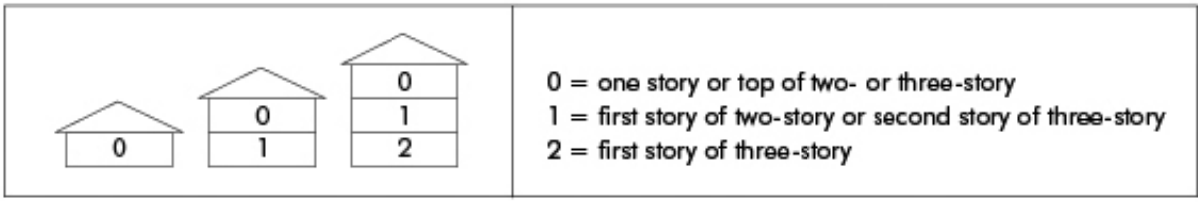
TABLE R602.10.1(1)[a,b,c] (Supp)
WALL BRACING

SEISMIC DESIGN CATEGORY (SDC) OR WIND SPEED	STORIES ABOVE BRACED WALL LINE[d]	METHOD OF BRACING PERMITTED	PERCENTAGE OF FULL-HEIGHT BRACING PER WALL LINE		MAXIMUM SPACING BETWEEN BRACED WALL LINES (FT)
			For Method 3 and continuous sheathing methods~~Bracing~~	For other methods permitted [e]	
SDC A and B (S_s 0.35g and S_{ds} 0.33g), . 100 mph	0	Methods 1-8	16%	16%	35 (See Section R602.10.1.4 for exceptions)
	1	Methods 1-8	16%	25%	
	2	Methods 2-8	25%	35%	
SDC C (S_s 0.6g and S_{ds} 0.53g), < 110 mph	0	Methods 1-8	16%	25%	
	1	Methods 2-8	30%	45%	
	2	Methods 2-8	45%	60%	
SDC D_0 & D_1 (S_s 1.25g and S_{ds} 0.83g), < 110 mph	0	Methods 2-8	20%	30%	25 (See Section R602.10.1.4.1 for exceptions)
	1	Methods 2-8	45%	60%	
	2	Methods 2-8	60%	85%	
SDC D_2, < 110 mph	0	Methods 2-8	25%	40%	
	1	Methods 2-8	55%	75%	
	Cripple wall	Method 3	75%	Not Permitted	

a. Wall bracing percentages are based on a soil site class "D." Interpol ation of bracing percentage between the S_{ds} values associated with the Seismic Design Categories shall be permitted when a site-specific S_{ds} value is determined in accordance with Section 1613.5 of the *International Building Code*.
b. Foundation cripple wall panels shall be braced in accordance with Section R602.10.8.
c. Methods of bracing shall be as described in Sections R602.10.2 and R602.10.4.1. The alternate braced wall panels described in Section R602.10.3.2 shall also be permitted
d. Stories above braced wall line. 0 = one story or top of two or three story. 1 = first story of two story or second story of three story. 2 = first story of three story.



e. Method 1 bracing exempt from percentage bracing requirement.

TABLE R602.10.1(2) (Supp)
ADJUSTMENT FACTORS TO THE PERCENTAGE OF REQUIRED WALL BRACING [a]

ADJUSTMENT BASED ON:			MULTIPLY PERCENTAGE OF BRACING PER WALL LINE BY:	APPLIES TO:
Story height[b] (Section 301.3)		≤10 ft	1.0	All bracing methods - R602.10.2 and R602.10.4.1
		>10 ≤ 12 ft	1.2	
Braced wall line spacing in SDC A-C[b,d]		≤35 ft	1.0	
		> 35 ≤ 50 ft	1.43	
Wall dead load[e]		> 8 ≤ 15	1.0	
		≤8 psf	0.85	
Roof/ceiling dead load for wall supporting [b,c]:	roof only or roof plus one story	≤15 psf	1.0	
	roof only	> 15 psf ≤ 25 psf	1.1	
	roof plus one story	> 15 psf ≤ 25 psf	1.2	
Walls with stone or masonry veneer in SDC C-D_2		See Section R703.7, Exception 1-4		
Cripple walls		See Section R602.10.8		

a. The total percentage of bracing required for a given wall line is the product of all applicable adjustment factors.
b. Linear interpolation shall be permitted.
c. Bracing required for a site's wind speed shall not be adjusted for dead load.
d. Braced wall line spacing in excess of 35-ft shall be in accordance with R602.10.1.4.
e. The adjusted percentage of bracing shall not be less than that required for the site's wind speed.

R602.10.3 (Supp) Minimum length of braced panels. For Methods 2, 3, 4, 6, 7 and 8 above, each braced wall panel shall be at least 48 inches (1219 mm) in length, covering a minimum of three stud spaces where studs are spaced 16 inches (406 mm) on center and covering a minimum of two stud spaces where studs are spaced 24 inches (610 mm) on center. For Method 5 above, each braced wall panel and shall be at least 96 inches (2438 mm) in length where applied to one face of a braced wall panel and at least 48 inches (1219 mm) where applied to both faces. For Methods 2, 3, 4, 6, 7 and 8, for purposes of computing the percentage of panel bracing required in Table R602.10.1(1), the effective length of the braced wall panel shall be equal to the actual length of the panel. When Method 5 panels are applied to only one face of a braced wall panel, bracing percentages required in Table R602.10.1(1) for Method 5 shall be doubled.

Exceptions:

1. Lengths of braced wall panels for continuous ~~wood structural panel~~ sheathing methods shall be in accordance with ~~Section~~ Table R602.10.4.2.
2. Lengths of alternate braced wall panels shall be in accordance with Section R602.10.3.2.1 or Section R602.10.3.2.2.
3. For Methods 2, 3, 4, 6, 7 and 8 in Seismic Design Categories A, B, and C: Panels between 36 inches and 48 inches in length shall be permitted to count towards the required percentage of bracing in Table R602.10.1(1), and the effective contribution shall comply with Table R602.10.3.

TABLE R602.10.3 (Supp)
EFFECTIVE LENGTHS FOR BRACE WALL PANELS LESS THAN 48 INCHES IN ACTUAL LENGTH
(BRACE METHODS 2, 3, 4, 6, 7, AND 8[a]

	Effective Length of Braced Wall Panel (inches)		
Actual Length of Braced Wall Panel (inches)	8-foot Wall Height	9-foot Wall Height	10-foot Wall Height
48	48	48	48
42	36	36	N/A
36	27	N/A	N/A

For SI: 1 inch = 25.4mm
Interpolation shall be permitted.

2. Delete and substitute as follows:

~~**R602.10.4 (Supp) Continuously-sheathed braced wall line using Method 3 (wood structural panel).** Continuously sheathed braced wall lines using wood structural panels shall comply with this section. Different bracing methods shall not be permitted within a continuously sheathed braced wall line. Other bracing methods prescribed by this code shall be permitted on other braced wall lines on the same story level or on different story levels of the building.~~

~~**Exception:** All exterior braced wall lines shall be continuously sheathed where required by Section R602.10.4.7.~~

~~**R602.10.4.1 (Supp) Continuously-sheathed braced wall line requirements.** Continuously-sheathed braced wall line shall be in accordance with Figure R602.10.4(1) and 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 the braced wall percentage in accordance with Table R602.10.1(1).~~

~~**FIGURE R602.10.4(1) (Supp)**~~
~~**CONTINUOUSLY-SHEATHED BRACED WALL LINE**~~

~~**R602.10.4.2 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 R602.10.4.2.~~

~~**TABLE R602.10.4.2 (Supp)**~~
~~**LENGTH REQUIREMENTS FOR BRACED WALL PANELS**~~
~~**IN A CONTINUOUSLY SHEATHED WALL [a]**~~
~~**MINIMUM LENGTH OF BRACED WALL PANEL**~~

~~For SI: 1 inch = 25.4 mm, 1 foot = 305 mm~~
~~a. Interpolation shall be permitted.~~

R602.10.4.3 (Supp) 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 (610 mm) wood structural panel corner return shall be provided at both ends of a continuously-sheathed braced wall line in accordance with Figure R602.10.4.3(1). 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 in accordance with Figure R602.10.4.3(2).

Exception: The first braced wall panel shall be permitted to begin 12 feet 6 inches (3810 mm) from each end of the braced wall line in Seismic Design Categories A, B, and C and 8 feet in Seismic Design Categories D_0, D_1, and D_2 provided one of the following is satisfied:

1. A minimum 2-foot-long (610 mm), full-height wood structural panel is provided at both sides of a corner constructed in accordance with Figure R602.10.4.3(1) at the braced wall line ends in accordance with Figure R602.10.4.3(3), 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 (36 kg) fastened to the stud at the edge of the braced wall panel closest to the corner and to the foundation or framing below in accordance with Figure R602.10.4.3(4).

FIGURE R602.10.4.3(1) (Supp)
TYPICAL EXTERIOR CORNER FRAMING FOR CONTINUOUS STRUCTURAL PANEL SHEATHING SHOWING REQUIRED STUD-TO-STUD NAILING

FIGURE R602.10.4.3(2) (Supp)
CONTINUOUSLY SHEATHED BRACED WALL LINE – WITHOUT CORNER RETURN

FIGURE R602.10.4.3(3) (Supp)
CONTINUOUSLY SHEATHED BRACED WALL LINE – FIRST BRACED WALL PANEL AWAY FROM END OF WALL LINE WITHOUT TIE DOWN

FIGURE R602.10.4.3(4) (Supp)
CONTINUOUSLY SHEATHED BRACED WALL LINE – FIRST BRACED WALL PANEL AWAY FROM END OF WALL LINE WITH TIE DOWN

R602.10.4.4 (Supp) Braced wall percentage. In addition to bracing percentage adjustments specified elsewhere in this code, the braced wall percentages for Method 3 from Table 602.10.1(1) shall be permitted to be multiplied by a factor in accordance with Table R602.10.4.4.

TABLE R602.10.4.4 (Supp)
ADJUSTMENT FACTORS TO THE PERCENTAGE OF REQUIRED BRACING PER WALL LINE –CONTINUOUSLY SHEATHED

a. Percentage of bracing for continuous wood structural panel sheathing shall be based on Method 3 requirements.

R602.10.4.5 (Supp) 4:1 aspect ratio segments at garage door openings used with continuous structural panel sheathing. A 4:1 aspect ratio shall be permitted for full height sheathed wall segments on either side of garage openings that support light frame roofs only, with roof covering dead loads of 3 psf (0.14 kN/m^2) or less. For purposes of calculating the percentage of panel bracing required by Table R602.10.1(1), the length of the full height sheathing segment shall be equal to its measured length. This option is limited to one wall of the garage.

R602.10.4.6 (Supp) 6:1 aspect ratio segments used with continuous structural panel sheathing. Wall segments having a maximum 6:1 height to width ratio shall be permitted to be built in accordance with Figure R602.10.4.6 The maximum 6:1 height-to-width ratio is based on height being measured from top of header to the bottom of the wall segment bottom plate. For purposes of calculating the percentage of panel bracing required by Table R602.10.1(1), the width of the full-height sheathing segment shall be equal to its measured width. Corners at the ends of walls using this option shall be constructed in accordance with Figure R602.10.4.3(1). The reduction factors for continuously braced walls from Section R602.10.4.4 shall be applied when calculating applicable percentages of wall bracing. The number of wall segments having a maximum 6:1 height to width ratio in a wall line shall not exceed four. In multi-story buildings, wall segments having a maximum 6:1 height to width ratio are not permitted to be directly stacked vertically. For purposes of resisting wind pressures acting perpendicular to the wall, in accordance with Section R301.2, the minimum requirements of Figure R602.10.4.6 shall be sufficient for wind speeds less than 110 mph in Exposure Category B. For Exposure Categories C and D, the header to jack stud strap requirements and the number of additional jack studs shall be in accordance with Table R602.10.4.6.

R602.10.4.7 (Supp) Continuously-sheathed braced wall lines. Where a continuously-sheathed braced wall line is used in Seismic Design Categories D_0, D_1, and D_2 or regions where the basic wind speed exceeds 100 miles per hour, all other exterior braced wall lines in the same story shall be continuously sheathed.

~~**FIGURE R602.10.4.6 (Supp)**~~
~~**WALLS WITH 6:1 ASPECT RATIO USED WITH CONTINUOUS WOOD STRUCTURAL PANEL SHEATHING**~~

~~**TABLE R602.10.4.6 (Supp)**~~
~~**HEADER TO JACK STUD STRAP AND THE NUMBER OF ADDITIONAL JACK STUDS REQUIRED FOR RESISTING WIND PRESSURES PERPENDICULAR TO 6:1 ASPECT RATIO WALLS LOCATED IN WIND EXPOSURE CATEGORIES C AND D**~~

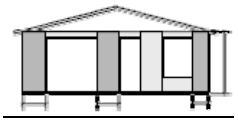
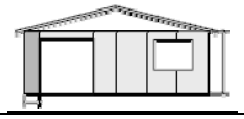
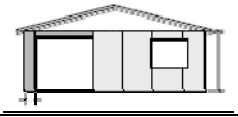
~~a. If 2x6 framing is used, then the required strap capacity may be multiplied by 0.65, but in no case shall the required strap capacity be less than 1,000 lb.~~
~~b. If 2x6 framing is used, then no additional framing shall be required.~~

R602.10.4 Continuous sheathing. Braced wall lines with continuous sheathing shall be constructed in accordance with this section. All braced wall lines along exterior walls on the same story shall be continuously sheathed.

Exception: Within Seismic Design Categories A, B, and C or in regions where the basic wind speed is less than or equal to 100 mph, other bracing methods prescribed by this code shall be permitted on other braced wall lines on the same story level or on any braced wall line on different story levels of the building.

R602.10.4.1 Continuous sheathing braced wall panels. Continuous sheathing methods require structural panel sheathing to be used on all sheathable surfaces on one side of a braced wall line including areas above and below openings and gable end walls. Braced wall panels shall be constructed in accordance with one of the methods listed in Table R602.10.4.1. Different bracing methods, other than those listed in Table R602.10.4.1, shall not be permitted along a braced wall line with continuous sheathing.

TABLE R602.10.4.1
CONTINUOUS SHEATHING METHODS

METHOD	MATERIAL	MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA
CS-WSP	Wood structural panel	3/8"		6d common (2"x0.113") nails at 6" spacing (panel edges) and at 12" spacing (intermediate supports) or 16 ga. x 1-3/4 staples: at 3" spacing (panel edges) and 6" spacing (intermediate supports)
CS-G	Wood structural panel adjacent to garage openings and supporting roof load only[a,b]	3/8"		See Method CS-WSP
CS-PF	Continuous portal frame	See Section R602.10.4.1.1		See Section R602.10.4.1.1

For SI: 1 inch = 25.4 mm
a. Applies to one wall of a garage only.
b. Roof covering dead loads shall be 3 psf (0.14 kN/m^2) or less

R602.10.4.1.1 Continuous portal frame. Continuous portal frame braced wall panels shall be constructed in accordance with Figure R602.10.4.1.1. The number of continuous portal frame panels in a single braced wall line shall not exceed four. Continuous portal frame panels shall not be permitted to be directly stacked vertically in multi-story buildings. For purposes of resisting wind pressures acting perpendicular to the wall, in accordance with Section R301.2, the minimum requirements of Figure R602.10.4.1.1 shall be sufficient for wind speeds less than 110 mph in Exposure Category B. For Exposure Categories C and D, the header to jack stud strap requirements and the number of additional jack studs shall be in accordance with Table R602.10.4.1.1.

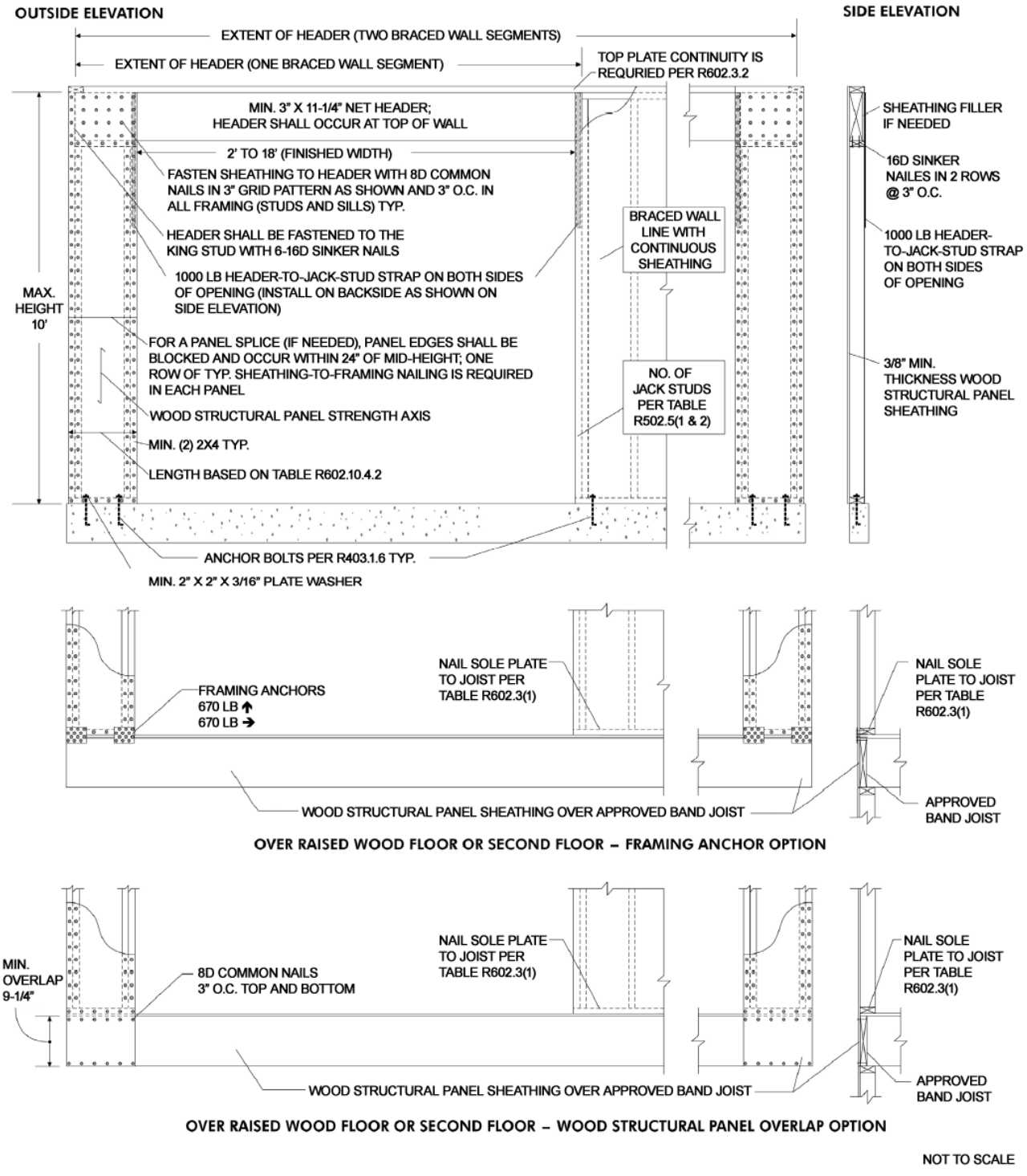


FIGURE R602.10.4.1.1
METHOD CS-PF: CONTINUOUS PORTAL FRAME PANEL CONSTRUCTION

TABLE R602.10.4.1.1
HEADER TO JACK STUD STRAP AND THE NUMBER OF ADDITIONAL JACK STUDS REQUIRED FOR RESISTING WIND PRESSURES PERPENDICULAR TO CONTINUOUS PORTAL FRAME PANELS LOCATED IN WIND EXPOSURE CATEGORIES C AND D

Required	Wall Height (ft)	Wind Exposure Category C			Wind Exposure Category D		
		85 mph	90 mph	less than 110 mph	85 mph	90 mph	less than 110 mph
Strap Capacity(lb)[a]	10 and less	1000	1200	2275	1375	1750	3050
Number of additional 2x4 Jack Studs[b]	8	--	--	--	--	--	1
	9	--	--	1	--	1	2
	10	--	1	2	1	2	3

a. If 2x6 framing is used, then the required strap capacity may be multiplied by 0.65, but in no case shall the required strap capacity be less than 1,000 lb.
b. If 2x6 framing is used, then no additional framing shall be required.

R602.10.4.2 Length of braced wall panels with continuous sheathing. Braced wall panels along a braced wall line with continuous sheathing shall be full-height with a length based on the adjacent clear opening height in accordance with Table R602.10.4.2 and Figure R602.10.4.2. Within a braced wall line when a panel has an opening on either side of differing heights, the taller opening height shall be used to determine the panel length from Table R602.10.4.2. For Method CS-PF, wall height shall be measured from the top of the header to the bottom of the bottom plate as shown in Figure R602.10.4.1.1.

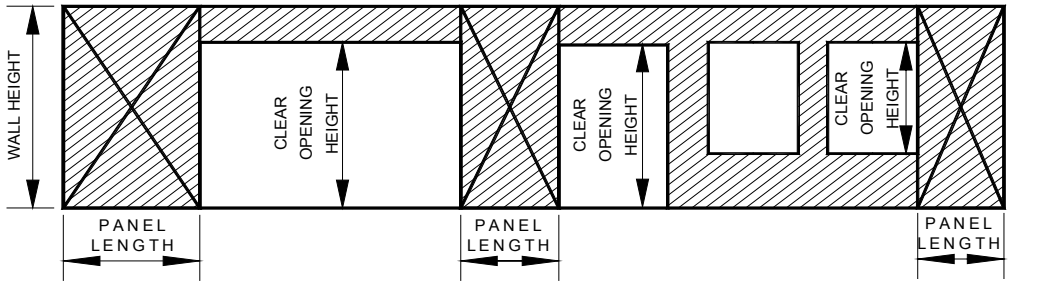


FIGURE R602.10.4.2
BRACED WALL PANELS WITH CONTINUOUS SHEATHING

TABLE R602.10.4.2
LENGTH REQUIREMENTS FOR BRACED WALL PANELS WITH CONTINUOUS SHEATING [a]

METHOD	ADJACENT CLEAR OPENING HEIGHT	WALL HEIGHT		
		8'	9'	10'
CS-WSP	64"	24"	27"	30"
	68"	26"	27"	30"
	72"	28"	27"	30"
	76"	29"	30"	30"
	80"	31"	33"	30"
	84"	35"	36"	33"
	88"	39"	39"	36"
	92"	44"	42"	39"
	96"	48"	45"	42"
	100"		48"	45"
	104"		51"	48"
	108"		54"	51"
	112"			54"
	116"			57"
	120"			60"
CS-G	≤ 120"	24"	27"	30"
CS-PF	≤ 120"	16"	18"	20"

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm
a. Interpolation shall be permitted.

R602.10.4.3 Percentage of bracing for continuous sheathing. Braced wall lines with continuous sheathing shall be provided with braced wall panels in the percentage required in Table R602.10.1(1). Only those full-height braced wall panels complying with the length requirements of Table R602.10.4.2 shall be permitted to contribute towards the minimum required percentage of bracing. In addition to bracing percentage adjustments specified elsewhere in this code, the braced wall percentages from Table 602.10.1(1) shall be permitted to be multiplied by a factor in accordance with Table R602.10.4.3.

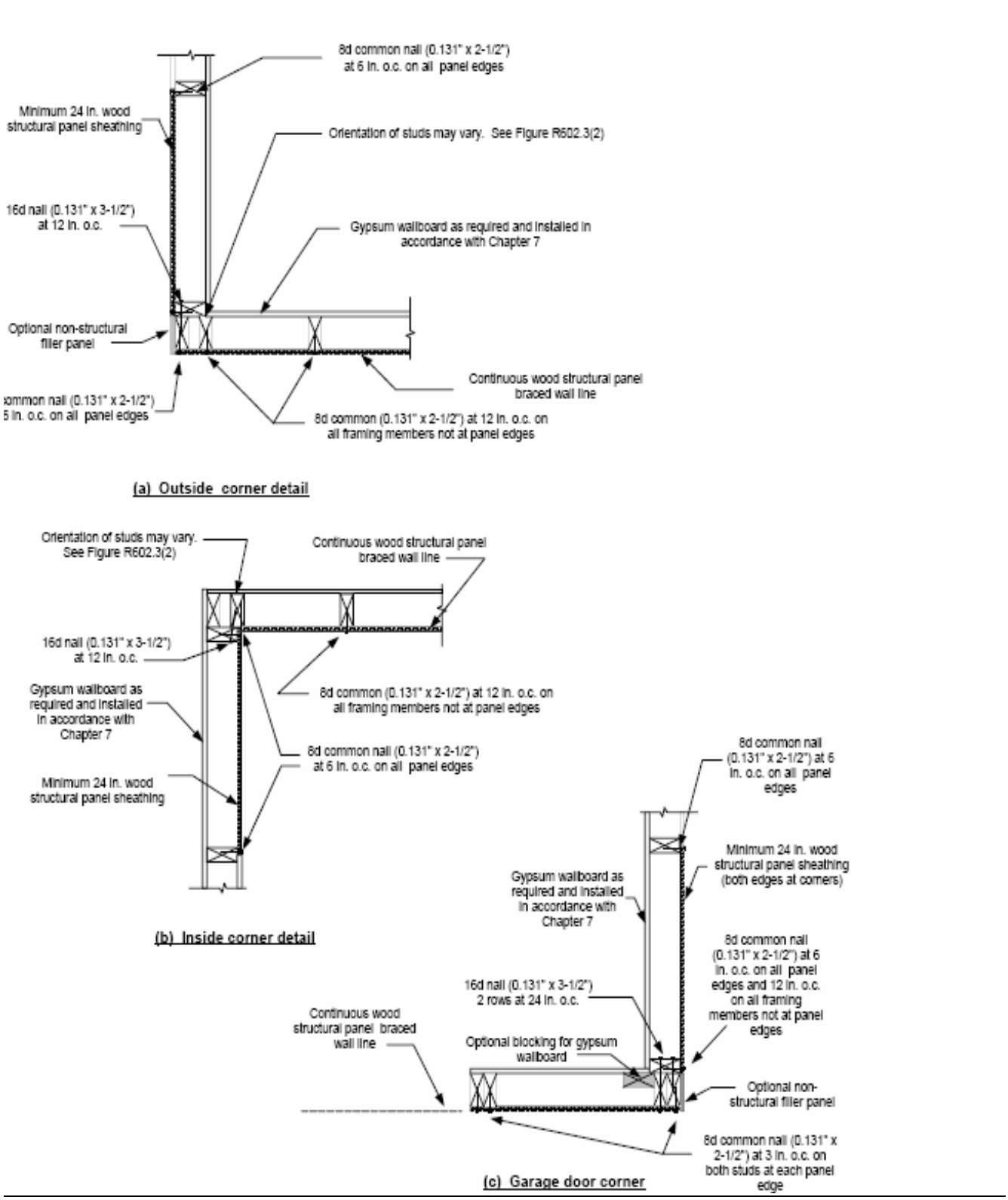
TABLE R602.10.4.3
ADJUSTMENT FACTORS TO THE PERCENTAGE OF REQUIRED BRACING PER BRACED WALL LINE WITH CONTINUOUS SHEATHING

MAXIMUM CLEAR OPENING HEIGHT IN A BRACED WALL LINE	ADJUSTMENT FACTOR
85% of wall height	0.9
67% of wall height	0.8

R602.10.4.4 Braced wall panel location and corner construction. For all continuous sheathing methods, full-height braced wall panels complying with the length requirements of Table R602.10.4.2 shall be located at each end of a braced wall line with continuous sheathing and at least every 25 feet (7620 mm) on center. A minimum 24 inch (610 mm) wood structural panel corner return shall be provided at both ends of a braced wall line with continuous sheathing in accordance with Figures R602.10.4.4(1) and R602.10.4.4(2). In lieu of the corner return, a hold-down device with a minimum uplift design value of 800 lb (3560 N) shall be fastened to the corner stud and to the foundation or framing below in accordance with Figure R602.10.4.4(3).

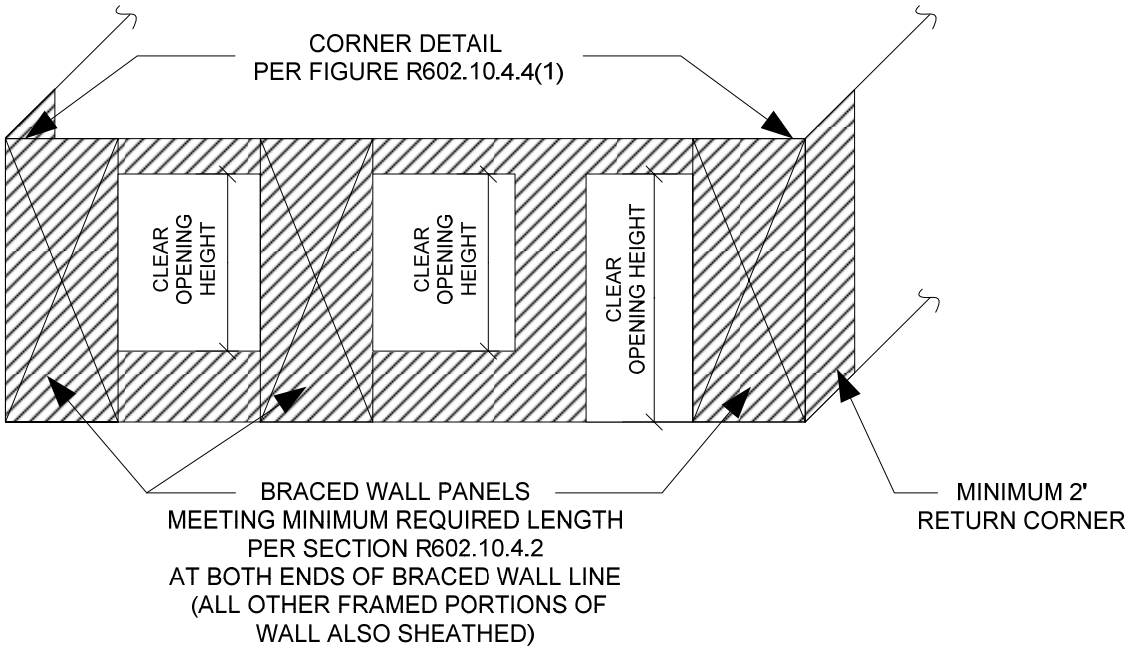
Exception: The first braced wall panel shall be permitted to begin 12.5 feet (3810 mm) from each end of the braced wall line in Seismic Design Categories A, B, and C and 8 feet (2438 mm) in Seismic Design Categories D_0, D_1, and D_2 provided one of the following is satisfied:

1. A minimum 24 inch (610 mm) long, full-height wood structural panel is provided at both sides of a corner constructed in accordance with Figure R602.10.4.4(1) at the braced wall line ends in accordance with Figure R602.10.4.4(4), or
2. The braced wall panel closest to the corner shall have a hold-down device with a minimum uplift design value of 800 lb (3560 N) fastened to the stud at the edge of the braced wall panel closest to the corner and to the foundation or framing below in accordance with Figure R602.10.4.4(5).



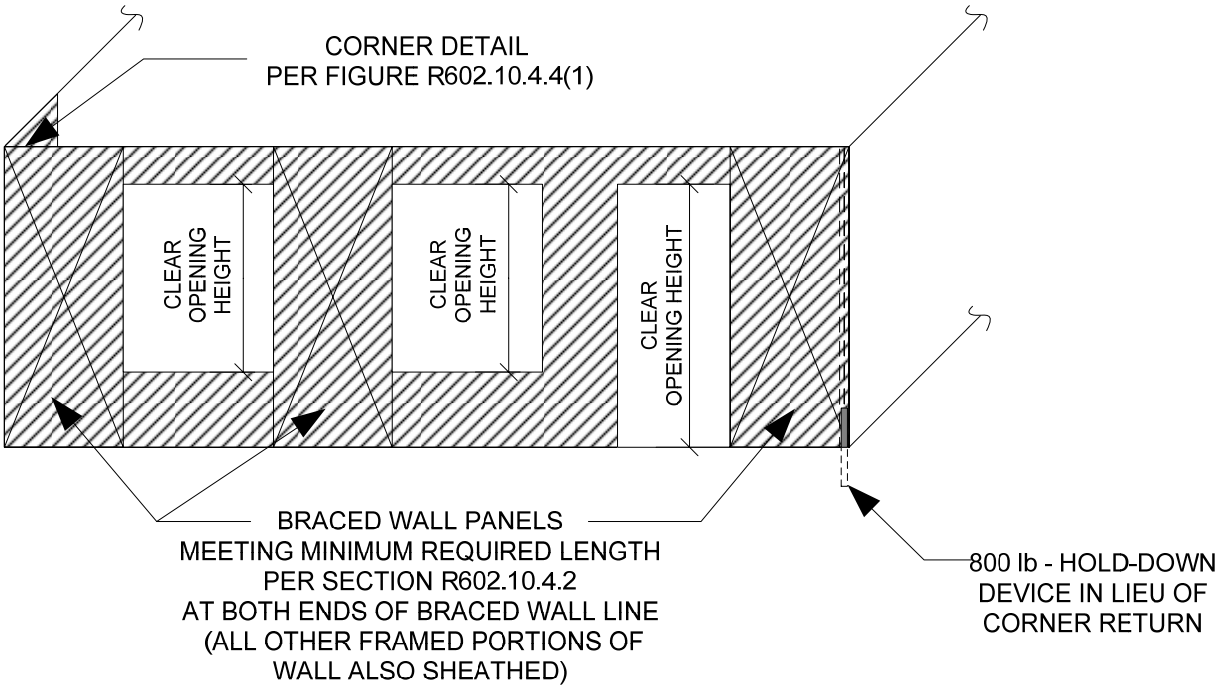
For SI: 1 inch = 25.4 mm, 1 foot = 305 mm

FIGURE R602.10.4.4(1)
TYPICAL EXTERIOR CORNER FRAMING FOR CONTINUOUS SHEATHING



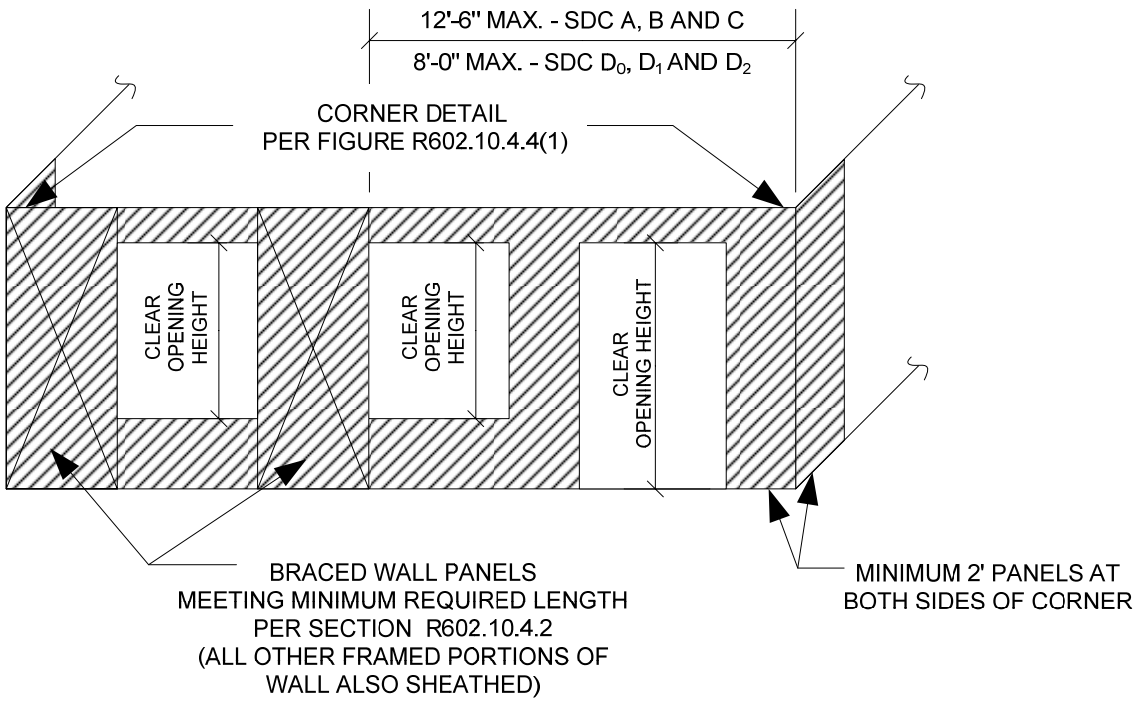
For SI: 1 foot = 305 mm

FIGURE R602.10.4.4(2)
BRACED WALL LINE WITH CONTINUOUS SHEATHING
WITH CORNER RETURN PANEL



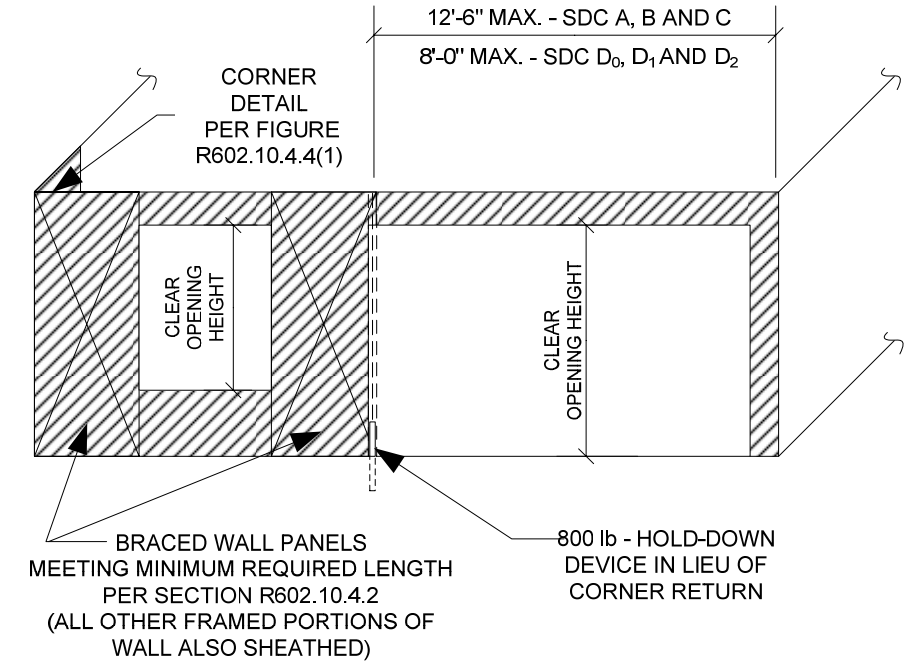
For SI: 1 inch = 25.4 mm, 1 pound = 4.45 N

FIGURE R602.10.4.4(3)
BRACED WALL LINE WITH CONTINUOUS SHEATHING
WITHOUT CORNER RETURN PANEL



For SI: 1 inch = 25.4 mm

FIGURE R602.10.4.4(4)
BRACED WALL LINE WITH CONTINUOUS SHEATHING – FIRST BRACED WALL PANEL AWAY FROM END OF WALL LINE WITHOUT TIE DOWN



For SI: 1 foot = 305 mm, 1 pound = 4.45 N

FIGURE R602.10.4.4(5)
BRACED WALL LINE WITH CONTINUOUS SHEATHING – FIRST BRACED WALL PANEL AWAY FROM END OF WALL LINE WITH TIE-DOWN

Reason: The ICC Ad-Hoc Committee on Wall Bracing is proposing fourteen technical and non-technical code changes as we work through the process of making Section R602.10 of the 2009 IRC technically correct and easier to understand. The individual code changes are designed to stand alone if necessary, but the total body of work is respectively submitted as a comprehensive continuation of cycle 1 changes for the 2009 IRC. To see how the individual changes are intended to meld together, please visit the ICC web site, and review the composite document on the Ad hoc Committee on Wall Bracing page: http://www.iccsafe.org/cs/cc/ahc-wb/index.html.

This is a technical change to provide:

-The continuous sheathing methods with distinct names, abbreviations and descriptions,

-A table for determining the minimum panel length of bracing required when the panel is adjacent to a door or window,

In many areas of the county, the continuous sheathing method is the predominant avenue designers take to comply with the wall bracing provisions of R602.10. Nationwide, designers have complained that the continuous sheathing section is too complicated and doesn't provide enough flexibility. To address the confusion and clearly differentiate bracing options, we have:

-Expanded the separation of "intermittent" bracing from the "continuous" method,

-Enumerated the continuous wood structural panel methods (with a table similar to the one we created in the "intermittent" code change proposal) by giving each method its own identity, CS-WSP, CS-G and CS-PF

-Coordinated the corner bracing drawings with the new nomenclature,

The flow of the section now provides a list of methods, similar to the "intermittent" Methods 1-8, and elevates the garage panels and portal frame alternates to individual continuous sheathing methods. The change also severs the relationship between Method 3 and continuous sheathing. In the future, as new continuous methods are available, the table can be expanded to incorporate them easily into the code.

Users also expressed frustration with the percentage table (Table R602.10.5 in the 2006 IRC and Table R602.10.4.2 in the 2007 Supplement) and the calculations necessary to obtain a simple panel length. The new Table R602.10.4.2 computes the panel length required when a panel is adjacent to a door or window.

Text and drawings have been added to numerous sections to clean up or clarify provisions that were merely implied in the previous text.

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

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

RB145–07/08

R602.10.1.1

Proponent: Chuck Bajnai, Chesterfield County, VA, representing the ICC Ad Hoc Committee on Wall Bracing

Revise as follows:

R602.10.1.1 (Supp) Percentage of bracing. The percentage of bracing along each braced wall line shall be in accordance with Table R602.10.1(1) and shall be the greater of that required by the Seismic Design Category or the design wind speed. Adjustments to the percent of braced wall specified in Table R602.10.1(1) shall be as specified in Table R602.10.1(2). Only walls that are parallel to the braced wall line may be counted towards the bracing requirement of that line.

Reason: The ICC Ad-Hoc Committee on Wall Bracing is proposing fourteen technical and non-technical code changes as we work through the process of making Section R602.10 of the 2009 IRC technically correct and easier to understand. The individual code changes are designed to stand alone if necessary, but the total body of work is respectively submitted as a comprehensive continuation of cycle 1 changes for the 2009 IRC. To see how the individual changes are intended to meld together, please visit the ICC web site, and review the composite document on the Ad hoc Committee on Wall Bracing page: http://www.iccsafe.org/cs/cc/ahc-wb/index.html.

This is a non-technical change to clarify that walls perpendicular to the braced wall line do not contribute towards the bracing requirement of that braced wall line.

This code change corrects a misinterpretation that has been used in several jurisdictions and some say has been given legitimacy by a formal ICC interpretation. Only the bracing panels that are parallel to the braced wall line resist the lateral forces associated with the wind and seismic loads. Sections of the wall that are perpendicular to the wall line direction are being loaded in out-of-plane bending rather than racking shear. These perpendicular segments do contribute to tying the building together so that the panels parallel to the wall line act together, they do not actively resist the lateral load in the direction of the wall line.

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

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

RB146–07/08
Table R602.10.1(1)

Proponent: Jay H. Crandell, PE, ARES Consulting, representing the Foam Sheathing Coalition

Revise table as follows:

TABLE R602.10.1(1)[a,b,c] (Supp)
WALL BRACING

SEISMIC DESIGN CATEGORY (SDC) OR WIND SPEED	STORIES ABOVE BRACED WALL LINE[d]	METHOD OF BRACING PERMITTED	PERCENTAGE OF FULL-HEIGHT BRACING PER WALL LINE		MAXIMUM SPACING BETWEEN BRACED WALL LINES (FT)
			For Method 3 Bracing	For other methods permitted [e,f]	

a. through e. (No change)

f. When Method 5 braced wall panels installed in accordance with Section R602.10.2 are fastened at 4 inches (102 mm) on center at panel edges, including top and bottom plates, and are blocked at all horizontal joints, the required bracing percentage for wind loading only shall be permitted to be multiplied by 0.7. In no instance shall the bracing percentage be less than 16%.

Reason: This change proposal recognizes the benefit of increasing fastening and blocking requirements for Method 5 bracing. However, the adjustment to bracing amount is limited to wind bracing requirements only. The 0.7 adjustment factor is based on the ratio of design values for gypsum board bracing in the NDS standard supplement *Special Design Provisions for Wind and Seismic*. For example,

- nominal shear value = 200 plf (7"oc edge fastening, unblocked)
- nominal shear value = 300 plf (4"oc edge fastening, blocked)

Therefore, 200 plf / 300 plf ≈ 0.7

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

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

RB147–07/08
R202, R602.10.1, R602.10.1.3, R602.10.1.4, Figure R602.10.1.4 (New)

Proponent: Chuck Bajnai, Chesterfield County, VA, representing the ICC Ad Hoc Committee on Wall Bracing

1. Revise as follows:

SECTION R202
GENERAL DEFINITIONS

ASPECT RATIO. The ratio of longest to shortest perpendicular dimensions, or for wall sections, the ratio of height to length. ~~width (h/w) of a shear wall. The shear wall height is the maximum clear height from top of foundation or diaphragm to bottom of diaphragm framing above and the shear wall width is the sheathed dimension in the direction of applied force on the shear wall~~.

BRACED WALL LINE. A straight line through the building plan that represents the location of the lateral resistance provided by the wall bracing ~~series of braced wall panels in a single story constructed in accordance with Section R602.10 for wood framing or Section R603.7 or R301.1.1 for cold-formed steel framing to resist racking from seismic and wind forces~~.

BRACED WALL PANEL. A full-height section of ~~a braced wall line~~ wall constructed to resist in-plane shear loads through interaction of framing members, sheathing material, and anchors. The panel's length meets the requirements of its particular bracing method, and contributes toward the total amount of bracing required along its braced wall line in accordance with Section R602.10.1. ~~in accordance with Section R602.10 for wood framing or Section R603.7 or R301.1.1 for cold-formed steel framing, which extend the full height of the wall.~~

R602.10.1 (Supp) Braced wall lines. Braced wall lines, both interior and exterior, shall be provided with braced wall panels in the percentage and location specified in this section. The length of a braced wall line shall be measured as the distance between the ends of the wall line. The end of a braced wall line shall be considered to be either

The intersection with perpendicular exterior walls or projection thereof.
The intersection with perpendicular braced wall lines.
The end of the braced wall line shall be chosen such that the maximum length results.

Braced wall panels shall be in accordance with one of the bracing methods specified in Section R602.10.2, the alternate braced wall method of Section R602.10.3.2, or the continuous structural panel sheathing method of Section R602.10.4. Bracing method shall be permitted to vary as follows:

1. Variation in bracing method from story to story is permitted.
2. Variation in bracing method from braced wall line to braced wall line within a story is permitted, except that continuous structural panel sheathing shall conform to the additional requirements of Section R602.10.4.
3. In Seismic Design Categories A and B, and detached dwellings in Seismic Design Category C, variation in bracing method within a braced wall line is permitted. The required sheathing percentage for the braced wall line with mixed sheathing types shall have the higher bracing percentage, in accordance with Table R602.10.1(1), of all types of bracing used. Wall lines using continuous wood structural panel sheathing shall conform to the additional requirements of Section R602.10.4.

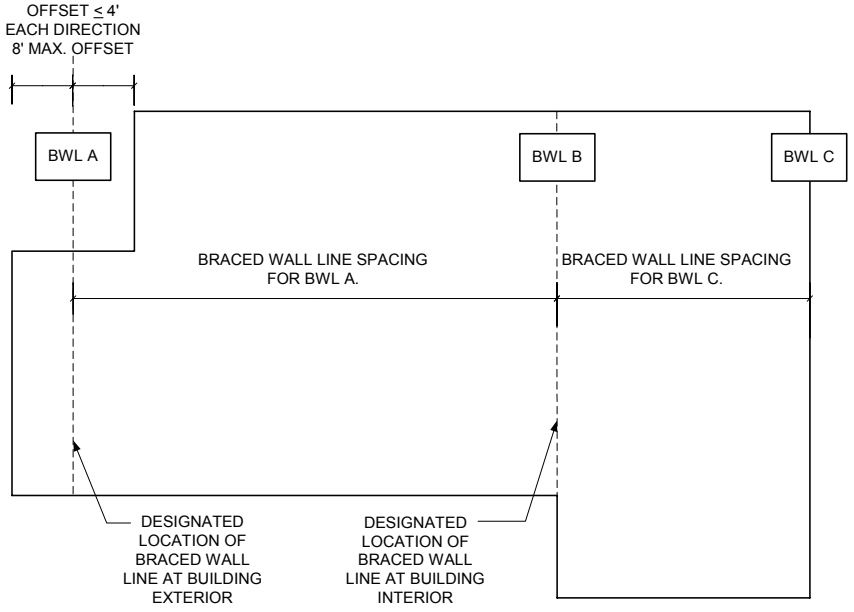
R602.10.1.3 (Supp) Braced wall panel location. Braced wall panels shall be located in accordance with Table R602.10.1(1) and Figure R602.10.1.3(1). Braced wall panels shall be located at least every 25 feet on center and shall begin no more than 12.5 feet (3810 mm) from each end of a braced wall line in accordance with Section R602.10.1 and Figure R602.10.1.3(2). Braced wall panels may be offset out-of-plane up to 4 feet (1219 mm) from the designated braced wall line provided that the total out-to-out offset of braced wall panels in ~~any~~ a braced wall line is not more than 8 feet (2438 mm) in accordance with Figure R602.10.1.3(3). All braced wall panels within a braced wall line shall be permitted to be offset from the designated braced wall line.

R602.10.1.4 (Supp) Braced wall line spacing. Spacing of braced wall lines shall not exceed 35 feet (10 668 mm) on center in both the longitudinal and transverse direction in each story. Braced wall line spacing shall be measured as the maximum distance to any adjacent parallel braced wall line. See Figure R602.10.1.4.

Exception: Spacing of braced wall lines not exceeding 50 feet (15 240 mm) shall be permitted where:

1. The wall bracing provided equals or exceeds the percentage of bracing required by Table R602.10.1(1) multiplied by a factor equal to the braced wall line spacing divided by 35 feet (10 668 mm), and
2. The length-to-width ratio for the floor/roof diaphragm as measured between braced wall lines does not exceed 3:1.

2. Add new figure as follows:



NOTE: BRACED WALL SPACING FOR BWL B IS THE GREATER OF THE DISTANCE FROM BWL A TO BWL B OR FROM BWL B TO BWL C.

FIGURE R602.10.1.4
BRACED WALL LINE SPACING

Reason: The ICC Ad-Hoc Committee on Wall Bracing is proposing fourteen technical and non-technical code changes as we work through the process of making Section R602.10 of the 2009 IRC technically correct and easier to understand. The individual code changes are designed to stand alone if necessary, but the total body of work is respectively submitted as a comprehensive continuation of cycle 1 changes for the 2009 IRC. To see how the individual changes are intended to meld together, please visit the ICC web site, and review the composite document on the Ad hoc Committee on Wall Bracing page: http://www.iccsafe.org/cs/cc/ahc-wb/index.html.

This change represents the Committee's best interpretation regarding length, location and spacing of braced wall lines, and to clarify some definitions that deal with braced wall panels and braced wall lines.

One of the items that the ICC Ad Hoc Committee on Wall Bracing identified as being in need of clarification is the length and spacing of braced wall panels. The existing definitions of braced wall lines and panels are circular, so that each refers to the other in its definition. The existing definition of aspect ratio refers to shear walls, but except for masonry walls, the IRC does not use shear walls, it uses braced wall panels. Braced wall length and spacing are not currently specifically defined. Without these new definitions, it is difficult to consistently determine the length and spacing of braced wall lines. If the length and spacing of braced wall lines can not be determined, the amount of bracing required can not be determined.

At their meeting on July 13, 2007, the ICC Ad Hoc Committee on Wall Bracing developed these definitions of aspect ratio, braced wall lines, braced wall panels, length of braced wall lines and spacing of braced wall lines. We believe these definitions result in the most accurate application of the braced wall amounts in the IRC.

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

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

RB148–07/08

R602.10.1, R602.10.1.1, R602.10.1.2, Table R602.10.1(1), Table R602.10.1(2) (New), Table R602.10.1(2), Table R602.10.1(3), R602.10.1.4, R602.10.1.4.1,, Table R602.10.1.4.1, R602.10.2.1, R602.10.3, Table R602.3(1), R602.10.2, R602.10.4.1, R602.10.4.4, Table R602.10.4.4, R602.10.4.5, R602.10.4.6, R602.10.7, R602.10.8

Proponent: Chuck Bajnai, Chesterfield County, VA, representing the ICC Ad Hoc Committee on Wall Bracing

1. Revise Sections R602.10.1, R602.10.1.1, and R602.10.1.2 as follows and add a new table R602.10.1(1):

R602.10.1 (Supp) Braced wall lines. Braced wall lines~~, both interior and exterior,~~ shall be provided in accordance with this section. ~~with braced wall panels in the percentage and location specified in this section.~~

Braced wall panels shall be in accordance with one of the bracing methods specified in Section R602.10.2, the alternate braced wall method of Section R602.10.3.2, or the continuous structural panel sheathing method of Section R602.10.4. Bracing method shall be permitted to vary as follows:

1. Variation in bracing method from story to story is permitted.
2. Variation in bracing method from braced wall line to braced wall line within a story is permitted, except that continuous structural panel sheathing shall conform to the additional requirements of Section R602.10.4.
3. In Seismic Design Categories A and B, and detached dwellings in Seismic Design Category C, variation in bracing method within a braced wall line is permitted. The ~~required sheathing~~ ~~percentage~~ length of required bracing for the braced wall line with mixed sheathing types shall have the higher bracing ~~percentage~~ length requirement, in accordance with Tables R602.10.1(1) and R602.10.1(2), of all types of bracing used. Wall lines using continuous wood structural panel sheathing shall conform to the additional requirements of Section R602.10.4.

R602.10.1.1 (Supp) ~~Percentage~~ Length of bracing. The ~~percentage~~ length of bracing along each braced wall line shall be in accordance with Tables R602.10.1(1) and R602.10.1(2)and shall be the greater of that required by the design wind speed ~~Seismic Design Category~~ or the ~~design wind speed~~ Seismic Design Category. Adjustments to the ~~percent~~ length of braced wall specified in Tables R602.10.1(1) and R602.10.1(2) shall be as specified in Table R602.10.1(~~2~~ 3)

R602.10.1.2 (Supp) Angled corners. At corners, braced wall lines shall be permitted to angle out of plane up to 45 degrees with a maximum diagonal length of 8 feet (2438 mm). When determining the ~~percentage~~ length of bracing required, the length of each braced wall line shall be determined as shown in Figure R602.10.1.2. The placement of bracing for the braced wall lines shall begin at the point where the braced wall line, which contains the angled wall adjoins the adjacent braced wall line (Point A as shown in Figure R602.10.1.2). Where an angled corner is constructed at an angle equal to 45 degrees and the diagonal length is no more than 8 feet (2438 mm) in length, the angled wall may be considered as part of either of the adjoining braced wall lines, but not both. Where the diagonal length is greater than 8 feet (2438 mm), it shall be considered its own braced wall line and be braced in accordance with Section R602.10.1 and methods in Section R602.10.2.

2. Delete and substitute as follows:

TABLE R602.10.1(1)[a,b,c] (Supp)
WALL BRACING

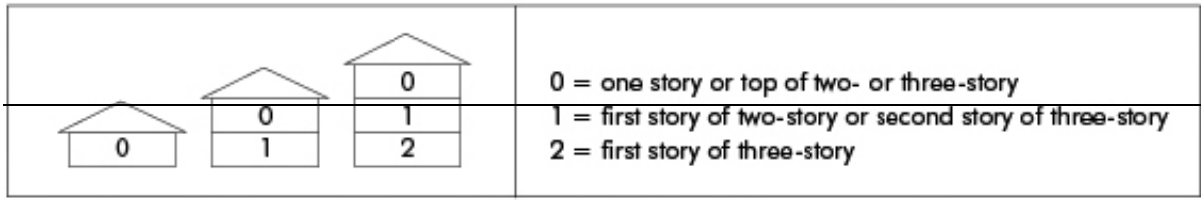
SEISMIC DESIGN CATEGORY (SDC) OR WIND SPEED	STORIES ABOVE BRACED WALL LINE[d]	METHOD OF BRACING PERMITTED	PERCENTAGE OF FULL HEIGHT BRACING PER WALL LINE		MAXIMUM SPACING BETWEEN BRACED WALL LINES (FT)
			For Method 3 Bracing	For other methods permitted[e]	
SDC A and B (S_s 0.35g and S_{ds} 0.33g), 100 mph	0	Methods 1-8	16%	16%	35 (See Section R602.10.1.4 for exceptions)
	1	Methods 1-8	16%	25%	
	2	Methods 2-8	25%	35%	
SDC C (S_s 0.6g and S_{ds} 0.53g), < 110 mph	0	Methods 1-8	16%	25%	
	1	Methods 2-8	30%	45%	
	2	Methods 2-8	45%	60%	
SDC D_0 & D_1 (S_s 1.25g and S_{ds} 0.83g), < 110 mph	0	Methods 2-8	20%	30%	25 (See Section R602.10.1.4.1 for exceptions)
	1	Methods 2-8	45%	60%	
	2	Methods 2-8	60%	85%	
SDC D_2, < 110 mph	0	Methods 2-8	25%	40%	
	1	Methods 2-8	55%	75%	
	Cripple wall	Method 3	75%	Not Permitted	

a. Wall bracing percentages are based on a soil site class "D." Interpolation of bracing percentage between the S_{ds} values associated with the Seismic Design Categories shall be permitted when a site-specific S_{ds} value is determined in accordance with Section 1613.5 of the *International Building Code*.

b. Foundation cripple wall panels shall be braced in accordance with Section R602.10.8.

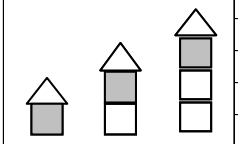
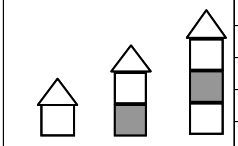
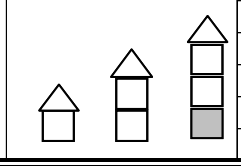
c. Methods of bracing shall be as described in Section R602.10.2. The alternate braced wall panels described in Section R602.10.3.2 shall also be permitted

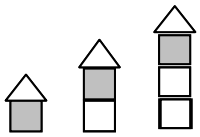
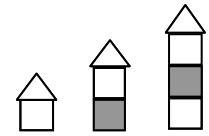
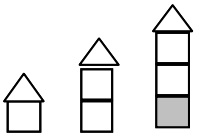
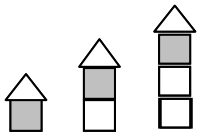
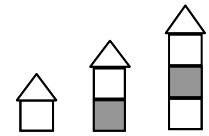
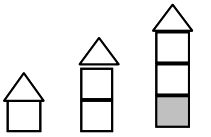
d. Stories above braced wall line. 0 = one story or top of two or three story. 1 = first story of two story or second story of three story. 2 = first story of three story.

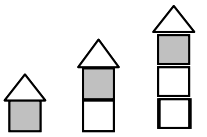
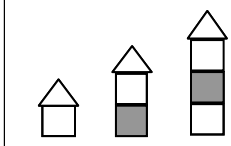
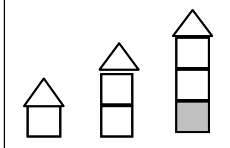


e. Method 1 bracing exempt from percentage bracing requirement.

TABLE R602.10.1(1)[a,b,c,d]
BRACING REQUIREMENTS BASED ON WIND
(A FUNCTION OF BRACED WALL LINE SPACING)
Minimum Total Length (feet) of Braced Wall Panels Required each Braced Wall Line

Exposure B mrh= 30' Eave to ridge =10 wall height = 10' 2 BWL							
Wind Speed	Location	BWL Spacing	Method 1	Method 5[f] (double sided)	Methods[e,g] 2,3,4,6,7,8	Cont Sheathing (85% opening)	Cont Sheathing (65% opening)
≤85 MPH		10	6.9	6.9	3.9	3.5	3.1
		15	9.9	9.9	5.7	5.1	4.5
		20	12.9	12.9	7.3	6.6	5.9
		25	15.7	15.7	9.0	8.1	7.2
		30	18.5	18.5	10.6	9.5	8.5
		35	21.4	21.4	12.2	11.0	9.8
		40	24.2	24.2	13.8	12.4	11.0
		45	26.9	26.9	15.4	13.9	12.3
		50	29.7	29.7	17.0	15.3	13.6
		10	9.4	9.4	5.4	5.1	4.8
		15	13.6	13.6	7.8	7.4	7.0
		20	17.6	17.6	10.0	9.5	9.0
		25	21.5	21.5	12.3	11.7	11.1
		30	25.4	25.4	14.5	13.8	13.0
		35	29.2	29.2	16.7	15.8	15.0
		40	33.0	33.0	18.9	17.9	17.0
		45	36.8	36.8	21.1	20.0	18.9
		50	40.6	40.6	23.2	22.1	20.9
		10	NP	10.8	6.2	6.2	6.2
		15	NP	15.6	8.9	8.9	8.9
		20	NP	20.2	11.5	11.5	11.5
		25	NP	24.7	14.1	14.1	14.1
		30	NP	29.1	16.6	16.6	16.6
		35	NP	33.5	19.1	19.1	19.1
		40	NP	37.9	21.7	21.7	21.7
		45	NP	42.3	24.2	24.2	24.2
		50	NP	46.7	26.7	26.7	26.7

≤ 90 MPH		10	7.7	7.7	4.4	4.0	3.5
		15	11.1	11.1	6.4	5.7	5.1
		20	14.4	14.4	8.2	7.4	6.6
		25	17.6	17.6	10.1	9.1	8.1
		30	20.8	20.8	11.9	10.7	9.5
		35	23.9	23.9	13.7	12.3	10.9
		40	27.1	27.1	15.5	13.9	12.4
		45	30.2	30.2	17.3	15.5	13.8
		50	33.3	33.3	19.0	17.1	15.2
		10	10.5	10.5	6.0	5.7	5.4
		15	15.2	15.2	8.7	8.3	7.8
		20	19.7	19.7	11.3	10.7	10.1
		25	24.1	24.1	13.8	13.1	12.4
		30	28.4	28.4	16.2	15.4	14.6
		35	32.7	32.7	18.7	17.8	16.8
		40	37.0	37.0	21.2	20.1	19.0
		45	41.3	41.3	23.6	22.4	21.2
		50	45.6	45.6	26.0	24.7	23.4
		10	NP	12.1	6.9	6.9	6.9
		15	NP	17.5	10.0	10.0	10.0
		20	NP	22.6	12.9	12.9	12.9
		25	NP	27.6	15.8	15.8	15.8
		30	NP	32.6	18.6	18.6	18.6
		35	NP	37.6	21.5	21.5	21.5
		40	NP	42.5	24.3	24.3	24.3
		45	NP	47.4	27.1	27.1	27.1
		50	NP	52.3	29.9	29.9	29.9
≤ 100 MPH		10	9.5	9.5	5.4	4.9	4.4
		15	13.8	13.8	7.9	7.1	6.3
		20	17.8	17.8	10.2	9.2	8.1
		25	21.8	21.8	12.4	11.2	9.9
		30	25.7	25.7	14.7	13.2	11.7
		35	29.6	29.6	16.9	15.2	13.5
		40	33.4	33.4	19.1	17.2	15.3
		45	37.3	37.3	21.3	19.2	17.0
		50	41.1	41.1	23.5	21.2	18.8
		10	13.0	13.0	7.4	7.1	6.7
		15	18.8	18.8	10.8	10.2	9.7
		20	24.3	24.3	13.9	13.2	12.5
		25	29.7	29.7	17.0	16.1	15.3
		30	35.1	35.1	20.1	19.0	18.0
		35	40.4	40.4	23.1	21.9	20.8
		40	45.7	45.7	26.1	24.8	23.5
		45	51.0	51.0	29.1	27.7	26.2
		50	56.3	56.3	32.1	30.5	28.9
		10	NP	14.9	8.5	8.5	8.5
		15	NP	21.6	12.3	12.3	12.3
		20	NP	27.9	16.0	16.0	16.0
		25	NP	34.1	19.5	19.5	19.5
		30	NP	40.3	23.0	23.0	23.0
		35	NP	46.4	26.5	26.5	26.5
		40	NP	52.5	30.0	30.0	30.0
		45	NP	58.5	33.4	33.4	33.4
		50	NP	64.6	36.9	36.9	36.9

< 110 MPH		10	11.3	11.3	6.5	5.8	5.2
		15	16.4	16.4	9.3	8.4	7.5
		20	21.1	21.1	12.1	10.9	9.7
		25	25.8	25.8	14.8	13.3	11.8
		30	30.5	30.5	17.4	15.7	13.9
		35	35.1	35.1	20.1	18.1	16.1
		40	39.7	39.7	22.7	20.4	18.2
		45	44.3	44.3	25.3	22.8	20.3
		50	48.9	48.9	27.9	25.1	22.3
		10	15.5	15.5	8.8	8.4	8.0
		15	22.4	22.4	12.8	12.1	11.5
		20	28.9	28.9	16.5	15.7	14.9
		25	35.3	35.3	20.2	19.2	18.2
		30	41.7	41.7	23.8	22.6	21.4
		35	48.0	48.0	27.4	26.1	24.7
		40	54.3	54.3	31.0	29.5	27.9
		45	60.6	60.6	34.6	32.9	31.2
		50	66.8	66.8	38.2	36.3	34.4
		10	NP	17.7	10.1	10.1	10.1
		15	NP	25.7	14.7	14.7	14.7
		20	NP	33.2	19.0	19.0	19.0
		25	NP	40.6	23.2	23.2	23.2
		30	NP	47.8	27.3	27.3	27.3
		35	NP	55.1	31.5	31.5	31.5
		40	NP	62.3	35.6	35.6	35.6
		45	NP	69.5	39.7	39.7	39.7
		50	NP	76.7	43.8	43.8	43.8

a. Bracing values are based upon an assumption of 10ft high walls and 10 ft eave to ridge height.

b. Wind exposure B and a 30' mean roof height. For other conditions, multiply required bracing length by one of the following factors:

No. of Stories in Bldg	Mean Roof, ht h	Exposure/Height Factors, λ	
		Exp B	Exp C
1	15	1.0	1.2
2	22.5	1.0	1.3
3	30	1.0	1.4

c. Wall height of 10 feet for all stories. For maximum 9-foot wall heights, multiply table values by 0.95. For maximum 8-foot wall heights, multiply table values by 0.9. For maximum 12-foot wall heights, multiply table values by 1.1.

d. Two braced wall lines sharing load in a given plan direction on a given story level. For a different number of braced wall lines in a given plan direction, multiply required bracing length by one of the following:

No. of BWLs	Adjustment Factor
2	1
3	1.3
4	1.45
5	1.6

e. GWB finish (or equivalent) applied to the inside face of a brace wall panel. When GWB finish (or equivalent) is not applied to inside face of BWP, multiply table values by one of the following factors:

Bracing Method	Multiply Required Bracing Amount by:
Method 1	1.8
Method 2-8	1.4

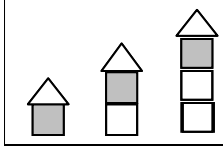
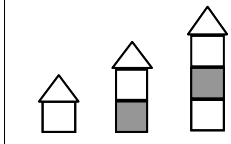
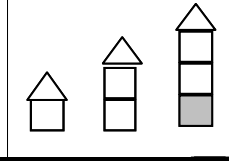
f. Bracing amounts for Method 5 are based on application of GWB on both faces of a BWP. When Method 5 Bracing is used on only side of the wall, the required bracing amounts shall be doubled.

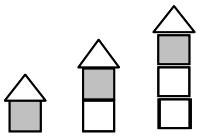
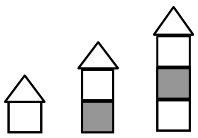
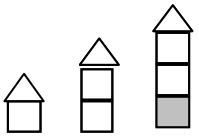
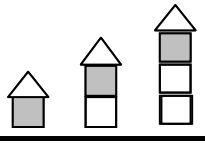
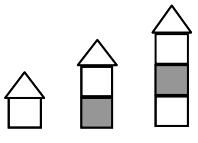
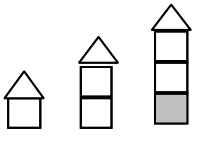
g. Method 1 bracing shall have gypsum wallboard attached to at least one side according to the Section R602.10.2 Method 5 requirements.

3. Add new table as follows:

TABLE R602.10.1(2)[a,b,c]
BRACING REQUIREMENTS BASED ON SEISMIC DESIGN CATEROGY
(A FUNCTION OF BRACED WALL LINE LENGTH)
Minimum Total Length (feet) of Braced Wall Panels Required of Braced Wall Line

Soil Class D
Wall Height = 10 ft
10 psf floor dead load
15 psf roof/ceiling dead load
1 BWL
BWL Spacing ≤ 25 ft

Seismic Design Category	Location	BWL Length	Method 1	Methods 2,4,5,6,7,8	Method 3	Cont Sheathing (85% Opening)	Cont. Sheathing (65% Opening)
SDC A and B, and Detached Dwellings in C		**Exempt from Seismic Requirements** Use Table R602.10.1(1) for bracing requirements					
SDC C		10.0	2.5	2.5	1.6	1.4	1.3
		15.0	3.8	3.8	2.4	2.2	1.9
		20.0	5.0	5.0	3.2	2.9	2.6
		25.0	6.3	6.3	4.0	3.6	3.2
		30.0	7.5	7.5	4.8	4.3	3.8
		35.0	8.8	8.8	5.6	5.0	4.5
		40.0	10.0	10.0	6.4	5.8	5.1
		45.0	11.3	11.3	7.2	6.5	5.8
		50.0	12.5	12.5	8.0	7.2	6.4
		10.0	NP	4.5	3.0	2.7	2.4
		15.0	NP	6.8	4.5	4.1	3.6
		20.0	NP	9.0	6.0	5.4	4.8
		25.0	NP	11.3	7.5	6.8	6.0
		30.0	NP	13.5	9.0	8.1	7.2
		35.0	NP	15.8	10.5	9.5	8.4
		40.0	NP	18.0	12.0	10.8	9.6
		45.0	NP	20.3	13.5	12.2	10.8
		50.0	NP	22.5	15.0	13.5	12.0
		10.0	NP	6.0	4.5	4.1	3.6
		15.0	NP	9.0	6.8	6.1	5.4
		20.0	NP	12.0	9.0	8.1	7.2
		25.0	NP	15.0	11.3	10.1	9.0
		30.0	NP	18.0	13.5	12.2	10.8
		35.0	NP	21.0	15.8	14.2	12.6
		40.0	NP	24.0	18.0	16.2	14.4
		45.0	NP	27.0	20.3	18.2	16.2
		50.0	NP	30.0	22.5	20.3	18.0

SDC D0 or D1		10.0	NP	3.0	2.0	1.8	1.6
		15.0	NP	4.5	3.0	2.7	2.4
		20.0	NP	6.0	4.0	3.6	3.2
		25.0	NP	7.5	5.0	4.5	4.0
		30.0	NP	9.0	6.0	5.4	4.8
		35.0	NP	10.5	7.0	6.3	5.6
		40.0	NP	12.0	8.0	7.2	6.4
		45.0	NP	13.5	9.0	8.1	7.2
		50.0	NP	15.0	10.0	9.0	8.0
		10.0	NP	6.0	4.5	4.1	3.6
		15.0	NP	9.0	6.8	6.1	5.4
		20.0	NP	12.0	9.0	8.1	7.2
		25.0	NP	15.0	11.3	10.1	9.0
		30.0	NP	18.0	13.5	12.2	10.8
		35.0	NP	21.0	15.8	14.2	12.6
		40.0	NP	24.0	18.0	16.2	14.4
		45.0	NP	27.0	20.3	18.2	16.2
		50.0	NP	30.0	22.5	20.3	18.0
		10.0	NP	8.5	6.0	5.4	4.8
		15.0	NP	12.8	9.0	8.1	7.2
		20.0	NP	17.0	12.0	10.8	9.6
		25.0	NP	21.3	15.0	13.5	12.0
		30.0	NP	25.5	18.0	16.2	14.4
		35.0	NP	29.8	21.0	18.9	16.8
		40.0	NP	34.0	24.0	21.6	19.2
		45.0	NP	38.3	27.0	24.3	21.6
		50.0	NP	42.5	30.0	27.0	24.0
SDC D_2		10.0	NP	4.0	2.5	2.3	2.0
		15.0	NP	6.0	3.8	3.4	3.0
		20.0	NP	8.0	5.0	4.5	4.0
		25.0	NP	10.0	6.3	5.6	5.0
		30.0	NP	12.0	7.5	6.8	6.0
		35.0	NP	14.0	8.8	7.9	7.0
		40.0	NP	16.0	10.0	9.0	8.0
		45.0	NP	18.0	11.3	10.1	9.0
		50.0	NP	20.0	12.5	11.3	10.0
		10.0	NP	7.5	5.5	5.0	4.4
		15.0	NP	11.3	8.3	7.4	6.6
		20.0	NP	15.0	11.0	9.9	8.8
		25.0	NP	18.8	13.8	12.4	11.0
		30.0	NP	22.5	16.5	14.9	13.2
		35.0	NP	26.3	19.3	17.3	15.4
		40.0	NP	30.0	22.0	19.8	17.6
		45.0	NP	33.8	24.8	22.3	19.8
		50.0	NP	37.5	27.5	24.8	22.0
		10.0	NP	NP	NP	NP	NP
		15.0	NP	NP	NP	NP	NP
		20.0	NP	NP	NP	NP	NP
		25.0	NP	NP	NP	NP	NP
		30.0	NP	NP	NP	NP	NP
		35.0	NP	NP	NP	NP	NP
		40.0	NP	NP	NP	NP	NP
		45.0	NP	NP	NP	NP	NP
		50.0	NP	NP	NP	NP	NP

a. Wall bracing lengths are based on a soil site class "D." Interpolation of bracing length between the S_{ds} values associated with the Seismic Design Categories shall be permitted when a site-specific S_{ds} value is determined in accordance with Section 1613.5 of the *International Building Code*.

b. Foundation cripple wall panels shall be braced in accordance with Section R602.10.8.

c. Methods of bracing shall be as described in Section R602.10.2. The alternate braced wall panels described in Section R602.10.3.2 shall also be permitted

4. Revise Table R602.10.1(2) as follows:

TABLE R602.10.1(~~2~~ 3) (Supp)
ADJUSTMENT FACTORS TO THE ~~PERCENTAGE~~ LENGTH OF REQUIRED WALL BRACING [a]

ADJUSTMENT BASED ON:			MULTIPLY ~~PERCENTAGE~~ LENGTH OF BRACING PER WALL LINE BY:	APPLIES TO:
Story height[b] (Section 301.3)		≤ 10 ft	1.0	All bracing methods - R602.10.2
		> 10 ≤ 12 ft	1.2	
Braced wall line spacing in SDC A-C[b,d]		≤ 35 ft	1.0	
		> 35 ≤ 50 ft	1.43	
Wall dead load[e]		> 8≤ 15 psf	1.0	
		≤ 8 psf	0.85	
Roof/ceiling dead load for wall supporting [b,c]:	roof only or roof plus one story	≤ 15 psf	1.0	
	roof only	> 15 psf ≤ 25 psf	1.1	
	roof plus one story	> 15 psf ≤ 25 psf	1.2	
Walls with stone or masonry veneer in SDC C-D_2		See Section R703.7, Exception 1-4		
Cripple walls		See Section R 602.10.8		

a. The total ~~percentage~~ length of bracing required for a given wall line is the product of all applicable adjustment factors.
b. Linear interpolation shall be permitted.
c. Bracing required for a site's wind speed shall not be adjusted for dead load.
d. Braced wall line spacing in excess of 35-ft shall be in accordance with R602.10.1.4.
e. The adjusted ~~percentage~~ length of bracing shall not be less than that required for the site's wind speed.

5. Delete Section R602.10.1.4, revise Section R602.10.1.4.1 and Table R602.10.1.4.1 as follows:

~~**R602.10.1.4 (Supp) Braced wall line spacing**. Spacing of braced wall lines shall not exceed 35 feet (10 668 mm) on center in both the longitudinal and transverse direction in each story.~~

~~**Exception:** Spacing of braced wall lines not exceeding 50 feet (15 240 mm) shall be permitted where:~~

~~1. The wall bracing provided equals or exceeds the percentage of bracing required by Table R602.10.1(1) multiplied by a factor equal to the braced wall line spacing divided by 35 feet (10 668 mm), and~~
~~2. The length-to-width ratio for the floor/roof diaphragm as measured between braced wall lines does not exceed 3:1.~~

R602.10.1.4.~~1~~ (Supp) Braced wall line spacing for Seismic Design Categories D_0, D_1 and D_2. Spacing between braced wall lines in each story shall not exceed 25 feet (7620 mm) on center in both the longitudinal and transverse directions.

Exception: In one-and two-story buildings, spacing between two adjacent braced wall lines shall not exceed 35 feet (10 668 mm) on center in order to accommodate one single room not exceeding 900 square feet (84 m^2) in each dwelling unit. Spacing between all other braced wall lines shall not exceed 25 feet (7 620 mm). A spacing of 35 feet (10 668 mm) or less shall be permitted between braced wall lines where the length of wall bracing required by Table R602.10.1(~~1~~ 2) is multiplied by the appropriate adjustment factor from Table R602.10.1.4.~~1~~, the length-to-width ratio for the floor/roof diaphragm does not exceed 3:1, and the top plate lap splice face nailing shall be twelve 16d nails on each side of the splice.

TABLE R602.10.1.4.1 (Supp)
ADJUSTMENTS OF BRACING ~~PERCENTAGE~~ LENGTH FOR BRACED WALL LINES GREATER THAN 25 FEET [a,b]

BRACED WALL LINE SPACING (feet)	MULTIPLY BRACING ~~PERCENTAGE~~ LENGTH IN TABLE R602.10.1(~~1~~ 2) BY:
25	1.0
30	1.2
35	1.4

For SI: 1 foot = 304.8 mm.
Notes:
a. Linear interpolation is permissible.
b. For an interior braced wall, the adjustment for the larger spacing between braced wall lines shall be used.

6. Revise Section R602.10.2.1 as follows:

R602.10.2.1 (Supp) Braced wall panel interior finish material. Braced wall panels shall have gypsum wall board installed on the side of the wall opposite the bracing material. Gypsum wall board shall be not less than ½ inch (12.7 mm) in thickness and be fastened in accordance with Table R702.3.5 for interior gypsum wall board.

Exceptions:

1. Wall panels that are braced in accordance with Method 5.
2. Wall panels that are braced in accordance with Section R602.10.3.2 .
3. When an approved interior finish material with an in-plane shear resistance equivalent to gypsum board is installed.
4. For Methods 2, 3, 4, 6, 7, and 8, gypsum wall board is permitted to be omitted provided the ~~percentage~~ length of bracing in Tables R602.10.1(1) and R602.10.1(2) is multiplied by a factor of 1.5.

7. Revise Section R602.10.3 as follows:

R602.10.3 (Supp) Minimum length of braced panels. For Methods 2, 3, 4, 6, 7 and 8 above, each braced wall panel shall be at least 48 inches (1219 mm) in length, covering a minimum of three stud spaces where studs are spaced 16 inches (406 mm) on center and covering a minimum of two stud spaces where studs are spaced 24 inches (610 mm) on center. For Method 5 above, each braced wall panel and shall be at least 96 inches (2438 mm) in length where applied to one face of a braced wall panel and at least 48 inches (1219 mm) where applied to both faces. For Methods 2, 3, 4, 6, 7 and 8, for purposes of computing the ~~percentage~~ length of panel bracing required in Tables R602.10.1(1) and R602.10.1(2), the effective length of the braced wall panel shall be equal to the actual length of the panel. When Method 5 panels are applied to only one face of a braced wall panel, bracing ~~percentages~~ lengths required in Tables R602.10.1(1) and R602.10.1(2) for Method 5 shall be doubled.

Exceptions:

1. Lengths of braced wall panels for continuous wood structural panel sheathing shall be in accordance with Section R602.10.4.
2. Lengths of alternate braced wall panels shall be in accordance with Section R602.10.3.2.1 or Section R602.10.3.2.2.
3. For Methods 2, 3, 4, 6, 7 and 8 in Seismic Design Categories A, B, and C: Panels between 36 inches and 48 inches in length shall be permitted to count towards the required ~~percentage~~ length of bracing in Tables R602.10.1(1) and R602.10.1(2), and the effective contribution shall comply with Table R602.10.3.

8. Revise Table R602.3(1) and Section R602.10.2 as follows:

Table R602.3(1) (Supp)
FASTENER SCHEDULE FOR STRUCTURAL MEMBERS

DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENERS[a,b,c]	SPACING OF FASTENERS	
1" brace to each stud and plate, face nail	2-8d (2 ½ " x 0.131" ~~0.113)~~ ~~2~~ 3 staples, 1 ¾"	--	
1" x 6" Sheathing to each bearing, face nail	2-8d (2 ½" x 0.131" ~~0.113"~~) ~~2~~ ~~staples~~ at each stud 3-8d (2 ½" x 0.131") at each plate	--	
1" x 8" Sheathing to each bearing, face nail	2-8d (2 ½" x 0.131" ~~0.113"~~) ~~2~~ ~~staples~~ at each stud 3-8d (2 ½" x 0.131") at each plate	--	
Wood structural panels, subfloor, roof and wall sheathing to framing, ~~and particleboard wall sheathing to framing~~			
3/8" -1/2"	6d common (2" x 0.113") nail (subfloor, wall 8d common (2 1/2" x 0.131") nail (roof)[f]	6	12[g]
19/32"-1"	8d common nail (2 1/2" x 0.131")	6	12[g]
1 1/8" – 1 1/4"	10d common (3" x 0.148") nail or 8d (2 1/2" x 0.131") deformed nail	6	12
Particleboard wall sheathing to framing			
3/8"	6d common nail (2" x 0.113")	4	6
3/8"-1/2"	8d common nail (2 ½" x 0.131")	4	6
½"-5/8"	10d common nail (3" x 0.148")	4	6

(Portions of table and footnotes not shown remain unchanged)

R602.10.2 (Supp) Braced wall panel construction methods. The construction of braced wall panels shall be in accordance with one of the following methods:

1. Nominal 1-inch-by-4-inch (19.1 mm by 88.9 mm) continuous diagonal braces let in to the top and bottom plates and the intervening studs or approved metal strap devices installed in accordance with the manufacturer's specifications. The let-in bracing shall be placed at an angle not more than 60 degrees (1.06 rad) or less than 45 degrees (0.79 rad) from the horizontal. Let-in brace shall be attached to studs in accordance with Table R602.3(1). Stud spacing shall not exceed 16: o.c.
2. Wood boards ~~of 5/8-inch (15.9 mm) net~~ of nominal 1" minimum thickness (3/4", 19 mm actual) applied diagonally on studs spaced a maximum of 24 inches (610 mm). Diagonal boards shall be attached to studs in accordance with Table R602.3(1).
3. Wood structural panel sheathing with a thickness not less than 3/8 inch (9.5 mm) for 16-inch (406 mm) or 24-inch (610 mm) stud spacing. Wood Structural panels shall be installed in accordance with Table R602.3(3) and Table R602.3(1).
4. One-half-inch (12.7 mm) or 25/32-inch (19.8 mm) thick structural fiberboard sheathing applied vertically or horizontally on studs spaced a maximum of 16 inches (406 mm) on center. Structural fiberboard sheathing shall be installed in accordance with Table R602.3(1).
5. Gypsum board with minimum ½-inch (12.7 mm) thickness placed on studs spaced a maximum of 24 inches (610 mm) on center and fastened at panel edges including top and bottom plates at 7 inches (178 mm) on center with the size nails specified in Table R602.3(1) for sheathing and Table R702.3.5 for interior gypsum board. Gypsum shall be attached to the studs and top and bottom plates for all braced wall panel locations
6. Particleboard wall sheathing panels installed in accordance with Table R602.3(4) and Table R602.3(1).
7. Portland cement plaster on studs spaced a maximum of 16 inches (406 mm) on center and installed in accordance with Section R703.6.
8. Hardboard panel siding when installed in accordance with Table R703.4.

Exception: Alternate braced wall panels constructed in accordance with Sections R602.10.3.2.1 or R602.10.3.2.2 shall be permitted to replace any braced wall panel in any of the above methods of braced wall panels.

9. Revise Sections R602.10.4.1and R602.10.4.4 as follows:

R602.10.4.1 (Supp) Continuously-sheathed braced wall line requirements. Continuously-sheathed braced wall line shall be in accordance with Figure R602.10.4(1) and 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 the braced wall ~~percentage~~ length in accordance with Tables R602.10.1(1) and R602.10.1(2).

R602.10.4.4 (Supp) Braced wall ~~percentage~~ length. In addition to bracing ~~percentage~~ length adjustments specified elsewhere in this code, the braced wall ~~percentages~~ lengths for continuously sheathed braced wall lines shall be in accordance with Tables R602.10.1(1) and R602.10.1(2). ~~Method 3 from Table 602.10.1(1) shall be permitted to be multiplied by a factor in accordance with Table R602.10.4.4.~~

~~**TABLE R602.10.4.4 (Supp)**~~
~~**ADJUSTMENT FACTORS TO THE PERCENTAGE OF REQUIRED BRACING PER WALL LINE –CONTINUOUSLY SHEATHED**~~

~~ADJUSTMENT BASED ON MAXIMUM WALL CLEAR OPENING HEIGHT:~~		~~MULTIPLY PERCENTAGE OF BRACING PER WALL LINE BY:~~
~~Continuous wood structural panel sheathing when maximum opening height in wall line does not exceed [a] (Section 301.2.2.2.1)~~	~~85% of wall height~~	~~0.9~~
	~~67% of wall height~~	~~0.8~~

~~a. Percentage of bracing for continuous wood structural panel sheathing shall be based on Method 3 requirements.~~

10. Revise Sections R602.10.4.5 and R602.10.4.6 as follows:

R602.10.4.5 (Supp) 4:1 aspect ratio segments at garage door openings used with continuous structural panel sheathing. A 4:1 aspect ratio shall be permitted for full-height sheathed wall segments on either side of garage openings that support light frame roofs only, with roof covering dead loads of 3 psf (0.14 kN/m^2) or less. For purposes of calculating the ~~percentage~~ length of panel bracing required by Table R602.10.1(1), the length of the full height sheathing segment shall be equal to its measured length. This option is limited to one wall of the garage.

R602.10.4.6 (Supp) 6:1 aspect ratio segments used with continuous structural panel sheathing. Wall segments having a maximum 6:1 height to width ratio shall be permitted to be built in accordance with Figure R602.10.4.6 The maximum 6:1 height-to-width ratio is based on height being measured from top of header to the bottom of the wall segment bottom-plate. For purposes of calculating the ~~percentage~~ length of panel bracing required by Tables R602.10.1(1) and R602.10.1(2), the width of the full-height sheathing segment shall be equal to its measured width. Corners at the ends of walls using this option shall be constructed in accordance with Figure R602.10.4.3(1). The reduction factors for continuously braced walls from Section R602.10.4.4 shall be applied when calculating applicable ~~percentages~~ lengths of wall bracing. The number of wall segments having a maximum 6:1 height to width ratio in a wall line shall not exceed four. In multi-story buildings, wall segments having a maximum 6:1 height to width ratio are not permitted to be directly stacked vertically. For purposes of resisting wind pressures acting perpendicular to the wall, in accordance with Section R301.2, the minimum requirements of Figure R602.10.4.6 shall be sufficient for wind speeds less than 110 mph in Exposure Category B. For Exposure Categories C and D, the header to jack stud strap requirements and the number of additional jack studs shall be in accordance with Table R602.10.4.6.

11. Revise Sections R602.10.7 and R602.10.8 as follows:

R602.10.7 (Supp) Panel joints. All vertical joints of panel sheathing shall occur over, and be fastened to common studs. Horizontal joints in braced wall panels shall occur over, and be fastened to common blocking of a minimum 1-1/2 inch (38 mm) thickness.

Exceptions:

1. Blocking at horizontal joints shall not be required in wall segments that are not counted as braced wall panels.
2. Where the bracing ~~percentage~~ length provided is at least twice the minimum ~~percentage~~ length required by Tables R602.10.1(1) and R602.10.1(2) blocking at horizontal joints shall not be required in braced wall panels constructed using Methods 3, 4, 5, 6, or 8.

R602.10.8 (Supp) Cripple wall bracing. In Seismic Design Categories other than D_2, cripple walls shall be braced with a ~~percentage~~ length and type of bracing as required for the wall above in accordance with Tables R602.10.1(1) and R602.10.1(2) with the following modifications for cripple wall bracing:

1. The ~~percentage~~ length of bracing as determined from Tables R602.10.1(1) and R602.10.1(2) shall be multiplied by a factor of 1.15, and
2. The wall panel spacing shall be decreased to 18 feet (5486 mm) instead of 25 feet (7620 mm).

Reason: The ICC Ad-Hoc Committee on Wall Bracing is proposing fourteen technical and non-technical code changes as we work through the process of making Section R602.10 of the 2009 IRC technically correct and easier to understand. The individual code changes are designed to stand alone if necessary, but the total body of work is respectively submitted as a comprehensive continuation of cycle 1 changes for the 2009 IRC. To see how the individual changes are intended to meld together, please visit the ICC web site, and review the composite document on the Ad hoc Committee on Wall Bracing page: http://www.iccsafe.org/cs/cc/ahc-wb/index.html.

This is a technical change to provide:

- ●Separate the bracing requirements for wind and seismic loading.
- ●Revise the bracing tables and convert them from percentages to lengths in feet.

This change corrects a problem that has been in the IRC since it was "merged". The assumption that structures responding to wind loading will perform similar to structures responding to seismic events was overstated. Therefore, this code change introduces new bracing requirements for wind loading (i.e. a new "Wind Table") and reformats the seismic bracing requirements (i.e. the "Seismic Table").

To make the tables less onerous, the ad hoc committee replaced "percentages" with actual "length" of bracing in feet.

1 & 2) This proposal introduces the table **BRACING REQUIREMENTS BASED ON WIND**.

This major change creates a "wind table" for the majority of the country where wind loading is the dominant lateral force. In prior editions of the code, wind bracing was erroneously assumed to be similar to the "percentages" of the "seismic table".

The problem with the existing "seismic table" is that it is based entirely on seismic loading, which is proportional to the length of the building. Wind loading on the other hand, is proportional to the wall line spacing, the height of the walls and the height of the roof relative to the eaves (i.e. the sail area upon which the wind pressure is exerted).

Having a single table (driven by seismic loading) has been a major concern in the higher wind speed regions. An evaluation based on testing and analysis of available engineering data by the Ad Hoc Committee has shown that the sheathing requirements for the 90 – 110 MPH wind speeds are currently insufficient, and thus a separate wind table is necessary. Note: in the hurricane prone regions of the country, the IRC requires the use of alternative design documents.

The "wind table" was developed based on the sail area of the building, with an assumed 10 ft high wall for each story, and a 10 ft height between the eave and the ridge of the building. The loads are based on the reference document for the code, ASCE 7-05. Built into the new Wind Table is an agreed assumption that 55% of the full restraint can be achieved on the top story, 75% of the full restraint can be achieved on a bottom story of a two story or the second story of a three story, and 100% full restraint can be achieved on the bottom story of a three story building. These assumptions of performance are carried through to all of the higher wind speeds.

The difference between Method 3 and its "exception", continuous wood structural panels, is that method 3 is assumed to have 100% openings adjacent to it (i.e. the wood structural panels are non-contiguous). When the continuous wood structural panel method is used, the sheathing above and below openings do contribute to the strength of the braced wall line. A benefit is granted by way of a less required bracing along that line.

Having said that, however, the reason that in the Wind Table, the Method 3 column and the 85% and the 65% columns each have the same amount of required bracing on the first of three story structures follows: The bottom of a three story structure, where the braced wall panels already act as if they are fully restrained, little to no additional strength can be achieved by sheathing above and below the openings. Therefore the amount of bracing is the same for Method 3 and the 85% and 65% adjacent openings.

The values for the second story of 3 and the bottom story of 2 does receive a benefit, but only half as much as the top story, because the base values used in determining the Method 3 sheathing requirements assume that the second story is 75% restrained for overturning by the surrounding structure. The top story is gets the full benefit of using continuous sheathing since it is the least restrained by the surrounding structure and is the most representative of the test conditions upon which the continuously sheathed method is based.

The calibration of the calculations was checked to see if the numbers were reasonably close to what has historically (i.e. 1950-1960) been built in the central United States for 1 story buildings. The check was reasonably close to what was typically used.

The adjustments for conditions other than those assumed for the table are provided in the footnotes. These adjustments include increases if the exposure of the building is classified as Exposure C, decreases or increases if the wall height is different than 10ft, if there are more than 2 wall lines resisting the load, and if gypsum wallboard is not used on the inside of the wall.

3) This change reformats the seismic bracing table. It deletes "percentages" and provides the bracing requirements in "length (feet)" of braced wall line.

The reformat of the seismic table is non-technical except for the addition of let-in bracing. Let-in bracing was given the same value of resistance as gypsum wall board, just as was done when the bracing requirements were developed for the new wind load bracing requirements in Item 1 of this proposal.

4) Deleted the word "percentage" and changes it to "length" for consistency in the code.

5) Changes to Sections R602.10.1.4 and R602.10.1.4.1 are made to eliminate the need for making modifications to the bracing amounts for wind since they are included in the new table and the modifications for wall line spacing greater than 25 ft for seismic was modified to change the word percentage to length.

6) The word "percentage" was changed to "length" and the reference to the bracing tables was corrected to include both tables.

7) Section R602.10.3 was modified to change the word "percentage" to "length" and to correct the reference to the bracing tables to include both tables

8) Changes to Table R602.3(1) and Section R602.10.2 are made to make the construction practice mimic the requirements of the Special Design Provisions for Wind and Seismic of the National Design Specification and experimental testing, upon which the resistances are based. The fastening requirements for let-in bracing, diagonal lumber sheathing, and gypsum wallboard are effected. Gypsum wallboard fastening is not changed, but additional language is added to the method description to highlight the fact that the wall sheathing needs to be attached to the top and bottom plates if the wallboard is to be included as bracing. This modifies the practice of floating the corners in the gypsum wallboard to where now only the ceiling gypsum can be floated in locations where the wall is being used as bracing. The gypsum wallboard needs to be attached to the top and bottom plates as well as the studs in order for the wall panel to resist any lateral forces.

This change allows all of the sheathing types, with the exception of let-in bracing and continuous sheathing methods, to be considered equal when resisting wind since strength is the only concern. Due to the differences in ductility, and general toughness when subjected to cyclic loads, the sheathing materials could not be considered equal for seismic loading at this time. This is an issue being worked on by the Dolan Group.

9) Sections R602.10.4.1 and R602.10.4.4 were revised to add the reference to the new bracing requirements provided for wind loading, change the word "percentage" to "length", and eliminate the adjustment factors since they are included in the new tables.

10) Sections R602.10.4.5 and R602.10.4.6 were revised to add the reference to the new bracing requirements provided for wind loading, and change the word "percentage" to "length".

11) Sections R602.10.4.7 and R602.10.4.8 were revised to add the reference to the new bracing requirements provided for wind loading, and change the word "percentage" to "length".

Cost Impact: The code change proposal will increase the cost of construction.

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

RB149–07/08

R301.3, Table R602.10.1(2), R602.10.3.1, Table R602.3.1, Table R602.10.3.2.1

Proponent: Chuck Bajnai, Chesterfield County, VA, representing the ICC Ad Hoc Committee on Wall Bracing

Revise as follows:

1. Revise as follows:

R301.3 (Supp) Story height. Buildings constructed in accordance with these provisions shall be limited to story heights of not more than the following:

1. For wood wall framing, the laterally unsupported bearing wall stud height permitted by Table R602.3(5) plus a height of floor framing not to exceed 16 inches.

   ~~**Exception:** For wood framed wall buildings with bracing in accordance with Table R602.10.1, the wall stud clear height used to determine the maximum permitted story height may be increased to 12 feet (3658 mm) without requiring an engineered design for the building wind and seismic force resisting systems provided that the length of bracing required by Table R602.10.1 is increased by multiplying by a factor of 1.20. Wall studs are still subject to the requirements of this section.~~

2. For steel wall framing, a stud height of 10 feet (3048 mm), plus a height of floor framing not to exceed 16 inches (406 mm).
3. For masonry walls, a maximum bearing wall clear height of 12 feet (3658 mm) plus a height of floor framing not to exceed 16 inches (406 mm).

   Exception: An additional 8 feet (2438 mm) is permitted for gable end walls.

4. For insulating concrete form walls, the maximum bearing wall height per story as permitted by Section R611 tables plus a height of floor framing not to exceed 16 inches (406 mm).
5. For structural insulated panel walls, the maximum bearing wall height per story as permitted by Section 614 tables plus a height of floor framing not to exceed 10 feet (3048 mm).

Individual walls or walls studs shall be permitted to exceed these limits as permitted by Chapter 6 provisions, provided story heights are not exceeded. Floor framing height shall be permitted to exceed these limits provided the story height does not exceed 11 feet 7 inches (3531 mm). An engineered design shall be provided for the wall or wall framing members when they exceed the limits of Chapter 6. Where the story height limits are exceeded, an engineered design shall be provided in accordance with the *International Building Code* for the overall wind and seismic force resisting systems.

TABLE R602.10.1(2) (Supp)
ADJUSTMENT FACTORS TO THE PERCENTAGE OF REQUIRED WALL BRACING [a]

ADJUSTMENT BASED ON:			MULTIPLY PERCENTAGE OF BRACING PER WALL LINE BY:	APPLIES TO:
~~Story height[b] (Section 301.3)~~		~~10 ft~~	~~1.0~~	All bracing methods - R602.10.2
		~~> 10 12 ft~~	~~1.2~~	
Braced wall line spacing in SDC A-C[b,d]		≤ 35 ft	1.0	
		> 35 ≤ 50 ft	1.43	
Wall dead load[e]		> 8≤ 15 psf	1.0	
		≤8 psf	0.85	
Roof/ceiling dead load for wall supporting [b,c]:	roof only or roof plus one story	≤15 psf	1.0	
	roof only	> 15 psf ≤ 25 psf	1.1	
	roof plus one story	> 15 psf ≤ 25 psf	1.2	
Walls with stone or masonry veneer in SDC C-D_2		See Section R703.7, Exception 1-4		
Cripple walls		See Section R 602.10.8		

a. The total percentage of bracing required for a given wall line is the product of all applicable adjustment factors.
b. Linear interpolation shall be permitted.
c. Bracing required for a site's wind speed shall not be adjusted for dead load.

d. Braced wall line spacing in excess of 35-ft shall be in accordance with R602.10.1.4.
e. The adjusted percentage of bracing shall not be less than that required for the site's wind speed.

2. Delete without substitution:

~~**R602.10.3.1 (Supp) Adjustment of length of braced panels.** When story height (H), measured in ft, exceeds 10 feet (3048 mm), in accordance with Section R301.3, the minimum length of braced wall panels specified in Section R602.10.3 shall be increased by a factor H/10. See Table R602.10.3.1. Interpolation is permitted.~~

~~**TABLE R602.10.3.1 (Supp)**~~
~~**MINIMUM LENGTH REQUIREMENTS FOR BRACED WALL PANELS**~~

3. Revise as follows:

TABLE R602.10.3.2.1
MINIMUM LENGTH REQUIREMENTS AND TIE-DOWN FORCES
FOR ALTERNATE BRACED WALL PANELS

SEISMIC DESIGN CATEGORY AND WIND SPEED		HEIGHT OF BRACED WALL PANEL				
		8 ft.	9 ft.	10 ft.	~~11 ft.~~	~~12 ft.~~
SDC A, B and C Wind speed < 110 mph	Minimum Sheathed Length	2'-4"	2'-8"	2'-10"	~~3' 2"~~	~~3' 6"~~
	R602.10.3.2.1, Item 1 Tie-down Force (lbs)	1800	1800	1800	~~2000~~	~~2200~~
	R602.10.3.2.1, Item 2 Tie-down Force (lbs)	3000	3000	3000	~~3300~~	~~3600~~
SDC D_o, D_1 and D_2 Wind speed < 110 mph	Minimum Sheathed Length	2'-8"	2'-8"	2'-10"	~~NP[a]~~	~~NP[a]~~
	R602.10.3.2.1, Item 1 Tie-down Force (lbs)	1800	1800	1800	~~NP[a]~~	~~NP[a]~~
	R602.10.3.2.1, Item 2 Tie-down Force (lbs)	3000	3000	3000	~~NP[a]~~	~~NP[a]~~

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 pound = 4.44822 Newtons
a. NP = Not Permitted. Maximum height of 10 feet (3,048 mm).

Reason: The ICC Ad-Hoc Committee on Wall Bracing is proposing fourteen technical and non-technical code changes as we work through the process of making Section R602.10 of the 2009 IRC technically correct and easier to understand. The individual code changes are designed to stand alone if necessary, but the total body of work is respectively submitted as a comprehensive continuation of cycle 1 changes for the 2009 IRC. To see how the individual changes are intended to meld together, please visit the ICC web site, and review the composite document on the Ad hoc Committee on Wall Bracing page: http://www.iccsafe.org/cs/cc/ahc-wb/index.html.

This is a technical change to eliminate stud heights greater than 10 ft.

This code change corrects an error that was expanded from a change that was made in Chapter 3 where the allowable height of the braced wall was increased to 12 ft. The original bracing requirements for the IRC were based on experimental data for 8 ft high wall specimens, and an assumption was made that increasing the wall height to 10 ft would not cause significant adverse performance problems.

The required increase in sheathing associated with increasing the wall height to 12 ft is not a linear function as the tables would have the user believe. For seismic loads, the overturning forces and the mass of the wall increase, but the floor area does not. For wind loads, the bracing required is a function of the sail area of the wall normal to the wind.

The ICC Sheathing Ad Hoc Committee and its technical advisor, the Dolan Group, voted to limit the wall height to the original 10 ft until the correct basis for determining loads can be incorporated into the code. While the current increases in sheathing amounts illustrates the correct intent, the values of 10% and 20% increase for the 11ft and 12 ft wall height are incorrect and not conservative.

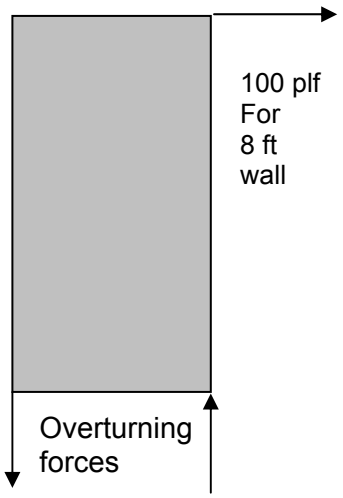
An effort to illustrate the error involved in the sheathing requirements associated with the increasing the stud height follows:

The following examples illustrate the differences in requirements on uplift for seismic and lateral resistance for wind. The first example is for a 1-story house and seismic loading. The example assumes a constant braced wall line length (which is proportional to the loading) and a constant 25 ft braced wall line spacing. The amount of required bracing is normalized to what would be required for the 8 ft stud condition (i.e., 1.0 for 8 ft and 1.2 for 11 and 12 ft). The seismic load is assumed to be such that the unit shear in the 8 ft stud condition causes 100 plf, and is adjusted to the lower unit shear when the amount of bracing is increased to account for the longer studs. (Actual capacity could be used rather than 100 plf without changing the results of the analysis.) The overturning force (uplift) is determined using the standard method of multiplying the unit shear by the height of the wall. The ratio of the uplift forces for the different stud heights to that experienced by an 8ft wall is then determined, and a number greater than 1 represents an overload condition. In the one story condition, the highest overload is 25%.

One Story Construction
Seismic Uplift Assuming 8 Ft is Basis

Stud Height (ft)	8ft	9ft	10ft	11ft	12ft
Length of Wall Bracing Required Compared to an 8 ft wall according to Table R602.10.1(2)	1.00	1.00	1.00	1.20	1.20
Assume Unit shear compared to 8 ft wall with 100 plf	100.00	100.00	100.00	83.33	83.33
Overturning uplift force at end stud (lbs)	800.00	900.00	1000.00	916.67	1000.00
Ratio of overturning forces with 8 ft stud height as base	1.00	1.13	1.25	1.15	1.25

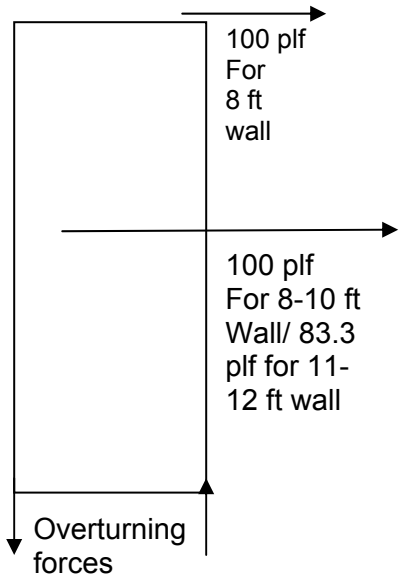
If walls are stacked, the error accumulates as the building has additional stories.



The second example is for a 2 story house with the stud height varied on the first floor and the second floor kept constant at 8 ft. The analysis is for local overturning forces only, not global overturning forces. If the building were very narrow, the effect of stacking would make the error on the first floor worse since the global overturning action would begin to effect the forces rather than only the local overturning forces. If the second floor were constructed with wall heights greater than 8 ft, the overload condition would also increase. In this condition, the overturning effects on the wall cause an overload of 17%.

Two Story Construction
Seismic Uplift
First Story Assume 8 ft 2nd floor and 100 plf load per floor

Length (ft)	8ft	9ft	10ft	11ft	12ft
Length of Wall Bracing Required Compared to an 8 ft wall according to Table R602.10.1(2)	1.00	1.00	1.00	1.20	1.20
Assumed Unit shear compared to 8 ft 2nd story wall	100.00	100.00	100.00	100.00	100.00
Assumed Unit shear compared to 8 ft 1st story wall with 200 plf	200.00	200.00	200.00	166.67	166.67
Overturning uplift force at end stud of first floor wall (lbs)	2400.00	2600.00	2800.00	2633.37	2800.04
Ratio of overturning forces with 8 ft stud height as base	1.00	1.08	1.17	1.10	1.17



For wind design the concern becomes the amount of sheathing required as well as the overturning issue illustrated above. The total force is changing with the stud height due to the increase in sail area.

The following illustrates only the error in the amount of sheathing required to resist the lateral loading, and does not include the effects of overturning. The analysis only checks the conditions for a 1-story house since the change in the wall height on a 1-story house will cause the largest percentage change in the sail area and therefore, the highest percentage change in the loads experienced by the walls. The example assumes 2 braced wall lines and that the amount of bracing required by the IRC for an 8ft high wall with 25 ft braced wall line spacing provides the correct amount of bracing for the building. Therefore, the amount of bracing for this condition is unitary. The amount of bracing required is then adjusted for each of the other conditions according to the requirements of the IRC. A constant pressure with respect to height on the building and a constant 10 ft eve to ridge height is assumed. Therefore, the load on the building is proportional to the sail area, and the load on each braced wall line would be proportional to the sail area divided by 2. If this value is then divided by the amount of bracing required, the result is the third line in the table, and essentially represents the unit shear for the wall line. Therefore the ratio of the unit shear for a wall with a specific stud height to the unit shear of an 8 ft wall indicates the amount of overload that is occurring (1.0 for an 8ft wall with 25 ft BWL spacing). Any ratio greater than 1.0 represents an overloaded wall condition. For the one story condition with a 25 ft wall spacing, the highest overload is 11% for the 10 ft condition. However, when the wall spacing is increased to 35 ft or greater, the overload condition increases to 36-56%, depending on the stud height. (The numbers indicating the overload use the 8 ft wall height at 25 ft BWL spacing as the basis of comparison, and therefore, Table 4 values should be compared to the 8 ft stud height in Table 3.) Increases in BWL spacing result in the same overload conditions as 35 ft BWL spacing because the amount of sheathing required increases linearly with the BWL spacing, from 35-50 ft.

This entire analysis is based upon the assumption that the 8ft height and 25 ft wall spacing provides sufficient resistance. **THIS ANALYSIS DOES NOT CHECK THE SUFFICIENCY OF THE BASE CONDITION. THAT IS DONE IN THE PROPOSAL THAT THE IRC AD HOC COMMITTEE DEVELOPED TO INTRODUCE THE WALL BRACING TABLE THAT IS BASED UPON WIND SPEED.**

Wind Lateral Force
1-Story Building with a constant 10ft eve to ridge height
Assume a constant wind speed/constant presure with height/ 25 ft BWL spacing

Stud Height (ft)	8	9	10	11	12
Amount of bracing required	1.00	1.00	1.00	1.20	1.20
Amount of Sail Area (represents the total force on walls)	450.00	475.00	500.00	525.00	550.00
Ratio of load to amount of wall bracing (assume 2 walls)	225.00	237.50	250.00	218.75	229.17
Ratio of required bracing for specific wall height to 8 ft wall height with BWL spacing = 25 ft	1.00	1.06	1.11	0.97	1.02

Following the same analysis, but increasing the braced wall line spacing
1-Story Building with a constant 10ft eve to ridge height
Assume a constant wind speed/constant presure with height/BWL spacing = 35 ft

Stud Height (ft)

Stud Height (ft)	8	9	10	11	12
Amount of bracing required	1.00	1.00	1.00	1.20	1.20
Amount of Sail Area (represents the total force on walls)	630.00	665.00	700.00	735.00	770.00
Ratio of load to amount of wall bracing (assume 2 walls)	315.00	332.50	350.00	306.25	320.83
Ratio of required bracing for specific wall height compared to an 8 ft wall height with 25 ft BWL spacing	1.40	1.48	1.56	1.36	1.43

Cost Impact: The code change proposal will require building configurations that have wall heights higher than 10 ft to be designed by a design professional.

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

RB150–07/08
R602.10.2

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

Revise as follows:

R602.10.2 Braced wall panel construction methods. The construction of braced wall panels shall be in accordance with one of the following methods:

1. Nominal 1-inch-by-4-inch (19.1 mm by 88.9 mm) continuous diagonal braces let in to the top and bottom plates and the intervening studs or approved metal strap devices installed in accordance with the manufacturer's specifications. The let-in bracing shall be placed at an angle not more than 60 degrees (1.06 rad) or less than 45 degrees (0.79 rad) from the horizontal.
2. Wood boards of 5/8-inch (15.9 mm) net minimum thickness applied diagonally on studs spaced a maximum of 24 inches (610 mm). Diagonal boards shall be attached to studs in accordance with Table R602.3(1).
3. Wood structural panel sheathing in accordance with Section R604 with a thickness not less than 3/8 inch (9.5 mm) for 16-inch (406 mm) or 24-inch (610 mm) stud spacing. Wood Structural panels shall be installed in accordance with Table R602.3(3) and Table R602.3(1).
4. One-half-inch (12.7 mm) or 25/32-inch (19.8 mm) thick structural fiberboard sheathing applied vertically or horizontally on studs spaced a maximum of 16 inches (406 mm) on center. Structural fiberboard sheathing shall be installed in accordance with Table R602.3(1).
5. Gypsum board with minimum ½-inch (12.7 mm) thickness placed on studs spaced a maximum of 24 inches (610 mm) on center and fastened at panel edges including top and bottom plates at 7 inches (178 mm) on center with the size nails specified in Table R602.3(1) for sheathing and Table R702.3.5 for interior gypsum board.
6. Particleboard wall sheathing panels in accordance with Section R605 and installed in accordance with Table R602.3(4) and Table R602.3(1).
7. Portland cement plaster on studs spaced a maximum of 16 inches (406 mm) on center and installed in accordance with Section R703.6.
8. Hardboard panel siding when installed in accordance with Table R703.4.

Exception: Alternate braced wall panels constructed in accordance with Sections R602.10.3.2.1 or R602.10.3.2.2 shall be permitted to replace any braced wall panel in any of the above methods of braced wall panels.

Reason: This code change proposal clarifies the code. It contains no new requirements.

The proposal placed a reference to the term wood structural panel and particleboard when they first appear for bracing. This to indicate that the wood structural and particleboard panels must be properly installed, manufactured, and grade marked. We would not normally suggest such a change because in most chapters and codes the material specifications are at the first part of the chapter. Chapter 6 seems to be an exception to the rule for wood structural panels and particleboard. Hopefully the change will tie the provisions of the code together and decrease the chances for misinterpretation.

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

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

RB151–07/08
R602.10.3.2.1, R602.10.3.2.2, Figure R602.10.3.2.1 (New), Figure R602.10.4.6

Proponent: Chuck Bajnai, Chesterfield County, VA, representing the ICC Ad Hoc Committee on Wall Bracing

1. Revise as follows:

R602.10.3.2.1 (Supp) Alternate braced wall panels. Alternate braced wall panels 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 R602.10.3. The maximum height and minimum length and tie-down force of each panel shall be in accordance with Table R602.10.3.2.1:

1. In one-story buildings, each panel shall be installed in accordance with Figure R602.10.3.2.1. ~~sheathed on one face with 3/8-inch minimum-thickness (9.5 mm) 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 to 12 inches from each end of the plate. Each panel end stud shall have a tie-down device fastened to the foundation, capable of providing an uplift capacity in accordance with Table R602.10.3.2.1.~~ 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 (305 mm), a minimum 12-inch-by-12-inch (305 mm by 305 mm) 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.~~ All reinforcement shall be lapped 15 inches (381 mm). ~~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 edge nailing spacing shall not exceed four inches on center.

R602.10.3.2.2 Alternate bracing wall panel adjacent to a door or window opening. Alternate braced wall panels constructed in accordance with one of the following provisions are also permitted to replace each 4 feet (1219 mm) of braced wall panel as required by Section R602.10.3 for use adjacent to a window or door opening with a full-length header:

1. ~~In one-story buildings, each panel shall have a length of not less than 16 inches (406 mm) and a height of not more than 10 feet (3048 mm).~~ Each panel ~~shall be sheathed on one face with a single layer of 3/8-inch minimum- thickness (9.5 mm) wood structural panel sheathing nailed with 8d common or galvanized box nails~~ shall be fabricated in accordance with Figure R602.10.3.2.2. The wood structural panel sheathing shall extend up over the solid sawn or glued-laminated header and shall be nailed in accordance with Figure R602.10.3.2.2. ~~A built-up header consisting of at least two 2 X 12s and fastened in accordance with Table R602.3(1) shall be permitted to be used.~~ A spacer, if used with built-up header, shall be placed on the side of the built-up beam opposite the wood structural panel sheathing. The header shall extend between the inside faces of the first full-length outer studs of each panel. T~~he clear span of the header between the inner studs of each panel shall be not less than 6 feet (1829 mm) and not more than 18 feet (5486 mm) in length. A strap with an uplift capacity of not less than 1000 pounds (4448 N) shall fasten the header to the side of the inner studs opposite the sheathing~~. One anchor bolt not less than 5/8-inch-diameter (16 mm) and installed in accordance with Section R403.1.6 shall be provided in the center of each sill plate. ~~The studs at each end of the panel shall have a tie-down device fastened to the foundation with an uplift capacity of not less than 4,200 pounds (18 683 N).~~ The tie-down devices shall be an embedded-strap type, installed in accordance with the manufacturer's recommendations. ~~Where a panel is located on one side of the opening, the header shall extend between the inside face of the first full-length stud of the panel and the bearing studs at the other end of the opening. A strap with an uplift capacity of not less than 1,000 pounds (4448 N) shall fasten the header to the bearing studs. The bearing studs shall also have a tie-down device fastened to the foundation with an uplift capacity of not less than 1,000 pounds (4448 N).~~ The panels shall be supported directly on a foundation, which is continuous across the entire length of the braced wall line. The foundation shall be reinforced as shown on Figure R602.10.3.2.1. ~~with not less than one No. 4 bar top and bottom. Where the continuous foundation is required to have a depth greater than 12 inches (305 mm), a minimum 12-inch-by-12-inch (305 mm by 305 mm) 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 not less than 15 inches (381 mm) 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 wall panel shall be braced in accordance with item 1 above, except that each panel shall have a length of not less than 24 inches (610 mm).

2. Add new figure as follows:

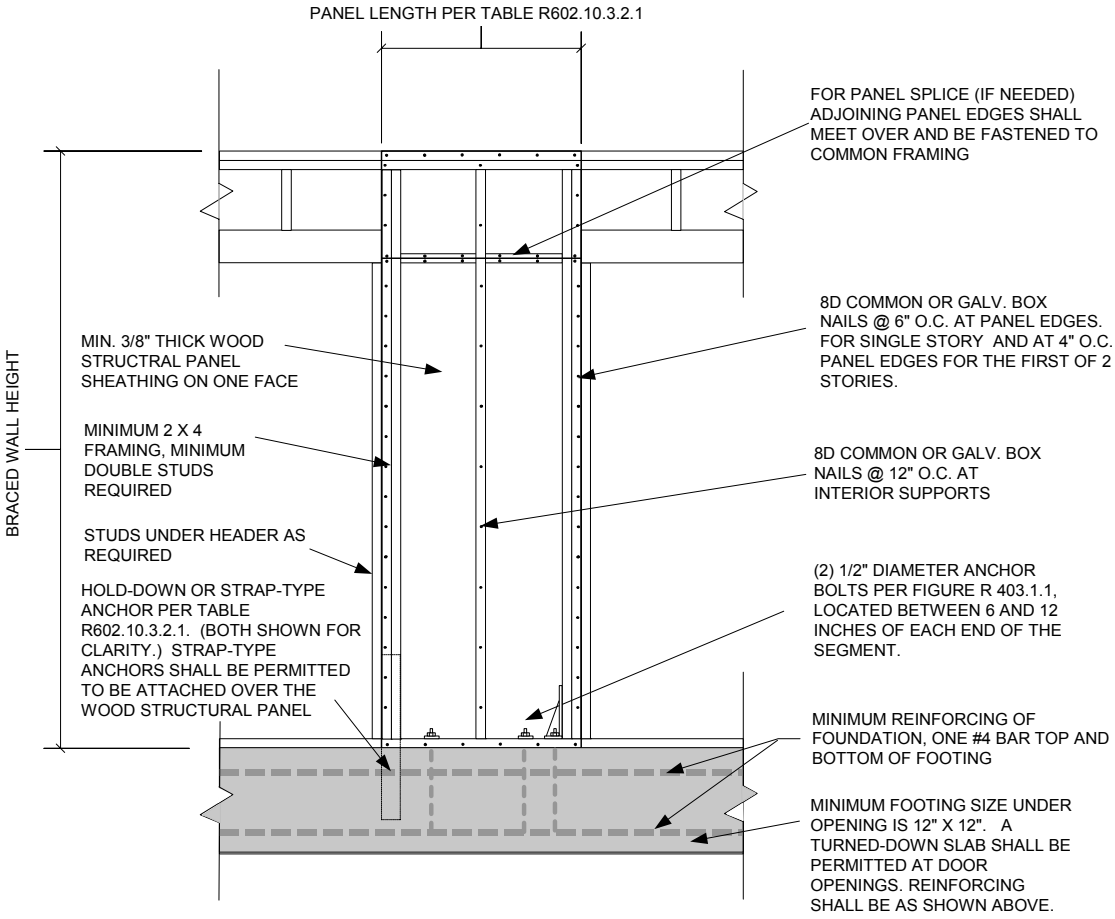


FIGURE R602.10.3.2.1
ALTERNATE BRACED WALL PANEL

3. Revise Figure R602.10.4.6 as follows:

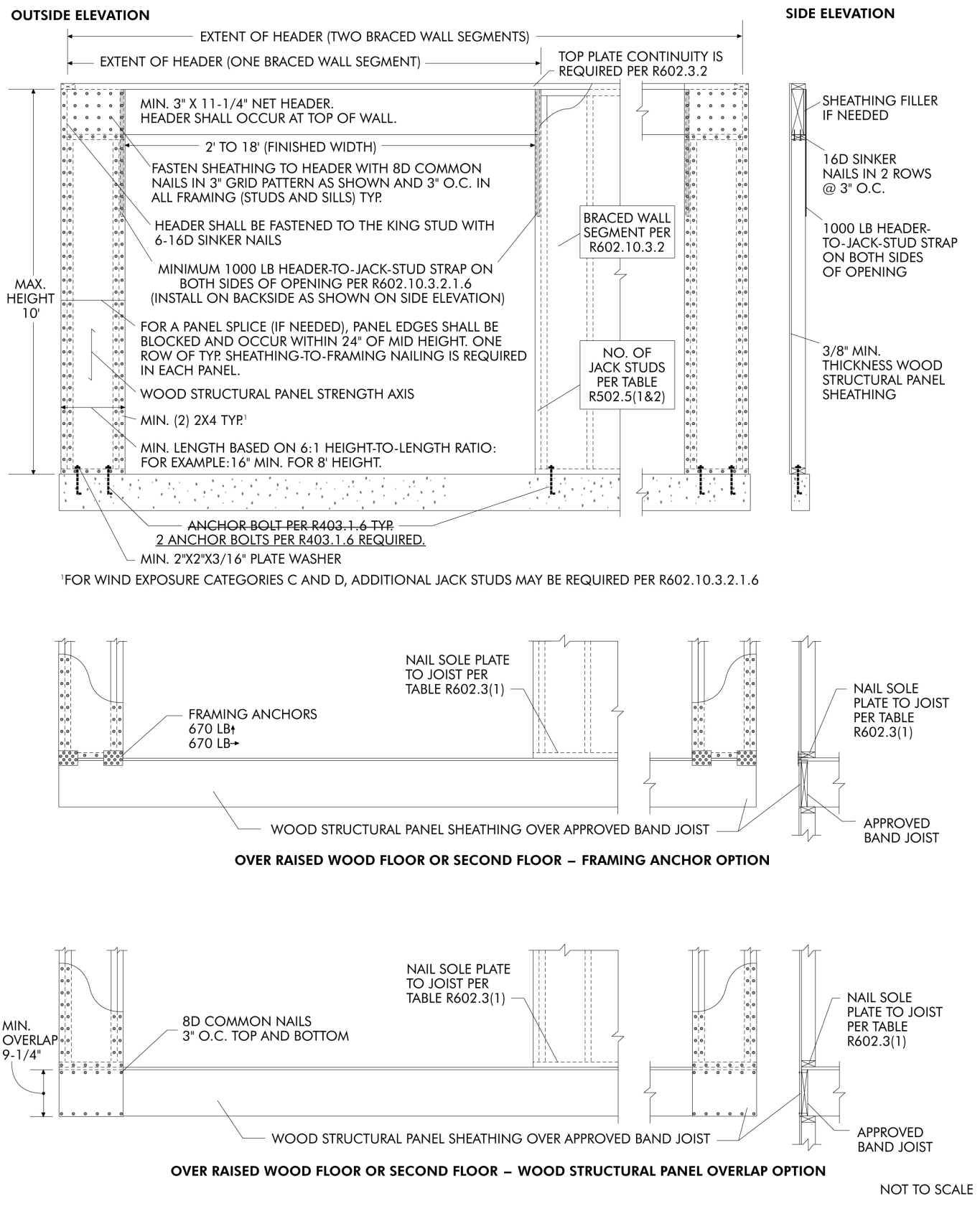


FIGURE R602.10.4.6 (Supp)
WALLS WITH 6:1 ASPECT RATIO USED WITH CONTINUOUS WOOD STRUCTURAL PANEL SHEATHING

Reason: The ICC Ad-Hoc Committee on Wall Bracing is proposing fourteen technical and non-technical code changes as we work through the process of making Section R602.10 of the 2009 IRC technically correct and easier to understand. The individual code changes are designed to stand alone if necessary, but the total body of work is respectively submitted as a comprehensive continuation of cycle 1 changes for the 2009 IRC. To see how the individual changes are intended to meld together, please visit the ICC web site, and review the composite document on the Ad hoc Committee on Wall Bracing page: http://www.iccsafe.org/cs/cc/ahc-wb/index.html.

This is a non-technical formatting change that does three things:

-Adds a figure for the Alternate Braced Wall Panel,

-Modifies the figure of the 6:1 portal to ensure that two bolts are used per portal, and

-Removes text by referring to the figures of the two types of Alternate Braced Wall Panel.

The ICC Ad Hoc Committee on Wall Bracing believes that figures are much clearer than text when describing methods of braced wall construction. Having detailed illustrations instead of text will make alternate braced wall panels easier to build and inspect. These are among the more complicated items in the wall bracing section and justify additional attention.

This is basically an editorial change. There is no intent to make a substantive change. The goal is simply to ease construction and inspection.

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

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

RB152–07/08

R602.10.3, R602.10.3.2, R602.10.3.2.3 (New), Figure R602.10.3.2.3 (New)

Proponent: Gary J. Ehrlich, PE, National Association of Home Builders

1. Revise as follows:

R602.10.3 (Supp) Minimum length of braced panels. For Methods 2, 3, 4, 6, 7 and 8 above, each braced wall panel shall be at least 48 inches (1219 mm) in length, covering a minimum of three stud spaces where studs are spaced 16 inches (406 mm) on center and covering a minimum of two stud spaces where studs are spaced 24 inches (610 mm) on center. For Method 5 above, each braced wall panel and shall be at least 96 inches (2438 mm) in length where applied to one face of a braced wall panel and at least 48 inches (1219 mm) where applied to both faces. For Methods 2, 3, 4, 6, 7 and 8, for purposes of computing the percentage of panel bracing required in Table R602.10.1(1), the effective length of the braced wall panel shall be equal to the actual length of the panel. When Method 5 panels are applied to only one face of a braced wall panel, bracing percentages required in Table R602.10.1(1) for Method 5 shall be doubled.

Exceptions:

1. Lengths of braced wall panels for continuous wood structural panel sheathing shall be in accordance with Section R602.10.4.
2. Lengths of alternate braced wall panels shall be in accordance with Section R602.10.3.2.1, ~~or~~ Section R602.10.3.2.2, or R602.10.3.2.3.
3. For Methods 2, 3, 4, 6, 7 and 8 in Seismic Design Categories A, B, and C: Panels between 36 inches and 48 inches in length shall be permitted to count towards the required percentage of bracing in Table R602.10.1(1), and the effective contribution shall comply with Table R602.10.3.

R602.10.3.2 (Supp) Alternative bracing panels. As an alternate to the bracing methods in Section R602.10.2, wall bracing panels in accordance with Sections R602.10.3.2.1, ~~and~~ R602.10.3.2.2, and R602.10.3.2.3 shall be permitted.

2. Add new text and figure as follows:

R602.10.3.2.3 Alternate braced wall panel at garage door openings in Seismic Design Categories A, B, and C. Where supporting a roof or one story and a roof, alternate braced wall panels constructed in accordance with the following provisions are permitted on either side of garage door openings. For the purpose of calculating wall bracing amounts to satisfy the minimum requirements of Table R602.10.1(1), the length of the alternate braced wall panel shall be multiplied by a factor of 1.5.

1. Braced wall panel length shall be a minimum of 24 inches and braced wall panel height shall be a maximum of 10 feet.
2. Braced wall panel shall be sheathed on one face with a single layer of 7/16-inch-minimum thickness wood structural panel sheathing attached to framing with 8d common nails at 3 inches on center in accordance with Figure R602.10.3.2.3.

3. The wood structural panel sheathing shall extend up over the solid sawn or glued-laminated header and shall be nailed to the header at 3 inch on center grid in accordance with Figure R602.10.3.2.3.
4. The header shall consist of a minimum of two solid sawn 2x12s or a 3"x11.25" glued-laminated header. The header shall extend between the inside faces of the first full-length outer studs of each panel in accordance with Figure R602.10.3.2.3. The clear span of the header between the inner studs of each panel shall be not less than 6 feet (1829 mm) and not more than 18 feet (5486 mm) in length.
5. A strap with an uplift capacity of not less than 1,000 pounds (4448 N) shall fasten the header to the side of the inner studs opposite the sheathing face. Where building is located in wind exposure categories C or D, the strap uplift capacity shall be in accordance with Table R602.10.4.6.
6. A minimum of two bolts not less than ½-inch diameter shall be installed in accordance with Section R403.1.6. A 3/16-inch by 2-1/2-inch by 2-1/2-inch steel plate washer is installed between the bottom plate and the nut of each bolt.
7. Braced wall panel shall be installed directly on a foundation.
8. Where an alternate braced wall panel is located only on one side of the garage opening, the header shall be connected to a supporting jack stud on the opposite side of the garage opening with a metal strap with an uplift capacity of not less than 1,000 lbs. Where that supporting jack stud is not part of a braced wall panel assembly, another 1,000 lbs strap shall be installed to attach the supporting jack stud to the foundation.

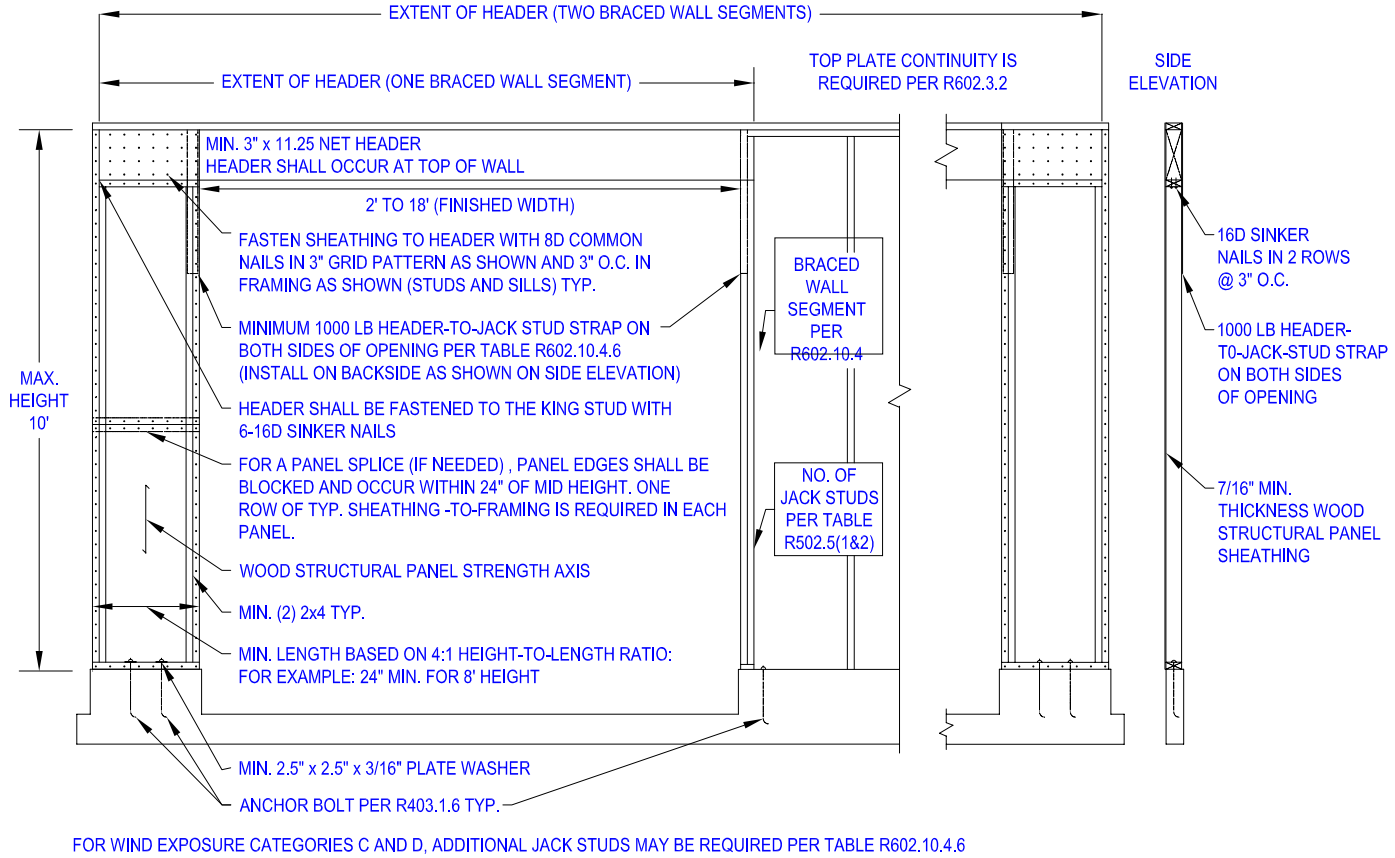


FIGURE R602.10.3.2.3
ALTERNATE BRACED WALL PANEL AT GARAGE DOOR OPENINGS
IN SEISMIC DESIGN CATEGORIES A, B, AND C

Reason: The proposed portal frame system with 24-inch piers provides an alternative solution for garage door bracing applications in braced wall lines that are not continuously sheathed with wood structural panels. The proposed portal frame was tested to demonstrate equivalency to intermittent (48-inch-long) Method 3 braced wall panels. The equivalency was established for both stiffness and capacity under cyclic loading over a range of boundary conditions. Results of the testing are summarized in a report that can be obtained from http://www.nahbrc.org/portalframe. The proposed portal frame will provide additional flexibility for home builders in meeting bracing provisions of the IRC at garage openings where narrow piers are often specified due to architectural considerations and/or lot size limitations. It also easier to install and inspect than the current alternate braced wall panel options. The rest of the house can be braced using other approved bracing methods. The proposed portal frame is limited to SDC A, B, and C to address the potential use of different bracing methods in the same braced wall line.

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

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

RB153–07/08

Figure R602.10.3.2.2, Figure R602.10.5(2)

Proponent: Edward L. Keith, PE, APA – The Engineered Wood Association

Revise as follows:

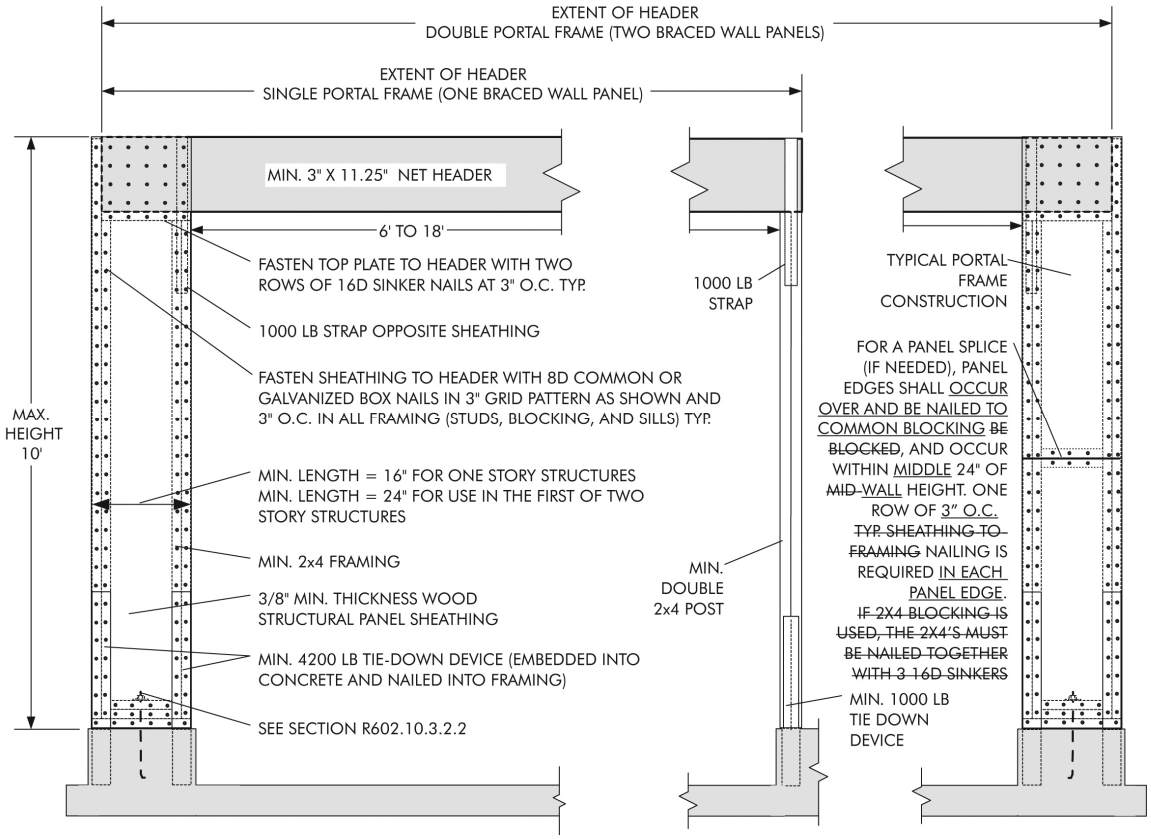


FIGURE R602.10.3.2.2 (Supp)
ALTERNATE BRACED WALL PANEL ADJACENT TO A DOOR OR WINDOW OPENING

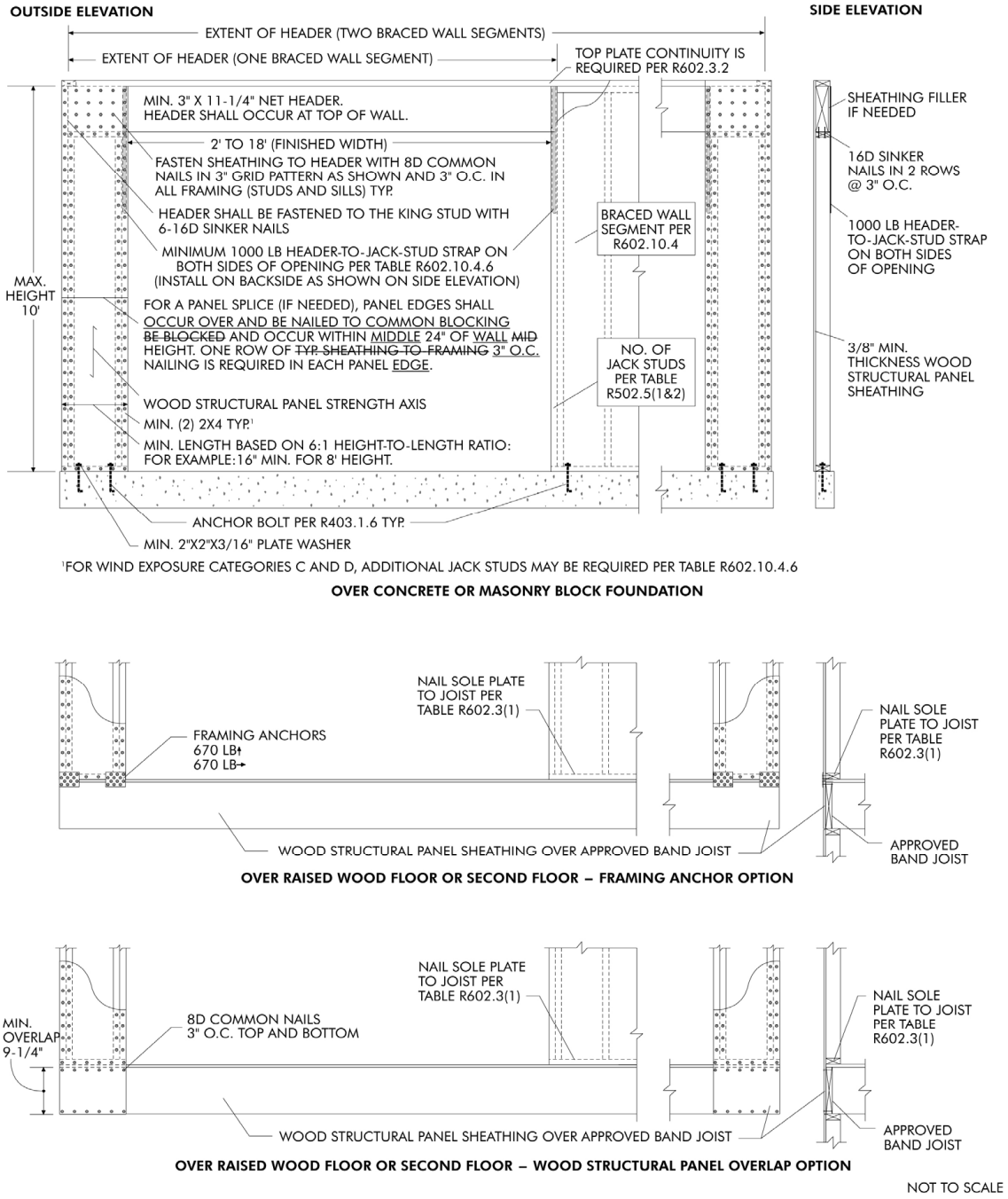


FIGURE R602.10.4.6 (Supp)
WALLS WITH 6:1 ASPECT RATIO USED WITH CONTINUOUS WOOD STRUCTURAL PANEL SHEATHING

Reason: The purpose of the code change proposal for both figures is to clarify the intent of the code.

The proposal does a number of things. The first being to clarify where the splice is permitted if used. The intent of the original proposal was that the splice should be within a two-foot band centered at the mid-height of the frame. The current language could be interpreted to mean 24" on either side of the mid-height location (a 48" band centered on the mid-height). This was never the intent of the code. The second is to eliminate the use of the term "typical" and substitute specific nail spacing. It further specifies that each panel edge at the splice shall have that spacing. And finally, both figures were clarified with the requirement that both panel edges at a splice shall occur over and be nailed to a common blocking panel. In Figure R602.10.3.2.2 the callout pertaining to two pieces of blocking was removed. The previous requirement for panel edges to occur over and be nailed to common blocking eliminates the need for what is really a "fix" for an undesirable building practice – double 2 x framing at a splice joint.

This was the intent of the original code proposals.

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

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

RB154–07/08
R602.10.4, R602.10.4.1, Figure R602.10.4.3(1), R602.10.4.4, Table R602.10.4.4

Proponent: Zeno Martin, PE, APA – The Engineered Wood Association

1. Revise as follows:

R602.10.4 (Supp) Continuously-sheathed braced wall line using ~~Method 3 (~~wood structural panels~~).~~
Continuously sheathed braced wall lines using wood structural panels shall comply with this section. Different bracing methods shall not be permitted within a continuously sheathed braced wall line. Other bracing methods prescribed by this code shall be permitted on other braced wall lines on the same story level or on different story levels of the building.

Exception: All exterior braced wall lines shall be continuously sheathed where required by Section R602.10.4.7.

R602.10.4.1 (Supp) Continuously-sheathed braced wall line requirements. Continuously-sheathed braced wall line shall be in accordance with Figure R602.10.4(1) and 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 the braced wall percentage in accordance with Table R602.10.1(1)
3. Wood structural panel sheathing with a thickness not less than 3/8 in. (9.5 mm) for a maximum of 24-inch (610 mm) stud spacing. Wood structural panels shall be installed with 8d common nails (0.131" x 2-1/2") spaced 4 in. o.c. at all panel edges and at 12 in. o.c. on intermediate framing members.

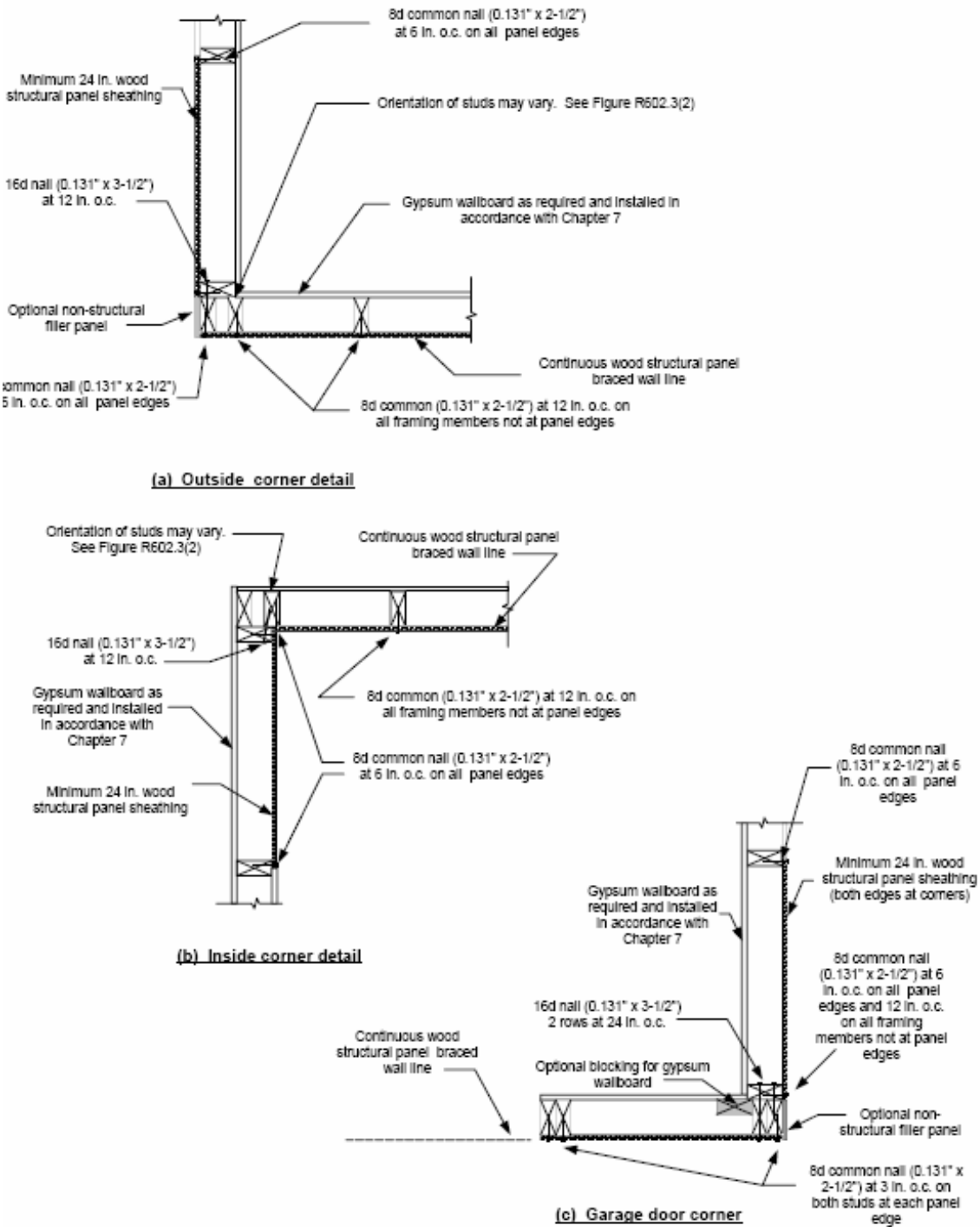


FIGURE R602.10.4.3(1) (Supp)
TYPICAL EXTERIOR CORNER FRAMING FOR CONTINUOUS STRUCTURAL PANEL SHEATHING SHOWING REQUIRED STUD-TO-STUD NAILING

All occurrences "8d common nail (0.131" x 2-1/2") at ~~6~~ 4 in. o.c. at all panel edges"
Remainder unchanged

R602.10.4.4 Braced wall percentage. The amount of bracing required for continuous wood structural panel sheathing shall be based on Method 3 requirements from Table R602.10.1. For continuous wood structural panel sheathed walls, in addition to bracing percentage adjustments specified elsewhere in this code, the braced wall ~~percentages~~ amounts for Method 3 from Table R602.10.(1) shall be permitted to be multiplied by a factor ~~in accordance with Table R602.10.4.4~~ of 0.5.

2.Delete table without substitution:

~~**TABLE R602.10.4.4**~~
~~**ADJUSTMENT FACTORS TO THE PERCENTAGE OF REQUIRED BRACING PER WALL LINE –CONTINUOUSLY SHEATHED**~~

~~**ADJUSTMENT BASED ON MAXIMUM WALL CLEAR OPENING HEIGHT:**~~		~~**MULTIPLY PERCENTAGE OF BRACING PER WALL LINE BY:**~~
~~Continuous wood structural panel sheathing when maximum opening height in wall line does not exceed [a] (Section 301.2.2.2.1)~~	~~85% of wall height~~	~~0.9~~
	~~67% of wall height~~	~~0.8~~

~~a. Percentage of bracing for continuous wood structural panel sheathing shall be based on Method 3 requirements.~~

Reason: The purpose of this code change is to:
1) Provide a simplified adjustment factor for continuously sheathed walls that more accurately reflects the difference between "isolated" method 3 panels and a wall continuously sheathed with wood structural panels.
2) Provide builders an option to use less wall bracing

The proposal can be justified in two ways for two extremes in boundary conditions as follows:

- The relatively highest restraint boundary conditions occur when the braced wall panel is located on the first of three stories. **For the highest restraint condition, the proposed change in the nail size and spacing alone can justify the 0.5 proposed factor**.
- The relatively lowest restraint boundary conditions occur when the braced wall panel has only a roof above it. **For the lowest restraint condition, the presence of continuous wood structural panel sheathing above and below openings alone can justify the 0.5 factor**.

The combination of increased nail size, increased number of nails, **and** use of continuous sheathing makes this proposal conservative. For conservatism and simplicity only one reduction factor is proposed.

The Nail Change Alone Supports the 0.5 Factor (Principles of Mechanics)

This proposal can be justified by principles of mechanics and even more liberal construction has been verified by extensive full-scale 2D and 3D testing. The nominal shear wall capacity for 3/8" wood structural panels with 6d common nails spaced 6" o.c. at panel edges is 560 plf and the nominal capacity for 3/8" wood structural panels with 8d common nails spaced at 4" o.c. at panel edges is 1065 plf, both based on 16" stud spacing (ANSI/AF&PA SDPWS-2005). The strength ratio between these two nailing differences alone is 560/1065 = 0.53, which is approximately 50%. The proposed change to a larger nail (8d common) and tighter nailing (4" o.c. at panel edges) makes the nailing requirements more consistent with other bracing methods. Principles of mechanics per the SDPWS shear wall tables confirms that a 50% adjustment is justified based simply on the nail size and spacing change.

Why the Increased Nailing?

A majority of the testing showing that continuous wood structural panel bracing is approximately two times stronger than isolated method 3 panel bracing is for a low degree of end restraint condition. An example of such a case is a single story where there is not much dead load or stiffness above the wall to provide restraint, so the effects of sheathing above and below openings are most pronounced. In theory, as restraint is provided to the walls by stories above (dead load and stiffness) the performance of a bracing panel depends on fastening and panel strength. In order to justify the 0.5 factor at the high degree of end restraint condition (the first story of a three story house) the nail spacing is changed accordingly based on principles of mechanics.

Large Scale Testing Supports the 0.5 Factor

Full-scale cyclic testing (Paevere et al. 2003) of a one-story house conventionally constructed with nails at 6" o.c. at panel edges confirms that peak load values for a continuously sheathed wood structural panel walls ranged from 707 plf to 1072 plf. These walls had bracing segments much narrower than permitted by this proposal and nails spacings (6" o.c.) more liberal than this proposal (4" o.c.). Recent work by the ICC Ad Hoc Committee on Wall Bracing and the BSSC committee on wall bracing suggest that conservative restraint conditions in a single story application would only lead to about 50% of the restrained value, thus the shear wall load value associated with the proposed in a first story application would be only 1065 plf x 0.5 = 532 plf, which is confirmed by available data with narrower walls and less nails.

A shake table test of conventional construction with continuously sheathed wood structural panel walls was also conducted as part of the CUREE-Caltech Wood frame Project (Fischer et al., 2004). The shake table house was two-story and the largest shaking event did not force the walls to reach their peak capacity, but the continuously sheathed braced walls did resist 874 plf with nails at 6" o.c. (this conventional construction tests was conducted without exterior or interior finishes). Recent work by the ICC Ad Hoc Committee on Wall Bracing and the BSSC committee on wall bracing suggest that the restraint conditions in a first of two story application would only lead to about 75% of the restrained value, thus the shear wall load value associated with the proposed in a first story application would be only 1065 plf x 0.75 = 800 plf which is again confirmed by this shake table test with less nails and walls that did not even reach its peak capacity, suggesting that the actual peak capacity actually exceeds 874 plf.

Another aspect of the CUREE shake table tests of a two-story wood frame house examined the effects of extra sheathing used above and below the openings. Houses built with segmented shear walls both with and without wood structural panel sheathing above and below window and door openings were compared. The shake table tests of segmented walls built without the added wood structural panel sheathing above and below openings had increased wall displacements by a factor more than two, suggesting that the wood structural panel sheathing above and below openings have an effect near a factor of 2 on the performance of the structure (Fischer et al., 2004).

A review of full-scale wood structural panel bracing wall tests (Martin et al., 2007), which includes 53 different tests of intermittent and continuous wall bracing in walls ranging from 12-ft long to 40-ft long and some 3D whole house testing shows that on average the improvement in peak loads for continuous is 1.95 (for walls without gypsum) and 1.87 (for walls with gypsum). The improvement in stiffness was 2.39 (for walls without gypsum) and 1.74 (for walls with gypsum). This comprehensive comparison shows that walls continuously sheathed with wood structural panels resist approximately two times the load at 0.5% drift and peak capacity.

Large scale 3D testing at APA of a 25-ft x 37.5-ft single story house shows that for equal amounts of bracing the continuously sheathed walls resisted 2.13 to 1.79 times higher loads at racking displacements of up to 1.5 inches. Further details can be seen in APA Report Form No. 3D-003 (APA, 2007).

Why Continuous Works

The reason that continuous wood structural panels provide such a benefit is that the sheathing above and below openings do the following:
1) Provide bearing restraint to the full height segments
2) Provides overturning and uplift restraint to full height segments by increased bottom plate to stud connections due to the sheathing below window openings
3) Provides top of wall stiffness and restraint to full height segments due to the sheathing above window and door openings

The additional sheathing next to full height segments works to restrain the full height segment from overturning. The additional sheathing next to full height segments provides a significantly greater degree of overturning restraint compared to an isolated (non-continuous) full height segment. Additional discussion of why continuous performs differently is available per the reference noted below (APA, 2007). Testing shows that the added sheathing above and below openings, when no other variables are changed, improves wall strength by a factor near two.

The combination of increasing nail size and frequency requirements with continuous sheathed wood structural panels can conservatively justify the 0.5 factor no matter where the wall occurs in a one, two or three story house.

References

APA, 2007. 3-D Testing With 4:1 Aspect Ratio Wall Bracing, Form No. 3D-003. APA-The Engineered Wood Association, Tacoma, WA. Available at: www.apawood.org/pdfs/TSD/3D-003.pdf

ANSI/AF&PA SDPWS-2005. Special Design Provisions for Wind and Seismic, American Forest & Paper Association, Inc, Washington, DC.

Fischer, D., Filiatrault, A., Folz, B., Uang, C-M, Seible, F., 2004. Shake Table Tests of a Two-Story Woodframe House. CUREE Publication W-06. CUREE, Richmond, CA.

Martin, Z., Skaggs, T., Keith, E., Yeh, B. 2007. A Review of Large Scale Wood Structural Panel Bracing Tests, Report to BSSC Bracing Committee May 2007, APA-The Engineered Wood Association, Tacoma, WA. Available at: www.apawood.org/pdfs/TSD/review_lg_scale_wall_bracing_tests.pdf

Paevere, P.J., Foliente, G.C., Kasal, B., 2003. Load-Sharing and Redistribution in a One-Story Woodframe Building, ASCE Journal of Structural Engineering, September 2003, Vol 129, No. 9. p. 1275

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

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

RB155–07/08

R602.10.4.2, R602.10.4.3, R602.10.4.4, R602.10.4.5, R602.10.4.6

Proponent: Edward L. Keith, PE, APA – The Engineered Wood Association

Revise as follows:

R602.10.4.2 (Supp) <u>Continuously sheathed</u> 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 R602.10.4.2.

R602.10.4.3 (Supp) <u>Continuously sheathed</u> 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 (610 mm) wood structural panel corner return shall be provided at both ends of a continuously-sheathed braced wall line in accordance with Figure R602.10.4.3(1). 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 in accordance with Figure R602.10.4.3(2).

Exception: The first braced wall panel shall be permitted to begin 12 feet 6 inches (3810 mm) from each end of the braced wall line in Seismic Design Categories A, B, and C and 8 feet in Seismic Design Categories D_0, D_1, and D_2 provided one of the following is satisfied:

1. A minimum 2-foot-long (610 mm), full-height wood structural panel is provided at both sides of a corner constructed in accordance with Figure R602.10.4.3(1) at the braced wall line ends in accordance with Figure R602.10.4.3(3), 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 (36 kg) fastened to the stud at the edge of the braced wall panel closest to the corner and to the foundation or framing below in accordance with Figure R602.10.4.3(4).

R602.10.4.4 (Supp) <u>Continuously sheathed</u> braced wall percentage. In addition to bracing percentage adjustments specified elsewhere in this code, the braced wall percentages for Method 3 from Table 602.10.1(1) shall be permitted to be multiplied by a factor in accordance with Table R602.10.4.4.

R602.10.4.5 (Supp) Continuously sheathed 4:1 aspect ratio segments used at garage door openings ~~used with continuous structural panel sheathing~~. Wall segments having a maximum 4:1 height to width ratio ~~A 4:1 aspect ratio~~ shall be permitted for full-height sheathed wall segments on either side of garage openings that support light frame roofs only, with roof covering dead loads of 3 psf (0.14 kN/m2) or less. For purposes of calculating the percentage of panel bracing required by Table R602.10.1(1), the length of the full height sheathing segment shall be equal to its measured length. This option is limited to one wall of the garage.

R602.10.4.6 (Supp) Continuously sheathed 6:1 aspect ratio segments ~~used with continuous structural panel sheathing~~. Wall segments having a maximum 6:1 height to width ratio shall be permitted to be built in accordance with Figure R602.10.4.6. The maximum 6:1 height-to-width ratio is based on height being measured from top of header to the bottom of the wall segment bottom-plate. For purposes of calculating the percentage of panel bracing required by Table R602.10.1(1), the width of the full-height sheathing segment shall be equal to its measured width. Corners at the ends of walls using this option shall be constructed in accordance with Figure R602.10.4.3(1). The reduction factors for continuously braced walls from Section R602.10.4.4 shall be applied when calculating applicable percentages of wall bracing. The number of wall segments having a maximum 6:1 height to width ratio in a wall line shall not exceed four. In multi-story buildings, wall segments having a maximum 6:1 height to width ratio are not permitted to be directly stacked vertically. For purposes of resisting wind pressures acting perpendicular to the wall, in accordance with Section R301.2, the minimum requirements of Figure R602.10.4.6 shall be sufficient for wind speeds less than 110 mph in Exposure Category B. For Exposure Categories C and D, the header to jack stud strap requirements and the number of additional jack studs shall be in accordance with Table R602.10.4.6.

Reason: The purpose of this proposal is to clarify the IRC. All of the 5 section titles modified by this proposal are specifically for the continuously sheathed method as the titles of R602.20.4.2 and R602.10.4.7, before and after these sections clearly indicate. As this section is spread out over a number of pages along with numerous tables and figures, it was thought advantageous to maintain the same title format for these 5 sections to prevent their inadvertent use for other bracing applications. This could be deemed an editorial change as it makes no change to content of the sections impacted.

In addition, an editorial change was made to Section R602.10.4.5 so the language would parallel that used in similar Section R602.10.4.6. Of the two sections, Section R602.10.4.6 was felt to be more clearly articulated.

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

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

RB156–07/08
Table R602.10.4.2

Proponent: Zeno Martin, PE, APA – The Engineered Wood Association

Revise table as follows:

TABLE R602.10.4.2 (Supp)
LENGTH REQUIREMENTS FOR BRACED WALL PANELS
IN A CONTINUOUSLY-SHEATHED WALL [a]

MINIMUM LENGTH OF BRACED WALL PANEL (inches)					MINIMUM OPENING CLEAR HEIGHT NEXT TO THE BRACED WALL PANEL (% of wall height)
8-foot wall	9-foot wall	10-foot wall	11-foot wall	12-foot wall	
48	54	60	66	72	100%
32	36	40	44	48	85%
24	27	30	33	36	67%

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm

a. Interpolation shall be permitted.

Reason: The purpose of this code change proposal is to achieve clear consistency between wall height limits for method 3 bracing and method 3 continuous bracing. Currently, wood framed braced wall heights are permitted to be 12-ft tall if in accordance with Section R301.3. Since all wood framed wall buildings braced in accordance with chapter 6 are permitted to be used in 12-ft tall walls when bracing amounts meet the requirements stated in R301.3, Table R602.10.4.2 for continuous method 3 sheathing is proposed to be modified accordingly.

Using engineering logic, if any method should be permitted at a height greater than 10-ft it should be continuous method 3 because it is aspect ratio based, and non-continuous bracing is not. It makes no logical sense to limit the height only on the aspect ratio based bracing segment, and permit tall heights (>10-ft to 12-ft) on bracing that is not aspect ratio based. Currently braced wall segments using non-continuous method 3 may be 12-ft tall x 4-ft long but since Table R602.10.4.2 doesn't have an explicit entry for 12-ft tall walls, some users interpret that to mean that a 12-ft tall wall is not permitted with continuous method 3. A continuous wall is a significantly stronger, stiffer and more structurally redundant wall and should have a height limit that is clearly consistent with all other bracing methods.

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

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

RB157–07/08
R602.10.4.5

Proponent: Chuck Bajnai, Chesterfield County, VA, representing the ICC Ad Hoc Committee on Wall Bracing

Revise as follows:

R602.10.4.5 (Supp) ~~4:1 aspect ratio segments at~~ Garage door openings used with continuous structural panel sheathing. A 4:1 aspect ratio shall be permitted for full-height sheathed wall segments on either side of garage openings that support light frame roofs or gable end walls only~~,~~. In Seismic Design Categories D_0, D_1, and D_2, ~~with~~ roof covering dead loads shall not exceed ~~of~~ 3 psf (0.14 kN/m^2) ~~or less~~ for these applications. For purposes of calculating the percentage of panel bracing required by Table R602.10.1(1), the length of the full height sheathing segment shall be equal to its measured length. This option is limited to one wall of the garage.

Reason: The ICC Ad-Hoc Committee on Wall Bracing is proposing fourteen technical and non-technical code changes as we work through the process of making Section R602.10 of the 2009 IRC technically correct and easier to understand. The individual code changes are designed to stand alone if necessary, but the total body of work is respectively submitted as a comprehensive continuation of cycle 1 changes for the 2009 IRC. To see how the individual changes are intended to meld together, please visit the ICC web site, and review the composite document on the Ad hoc Committee on Wall Bracing page: http://www.iccsafe.org/cs/cc/ahc-wb/index.html.

This is a non-technical change to clarify the residential code.

The existing requirement limiting the roof dead load to 3 psf is clearly a seismic requirement. Additional mass increases the structural loads during a seismic event while additional mass helps to prevent overturning in a wind event. In short, additional mass is bad for seismic events and provisions that limit building mass are almost invariably linked with seismic/SDC requirements. The purpose of this code change is to clarify that the 3 psf dead load limit is placed on the roof in higher seismic design categories to prevent the use of heavy stone, masonry or tile roofs in such areas.

For low seismic or wind situations up to 110 mph, the percentage bracing requirements of Table R602.10.1(1) insure sufficient bracing in the structure

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

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

RB158–07/08
R602.10.4.6

Proponent: Zeno Martin, PE, APA – The Engineered Wood Association

Revise as follows:

R602.10.4.6 (Supp) 6:1 aspect ratio segments used with continuous structural panel sheathing. Wall segments having a maximum 6:1 height to width ratio shall be permitted to be built in accordance with Figure R602.10.4.6 and Table R602.10.4.6. The maximum 6:1 height-to-width ratio is based on height being measured from top of the header to the bottom of the wall segment bottom plate. 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. Corners at ends of walls using this option shall be constructed in accordance with Figure R602.10.4.3(1). The reduction factors for continuously braced walls from Section R602.10.4.4 shall be applied when calculating applicable percentages of wall bracing. The number of wall segments having a maximum 6:1 height to length ratio in a wall line shall not exceed four. In multi-story buildings, wall segments having a maximum 6:1 height to length ratio shall ~~not~~ be permitted to be directly stacked vertically provided that the wall below is continuously sheathed with wood structural panels. For purposes of resisting wind pressures acting perpendicular to the wall, in accordance with Section R301.2, the minimum requirements of Figure R602.10.4.6 shall be sufficient for wind speeds less than 110 mph in Exposure Category B. For Exposure Categories C and D, the header to jack stud strap requirements and the number of additional jack studs shall be in accordance with Table R602.10.4.6

Reason: This change allows more flexibility for stacking narrow segments in a multistory structure and at the same time requiring an equally stiff and strong wall segment below. The original concern was that "forces imparted on the structure by the 6:1 aspect ratio portal frames are substantially higher than those in a traditionally sheathed wall." However, the existing provisions resulting from the concern would allow a 6:1 aspect ratio segment to be built over an opening or over a non-structurally sheathed wall (e.g., no wall sheathing with let-in brace) as just two examples. In keeping with the intent of the original concern, this code change proposal requires an equally strong and stiff wall segment below.

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

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

RB159–07/08
R602.10.4.6

Proponent: Zeno Martin, PE, APA – The Engineered Wood Association

Revise as follows:

R602.10.4.6 (Supp) 6:1 aspect ratio segments used with continuous structural panel sheathing. Wall segments having a maximum 6:1 height to width ratio shall be permitted to be built in accordance with Figure R602.10.4.6 and Table R602.10.4.6. The maximum 6:1 height-to-width ratio is based on height being measured from top of the header to the bottom of the wall segment bottom plate. 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. Corners at ends of walls using this option shall be constructed in accordance with Figure R602.10.4.3(1). The reduction factors for continuously braced walls from Section R602.10.4.4 shall be applied when calculating applicable percentages of wall bracing. The number of wall segments having a maximum 6:1 height to length ratio in a wall line shall not exceed four. ~~In multi-story buildings, wall segments having a maximum 6:1 height to length ratio shall not be permitted to be directly stacked vertically.~~ For purposes of resisting wind pressures acting perpendicular to the wall, in accordance with Section R301.2, the minimum requirements of Figure R602.10.4.6 shall be sufficient for wind speeds less than 110 mph in Exposure Category B. For Exposure Categories C and D, the header to jack stud strap requirements and the number of additional jack studs shall be in accordance with Table R602.10.4.6

Reason: This change allows more flexibility for stacking narrow segments in a multistory structure and eliminates an unjustified exclusion. The original concern was that "forces imparted on the structure by the 6:1 aspect ratio portal frames are substantially higher than those in a traditionally sheathed wall." However, the existing provisions resulting from the concern would allow a 6:1 aspect ratio segment to be built over an opening or over a non-structurally sheathed wall (e.g., no wall sheathing with let-in brace) as just two examples.

The 6:1 aspect ratio segment has equal or greater gravity load resistance, resistance to load perpendicular to the wall, and racking resistance compared to other permitted wall constructions. The 6:1 aspect ratio segment requires a minimum of 4 studs which is the same as that required for other 48" wide bracing segments (note: method 5 and method 3 could be built with only 3 studs). The 6:1 aspect ratio segment is also designed to resist loads perpendicular to the wall and such resistance with other methods is questionable when analyzed by the same principles of mechanics. The racking resistance of a wall continuously sheathed with wood structural panels is, without argument, as stiff and strong as the other methods and therefore should not be excluded. The 6:1 aspect ratio wall can only be built in a wall continuously sheathed with wood structural panels, which is the stiffest, strongest and most structurally redundant wall construction method. Excluding use in a stacking application while permitting stacking over let-in bracing, for example, doesn't make sense, nor does it seem to address the original concern.

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

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

RB160–07/08
R602.10.4.6, Figure R602.10.4.6, Table R602.10.4.6

Proponent: Zeno Martin, PE, APA – The Engineered Wood Association

1. Revise as follows:

R602.10.4.6 6:1 aspect ratio segments used with continuous structural panel sheathing. Wall segments having a maximum 6:1 height to width ratio shall be permitted to be built in accordance with Figure R602.10.4.6 and Table R602.10.4.6. The maximum 6:1 height-to-width ratio is based on height being measured from top of the header to the bottom of the wall segment bottom plate. 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. Corners at ends of walls using this option shall be constructed in accordance with Figure R602.10.4.3(1). The reduction factors for continuously braced walls from Section R602.10.4.4 shall be applied when calculating applicable percentages of wall bracing. The number of wall segments having a maximum 6:1 height to length ratio in a wall line shall not exceed four. In multi-story buildings, wall segments having a maximum 6:1 height to length ratio shall not be permitted to be directly stacked vertically. ~~For purposes of resisting wind pressures acting perpendicular to the wall, in accordance with Section R301.2, the minimum requirements of Figure R602.10.4.6 shall be sufficient for wind speeds less than 110 mph in Exposure Category B. For Exposure Categories C and D, the header to jack stud strap requirements and the number of additional jack studs shall be in accordance with Table R602.10.4.6~~ For purposes of resisting wind pressures acting perpendicular to the wall, the requirements of Figure R602.10.4.6 and Table R602.10.4.6 shall be met. There shall be a maximum of two braced wall segments per header and header length shall not exceed 20'-8". Tension straps shall be installed in accordance with the manufacturer's recommendations.

2. Delete existing Figure R602.10.4.6 and substitute with new Figure R602.10.4.6 as follows:

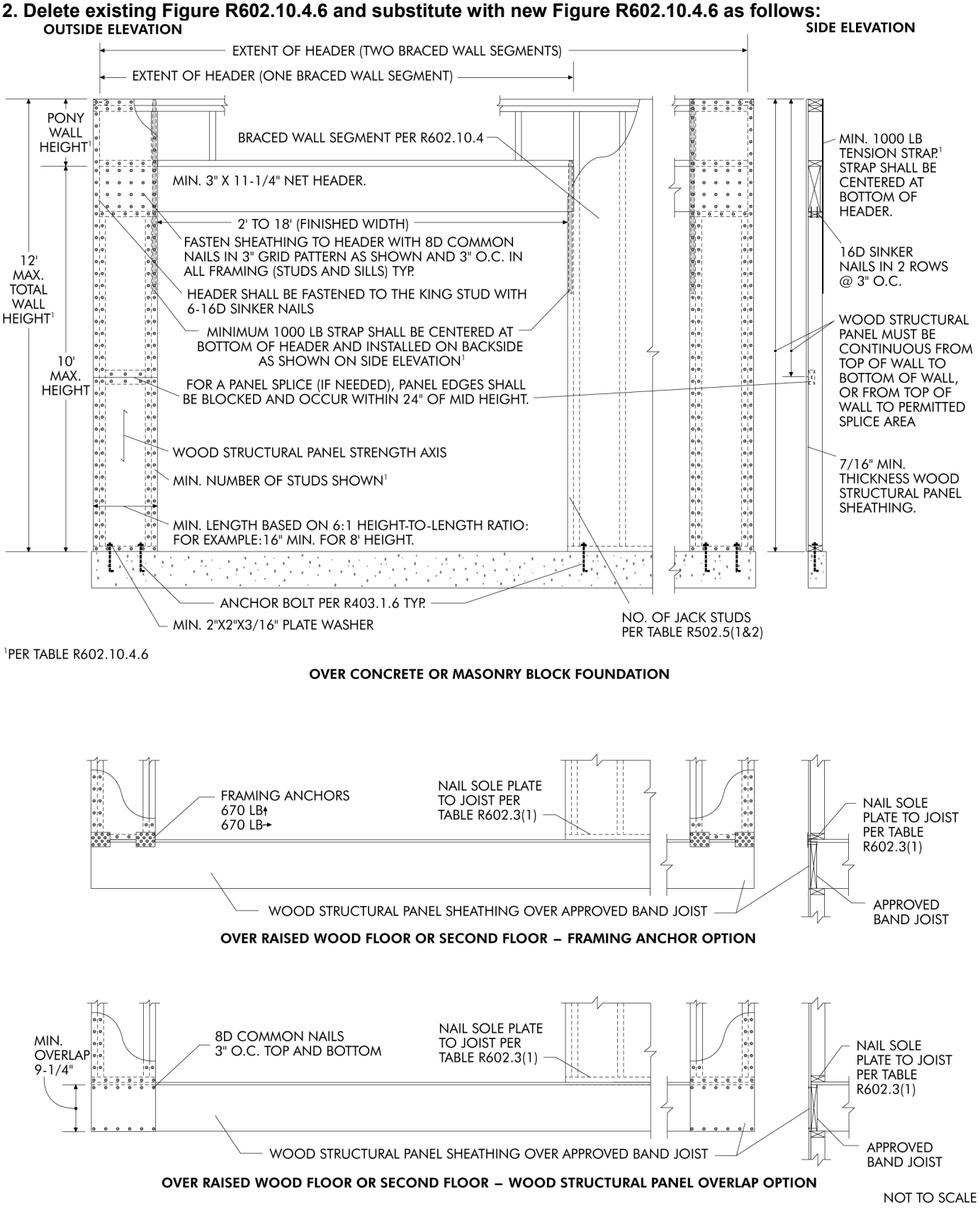


FIGURE R602.10.4.6
WALLS WITH 6:1 ASPECT RATIO USED WITH CONTINUOUS WOOD STRUCTURAL PANEL SHEATHING

3. Delete and substitute as follows:

~~**TABLE R602.10.4.6**~~
~~**HEADER TO JACK STUD STRAP AND THE NUMBER OF ADDITIONAL JACK STUDS REQUIRED FOR RESISTING WIND PRESSURES PERPENDICULAR TO 6:1 ASPECT RATIO WALLS LOCATED IN WIND EXPOSURE CATEGORIES C AND D~~

~~Required~~	~~Wall Height (ft)~~	~~Wind Exposure Category C~~			~~Wind Exposure Category D~~		
		~~85 mph~~	~~90 mph~~	~~less than 110 mph~~	~~85 mph~~	~~90 mph~~	~~less than 110 mph~~
~~Strap Capacity(lb)[a]~~	~~10 and less~~	~~1000~~	~~1200~~	~~2275~~	~~1375~~	~~1750~~	~~3050~~
~~Number of additional 2x4 Jack Studs[b]~~	~~8~~	~~--~~	~~--~~	~~--~~	~~--~~	~~--~~	~~1~~
	~~9~~	~~--~~	~~--~~	~~1~~	~~--~~	~~1~~	~~2~~
	~~10~~	~~--~~	~~1~~	~~2~~	~~1~~	~~2~~	~~3~~

~~a. If 2x6 framing is used, then the required strap capacity may be multiplied by 0.65, but in no case shall the required strap capacity be less than 1000 lb.~~
~~b. If 2x6 framing is used, then no additional framing shall be required.~~

TABLE R602.10.4.6
TENSION STRAP CAPACITY REQUIRED FOR RESISTING WIND PRESSURES PERPENDICULAR TO 6:1 ASPECT RATIO WALLS[a,b]

Minimum Wall Stud Framing Nominal Size and Grade	Maximum Pony Wall Height (ft)	Maximum Total Wall Height (ft)	Maximum Opening Width (ft)	Basic Wind Speed (mph)					
				85	90	100	85	90	100
				Exposure B			Exposure C		
				Tension strap capacity required (lbf)[a,b]					
2x4 No. 2 Grade	0	10	18	1000	1000	1000	1000	1000	1000
	1	10	9	1000	1000	1000	1000	1000	1275
			16	1000	1000	1750	1800	2325	3500
	2	10	9	1000	1000	1025	1075	1550	2500
			16	1525	2025	3125	3200	3900	NP
	2	12	9	1000	1200	2075	2125	2750	4000
			16	2600	3200	NP	NP	NP	NP
	4	12	9	1775	2350	3500	3550	NP	NP
			16	4175	NP	NP	NP	NP	NP
2x6 Stud Grade	2	12	9	1000	1000	1325	1375	1750	2550
			16	1650	2050	2925	3000	3550	NP
	4	12	9	1125	1500	2225	2275	2775	3800
			16	2650	3150	NP	NP	NP	NP

a. NP = not permitted
b. Strap shall be installed in accordance with manufacturer's recommendations

Reason: This code change proposal provides a prescriptive solution to the common construction practice of building a pony wall (short stem wall) above the header when using the 6:1 aspect ratio bracing segment. The proposed provisions are based on wind loads applied perpendicular to the wall surface as requested by the ICC Ad Hoc Committee on Wall Bracing. The wind pressures considered are in accordance with 2006 IRC Table R301.2(2) and assume all load from the opening is distributed into the wall segment. For example, a common case using a 16-ft wide garage door distributes the wind pressures acting on the door into the jack studs next to the opening via the garage door track. These provisions ensure that this braced wall segment framing can resist the large forces resulting from wind pressures on the wall surface including the wind pressures acting on adjacent openings. The resistance to the wind load is based on principles of mechanics and rational analysis. The complete load and resistance analysis is rather lengthy and complex but a sample calculation along with the complete tabulated procedure and values can be downloaded from: **http://www.apawood.org/pdfs/TSD/portal_frame_pony_wall.pdf**

It should be noted that out of plane loads from wind blowing on the wall surface, particularly concentrated at framing adjacent to garage doors, is not unique to this wall bracing segment. All wall framing and bracing types are subject to the same wind pressures. What is unique is that this bracing segment is a prescriptive solution for not only wall bracing (racking loads in the plane of the wall) but also to resist out of plane wind pressures.

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

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

RB161–07/08
R602.10.5

Proponent: Jim W. Sealy, FAIA and Kelly Cobeen, Building Seismic Safety Council of the National Institute of Building Sciences, representing FEMA/BSSC Code Resource Support Committee

Revise as follows:

R602.10.5 (Supp) Braced wall panel support <u>and fastening</u> <u>Each braced wall panel shall be fastened to framing above and below as required to meet the provisions of Table R602.3(1), Section R403.1.6, this section, and where applicable Section R602.11.</u> Braced wall panels shall be supported on floor framing or foundations as follows:

1. Where joists are perpendicular to braced wall lines above or below, blocking shall be provided between the joists at braced wall panel locations to permit fastening of wall plates in accordance with Table R602.3(1).
2. Where joists are parallel to braced wall lines above or below, a rim joist or other parallel framing member shall be provided at the wall to permit fastening of wall plates in accordance with Table R602.3(1)
3. Braced wall panels shall be permitted to be supported on cantilevered floor joists meeting the cantilever limits of Section R502.3.3 provided joists are blocked at the nearest bearing wall location, except such blocking shall not be required in Seismic Design Categories A, B, and C for cantilevers not exceeding 24 inches (610 mm) where a full height rim joist is provided.
4. Elevated post or pier foundations supporting braced wall panels shall be designed in accordance with accepted engineering practice.

Reason: Through the 2006 edition, this section discussed transfer of load in and out of braced wall panels to provide a complete load path. The concept of a complete load path is vital to seismic performance of braced wall panels. This change was modified by RB197-06/07 and RB225-06/07 to focus on framing members supporting braced wall panels. This proposed change strengthens the focus on fastening.

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

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

RB162–07/08
R602.10.5, Figure R602.10.5 (New)

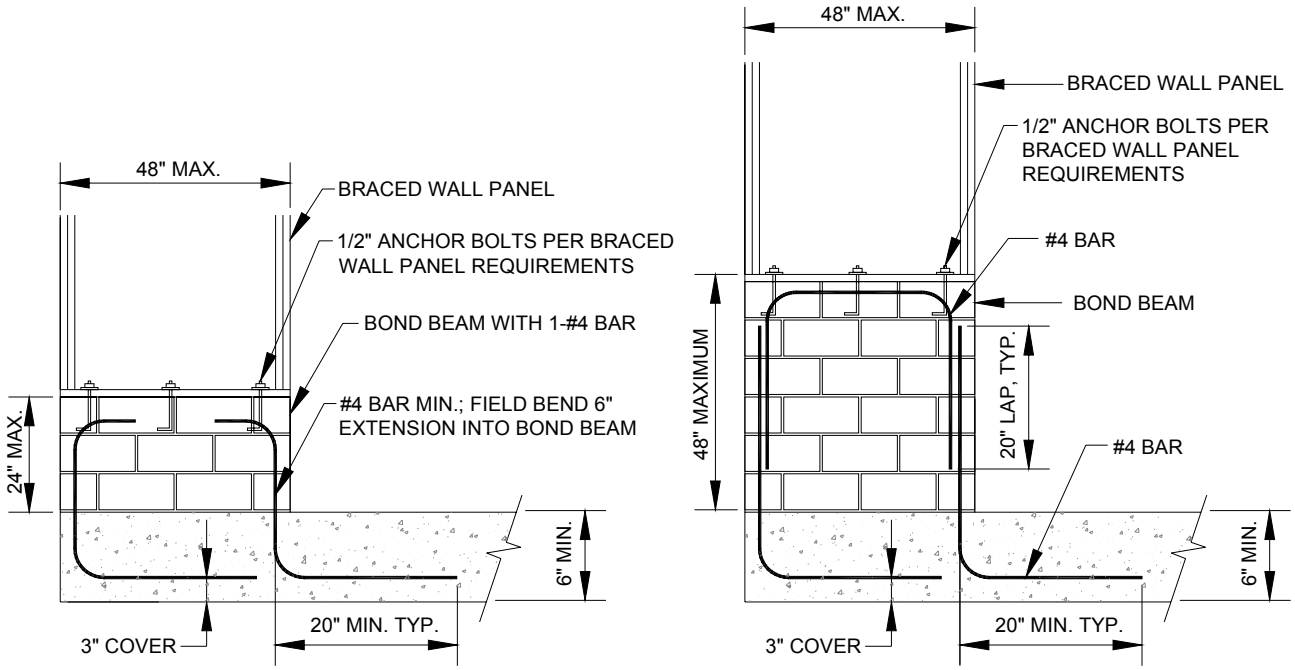
Proponent: Chuck Bajnai, Chesterfield County, VA, representing the ICC Ad Hoc Committee on Wall Bracing

1. Revise as follows:

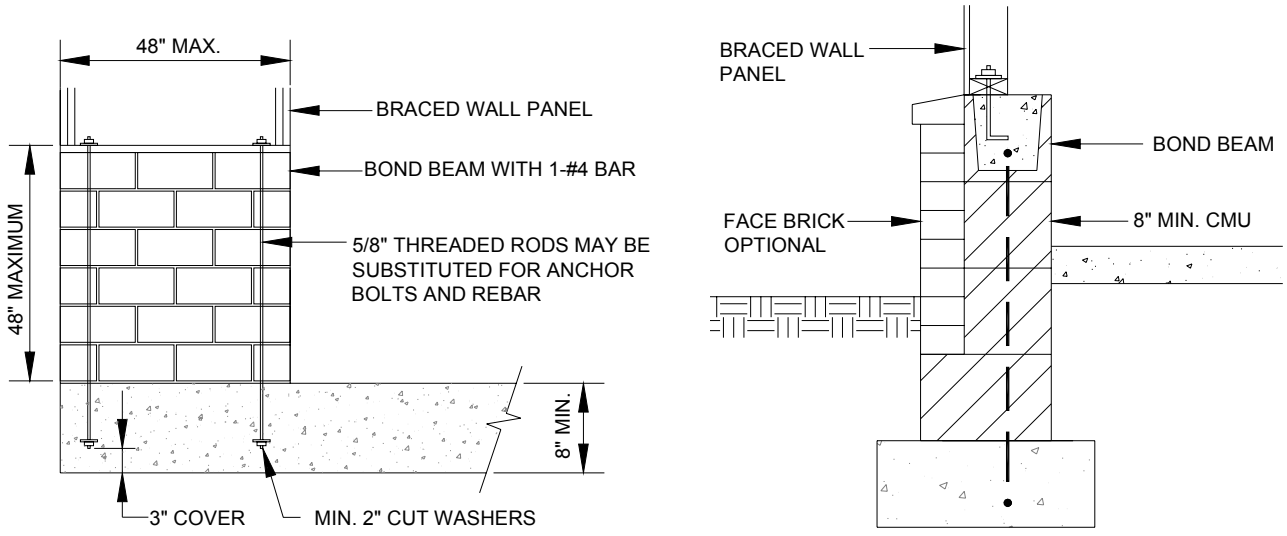
R602.10.5 (Supp) Braced wall panel support Braced wall panels shall be supported on floor framing or foundations as follows:

1. Where joists are perpendicular to braced wall lines above or below, blocking shall be provided between the joists at braced wall panel locations to permit fastening of wall plates in accordance with Table R602.3(1).
2. Where joists are parallel to braced wall lines above or below, a rim joist or other parallel framing member shall be provided at the wall to permit fastening of wall plates in accordance with Table R602.3(1)
3. Braced wall panels shall be permitted to be supported on cantilevered floor joists meeting the cantilever limits of Section R502.3.3 provided joists are blocked at the nearest bearing wall location, except such blocking shall not be required in Seismic Design Categories A, B, and C for cantilevers not exceeding 24 inches (610 mm) where a full height rim joist is provided.
4. Elevated post or pier foundations supporting braced wall panels shall be designed in accordance with accepted engineering practice.
5. <u>Masonry stem walls with a length of 48 inches (1220 mm) or less supporting braced wall panels shall be reinforced in accordance with Figure R602.10.5. Masonry stem walls with a length greater than 48 inches (1220 mm) supporting braced wall panels shall be constructed in accordance with Section R403.1. Braced wall panels constructed in accordance with Sections R602.10.3.2.1 and R602.10.3.2.2 shall not be permitted to attach to masonry stem walls.</u>

2. Add new figure as follows:



SHORT STEM WALL REINFORCEMENT **TALL STEM WALL REINFORCEMENT**



OPTIONAL STEM WALL REINFORCEMENT **TYPICAL STEM WALL SECTION**

NOTE: GROUT BOND BEAMS AND ALL CELLS WHICH CONTAIN REBAR, THREADED RODS AND ANCHOR BOLTS.

FIGURE R602.10.5
MASONRY STEM WALLS SUPPORTING BRACED WALL PANELS

Reason: The ICC Ad-Hoc Committee on Wall Bracing is proposing several technical and non-technical code changes as it works through the process of making Section R602.10 of the 2009 IRC technically correct and easier to understand. The individual code changes are designed to stand alone if necessary, but the total body of work is respectively submitted as a comprehensive continuation of cycle 1 changes for the 2009 IRC.

This is a technical change to provide direction for support of braced wall panels on masonry stem walls.

Masonry stem walls have never been addressed in previous editions of the IRC. Many jurisdictions are unsure how to enforce a braced wall panel on masonry stem walls or whether to exclude them entirely. In particular, portal frame panels atop masonry stem walls have come into question. This condition usually occurs at garage panels and slab conditions.

The proposed stem wall reinforcement requirements for braced wall panels less than 48" were generated jointly by members of the ICC Ad Hoc Committee on Wall Bracing and the National Concrete Masonry Association. It was agreed that the standard provisions for masonry wall construction of Chapter 4 were inadequate to resist the loads associated with a narrow (less than 48") braced wall panel. After computing sample loading conditions and analyzing the effects on the masonry, it was discover that reinforcement was essential. To provide flexibility in the field, optional conditions are offered as shown in the figure. Due to loads associated with a cast in place hold-down and constructability of same, it was prohibitive to allow the alternate braced wall panels to be constructed atop masonry.

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

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

RB163–07/08

R602.10.5, R602.10.5.1, Figure R602.10.5(1) (New), Figure R602.10.5(2) (New),R602.10.6, R602.10.6.1

Proponent: Chuck Bajnai, Chesterfield County, VA, representing the ICC Ad Hoc Committee on Wall Bracing

Delete and substitute as follows:

~~**R602.10.5 (Supp) Braced wall panel support** Braced wall panels shall be supported on floor framing or foundations as follows:~~

1. ~~Where joists are perpendicular to braced wall lines above or below, blocking shall be provided between the joists at braced wall panel locations to permit fastening of wall plates in accordance with Table R602.3(1).~~
2. ~~Where joists are parallel to braced wall lines above or below, a rim joist or other parallel framing member shall be provided at the wall to permit fastening of wall plates in accordance with Table R602.3(1)~~
3. ~~Braced wall panels shall be permitted to be supported on cantilevered floor joists meeting the cantilever limits of Section R502.3.3 provided joists are blocked at the nearest bearing wall location, except such blocking shall not be required in Seismic Design Categories A, B, and C for cantilevers not exceeding 24 inches (610 mm) where a full height rim joist is provided.~~
4. ~~Elevated post or pier foundations supporting braced wall panels shall be designed in accordance with accepted engineering practice.~~

~~**R602.10.5.1 (Supp) Interior braced wall panel connections for Seismic Design Categories D_0, D_1 and D_2.** Interior braced wall lines shall be fastened to floor and roof framing in accordance with Table R602.3(1), to required foundations in accordance with Section R602.11.1, and in accordance with the following requirements:~~

1. ~~Floor joists parallel to the top plate shall be toe-nailed to the top plate with at least 8d nails spaced a maximum of 6 inches (150 mm) on center.~~
2. ~~Top plate laps shall be face-nailed with at least eight 16d nails on each side of the splice.~~

~~**R602.10.6 (Supp) Interior braced wall support.** In Seismic Design Categories A through D_1, interior braced wall lines shall be supported as provided in Section R502.4.~~

~~**R602.10.6.1 (Supp) Interior braced wall support for Seismic Design Category D_2.** In one-story buildings located in Seismic Design Category D_2, interior braced wall lines shall be supported on continuous foundations at intervals not exceeding 50 feet (15 240 mm). In two story buildings located in Seismic Design Category D_2, all interior braced wall panels shall be supported on continuous foundations.~~

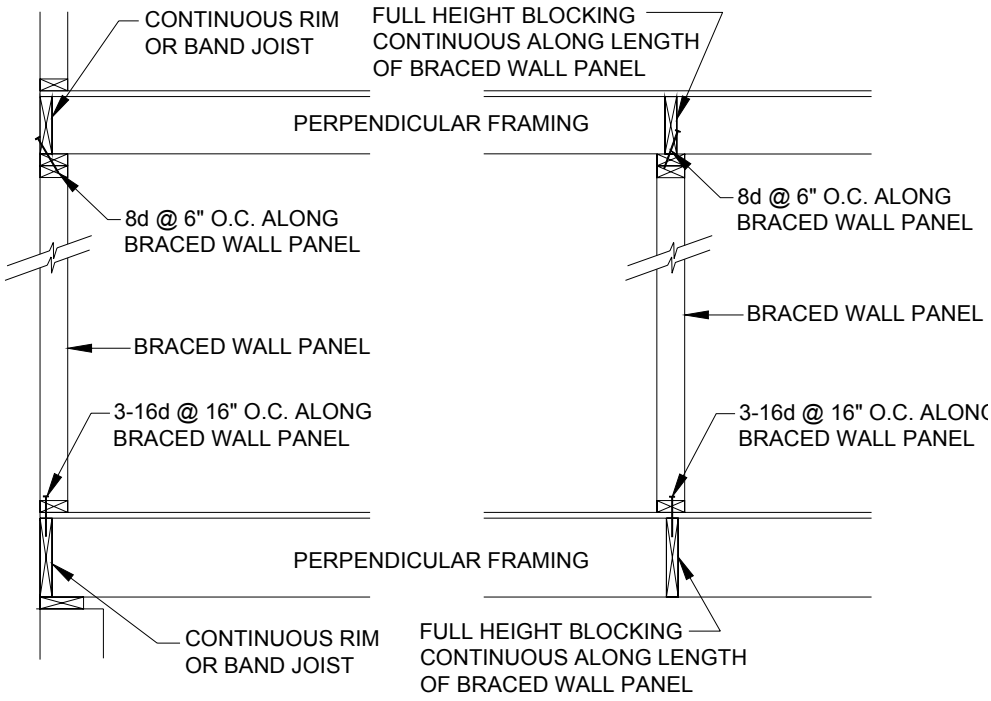
~~**Exception:** Two-story buildings shall be permitted to have interior braced wall lines supported on continuous foundations at intervals not exceeding 50 feet (15 240 mm) provided that:~~

1. ~~The height of cripple walls does not exceed 4 feet (1219 mm).~~
2. ~~First-floor braced wall panels are supported on doubled floor joists, continuous blocking or floor beams.~~
3. ~~The distance between bracing lines does not exceed twice the building width measured parallel to the braced wall line.~~

R602.10.5 Braced wall panel connections. Braced wall panels shall be connected to floor framing or foundations as follows:

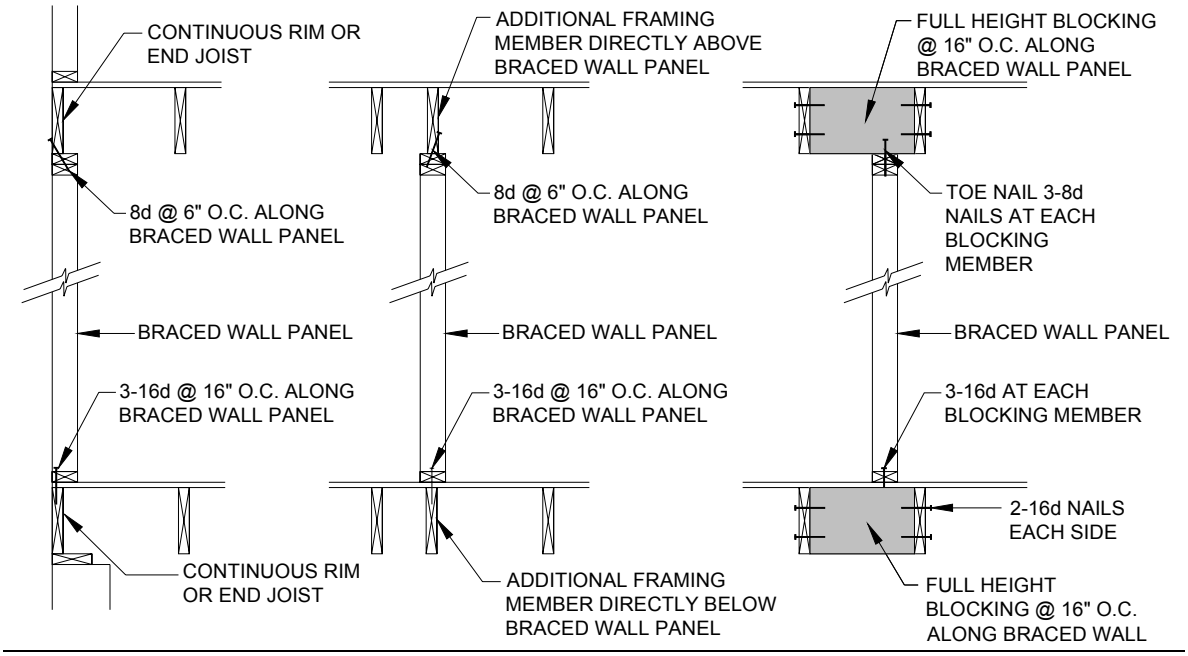
1. Where joists are perpendicular to a braced wall panel above or below, a rim joist, band joist or blocking shall be provided along the entire length of the braced wall panel in accordance with Figure R602.10.5(1). Fastening of top and bottom wall plates to framing, rim joist, band joist and/or blocking shall be in accordance with Table R602.3(1).

2. Where joists are parallel to a braced wall panel above or below, a rim joist, end joist or other parallel framing member shall be provided directly above and below the braced wall panel in accordance with Figure R602.10.5(2). Where a parallel framing member cannot be located directly above and below the panel, full-depth blocking at 16 inch (406 mm) spacing shall be provided between the parallel framing members to each side of the braced wall panel in accordance with Figure R602.10.5(2). Fastening of blocking and wall plates shall be in accordance with Table R602.3(1) and Figure R602.10.5(2).
3. Connections of braced wall panels to concrete or masonry shall be in accordance with Section R403.1.6.



For SI: 1 inch = 25.4 mm

FIGURE R602.10.5(1)
BRACED WALL PANEL CONNECTION WHEN
PERPENDICULAR TO FLOOR/CEILING FRAMING



For SI: 1 inch = 25.4 mm

FIGURE R602.10.5(2)
BRACED WALL PANEL CONNECTION WHEN PARALLEL TO FLOOR/CEILING FRAMING

R602.10.5.1 Braced wall panel connections for Seismic Design Categories D_0, D_1 and D_2. Braced wall panels shall be fastened to required foundations in accordance with Section R602.11.1, and top plate lap splices shall be face-nailed with at least eight 16d nails on each side of the splice.

R602.10.6 Braced wall panel support. Braced wall panel support shall be provided as follows:

1. Cantilevered floor joist, supporting braced wall lines, shall comply with Section R502.3.3. Solid blocking shall be provided at the nearest bearing wall location. In Seismic Design Categories A, B, and C, where the cantilever is not more than 24 inches (607 mm), a full height rim joist instead of solid blocking shall be provided.
2. Elevated post or pier foundations supporting braced wall panels shall be designed in accordance with accepted engineering practice.

R602.10.6.1 Braced wall panel support for Seismic Design Category D_2. In one-story buildings located in Seismic Design Category D_2, interior braced wall panels shall be supported on continuous foundations at intervals not exceeding 50 feet (15 240 mm). In two story buildings located in Seismic Design Category D_2, all interior braced wall panels shall be supported on continuous foundations.

Exception: Two-story buildings shall be permitted to have interior braced wall panels supported on continuous foundations at intervals not exceeding 50 feet (15 240 mm) provided that:

1. The height of cripple walls does not exceed 4 feet (1219 mm).
2. First-floor braced wall panels are supported on doubled floor joists, continuous blocking or floor beams.
3. The distance between bracing lines does not exceed twice the building width measured parallel to the braced wall line.

Reason: The ICC Ad-Hoc Committee on Wall Bracing is proposing fourteen technical and non-technical code changes as we work through the process of making Section R602.10 of the 2009 IRC technically correct and easier to understand. The individual code changes are designed to stand alone if necessary, but the total body of work is respectively submitted as a comprehensive continuation of cycle 1 changes for the 2009 IRC. To see how the individual changes are intended to meld together, please visit the ICC web site, and review the composite document on the Ad hoc Committee on Wall Bracing page: http://www.iccsafe.org/cs/cc/ahc-wb/index.html.

This is a non-technical change to differentiate between “connections” and “supports”, and provide details for connecting braced wall panels to framing.

The connection of the braced wall panels to the diaphragm above and below remains unclear. The current text requires the entire braced wall line to be attached to the diaphragm when in actuality, only the braced wall panel requires this. The proposed changes to Section R602.10.5 provides the user with clear requirements for attachment of all braced wall panels to framing. The figures showing connection options are provided to ensure proper installation without compromising the lateral load resisting system.

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

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

RB164–07/08

R602.10.5, Figure R602.10.5(1) (New), Figure R602.10.5(2) (New)

Proponent: Robert Rice, Grants Pass, OR, representing Josephine County Building Safety and Southern Oregon Chapter International Code Council

1. Revise as follows:

R602.10.5 (Supp) Braced wall panel ~~support~~ **connections.** Braced wall panels shall be **connected** ~~supported on floor framing or foundations~~ as follows:

1. Where ~~joists~~ floor or roof framing members are perpendicular to exterior braced wall lines above or below, solid blocking shall be provided between the ~~joists~~ framing members at braced wall panel locations ~~to permit fastening of wall plates in accordance with~~ and shall extend to within 2 inches of the bottom side of the roof sheathing and shall be fastened in accordance with Table R602.3(1).

   Exceptions:

   1. For Seismic Design Category C and wind speed zones less than 100 mph; Where the framing members are perpendicular to the wall line below and the height of the roof or floor diaphragm is less than 9 ¼” from the top plate of the wall line, solid, full-height blocking need not be provided when the perpendicular framing members or a parallel member such as a continuous rim joist or header is attached to the wall line per Table R602.3(1)
   2. Where the height of the blocking required for top plate connection is over 9 ¼ inches (235 mm) exterior braced wall panel top plates are permitted to be connected in accordance with one of the following methods:

      1. In accordance with Figure R602.10.5 (1)
      2. In accordance with Figure R602.10.5 (2)

   3. With full height engineered blocking panels designed for values listed in American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual for One- and Two-Family Dwellings* (WFCM). Roof or floor sheathing above shall be attached to the blocking panels and the blocking panels shall be attached to top of wall in accordance with Table R602.3(1).
   4. Designed in accordance with accepted engineering methods. Where floor or roof framing members are perpendicular to interior braced wall lines above or below, blocking shall be provided between the framing members at braced wall panel locations and attached per Table R602.3(1). Blocking at interior braced wall panels need not extend to floor or roof sheathing above.

2. Where ~~joists~~ floor or roof framing members are parallel to braced wall lines above or below, a rim joist or other parallel framing member shall be provided at ~~the~~ braced wall panels. ~~To permit fastening of wall plates per Table R602.3(1).~~ Roof or floor sheathing above shall be attached to the framing member and the framing member shall be attached to top of wall plates per Table R602.3(1)

~~3. Braced wall panels shall be permitted to be supported on cantilevered floor joists meeting the cantilever limits of Section R502.3.3 provided joists are blocked at the nearest bearing wall location, except such blocking shall not be required in Seismic Design Categories A, B, and C for cantilevers not exceeding 24 inches where a full height rim joist is provided.~~

~~4. Elevated post or pier foundations supporting braced wall panels shall be designed in accordance with accepted engineering practice.~~

2. Add new figures as follows:

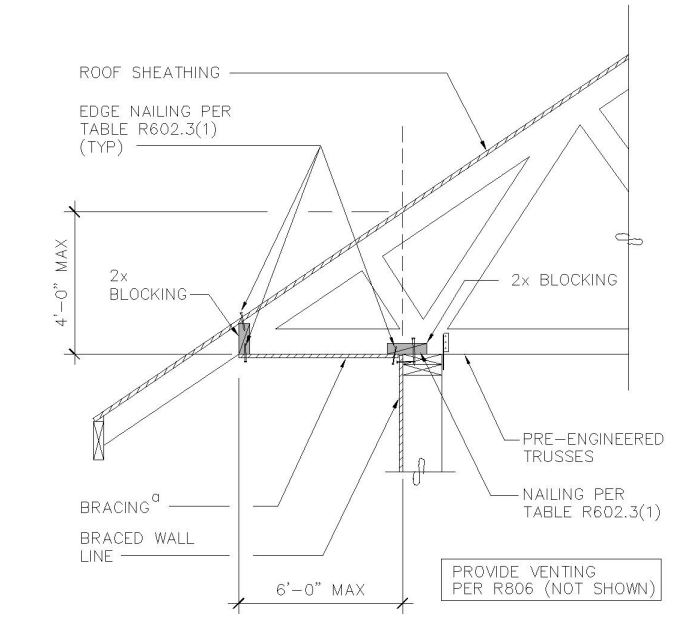


FIGURE R602.10.5(1)
ALTERNATE BRACED WALL PANEL TOP PLATE CONNECTION

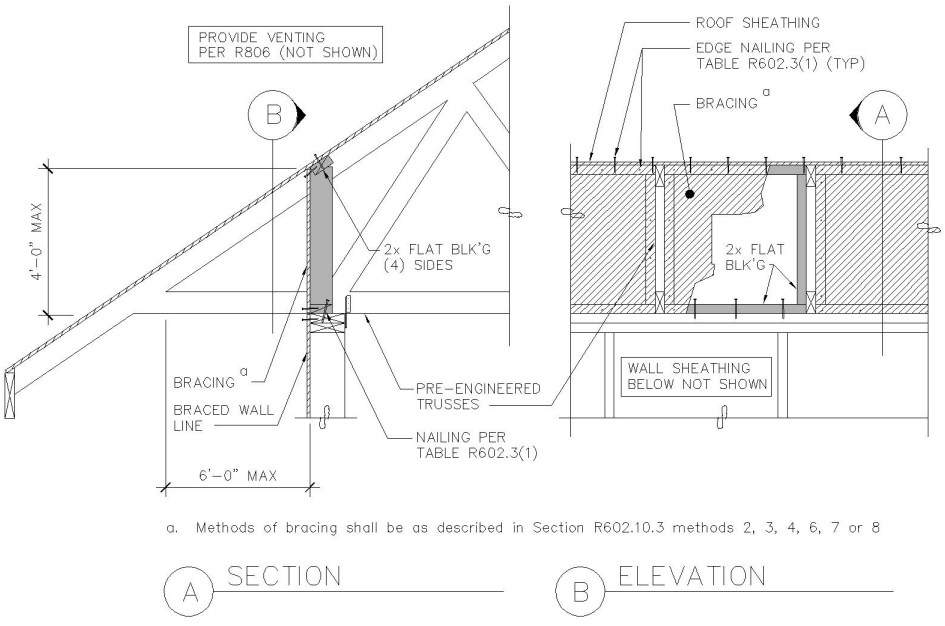


FIGURE R602.10.5(2)
ALTERNATE BRACED WALL PANEL TOP PLATE CONNECTION

Reason: The intent of the original code section, "R602.10.8 Connections", is to describe braced wall connections to framing above and below to provide a complete load path for lateral forces (i.e. wind or seismic). In the proposed modification that was approved for the 2007 supplement the change in the first sentence, "supported on floor framing or foundation ", changes the focus of the section and seems to exclude connections to framing above. In spite of that, item 1 of the proposal specifically accounts for the connection of braced walls below to framing above directly conflicting with the proposed title and first sentence. Furthermore, in the original code text it says, "…shall be connected to the framing above….". I propose changing the title and first sentence to reflect the intent of the section.

I propose changing the word "joists" to "floor or roof framing members" and "framing members" as applicable. Considering item 1, the braced wall could be connecting to floor joists, ceiling joists, rafters or trusses. The term "framing members" is already used in the current code language.

I propose adding the to separate exterior braced wall connections from interior braced walls. The intent of the required blocking in the original code language is to provide a complete load path of the lateral forces in the floor or roof sheathing above to the braced wall line. Also, when the braced walls are above typically the blocking provides bearing as well.

In both items 1 and 2 the language for the reference to Table R602.3(1) has been modified from the original proposal that more clearly states where and how attachments are to occur. The attachment requirements themselves do not change with this modification.

Item 4 is deleted. This condition is already covered by other code sections and confuses this section. The existing code states;
Section "**R602.10 Wall bracing**. All exterior walls shall be braced in accordance with this section."
Section "**R403.2 General**. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, wood foundations, or other approved structural systems....."

The code currently requires that all exterior walls are braced wall lines and are to be on foundations per code. If they are not, it already requires design.

Cost Impact: Currently, without a prescriptive provision to accomplish load path, engineering would be required. This proposal would provide a prescriptive solution without requiring engineering costs and delays. This would result in reduced cost.

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

RB165–07/08

R602.10.5 (New), R602.10.5.1 (New), R602.10.5.2 (New), Table R602.10.5(2) (New), R602.10.5.3 (New), R602.10.5.4 (New), Figure R602.10.4(1)-(2)-(3)-(4), Figure R602.10.4.3(1)

Proponent: Louis Wagner, American Fiberboard Association

1.Add new text as follows:

R602.10.5 Continuously-sheathed braced wall line using Method 4 (structural fiberboard sheathing). Continuously sheathed braced wall lines using structural fiberboard sheathing shall comply with this section. Different bracing methods shall not be permitted within a continuously sheathed braced wall line. Other bracing methods prescribed by this code shall be permitted on other braced wall lines on the same story level or on different story levels of the building.

R602.10.5.1 Continuously-sheathed braced wall line requirements. continuously-sheathed braced wall lines shall be in accordance with Figure R602.10.4(1) and shall comply with all of the following requirements:

1. Structural fiberboard sheathing shall be applied to all exterior sheathable surfaces of a braced wall line including areas above and below openings.
2. Only full-height or blocked braced wall panels shall be used for calculating the braced wall percentage in accordance with Table R602.10.1(1).

R602.10.5.2 Braced wall panel length. In a continuously-sheathed structural fiberboard braced wall line, the minimum braced wall panel length shall be permitted to be in accordance with Table R602.10.4+1(2).

TABLE R602.10.5(2)
MININUM LENGTH REQUIREMENTS FOR BRACED WALL PANELS IN A CONTINUOUSLY-SHEATHED WALL [a]

MINIMUM LENGTH OF BRACED WALL PANEL (inches)			MINIMUM 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	67%

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm
a. Interpolation shall be permitted.

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 32-inch structural fiberboard sheathing panel corner return shall be provided at both ends of a continuously-sheathed braced wall line in accordance with Figure R602.10.4.3(1) 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 in accordance with Figure R602.10.4.3 (2).

Exception: The first braced wall panel shall be permitted to begin 12-feet 6-inches from each end of the braced wall line in Seismic Design Categories A, B, and C provided one of the following is satisfied:

1. A minimum 32-inch-long, full-height fiberboard structural sheathing panel is provided at both sides of a corner constructed in accordance with Figure R602.10.4.3(1) at the braced wall line ends in accordance with Figure R602.10.4.3(3), 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 in accordance with Figure R602.10.4.3 (4).

R602.10.5.4 Continuously-sheathed braced wall lines. Where a continuously-sheathed braced wall line is used in Seismic Design Categories D_0, D1, and D_2 or regions where the basic wind speed exceeds 100 miles per hour, the braced wall line shall be designed in accordance with accepted engineering practice and the provisions of the *International Building Code*. Also all other exterior braced wall lines in the same story shall be continuously sheathed.

(Renumber subsequent sections)

2. Revise as follows:

In the body of Figures R602.10.4(1), R602.4.10.4.3(2), R602.10.4.3(3) and R602.10.4.3(4) add new text for fiberboard as follows: MINIMUM REQUIRED LENGTH PER SECTIONS R602.10.4 OR R602.10.5

Wherever the wording appears in the body of Figures R602.10.4.3(1)a , b and c add new text for fiberboard as follows:

Continuous wood structural panel or fiberboard braced wall line
Minimum 24 inch wood structural panel or 32 inch fiberboard sheathing

Also wherever the wording appears in the body of Figures R602.10.4.3(1)a , b and c delete and substitute as follows:

~~8d common nail (0.131" x 2-1/2") at 6 in o.c. on all panel edges and 12 in. o.c. on all framing members not at panel edges~~ See Table R602.3(1) for fastening.
~~8d common nail (0.131" x 2-1/2") at 12 in. o.c. on all framing members not at panel edges~~ See Table R602.3(1) for fastening.
~~8d common nail (0.131" x 2-1/2") at 6 in o.c. on all panel edges~~ See Table R602.3(1) for fastening.

Also in the body of Figure R602.10.4.3(1)c delete and substitute as follows:

~~8d common nail (0.131" x 2-1/2") at 3in. o.c.~~ Fasteners on both studs at each panel edge

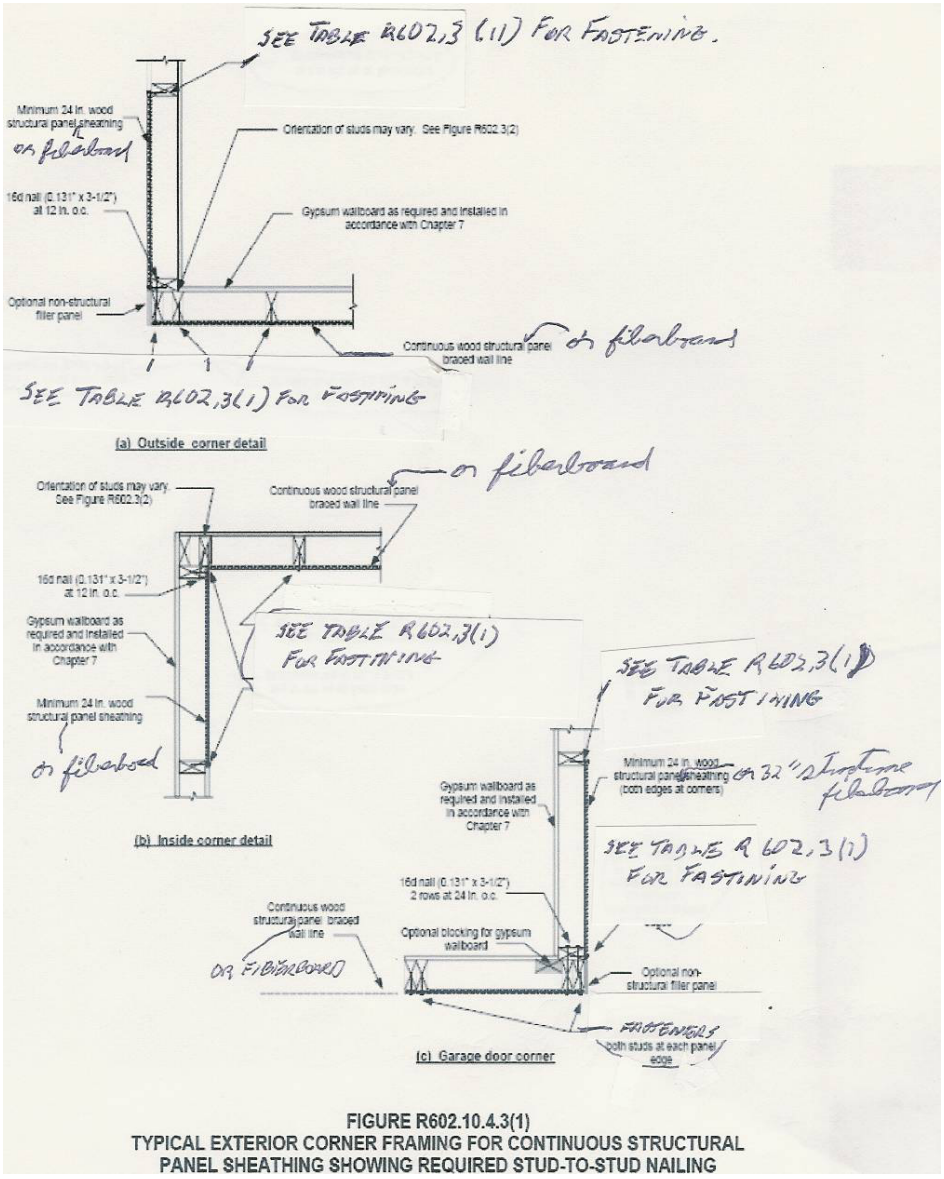


FIGURE R602.10.4.3(1)
TYPICAL EXTERIOR CORNER FRAMING FOR CONTINUOUS STRUCTURAL PANEL SHEATHING SHOWING REQUIRED STUD-TO-STUD NAILING

Reason: The purpose of the code change is to add new provisions to the code.

During the code change cycle leading to the 2007 Supplement, there was extensive discussion of the use of continuous fiberboard sheathing during the ICC Ad Hoc Committee on Wall Bracing meetings. A proposal very similar to the one above was submitted at the Public Comment stage, but was withdrawn when it was noted that there was no reference to a table similar to Table R602.10.4+1(2). This proposal includes that table and is modeled after the provisions for continuous wood structural panels.

Proposed use of fiberboard bracing in the continuous sheathed method is based on results from: Cyclical Testing of Fiberboard Shear Walls with Varying Aspect Ratios (NAHB-RC Report EG3209_031506 available in full at www.fiberboard.org). Testing of walls, having aspect ratios of 1:1, 2:1, 3:1 and 4:1 supports use of fiberboard wall bracing with aspect ratio up to 4:1. Percent bracing reductions applicable to continuous sheathed wood structural panel shear walls (either 0.9 for or 0.8 depending on maximum opening height -see 2007 IRC Table R602.10.4.4) are not requested for fiberboard wall bracing due to observations of reduced unit shear capacity with increasing aspect ratio (strength ratio between 4:1 and 2:1 aspect ratio wall segments is 0.82).

The minimum length of corner return (intended to provide overturning restraint) for fiberboard of 32" represents an increase over 24" applicable to wood structural panel and is recommended to conservatively address reported strength reductions as aspect ratio increases.

The Ad Hoc Committee was concerned that current data was not available to justify continuous fiberboard sheathing in high wind and seismic conditions. Wording omitted in the exception under R602.10.4+1.3 and added in section R602.10.4+1.7 should allay those concerns. We are not asking for use in higher seismic zones.

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

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

RB166–07/08
R602.10.7

Proponent: Chuck Bajnai, Chesterfield County, VA, representing the ICC Ad Hoc Committee on Wall Bracing

Revise as follows:

R602.10.7 (SUPP) Panel joints. All vertical joints of panel sheathing shall occur over, and be fastened to common studs. Horizontal joints in braced wall panels shall occur over, and be fastened to common blocking of a minimum 1-1/2 inch (38 mm) thickness.

Exceptions:

1. Blocking at horizontal joints shall not be required in wall segments that are not counted as braced wall panels.
2. Where the bracing percentage provided is at least twice the minimum percentage required by Table R602.10.1(1) blocking at horizontal joints shall not be required in braced wall panels constructed using Methods 3, 4, 5, 6, or 8.
3. When Method 5 panels are installed horizontally, blocking of horizontal joints is not required.

Reason: The ICC Ad-Hoc Committee on Wall Bracing is proposing fourteen technical and non-technical code changes as we work through the process of making Section R602.10 of the 2009 IRC technically correct and easier to understand. The individual code changes are designed to stand alone if necessary, but the total body of work is respectively submitted as a comprehensive continuation of cycle 1 changes for the 2009 IRC. To see how the individual changes are intended to meld together, please visit the ICC web site, and review the composite document on the Ad hoc Committee on Wall Bracing page: http://www.iccsafe.org/cs/cc/ahc-wb/index.html.

Blocking of horizontal joints in Method 5 is not required because taped joints provide adequate shear transfer between panels when panels are horizontally installed and fastened at 7"oc along top and bottom plates (not at horizontal joint at mid-height of wall).

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

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

RB167–07/08
R602.12 (New), R602.12.1 (New), R602.12.1.1 (New), R602.12.1.2 (New), R602.12.1.3 (New), R602.12.1.4 (New), R602.12.1.5 (New), R602.12.1.6 (New), Table R602.12(1) (New), Table R602.12(2) (New), Figure R602.12 (New), R703.7, Table R703.7(1), R703.7(2)

Proponent: Randall C. Shackelford, PE, Simpson Strong-Tie Co.

1. Add new text, tables and figures as follows:

R602.12 Wall bracing and stone and masonry veneer. Where stone and masonry veneer is installed in accordance with Section R703.7, wall bracing shall comply with this section.

For all buildings in Seismic Design Categories A, B and C, wall bracing at exterior and interior braced wall lines shall be in accordance with Section R602.10 or R603.7, and the additional requirements of Table R602.12(1).
For detached one- or two-family dwellings in Seismic Design Categories D_0, D_1 and D_2, wall bracing and hold downs at exterior and interior braced wall lines shall be in accordance with Sections R602.10 and R602.11 and the additional requirements of Section R602.12.1 and Table R602.12(2). In Seismic Design Categories D_0, D_1 and D_2, cripple walls shall not be permitted, and required interior braced wall lines shall be supported on continuous foundations.

R602.12.1 Seismic Design Categories D_0, D_1 and D_2. Wall bracing where stone and masonry veneer exceeds the first story height in Seismic Design Categories D_0, D_1 and D_2 shall conform to the requirements of Section R602.10 and R602.11 and the following requirements.

R602.12.1.1 Percentage of bracing. The percentage of bracing along each braced wall line shall be in accordance with Table R602.12(2).

R602.12.1.2 Braced wall panel location. Exterior braced wall lines shall have a braced wall panel located at each end of the braced wall line and spaced at least every 25 feet on center.

Exception: Braced wall panel shall be permitted to begin no more than 8 feet from each end of the braced wall line provided the end of each braced wall panel closest to the corner shall have a tie-down device providing an uplift allowable design value of at least 1,800 pounds greater than required by Table R602.12(2) and 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.

R602.12.1.3 Braced wall panel construction. Wood structural panels shall be constructed of sheathing with a thickness of not less than 7/16 inch nailed with 8d common nails spaced 4 inches on center at all panel edges and 12 inches on center at intermediate supports. The end of each braced wall panel shall have a holdown device in accordance with Table R602.12(2) installed at each end.

R602.12.1.4 Minimum length of braced panel. Each braced wall panel shall be at least 48 inches in length, covering a minimum of 3 stud spaces where studs are spaced 16 inches on center and covering a minimum of 2 stud spaced where studs are spaced 24 inches on center.

R602.12.1.5 Alternate braced wall panel. Alternate braced wall panels described in Section R602.10.3.2 shall not replace the braced wall panel specification of this section.

R602.12.1.6 Continuously-sheathed wall bracing. Continuously sheathed provisions of Section R602.10.4 shall not be used in conjunction with the wall bracing provisions of this section.

TABLE R602.12(1)
STONE OR MASONRY VENEER WALL BRACING REQUIREMENTS, WOOD OR STEEL FRAMING, SEISMIC DESIGN CATEGORIES A, B AND C

SEISMIC DESIGN CATEGORY	NUMBER OF WOOD OR STEEL FRAMED STORIES	WOOD OR STEEL FRAMED STORY	MINIMUM SHEATHING AMOUNT (percent of braced wall line length)c
A or B	Steel: 1 or 2 Wood: 1, 2 or 3	all	Table R602.10.1 or Table R603.7
C	1	1 only	Table R602.10.1 or Table R603.7
	2	top	Table R602.10.1 or Table R603.7
		bottom	1.5 times length required by Table R602.10.1 or 1.5 times length required by Table R603.7
	Wood only: 3	top	Table R602.10.1
		middle	1.5 times length required by Table R602.10.1
		bottom	1.5 times length required by Table R602.10.1

a. Applies to exterior and interior braced wall lines.

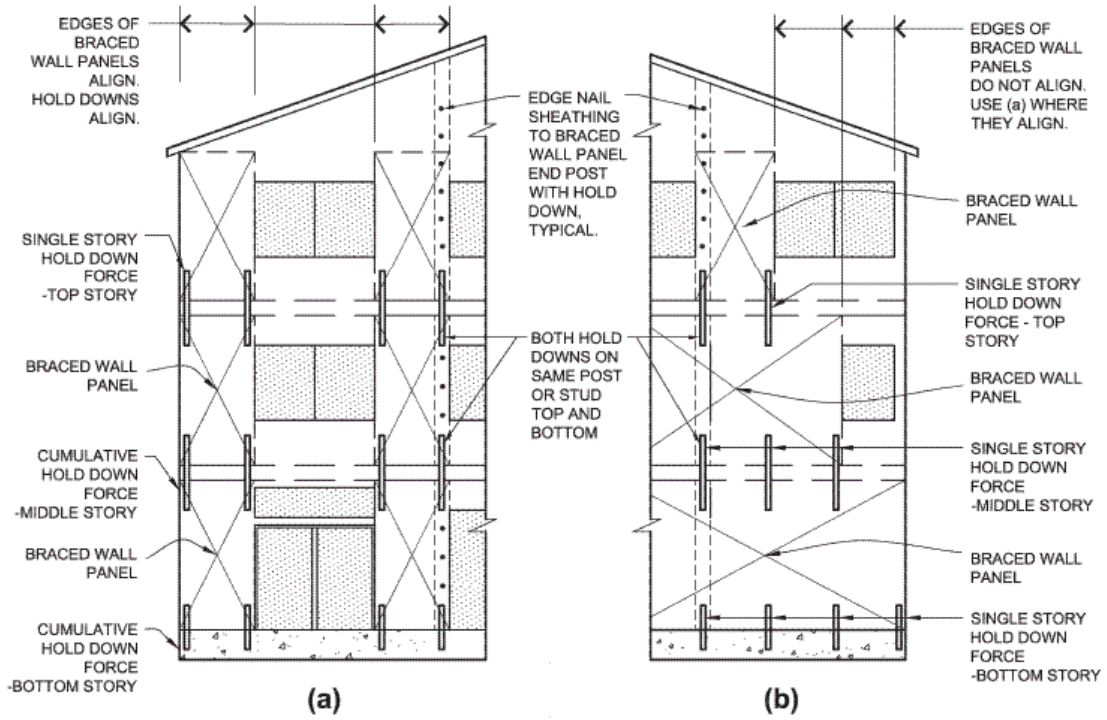
TABLE R602.12(2)
STONE OR MASONRY VENEER WALL BRACING REQUIREMENTS, ONE- AND TWO-FAMILY DETACHED DWELLINGS, WOOD FRAMING, SEISMIC DESIGN CATEGORIES D0, D1 AND D2

SEISMIC DESIGN CATEGORY	NUMBER OF WOOD FRAMED STORIES[a]	WOOD FRAMED STORY	MINIMUM SHEATHING AMOUNT (percent of braced wall line length)[c]	MINIMUM SHEATHING THICKNESS AND FASTENING	SINGLE STORY HOLD DOWN FORCE (lb)[d]	CUMULATIVE HOLD DOWN FORCE (lb)[e]
D_0	1	1 only	35	7/16-inch wood structural panel sheathing with 8d common nails spaced at 4 inches on center at panel edges, 12 inches on center at intermediate supports. 8d common nails at 4 inches on center at braced wall panel end posts with hold down attached	N/A	—
	2	top	35		1900	—
		bottom	45		3200	5100
	3	top	40		1900	—
		middle	45		3500	5400
		bottom	60		3500	8900
D_1	1	1 only	45		2100	—
	2	top	45		2100	—
		bottom	45		3700	5800
	3	top	45		2100	—
		middle	45		3700	5800
		bottom	60		3700	9500
D_2	1	1 only	55		2300	—
	2	top	55		2300	—
		bottom	55		3900	6200

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.479 kPa, 1 pound-force = 4.448 N.

a. Cripple walls are not permitted in Seismic Design Categories D_0, D_1 and D_2.

b. Applies to exterior and interior braced wall lines.
c. Hold down force is minimum allowable stress design load for connector providing uplift tie from wall framing at end of braced wall panel at the noted story to wall framing at end of braced wall panel at the story below, or to foundation or foundation wall. Use single story hold down force where edges of braced wall panels do not align; a continuous load path to the foundation shall be maintained. [See Figure R602.12].
d. Where hold down connectors from stories above align with stories below, use cumulative hold down force to size middle and bottom story hold down connectors. [See Figure R602.12].
e. The veneer shall not exceed 20 feet in height above a noncombustible foundation, with an additional 8 feet permitted for gable end walls, or 30 feet in height with an additional 8 feet for gable end walls where the lower 10 feet has a backing of concrete or masonry wall. See also story height imitations of Section R301.3.
f. The veneer shall not exceed 30 feet in height above a noncombustible foundation, with an additional 8 feet permitted for gable endwalls. See also story height limitations of Section R301.3.



(a) Braced wall panels stacked (aligned story to story). Use cumulative hold down force.
(b) Braced wall panels not stacked. Use single story hold down force.

FIGURE R602.12
HOLD DOWNS AT EXTERIOR AND INTERIOR BRACED WALL PANELS

2. Revise as follows:

R703.7 Stone and masonry veneer, general. Stone and masonry veneer shall be installed in accordance with this chapter, Table R703.4 and Figure R703.7. These veneers installed over a backing of wood or cold-formed steel shall be limited to the first story above-grade and shall not exceed 5 inches (127 mm) in thickness. See section R602.12 for wall bracing requirements for masonry veneer.

Exceptions:

1. For all buildings in Seismic Design Categories A, B and C, exterior stone or masonry veneer, as specified in Table R703.7(1), with a backing of wood or steel framing shall be permitted to the height specified in Table R703.7(1) above a noncombustible foundation. ~~Wall bracing at exterior and interior braced wall lines shall be in accordance with Section R602.10 or R603.7, and the additional requirements of Table R703.7(1).~~
2. For detached one- or two-family dwellings in Seismic Design Categories D_0, D_1 and D_2, exterior stone or masonry veneer, as specified in Table R703.7(2), with a backing of wood framing shall be permitted to the height specified in Table R703.7(2) above a noncombustible foundation. ~~Wall bracing and hold downs at exterior and interior braced wall lines shall be in accordance with Sections R602.10 and R602.11 and the additional requirements of Table R703.7(2). In Seismic Design Categories D0, D1 and D2, cripple walls shall not be permitted, and required interior braced wall lines shall be supported on continuous foundations.~~

TABLE R703.7(1)
STONE OR MASONRY VENEER LIMITATIONS AND REQUIREMENTS, WOOD OR STEEL FRAMING, SEISMIC DESIGN CATEGORIES A, B AND C

SEISMIC DESIGN CATEGORY	NUMBER OF WOOD OR STEEL FRAMED STORIES	MAXIMUM HEIGHT OF VENEER ABOVE NONCOMBUSTIBLE FOUNDATIONa (feet)	MAXIMUM NOMINAL THICKNESS OF VENEER (inches)	MAXIMUM WEIGHT OF VENEER (psf)b	WOOD OR STEEL FRAMED STORY	~~MINIMUM SHEATHING AMOUNT (percent of braced wall line length)c~~
A or B	Steel: 1 or 2 Wood: 1, 2 or 3	30	5	50	all	~~Table R602.10.1 or Table R603.7~~
C	1	30	5	50	1 only	~~Table R602.10.1 or Table R603.7~~
	2	30	5	50	top	~~Table R602.10.1 or Table R603.7~~
					bottom	~~1.5 times length required by Table R602.10.1 or 1.5 times length required by Table R603.7~~
	Wood only: 3	30	5	50	top	~~Table R602.10.1~~
					middle	~~1.5 times length required by Table R602.10.1~~
					bottom	~~1.5 times length required by Table R602.10.1~~

a. An Additional 8 feet is permitted for gable end walls. See also story height limitations of Section R301.3.
b. Maximum weight is installed weight and includes weight of mortar, grout, lath and other materials used for installation. Where veneer is placed on both faces of a wall, the combined weight shall not exceed that specified in this table.
~~c. Applies to exterior and interior braced wall lines.~~

TABLE R703.7(2)
STONE OR MASONRY VENEER LIMITATIONS AND REQUIREMENTS, ONE- AND TWO-FAMILY DETACHED DWELLINGS, WOOD FRAMING, SEISMIC DESIGN CATEGORIES D0, D1 AND D2

SEISMIC DESIGN CATEGORY	NUMBER OF WOOD FRAMED STORIES[a]	MAXIMUM HEIGHT OF VENEER ABOVE NONCOMBUSTIBLE FOUNDATION OR FOUNDATION WALL (FEET)	MAXIMUM NOMINAL THICKNESS OF VENEER (inches)	MAXIMUM WEIGHT OF VENEER (psf)	~~WOOD FRAMED STORY~~	~~MINIMUM SHEATHING AMOUNT (percent of braced wall line length)~~[e]	~~MINIMUM SHEATHING THICKNESS AND FASTENING~~	~~SINGLE STORY HOLD DOWN FORCE (lb)~~[d]	~~CUMULATIVE HOLD DOWN FORCE (lb)~~[e]
D_0	1	20[f]	4	40	~~1 only~~	~~35~~	~~7/16-inch wood structural panel sheathing with 8d common nails spaced at 4 inches on center at panel edges, 12 inches on center at intermediate supports. 8d common nails at 4 inches on center at braced wall panel end posts with hold down attached~~	~~N/A~~	—
	2	20[f]	4	40	~~top~~	~~35~~		~~1900~~	—
					~~bottom~~	~~45~~		~~3200~~	~~5100~~
	3	30[g]	4	40	~~top~~	~~40~~		~~1900~~	—
					~~middle~~	~~45~~		~~3500~~	~~5400~~
					~~bottom~~	~~60~~		~~3500~~	~~8900~~
D_1	1	20[f]	4	40	~~1 only~~	~~45~~		~~2100~~	—
	2	20[f]	4	40	~~top~~	~~45~~		~~2100~~	—
					~~bottom~~	~~45~~		~~3700~~	~~5800~~
	3	20[f]	4	40	~~top~~	~~45~~		~~2100~~	—
					~~middle~~	~~45~~		~~3700~~	~~5800~~
					~~bottom~~	~~60~~		~~3700~~	~~9500~~
D_2	1	20[f]	3	30	~~1 only~~	~~55~~		~~2300~~	—
	2	20[f]	3	30	~~top~~	~~55~~		~~2300~~	—
					~~bottom~~	~~55~~		~~3900~~	~~6200~~

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.479 kPa, 1 pound-force = 4.448 N.
a. Cripple walls are not permitted in Seismic Design Categories D_0, D_1 and D_2.
b. Maximum weight is installed weight and includes weight of mortar, grout and lath, and other materials used for installation.
~~c. Applies to exterior and interior braced wall lines.~~
~~d. Hold down force is minimum allowable stress design load for connector providing uplift tie from wall framing at end of braced wall panel at the noted story to wall framing at end of braced wall panel at the story below, or to foundation or foundation wall. Use single story hold down force where edges of braced wall panels do not align; a continuous load path to the foundation shall be maintained. [See Figure R703.7(1)(b)].~~
~~e. Where hold down connectors from stories above align with stories below, use cumulative hold down force to size middle and bottom story hold down connectors. [See Figure R703.7(1)(a)].~~

f c. The veneer shall not exceed 20 feet in height above a noncombustible foundation, with an additional 8 feet permitted for gable end walls, or 30 feet in height with an additional 8 feet for gable end walls where the lower 10 feet has a backing of concrete or masonry wall. See also story height imitations of Section R301.3.

g d. The veneer shall not exceed 30 feet in height above a noncombustible foundation, with an additional 8 feet permitted for gable endwalls. See also story height limitations of Section R301.3.

Reason: The purpose of this change is to clarify the code by moving the wall bracing requirements for brick veneer structures to the wall bracing chapter.

This is mainly an editorial change that moves the requirements for wall bracing of brick veneer structures from the exterior covering chapter to the wall chapter in the wall bracing section.

The wall bracing requirements are more appropriately placed in the wall bracing section.

A couple of subsections were added to clarify conflicts between wall bracing methods permitted in Chapter 6 and the completely different wall bracing method for masonry veneer in Chapter 7.

All wall bracing requirements should be in Chapter 6. Chapter 7 refers to the wall covering only, and should not contain wall bracing requirements. By the time the masonry veneer is applied, it is frequently too late to provide properly constructed wall bracing.

Because the Chapter 7 method of bracing walls with masonry veneer uses a designed shearwall method with hold-downs, these restrained braced wall panels have higher capacity than the braced wall panels of Chapter 6. Therefore, the alternate braced wall panel methods and the continuous sheathing methods do not apply because they do not result in the same allowable shear loads.

Cost Impact: There should be no cost impact as this is primarily editorial.

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

RB168–07/08

R603, Chapter 43 (New)

Proponent: Bonnie Manley, American Iron and Steel Institute

1. Revise as follows:

SECTION R603
STEEL WALL FRAMING

R603.1 General. Elements shall be straight and free of any defects that would significantly affect structural performance. Cold-formed steel wall framing members shall comply with the requirements of this section.

R603.1.1 Applicability limits. The provisions of this section shall control the construction of exterior cold-formed steel wall framing and interior load-bearing steel wall framing for buildings not more than 60 feet (18 288 mm) long perpendicular to the joist or truss span, not more than 40 feet (12 192mm) wide parallel to the joist or truss span, and less than or equal to three not more than two stories in height. All exterior walls installed in accordance with the provisions of this section shall be considered as load-bearing walls. Cold-formed Ssteel walls constructed in accordance with the provisions of this section shall be limited to sites subjected to a maximum design wind speed of 110 miles per hour (49 m/s) Exposure A, B or C and a maximum ground snow load of 70 psf (3.35 kPa).

R603.1.2 In-line framing. Load-bearing cold-formed steel studs constructed in accordance with Section R603 shall be located directly in-line with joists, trusses and rafters in accordance with Figure R603.1.2 and the tolerances specified as follows:

1. With a The maximum tolerance shall be of 3/4 inch (19.1 mm) between the centerline of the horizontal framing member and the centerline of the vertical framing member between their center lines.
2. Where the centerline of the horizontal framing member and bearing stiffener are located to one side of the centerline of the vertical framing member, the maximum tolerance shall be 1/8 inch (3 mm) between the web of the horizontal framing member and the edge of the vertical framing member.

Interior load-bearing steel studwalls shall be supported on foundations or shall be located directly above load-bearing walls with a maximum tolerance of 3/4 inch (19 mm) between the centerline of the studs.

R603.2 Structural framing. Load-bearing steel wall framing members shall comply with Figure R603.2(1) and with the dimensional and minimum thickness requirements specified in Tables R603.2(1) and R603.2(2). Tracks shall comply with Figure R603.2(2) and shall have a minimum flange width of 11/4 inches (32 mm). The maximum inside bend radius for members shall be the greater of 3/32 inch (2.4 mm) or twice the uncoated base steel thickness. Holes in wall studs and other structural members shall comply with all of the following conditions:

1. Holes shall conform to Figure R603.2(3);
2. Holes shall be permitted only along the centerline of the web of the framing member;
3. Holes shall have a center-to-center spacing of not less than 24 inches (610 mm);

~~4. Holes shall have a width not greater than 0.5 times the member depth, or 11/2 inches (38.1 mm);~~
~~5. Holes shall have a length not exceeding 41/2 inches (114 mm); and~~
~~6. Holes shall have a minimum distance between the edge of the bearing surface and the edge of the hole of not less than 10 inches (254 mm).~~

Framing members with web holes violating the above requirements shall be patched in accordance with Section R603.3.5 or designed in accordance with accepted engineering practices.

R603.2.1 Material. Load-bearing cold-formed steel framing members shall be cold-formed to shape from structural quality sheet steel complying with the requirements of one of the following:

1. ASTM A 653: Grades 33, ~~37, 40~~ and 50 (Class 1 and 3).
2. ASTM A 792: Grades 33, ~~37, 40~~ and 50A.
3. ~~ASTMA875: Grades 33, 37, 40 and 50 (Class 1 and 3).~~
4. ~~.~~ ASTM A 1003: Structural Grades 33 Type H, ~~37, 40~~ and 50 Type H.

R603.2.2 Identification. Load-bearing cold-formed steel framing members shall have a legible label, stencil, stamp or embossment with the following information as a minimum:

1. Manufacturer's identification.
2. Minimum ~~uncoated~~ base steel thickness in inches (mm).
3. Minimum coating designation.
4. Minimum yield strength, in kips per square inch (ksi) (kPa~~N~~).

R603.2.3 Corrosion protection. Load-bearing cold-formed steel framing shall have a metallic coating complying with ASTM A 1003 and one of the following:

1. A minimum of G 60 in accordance with ASTM A 653.
2. A minimum of AZ 50 in accordance with ASTM A 792.
3. ~~A minimum of GF 60 in accordance with ASTM A 875.~~

R603.2.4 Fastening requirements. Screws for steel-to-steel connections shall be installed with a minimum edge distance and center-to-center spacing of 1/2 inch (12.7 mm), shall be self-drilling tapping and shall conform to ~~SAE J78~~ASTM C1513. Structural sheathing shall be attached to cold-formed steel studs with minimum No. 8 self-drilling tapping screws that conform to ~~SAE J78~~ASTM C1513. Screws for attaching structural sheathing to cold-formed steel wall framing shall have a minimum head diameter of 0.292 inch (7.4 mm) with countersunk heads and shall be installed with a minimum edge distance of 3/8 inch (9.5 mm). Gypsum board shall be attached to cold-formed steel wall framing with minimum No. 6 screws conforming to ASTM C 954 or ASTM C1513 with a bugle head style and shall be installed in accordance with Section R702. For all connections, screws shall extend through the steel a minimum of three exposed threads. All ~~self drilling tapping screws conforming to SAE J78~~fasteners shall have ~~a Type II coating in accordance with ASTM B 633~~rust inhibitive coating suitable for the installation in which they are being used, or be manufactured from material not susceptible to corrosion.

Where No. 8 screws are specified in a steel-to-steel connection, the required number of screws in the connection is permitted to be reduced in accordance with the reduction factors in Table R603.2.4, when larger screws are used or when one of the sheets of steel being connected is thicker than 33 mils (0.84 mm). When applying the reduction factor, the resulting number of screws shall be rounded up.

2. Add new text as follows:

R603.2.5 Web holes, web hole reinforcing, and web hole patching. Web holes, web hole reinforcing, and web hole patching shall be in accordance with this section.

R603.2.5.1 Web holes. Web holes in wall studs and other structural members shall comply with all of the following conditions:

1. Holes shall conform to Figure R603.2.5.1;
2. Holes shall be permitted only along the centerline of the web of the framing member;
3. Holes shall have a center-to-center spacing of not less than 24 inches (610 mm);