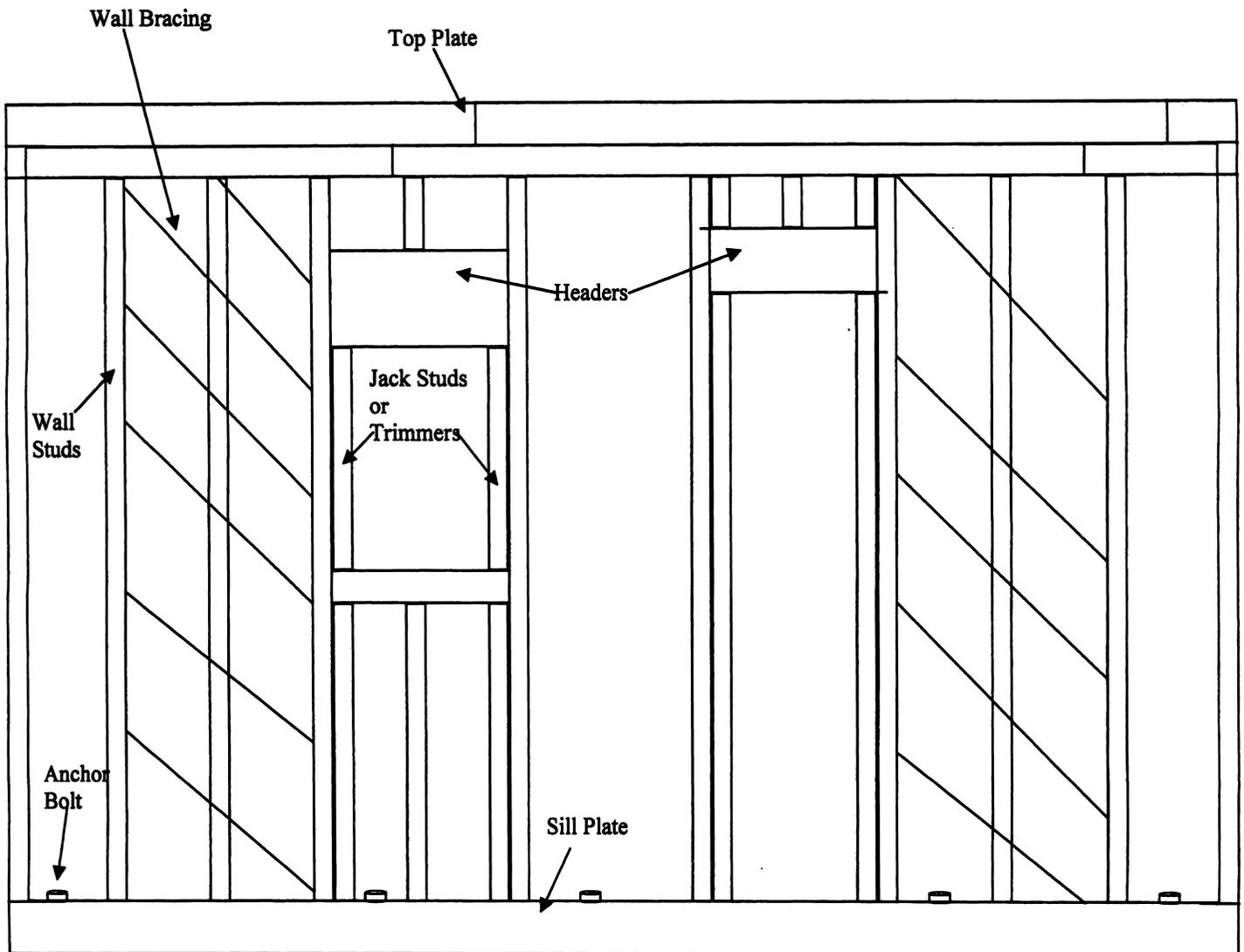
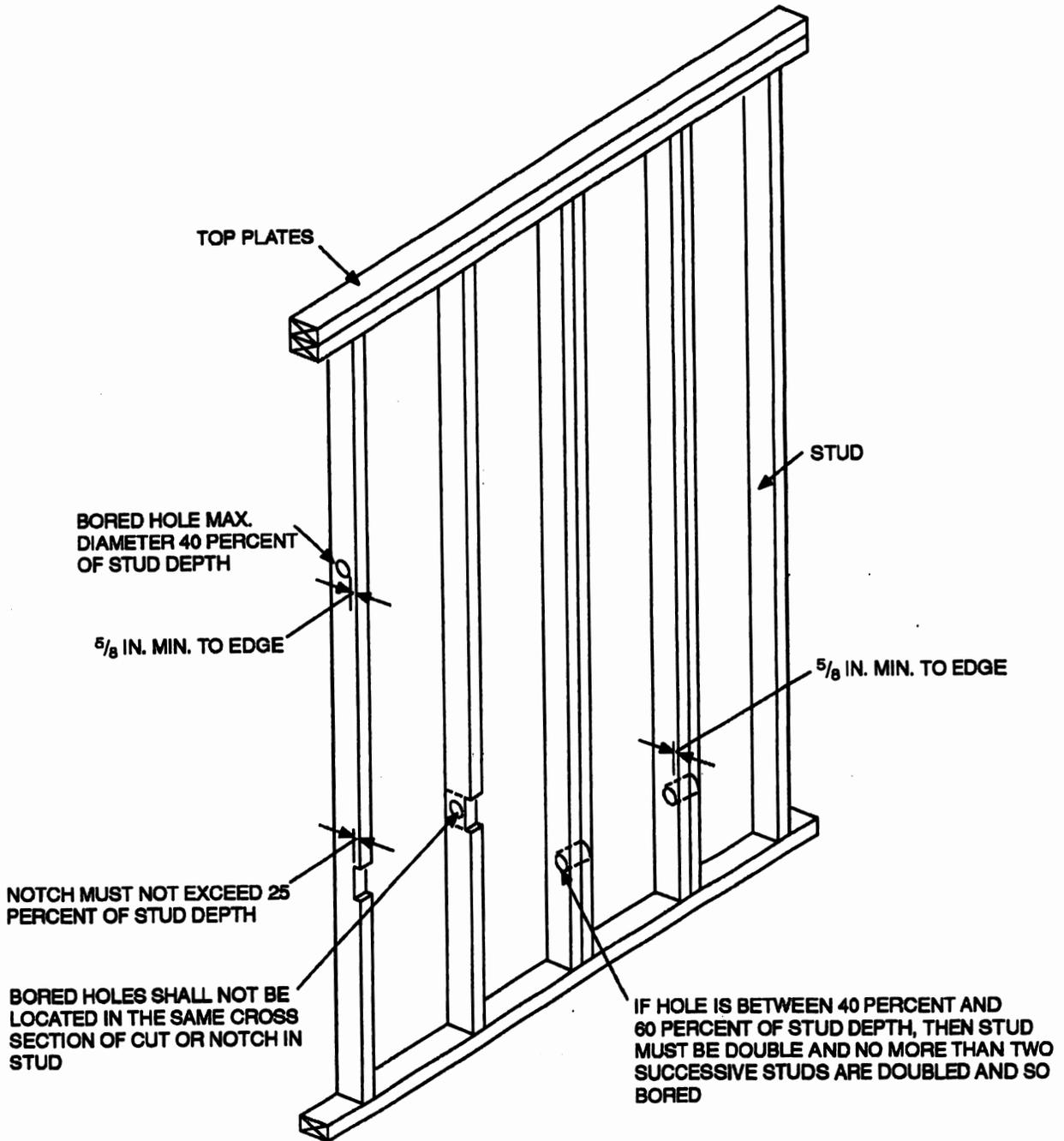


HUMBOLDT COUNTY BUILDING DEPARTMENT  
CITY OF WINNEMUCCA BUILDING DEPARTMENT  
FRAMING & WALL BRACING HANDOUT  
2012 INTERNATIONAL RESIDENTIAL CODE



Notes:

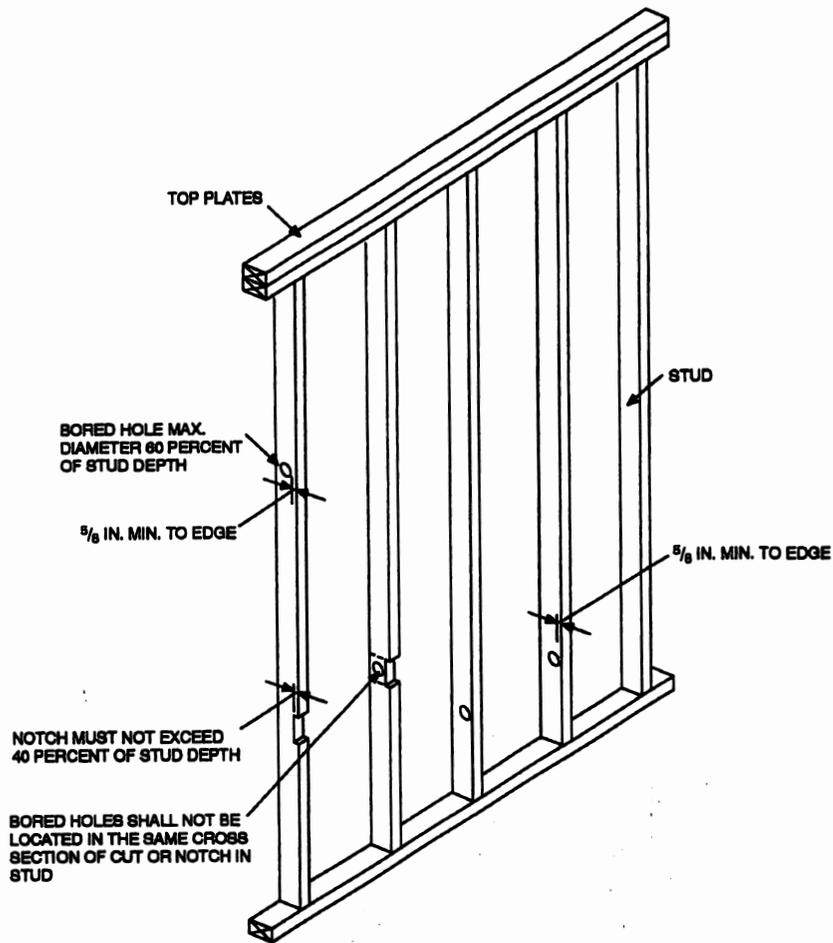
1. All exterior walls and main cross stud partitions shall be braced for Seismic Design Category D1, per IRC Section 602.10
2. Headers shall be per Section 602.7 & Tables R502.5(1), R502.2(2) & R602.7.1).
3. Studs supporting floors shall not be spaced more than 16" o.c. Bearing studs may be spaced 24" o.c. when supporting only a ceiling and roof and truss/rafter bears within 5" of stud. Wall stud height shall be per R602.3.1, Tables R602.3.1 & R602.3.5.
4. Double top plate installed to provide overlapping at corner intersections with bearing partitions. End joints in top plates shall be offset at least 24". Joints need not occur over studs. Plates shall be a nominal 2" in depth and have a width at least equal to the width of the studs.
5. Nailing schedule/fastener schedule per R602.3(1).
6. Min. insulation requirements: Ceiling-R38; Walls-R20; Floors- Sufficient to fill floor cavity (Min. R19)
7. Install a weather resistive wrap complying with R703.1 and Table R703.4.



For SI: 1 inch = 25.4 mm.

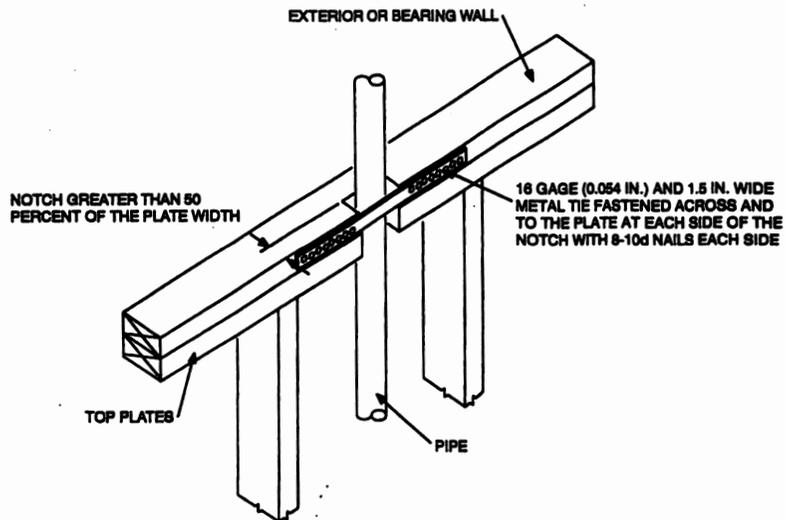
Note: Condition for exterior and bearing walls.

**FIGURE R602.6(1)**  
**NOTCHING AND BORED HOLE LIMITATIONS FOR EXTERIOR WALLS AND BEARING WALLS**



For SI: 1 inch = 25.4 mm.

**FIGURE R602.6(2)**  
**NOTCHING AND BORED HOLE LIMITATIONS FOR INTERIOR NONBEARING WALLS**



For SI: 1 inch = 25.4 mm.

**FIGURE R602.6.1**  
**TOP PLATE FRAMING TO ACCOMMODATE PIPING**

## WALL BRACING

### Braced Wall Panels Allowed in Siesmic Design Category D1

Braced wall panels shall be fastened to required foundation in accordance with Section R602.11.1, and top plate lap splices shall be faced nailed with at least eight 16d nails.

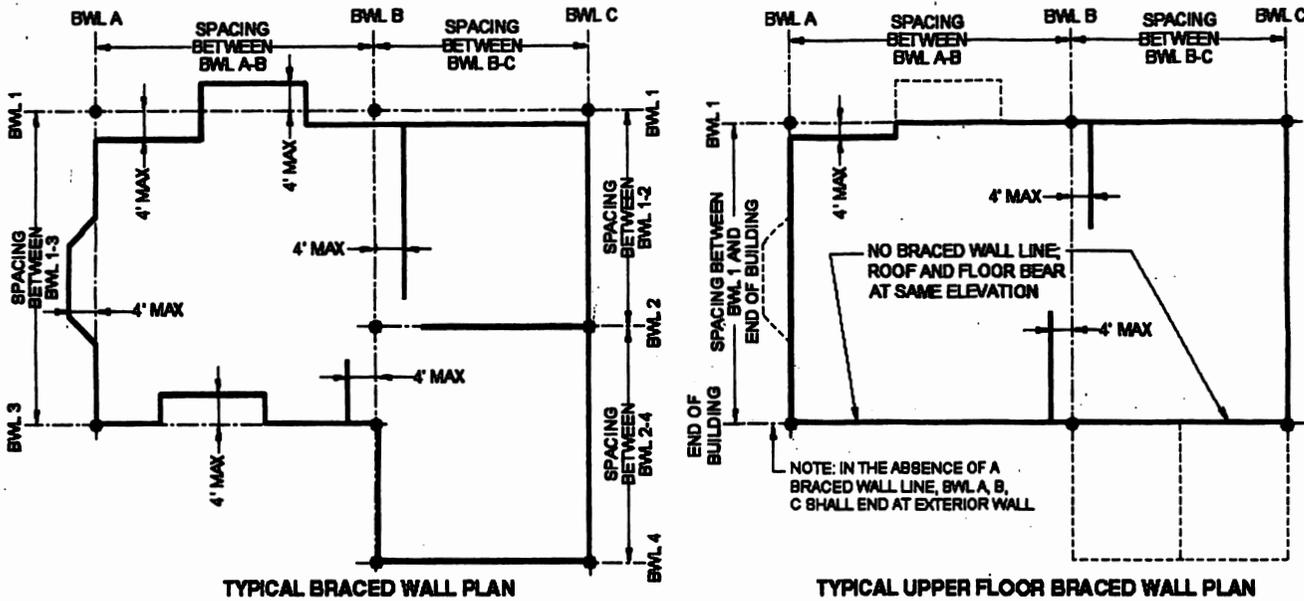
Methods/Material	Minimum Thickness	Connections	
<b>Intermittent Bracing</b>			
		Fasteners	Spacing
Wood Structural Panel (WSP)	3/8"	Exterior Sheathing per Table R602.3(3) Interior Sheathing per Table R602.3(1) or R602.3(2)	6" edges; 12" field  Varies by fastener
Wood Structural Panels with Stone or Masonry Veneer(BV-WSP)	7/16"	8d common (2 1/2" x 0.131 nails)	4" at panel edges 12" at intermediate supports 4" at braced wall panel end posts
Gypsum Board (GB)	1/2"	Exterior – Nails or screws per Table R602.3(1) Interior – Nails or screws per Table R702.3.5	For all braced wall locations: 7" edges (including top & bottom plates) & 7" in field
Particle Board Sheathing(PBS)	3/8" or 1/2" for max. 16" stud spacing	For 3/8" – 6d common (2" long x 0.113" dia) For 1/2" – 8d common (2 1/2" long x 0.131" dia) nails	3" edges 6" field
Portland Cement Plaster(PCP)	See section R703.6 for max. 16" stud spacing	1 1/2" long 11 gage, 7/16" dia. head nails or 7/8" long, 16 gage staples	6" o.c. in all framing members
Hardboard Panel Siding(HPS)	7/16" for max. 16" stud spacing	0.092" dia., 0.225 dia. head nails with length to accommodate 1 1/2" penetration into studs	4" edges; 8" field
Alternate Braced Wall(ABW)	3/8"	8d common or galv. box nails	6" o.c. panel edges 12" o.c. exterior supports
Portal Frame with Hold-Downs (PFH)	3/8"	8d common or galv. box nails	3" o.c. in all framing studs
<b>Continous Sheathing</b>			
Continuously Sheathed Wood Structural Panel (CS-WSP)	3/8"	Exterior & Interior – 16" max stud spacing 6d common (3/8" sheathing) 16" max. stud spacing 8d common (7/16" sheathing)	6" edges 12" field
Continuously Sheathed Wood Structural Panel Adjacent to Garage Openings(CS-G)	3/8"	Exterior & Interior (16" max stud spacing) 6d common (3/8" sheathing) 8d common (7/16" sheathing)	6" edges 12" field
Continously Sheathed Portal Frame (CS-PF)	7/16"	8d common or galv box nails	3" o.c. in all framing studs

### Braced Wall Length & Spacing

The length of a braced wall line shall be the distance between its ends. Required length of bracing shall be determined per R602.10.3, Table R602.10.3(1) or R602.10.3(3) and the applicable adjustment factors in Table R602.10.3(2) or R602.10.3(4).

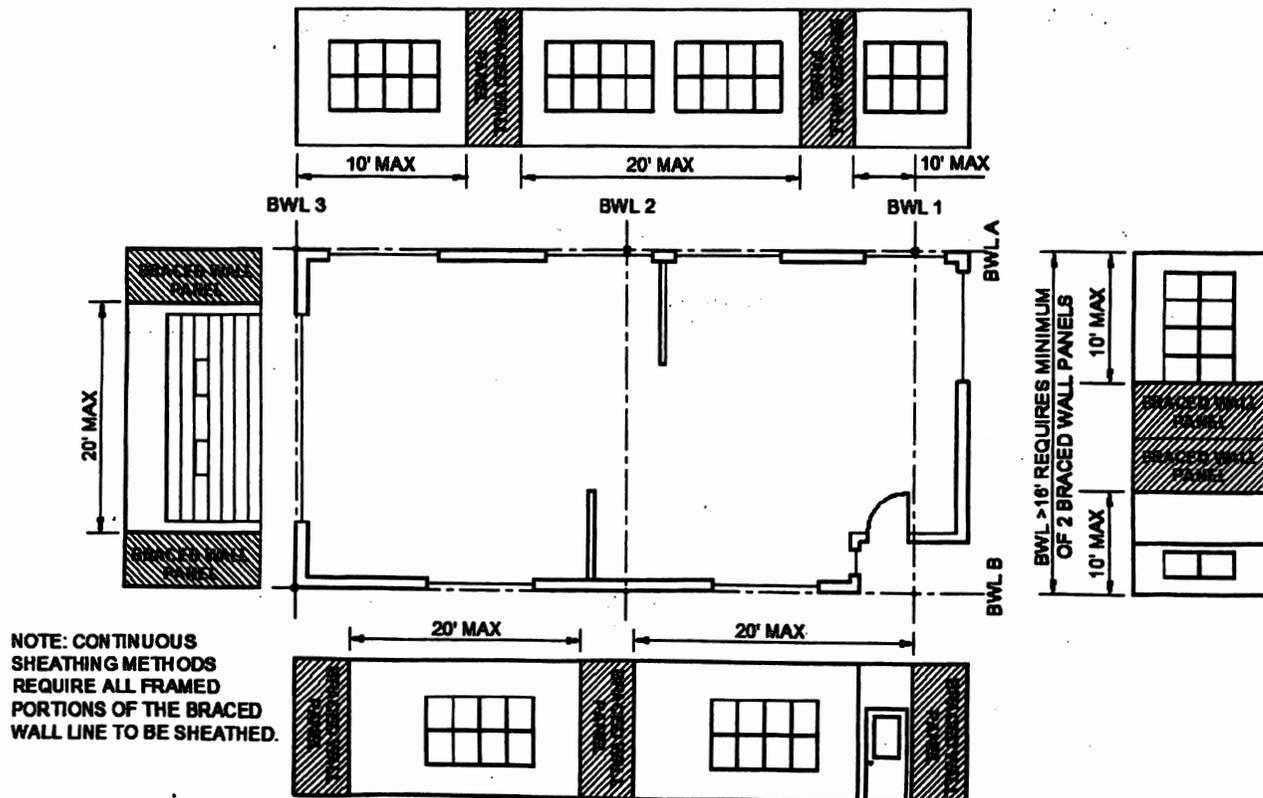
Maximum spacing for wall panels is 25'. Braced wall panels shall be located at each end of the braced wall line except braced wall lines using Methods WSP and continuous sheathing methods shall be permitted to begin no more than 10' from each end of a braced wall line provided each end complies with Conditions 4 & 5 of Figure R602.10.7.

Braced wall lines with a length of 16' or less shall have a min. of (2) braced wall panels of any length or one braced wall panel equal to 48" or more. Braced wall lines greater than 16' shall have a min. of (2) braced wall panels.



For SI: 1 foot = 304.8 mm.

**FIGURE R602.10.1.1  
BRACED WALL LINES**



Minimum Length of Braced Wall Panels (Table R602.10.5)

Method		Minimum Length					Contributing Length
		Wall Height					
		8'	9'	10'	11'	12'	
WSP,PBS,PCP,HPS,BV-WSP		48"	48"	48"	53"	58"	Actual
GB		48"	48"	48"	53"	58"	Double Sided = Actual Single Sided = .05 x actual
PFH(max. height 10' but wall height may be increased to 12' with pony wall)		16"	16"	16"	18"	20"	48"
CS-G		24"	27"	30"	33"	36"	Actual
CS-PF(max. height 10' but wall height may be increased to 12' with pony wall)		16"	18"	20"	22"	24"	Actual
	Adjacent Clear Opening Height (Inches)						
CS-WSP	<64	24"	27"	30"	33"	36"	Actual
	68	26"	27"	30"	33"	36"	
	72	27"	27"	30"	33"	36"	
	76	30"	29"	30"	33"	36"	
	80	32"	30"	30"	33"	36"	
	84	35"	32"	32"	33"	36"	
	88	38"	35"	33"	33"	36"	
	92	43"	37"	35"	35"	36"	
	100	---	44"	40"	38"	39"	
	104	---	49"	43"	40"	39"	
	108	---	54"	46"	43"	41"	
	112	---	---	50"	45"	43"	
	116	---	---	55"	48"	45"	
	120	---	---	60"	52"	48"	
	124	---	---	---	56"	51"	
	128	---	---	---	61"	54"	
	132	---	---	---	66"	58"	
	136	---	---	---	---	62"	
	140	---	---	---	---	66"	
	144	---	---	---	---	72"	

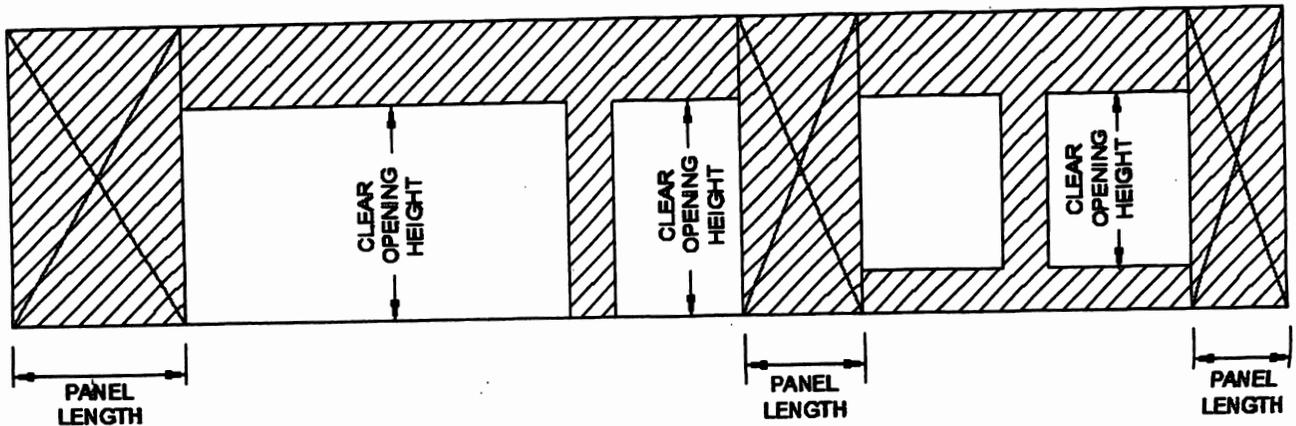
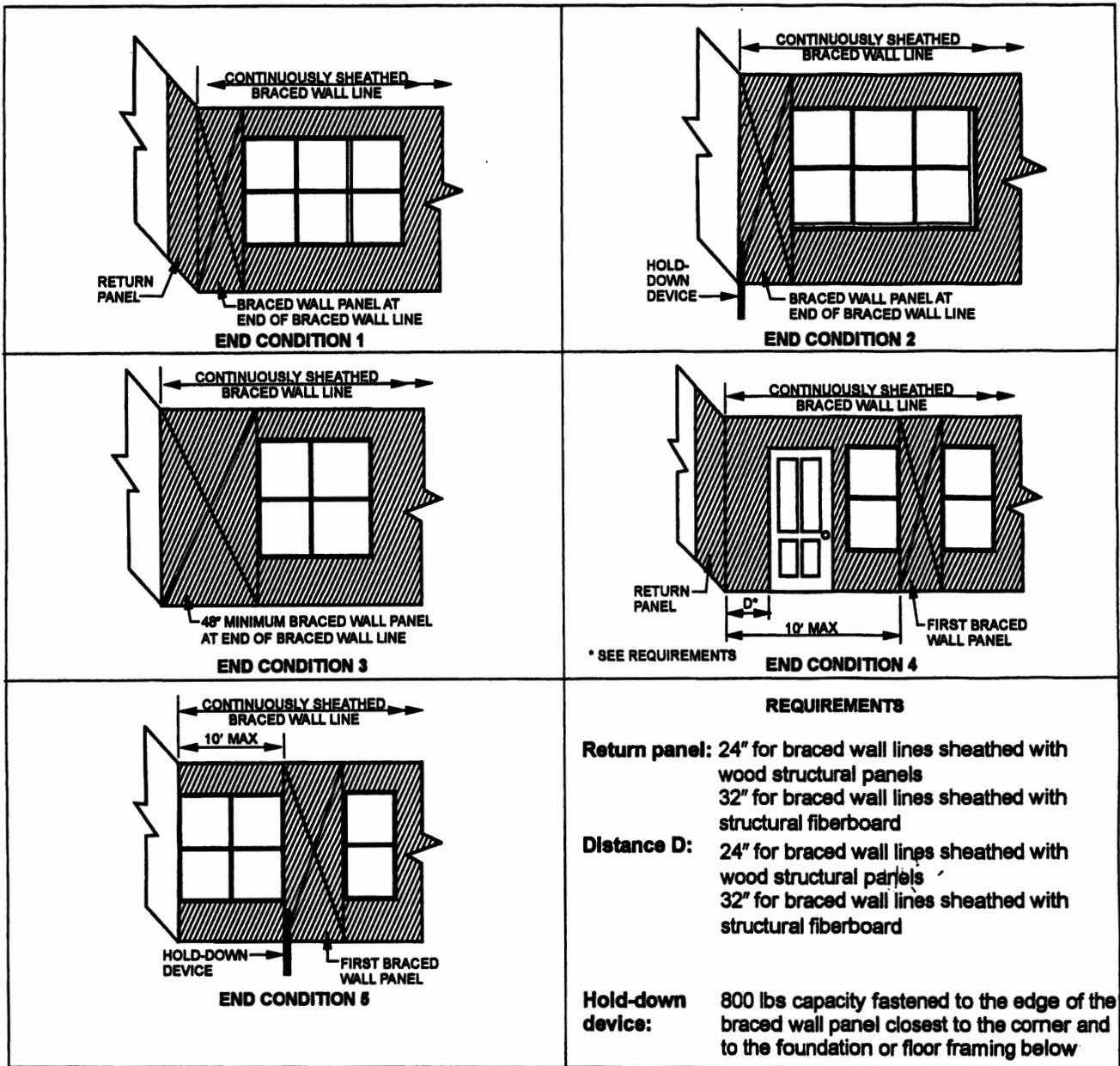


FIGURE R602.10.5  
BRACED WALL PANELS WITH CONTINUOUS SHEATHING

**Ends of Braced Wall Lines with Continuous Sheathing**

Each end of a braced wall line with continuous sheathing shall have one of the following conditions shown in Figure R602.10.7.

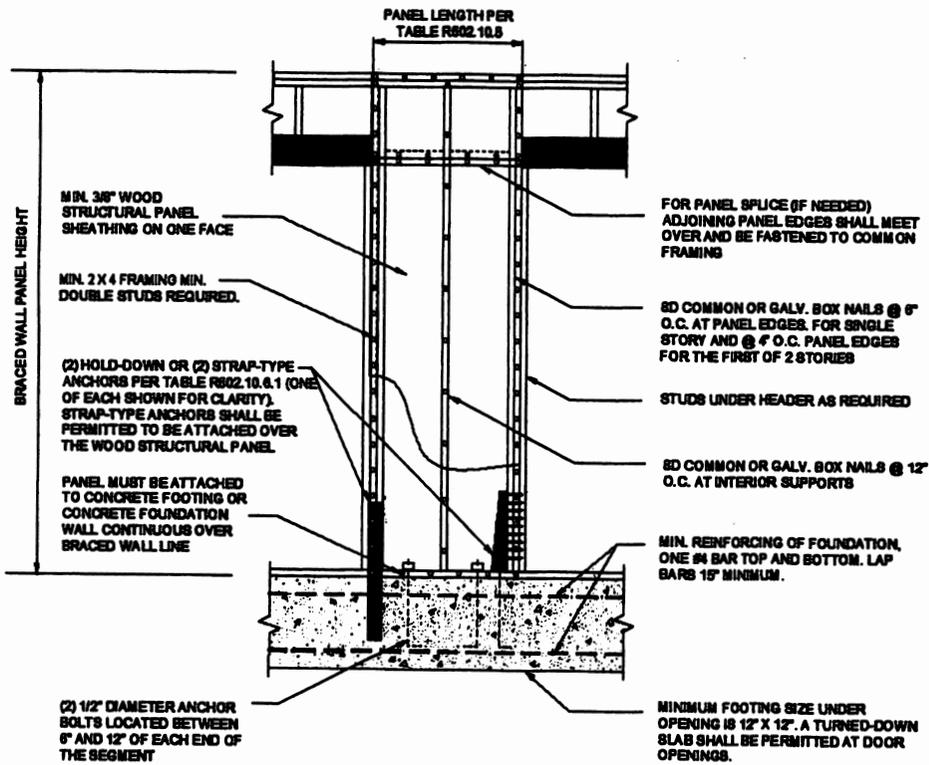


or SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 4.45 N.

**FIGURE R602.10.7  
END CONDITIONS FOR BRACED WALL LINES WITH CONTINUOUS SHEATHING**

Alternate Braced Wall Panels (ABW) shall be construction in accordance with Figure R602.10.6.1. Hold-down force shall be in accordance with Table R602.10.6.1.

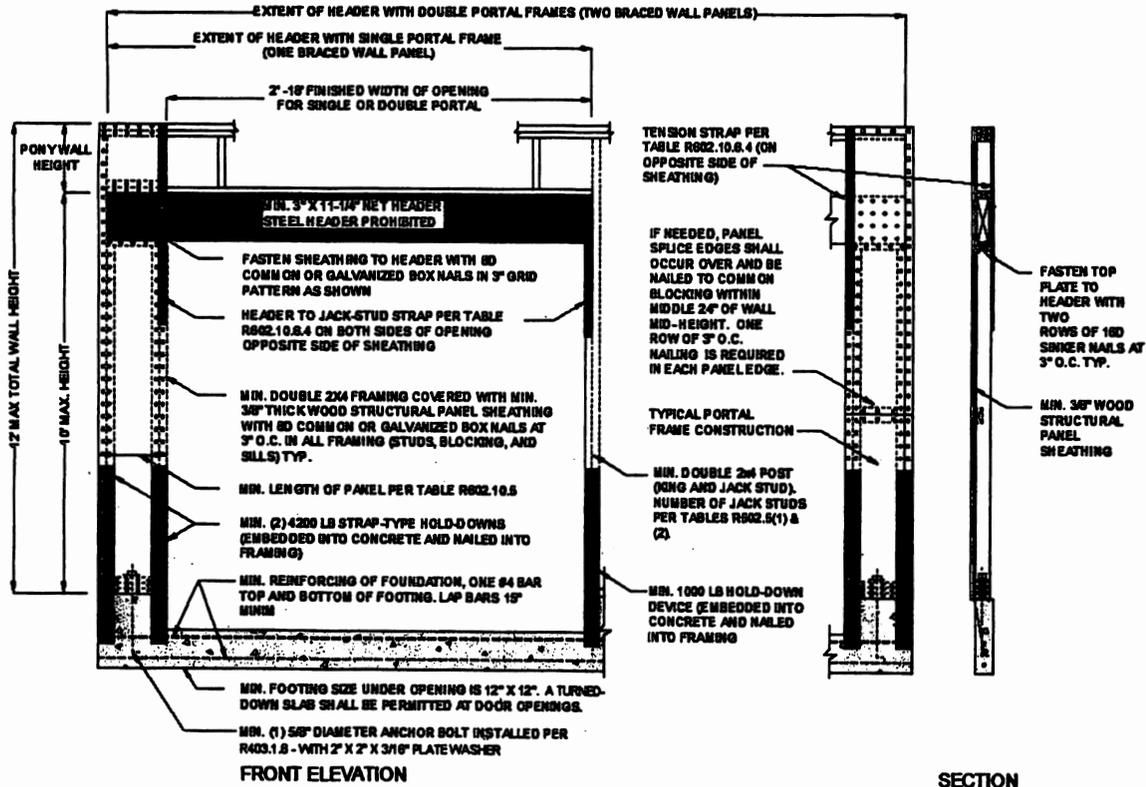
	Wall Height				
	8'	9'	10'	11'	12'
Min. Length	32"	32"	34"	NP	NP
Hold-Down	1,800 lb	1,800 lb	1,800 lb	NP	NP



For SI: 1 inch = 25.4 mm.

Portal Frame with Hold-Downs(PFH) – Shall be constructed in accordance with Figure R602.6.2

	Wall Height – 10' max. but wall height may be increased to 12' with pony wall				
	8'	9'	10'	11'	12'
Min. Length	16"	16"	16"	18"	18"
Hold-Down	(2) 4,200 lb & (1) 1,000 lb	(2) 4,200 lb & (1) 1,000 lb	(2) 4,200 lb & (1) 1,000 lb	(2) 4,200 lb & (1) 1,000 lb	(2) 4,200 lb & (1) 1,000 lb

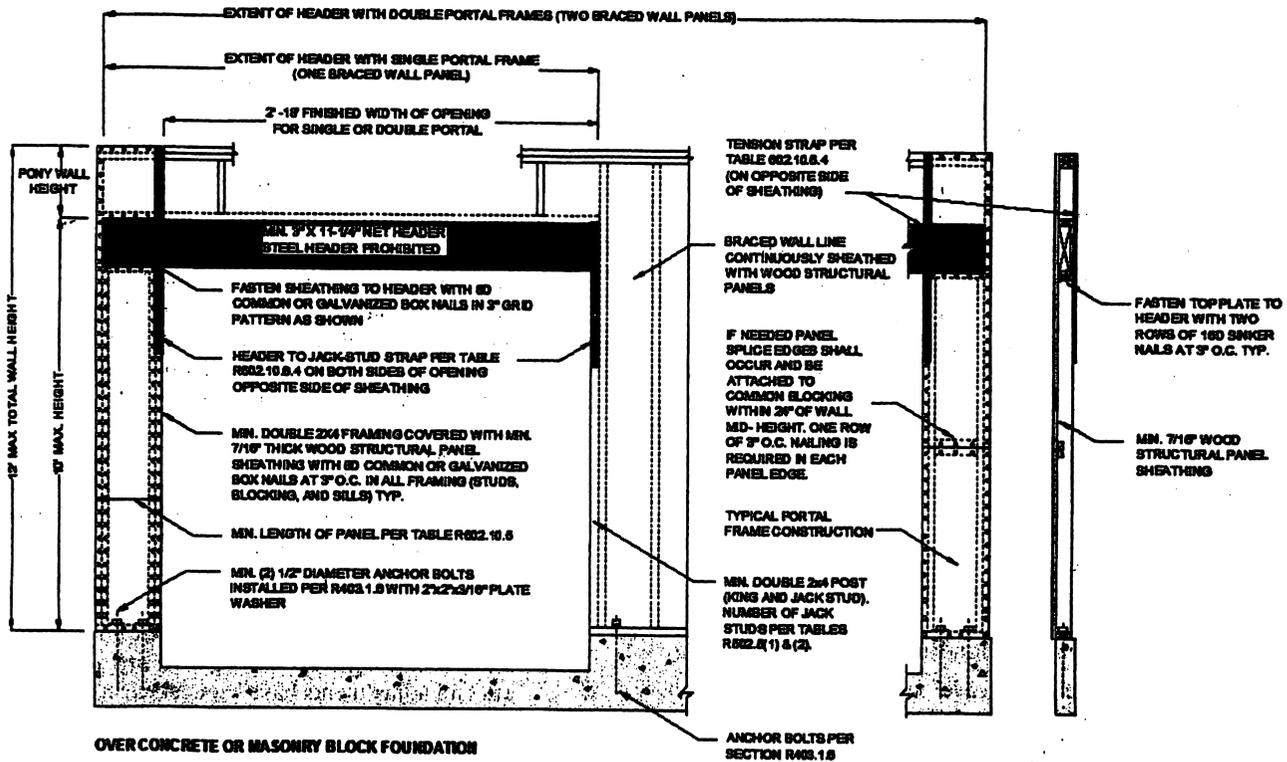


For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

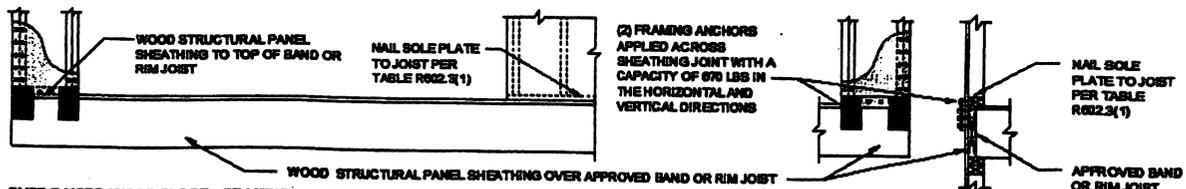
**FIGURE R602.10.6.2**  
**METHOD PFH—PORTAL FRAME WITH HOLD-DOWNS**

Continuously Sheathed Portal Frame (CS-PF) shall be constructed in accordance with Figure R602.6.4 and Table R602.6.4. The number of continuously sheathed portal frame panels in a single braced wall shall not exceed four.

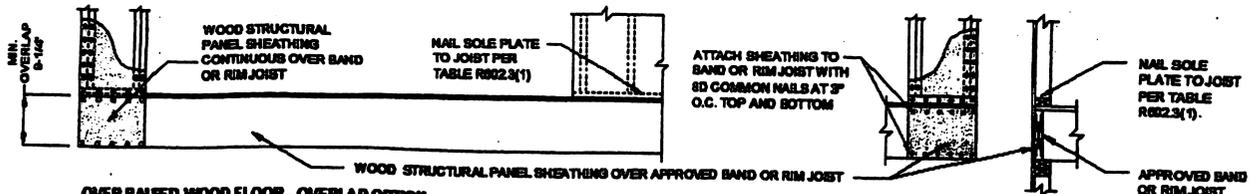
Wall Height – 10' max. but wall height may be increased to 12' with pony wall					
	8'	9'	10'	11'	12'
Min. Length	16"	18"	20"	22"	24"
Tension Straps					
	Max. Pony Wall Height	Max. Total Wall Height	Maximum Opening Width	Tension Strap Capacity	
2x4 No. 2 Grade	0	10	18	1,000	
	1	10	9	1,000	
			16	2,325	
			18	2,725	
	2	10	9	1,550	
			16	3,900	
2x6 Stud Grade	2	12	9	1,750	
			16	3,550	
			18	4,100	
	4	12	9	2,775	
			16	Design Required	
			18	Design Required	



OVER CONCRETE OR MASONRY BLOCK FOUNDATION



OVER RAISED WOOD FLOOR - FRAMING ANCHOR OPTION (WHEN PORTAL SHEATHING DOES NOT LAP OVER BAND OR RIM JOIST)



OVER RAISED WOOD FLOOR - OVERLAP OPTION

BRACING – INTERMITTENT METHOD  
WSP, ABW, PFH, with GB interior walls

This handout summarizes typical conventional light-frame construction bracing requirements for a one-story structure with a maximum wall height of 10' based on common construction methods in Winnemucca: concrete continuous footings; wood framing; exterior braced walls with wood structural panel (WSP); and interior gypsum board braced walls (this handout does not cover masonry stem walls or Hardboard Panel Siding - HPS). The user of this handout will need access to an IRC book to calculate required braced wall lengths and some knowledge of angled walls, 4' offset requirements, walls less than 16', redensation of cripple walls, etc. which are not included in this handout.

***\*Important: In seismic design category D1 you cannot mix intermittent bracing and continuous bracing methods within one story (you can only mix these methods from story to story). If you are using gypsum board for interior braced panels and wood structural panel on the exterior, refer to WSP for all bracing requirements and lengths rather than CS-WSP (continue sheathing – not included in this handout). You may mix intermittent bracing methods from braced wall line to braced wall line, but you may not mix intermittent methods within the same braced wall line.***

A braced wall line is required every 25' measured to the outermost ends of the panel and shall intersect with a perpendicular braced wall line, an angled braced wall line, or an exterior wall. One room, usually the garage, may have one room with a 35' braced wall line spacing in one direction to accommodate a room up to 900 s.f. The maximum distance between the inner edges of braced panels is 20'.

1. Designate exterior braced wall lines on the plan (max spacing 25' with 20' max between panels – one room exception).
2. Designate interior braced wall lines on the plan (max spacing 25' with 20' max between panels – one room exception).
3. Determine the minimum length of bracing required on each wall line by calculating the greater value from the wind and seismic adjustment tables. All adjustment factors must be addressed. For a house with exterior braced walls of wood structural panels and interior walls of gypsum board, the typical method used will be the WSP column for exterior walls and the GB column for interior.
  - a. Wind Table 602.10.3(1) with adjustments from Table 602.10.3(2); or
  - b. Seismic Table 602.10.3 (3) with adjustments from Table 602.10.3(4).
4. Each braced panel is to be a minimum of 4' wide unless one of the following options is met. NOTE: The following options may only be used with a min. 12"x12" footing under the opening. Therefore, this will negate using these methods where there is a footing with a stemwall rather than a turned down footing.
  - a. Alternate braced wall panels (ABW). This method may only be used with a min. 12"x12" footing under the opening . Panel width is 32" for 8' and 9' walls; and 34" for a 10' wall (equivalent to 48" of bracing). Min. 1800# holddowns required (Figure R602.10.6.1, page 178).
  - b. Portal frame with hold downs (PFH). This method may only be used with a min. 12" x 12 footing under the opening. Panel width is 16" (equivalent to 48" of bracing). This method calls for a 4200# strap which may not be available in SDC D1. Header size is a min. of 3x11-1/4". Top straps are sized by table 602.10.6.4. Strap capacity is determined by the size of studs, height of pony wall above the header, height of wall, and width of the opening. Figure 602.10.6.1.
5. Identify the specific panels that are braced along each braced wall line and specify the contributing lengths of panels. Braced wall panels must be located at each end of a braced wall line, with the exception that a WSP braced wall panel may begin a maximum of 10' from each end if:

A. A min. 24" panel is applied to each side of a building corner (Condition 4 illustration, figure 602.10.7, page 184); or

B. *The end of the braced panel closest to the end of the braced wall line has a 1,800 pound hold down* (Condition 5 illustration, figure 602.10.7, page 184).

6. Provide a legend on the plan indicating the bracing methods (i.e. exterior braced wall panels 7/16" WSP nailed 6" on edges, 12" field; interior braced wall panels ½" gyp board with screws spaced 7" o.c. - note required attachment of gyp board for bracing purposes is 7" o.c. min., including at top and bottom plate, etc.

7. Blocking is required between rafters or trusses over **exterior** braced wall panels in accordance with R602.10.8.2.

7. Where floor framing is perpendicular to the interior braced wall, blocking between joists under the entire length of the braced wall panel is required. Indicate location of blocking on floor framing plan.

8. Where floor framing is parallel to the interior braced wall, a parallel framing member (joist) shall be provided directly below the panel; or blocking @ 16" o.c. between parallel joists on each side of the braced wall panel is required. Indicate location of extra joist (if needed) or blocking on plan. Note: This would apply to a building that is less than 50' in length – see #10.

9. Where interior braced wall lines are not supported on a continuous foundation, the adjacent parallel cripple walls, where provided, must be braced with WSP or CS-WSP.

a. Calculate the required cripple wall braced panel length for each adjacent cripple wall using Tables R602.10.3(3) and (4).

b. Multiply the adjusted values above by 1.5 (IRC 602.10.11).

c. Identify cripple wall bracing on the plan. Note: This would apply to a building that is less than 50' in length – see item #10.

10. Does the building have a dimension (including garage) of over 50'? If yes,

a. Continuous footings are required to support interior braced wall panels. Specify continuous footings and cripple walls on the foundation plan.

b. Cripple walls over 4' are to be framed of studs required for an additional story. Cripple walls less than 14" are to be continuously sheathed or solid blocked.

c. Calculate the required cripple wall braced panel length for each wall using Tables R602.10.3(3) and (4).

d. Multiply the adjusted values above by 1.5 (IRC 602.10.11).

e. The distance between adjacent edges of braced panels on the cripple wall is 14'.

f. Identify locations, lengths and WSP thickness of cripple wall bracing on the foundation plan. A braced wall line is to intersect with a perpendicular braced wall line, an angled braced wall line, or an exterior wall.

**Review 602.10.11.1 including guidebook**

11. Stepped footings must comply with 602.11.2.

**Worksheet** for a one-story structure, max. 10' wall height.

**WIND – both directions** - Multiply the braced wall length (based on braced wall line spacing between parallel braced wall panels) as shown in table 602.10.3(1) (page 167) by the following:

One separation calculation needed for each wall

	Spacing of braced walls		_____
	Length of wall to be braced (pg 167)		_____
X	1.20	exposure C)	_____
X	.70	eave to roof ridge 5' or less	_____
	1.00	10'	
	1.30	15'	
	1.60	20'	
X	.90	8' wall height	_____
	.95	9' wall height	
	1.00	10' wall height	
X	1.00	2- Braced walls per direction	_____
	1.30	3	
	1.45	4	
	1.60	5>	
X	1.40	If no interior gypsum board (except CS-PF, ABW, PFH)	_____
	1.00	w/ interior gyp board – must be fastened at 7" o.c. to count (also on gables)	
X	0.7	gyp board fastening @ 4" @ panel edges & top/bottom plates, 7" in field and all joints blocked	_____
	<b>MIN. TOTAL LEGNTH OF BRACED WALL PANEL</b>		_____

**SEISMIC**– Multiply the braced wall line length as shown in table 602.10.3(3) by the following:

	Length of braced walls		_____
	Length of wall to be braced (page 171)		_____
X	1.2	braced wall line spacing >25 to 30' or less	_____
X	1.4	braced wall line spacing >30	_____
X	1.0	wall dead load >8 and <15 psf	_____
	0.85	<8 psf	
X	1.2	Roof/ceiling load is > 15 psf	_____
X	1.5	If no interior gypsum board Must be fastened at 7" o.c. to count (not required on ABW, PFH, CS-PF)	_____
X	1.0	w/interior gypsum board (also on gables)	_____
	<b>MIN. TOTAL LEGNTH OF BRACED WALL PANEL</b>		_____