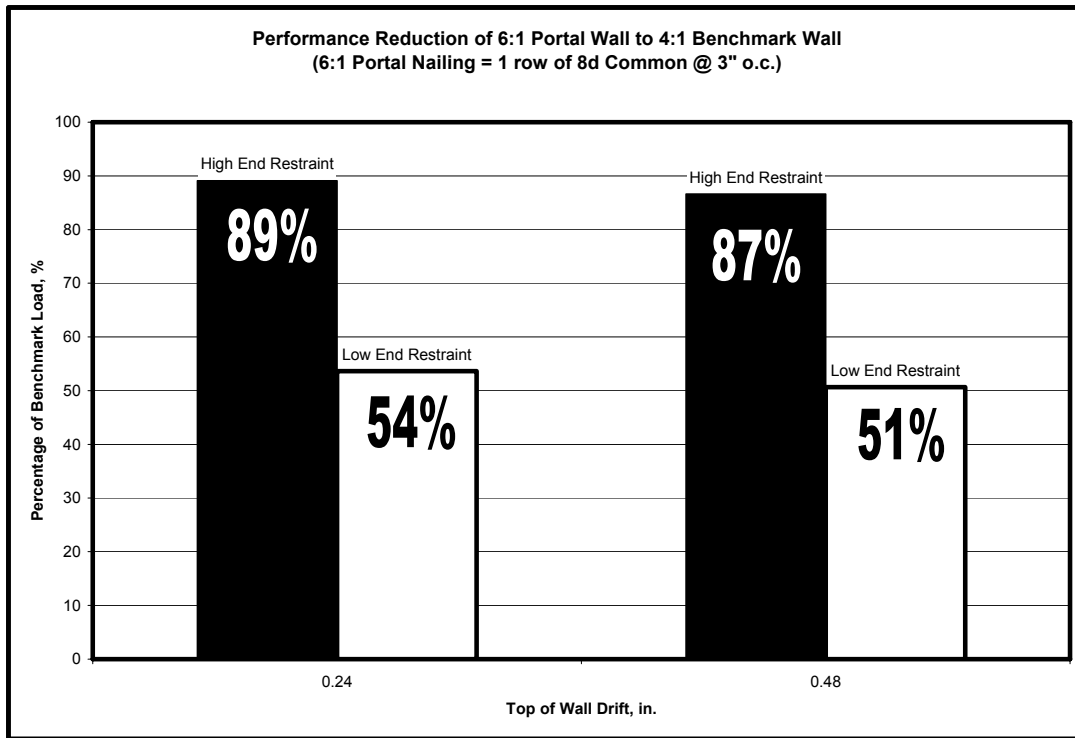
1. High End Restraint percentage = (6:1 Portal Wall with gypsum & holdown) / (4:1 baseline with gypsum & holdown)
2. Low End Restraint percentage = (6:1 Portal Wall with gypsum & no holdown) / (4:1 baseline with gypsum & no holdown)
3. All testing was performed at Simpson Strong-Tie’s IAS accredited laboratory and was independently witnessed

The high degree of end restraint that is needed to make the 6:1 portal frame comparable to the proven bracing methods was tested by the original proponent but only to “simulate the upper bound of end restraint provided by the fully sheathed return wall, header, and dead weight from above” (APA, T2003-48). Few corners will have gravity loads of this magnitude. In addition, shear forces on walls due to wind loading often coincides with a net uplift on the perpendicular return walls. A tie-down is required to ensure a high degree of end restraint in these common applications.

Subsequent to its approval in 2004, APA test report T2004-54 was submitted to show that the 6:1 portal frame was “relatively tolerable” to common installation errors. In this test program, only portals with a high degree of end restraint were evaluated. This restraint was achieved using a Simpson Strong-Tie holdown with an ultimate load of over 15,000 pounds. This is significantly more than could ever be expected to be provided by a single return wall. Because no testing was available for common installation errors on 6:1 portal frames with a low degree of end restraint, Simpson Strong-Tie tested these applications. The performance information is summarized in Figures 2 and 3. As indicated, a high degree of end restraint is required to overcome load reductions due to common installation errors.



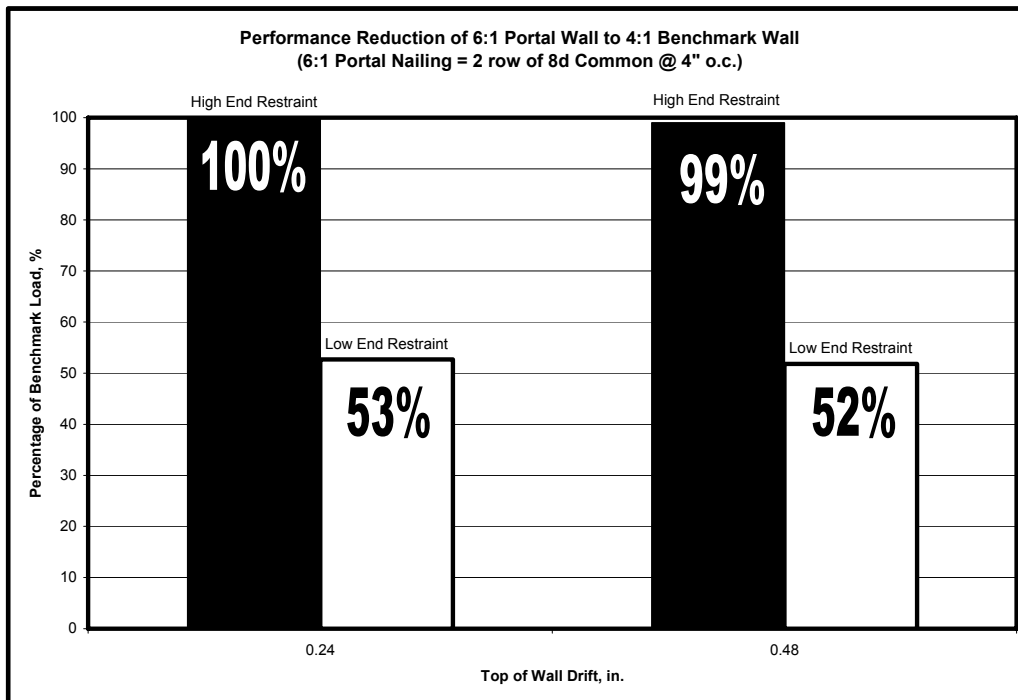
**FIGURE 2**



**Pacific A 3**

1. High End Restraint percentage from APA report T2004-54 Table 3; equals (6:1 with holddown) / (4:1 baseline with holddown, no gypsum)
2. Low End Restraint percentage from Simpson Strong-Tie testing; equals (6:1 no holddown) / (4:1 baseline no holddown, no gypsum)
3. Simpson Strong-Tie testing was performed at its IAS accredited laboratory and was independently witnessed

**FIGURE 3**



**Pacific A 4**

1. High End Restraint percentage from APA report T2004-54 Table 3; equals (6:1 with holddown) / (4:1 baseline with holddown, no gypsum)
2. Low End Restraint percentage from Simpson Strong-Tie testing; equals (6:1 no holddown) / (4:1 baseline no holddown, no gypsum)
3. Simpson Strong-Tie testing was performed at its IAS accredited laboratory and was independently witnessed.

These graphs show that simply having the nail spacing off by one inch results in a reduction in capacity of almost one half at realistic deflection levels. The addition of a tie-down significantly improves the performance of walls that are not built perfectly.

In an effort to verify our test findings, Simpson Strong-Tie hired Washington State University to perform the same comparison tests as both Simpson and APA had. Independent results from the Washington State testing verified Simpson Strong-Tie's results, and in fact showed an even larger discrepancy between the capacity of the 6:1 wall and the IRC minimum 24-in wide wall. The results are summarized in Figure 4 below.

**FIGURE 4**  
**Comparison of Results for Each Anchorage Condition Tested Using**  
**Slip Corrected Envelope Data (Ratios of 6:1 Data to 4:1 Data)**

Anchorage Condition	Displacement		
	0.24 in	0.48 in	Ultimate
No Hold-Down	0.59	0.64	0.76
With Hold-Down	0.60	0.64	1.05

Since the last round of code hearings, Simpson Strong-Tie has been conducting research into why the APA test results could not be reproduced by Washington State and Simpson Strong-Tie. In discussion with APA engineers, we found that two items in their test setup tended to inflate the capacity of the 6:1 wall. First, all sill bolts and hold-down bolts were tightened with an impact wrench, resulting in a far tighter connection than would ever be achieved by tightening on the jobsite. Second, APA's test setup uses a very stiff load head to impart the load into the wall. This load head inflates the capacity of portal systems because it stiffens the header that is attached to the narrow walls on each side. Taken together, these two items account for part of the reason the 6:1 wall seemed to perform similarly to the code minimum in APA tests.

These results show that, when tested against a wall built as required by code, the 6:1 wall specified in Footnote C of Table R602.10.5 does NOT in fact offer equivalent performance.

However, we understand that this option is popular with builders, so instead of asking that the 6:1 wall be removed from the code, we are asking that a tie-down be added to the wall, which will bring the capacity of the wall up to something similar to what would be provided by the previous code minimum wall.

The basis for the 3000 pound tie-down capacity is determined as follows:

- Section R602.10.6.2 requires a 4200 pound tie-down device for a wall that is similar to the 6:1 portal frame but does not have restraint from the corner return wall.
- A return wall that is anchored per code (R403.1.6 of the IRC) will have one 1/2" diameter anchor bolt, nut, and washer within 12" of the corner. The maximum bearing capacity of a standard washer on a sill plate is approximately 1000 pounds.
- Table R802.11 footnote "f" allows wall-to-foundation connections to be reduced by 50 plf due to the dead load of the assembly. Assuming a 4' return wall, this equates to 200 pounds.
- 3000 pounds is derived by subtracting the calculated corner restraint (200 pounds of dead load and 1000 pounds of anchorage) from the 4200 pound tie-down capacity. 3000 pounds also matches the tie-down requirement of alternate braced wall panels in the first of two story application (Section R602.6.1(2)).

All Simpson Strong-Tie testing was performed on state of the art equipment in an IAS accredited laboratory. Independent test reports are available at <http://www.strongtie.com/news/industry/wall-bracing/testing.html>

**Cost Impact:** The code change proposal will increase the cost of construction if this method is being currently used.

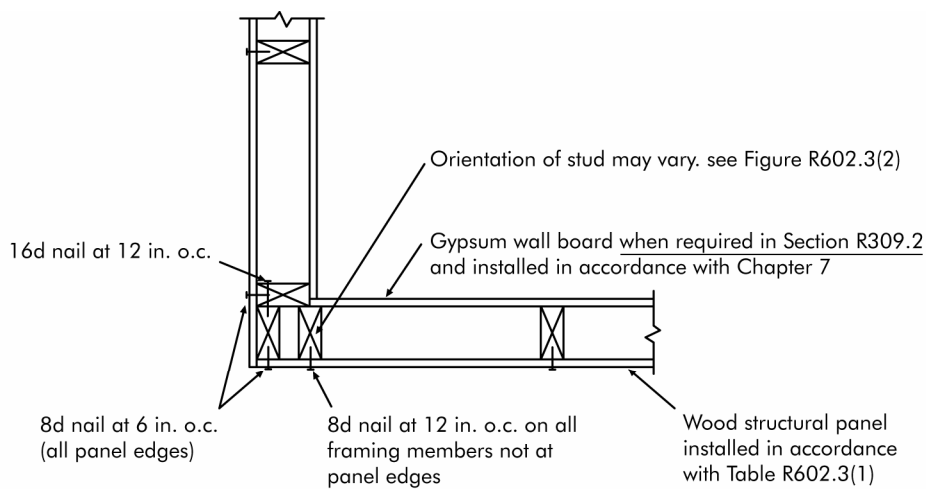
Public Hearing: Committee: AS AM D  
 Assembly: ASF AMF DF

## RB217-06/07

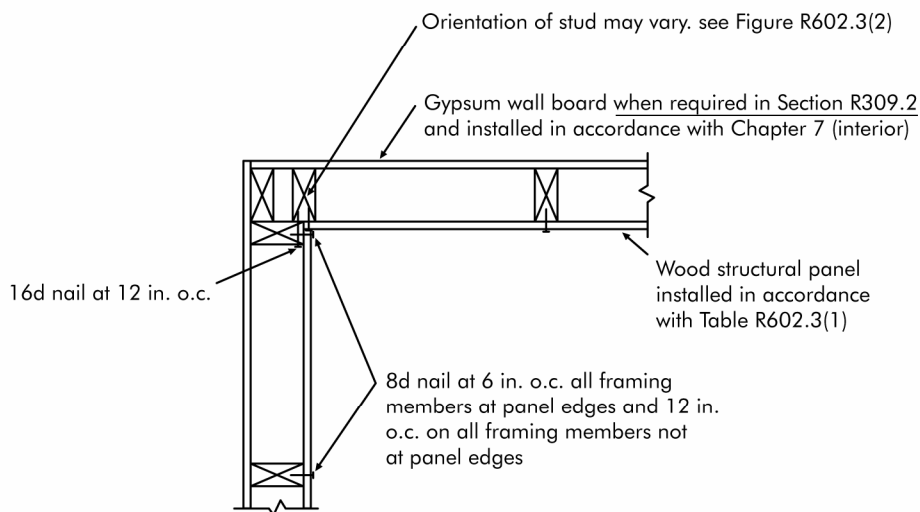
### Figure R602.10.5

**Proponent:** Edward L. Keith, APA-The Engineered Wood Association

**Revise figure as follows:**



(a) Outside corner detail



(b) Inside corner detail

For SI: 1 inch = 25.4 mm.

**FIGURE R602.10.5**  
**TYPICAL EXTERIOR CORNER FRAMING FOR CONTINUOUS STRUCTURAL PANEL SHEATHING;**  
**SHOWING REQUIRED STUD-TO-STUD NAILING**

**Pacific A 5**

**Reason:** To clarify the intent of the code.

Section R309.2 of the IRC dictates where gypsum board is required in a structure built in accordance with the IRC. The callout in Figure R602.10, the way it is currently written, has been misconstrued to indicate that gypsum wall board **MUST** be used in conjunction with the corner detail. This is not the case. The proposal made and approved in the 04-05 cycle (RB-166-04/05) modified the name of this figure to indicate that the stud-to-stud nailing requirement was the "purpose" of the figure. This proposal is being made to further clarify the intent of the figure and eliminate the possibility of conflicting requirements in the Code.

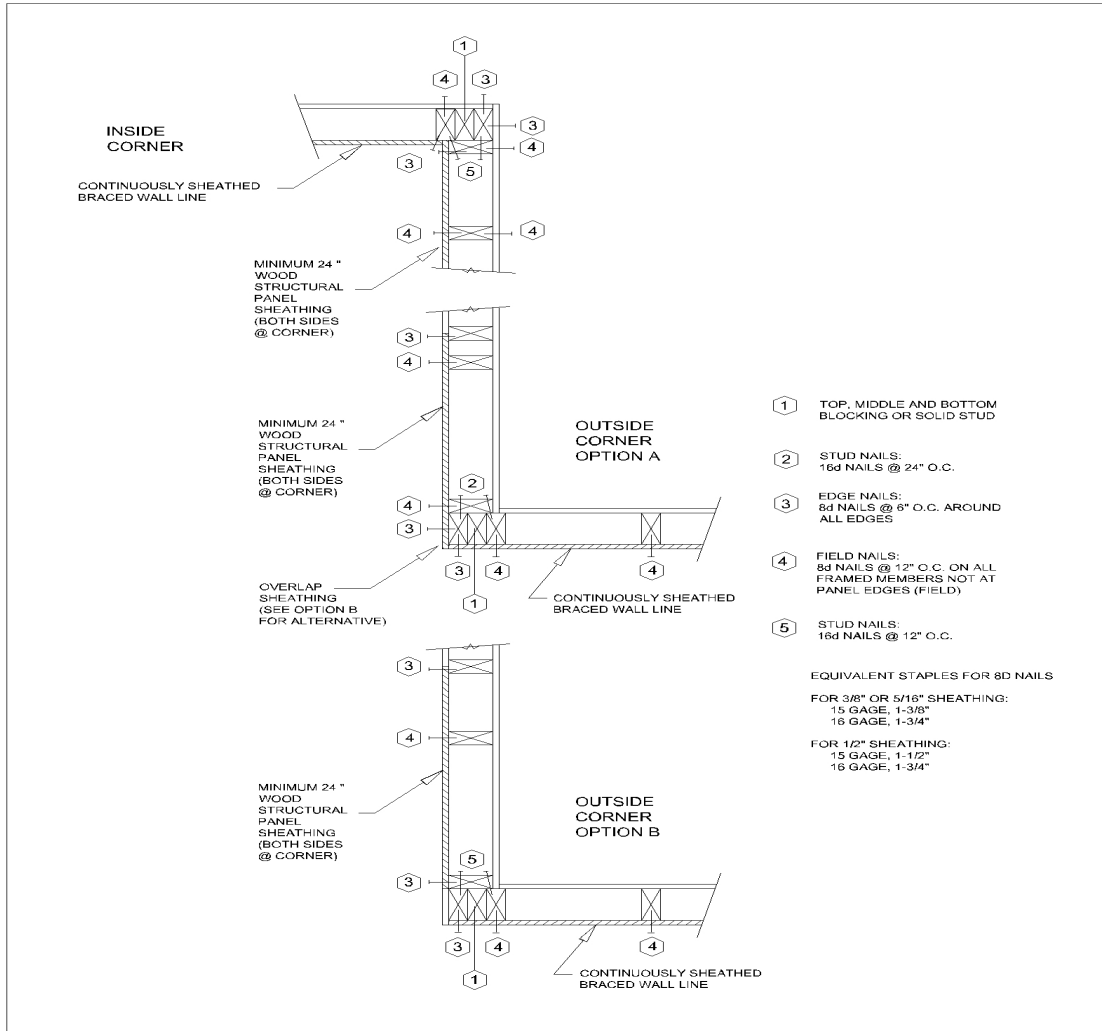
**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
 Assembly: ASF AMF DF

**RB218-06/07**  
**Figure R602.10.5 (New)**

**Proponent:** Richard E. Bartell, Hanover County, VA, representing the Virginia Plumbing and Mechanical Inspectors Association/Virginia Building and Code Officials Association

**Delete existing Figure R602.10.5 and substitute as follows:**



**FIGURE R602.10.5**

**TYPICAL CORNER FRAMING FOR CONTINUOUS STRUCTURAL PANEL SHEATHING, SHOWING REQUIRED WRAPPED SIDE WALLS AND STUD-TO-STUD NAILING**

**Reason:** Based on the ad-hoc Reno meeting, it was determined that 24" sidewalls were required when using the continuous structural panel sheathing, and this figure reflects that requirement. The figure also provides an optional framing method for the exterior corner, which allows the framer to walk-up the exterior wall.

The purpose is two fold:

1. Show how the continuous structural panel sheathing - 24 inch wrapped corner detail is supposed to be framed
2. Provide an optional method for framing the exterior walls

The Reno ad-hoc delegates agreed that continuous structural panel sheathing could be applied to a single braced wall line instead of the whole house. They also agreed that when using continuous structural panel sheathing along a single braced wall, the adjacent side walls have to be sheathed a minimum of 24" around the corner to transmit the forces around the corner. If continuous structural panel sheathing can be applied to a single braced wall line, the corner detail has to be corrected to reflect this change.

The optional exterior wall detail provides an equivalent framing method which will allow the framers to walk-up the adjacent side walls. Currently, Figure 602.10.5 is sufficiently difficult and dangerous to construct, - the adjacent wall has to be slid in place around the continuous structural panel sheathed wall.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
 Assembly: ASF AMF DF

# RB219-06/07

## R602.10.5, Figure R602.10.5

**Proponent:** Louis Wagner, American Fiberboard Association

### 1. Add new text as follows:

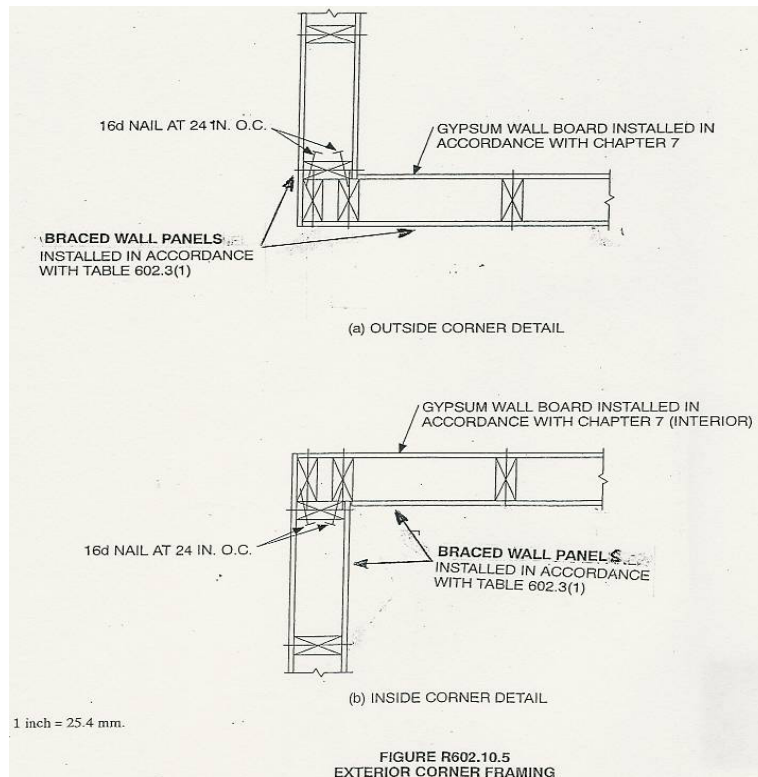
**R602.10.5 Continuous fiberboard structural panel sheathing.** The continuous fiberboard structural sheathing option shall be permitted on any story or stories regardless of the bracing methods used on other stories. Continuous fiberboard structural sheathing shall be permitted on any wall line. When continuous fiberboard structural sheathing is used on only a selected wall line or lines, all other braced wall lines on the same story shall be either Method 4 or fiberboard structural panel sheathing. The bracing amounts in Table R602.10.1 for Method 4 shall be permitted to be multiplied by a factor of 0.9 for walls with a maximum opening height that does not exceed 85 percent of the wall height, or a factor of 0.8 for walls with a maximum opening height that does not exceed 67 percent of the wall height.

Continuous fiberboard structural sheathing braced wall lines shall be provided with a minimum of 2-foot length fiberboard structural panel at both sides of a corner at the ends of a braced wall line and shall be constructed in accordance with Figure R602.10.5.

**Exception:** In lieu of the 2-foot fiberboard structural sheathing corner return, a tie-down device shall be fastened to the stud at the edge of the braced wall panel closest to the corner and to the foundation or framing below. The tie-down device shall be capable of providing an allowable uplift design value of at least 1800 lb (816.5 kg). The tie down device shall be installed in accordance with the manufacturers' recommendation.

(Renumber existing Section R602.10.5)

### 2. Delete Figure R602.10.5 and substitute as follows:



**Reason:** The purpose of this change is to clarify the code in instances where continuous structural fiberboard sheathing is used as a wall bracing method.

Since the 2000 IRC was published, there has been a series of changes to this section which have been construed caused confusion among builders and code officials. Addition of a new section for fiberboard based on recent discussions on using continuous sheathing clarifies at least part of the issue.

Equivalency to other bracing methods is established in Table R602.10.1. The reduction factors requested in the new section are consistent with and were established in the 2000 IRC Section R602.10.5. For further information on the performance of fiberboard structural sheathing consult the test reports cited in the bibliography.

A coordinated change to Figure R602.10.5 is submitted to broaden the use of the figure for fiberboard structural panel sheathing and wood structural panel sheathing braced wall panel construction method.

**Cost Impact:** The code change proposal will not increase the cost of construction.

Public Hearing: Committee: AS AM D  
 Assembly: ASF AMF DF

## RB220-06/07

### R602.10.6.1, Table R602.10.6

**Proponent:** Randall Shackelford, Simpson Strong-Tie Co.

#### Revise as follows:

**R602.10.6.1 Alternate braced wall panels.** Alternate braced wall lines constructed in accordance with one of the following provisions shall be permitted to replace each 4 feet (1219 mm) of braced wall panel as required by Section R602.10.4. The maximum height and minimum width of each panel shall be in accordance with Table R602.10.6:

1. In one-story buildings, each panel shall be sheathed on one face with 3/8-inch-minimum-thickness (10mm) wood structural panel sheathing nailed with 8d common or galvanized box nails spaced in accordance with Table R602.3(1) and blocked at all wood structural panel sheathing edges. Two anchor bolts installed in accordance with Figure R403.1(1) shall be provided in each panel. Anchor bolts shall be placed 6-12 inches from each end of the plate at panel quarter points. Each panel end stud shall have a tie-down device fastened to the foundation, capable of providing an uplift capacity in accordance with Table R602.10.6. The tie down device shall be installed in accordance with the manufacturer's recommendations. The panels shall be supported directly on a foundation or on floor framing supported directly on a foundation which is continuous across the entire length of the braced wall line. This foundation shall be reinforced with not less than one No. 4 bar top and bottom. When the continuous foundation is required to have a depth greater than 12 inches (305mm), a minimum 12-inch-by-12-inch (305mm by 305mm) continuous footing or turned down slab edge is permitted at door openings in the braced wall line. This continuous footing or turned down slab edge shall be reinforced with not less than one No. 4 bar top and bottom. This reinforcement shall be lapped 15 inches (381mm) with the reinforcement required in the continuous foundation located directly under the braced wall line.
2. In the first story of two-story buildings, each braced wall panel shall be in accordance with Item 1 above, except that the wood structural panel sheathing shall be installed on both faces, sheathing edge nailing spacing shall not exceed 4 inches (102mm) on center, at least three anchor bolts shall be placed at one fifth points.

TABLE R602.10.6  
 MINIMUM WIDTHS AND TIE-DOWN FORCES OF ALTERNATE BRACED WALL PANELS

SEISMIC DESIGN CATEGORY AND WINDSPEED	TIE-DOWN FORCE (lb)	HEIGHT OF BRACED WALL PANEL				
		<u>Minimum</u> Sheathed Width				
		8 ft. 2' - 4"	9 ft. 2' - 8"	10 ft. <del>2' - 8"</del> 2'-10"	11 ft. 3' - 2"	12 ft. 3' - 6"
SDC A, B, and C Windspeed < 110 mph	R602.10.6.1, Item 1	1800	1800	1800	2000	2200
	R602.10.6.1, Item 2	3000	3000	3000	3300	3600
SDC D <sub>0</sub> , D <sub>1</sub> and D <sub>2</sub> Windspeed < 110 mph		<u>Minimum</u> Sheathed Width				
		2' - 8"	2' - 8"	<del>2' - 8"</del> 2'-10"	Note a	Note a
		R602.10.6.1, Item 1	1800	1800	1800	—
	R602.10.6.1, Item 2	3000	3000	3000	—	—

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Not permitted because maximum height is 10 feet.