

Chapter 6

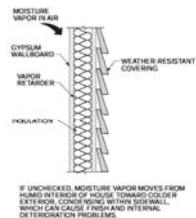
- Provides the requirements for the design and construction of wall systems that are capable of supporting the minimum design vertical loads (dead, live, and snow) and lateral loads (wind or seismic loads).
- The Chapter covers 5 different wall types, wood framed, cold-formed steel, masonry, concrete and Structural insulated panel (SIP)
- It also covers vapor retarders for moisture control
- As well as the criteria for the performance of exterior windows and doors.

Chapter 6

- There are three wall systems related to chapter 6 that will require a fire-resistance rating, they are.
- Exterior walls based on location on the property in accordance with R302
- Walls serving as dwelling unit separations in two-family dwellings in accordance with R302.3
- Common walls between townhouses in accordance with R302.2

Section R601 General

- R601.3 Vapor retarders-In CT, class I or II vapor retarders are required on the interior side of framed walls.
- R601.3.2 Material vapor Retarder class-
 - Class I-Sheet polyethylene, unperforated aluminum foil.
 - Class II-Kraft-faced fiberglass batts.
 - Class III-Latex or enamel paint.



Section R602 Wood Wall Framing

- R602.3 Design and Construction- Structural wall sheathing shall be fastened directly to structural framing members.
- R602.3.1 Stud size, height and spacing-In accordance with table R602.3(5).
- Stud spacing based on size and loading conditions.

TABLE R602.3(S) SIZE, HEIGHT AND SPACING OF WOOD STUDS ^a							
STUD SIZE (inches)	BEARING WALLS				NONBEARING WALLS		
	Laterally unsupported stud height ^b (feet)	Maximum spacing when supporting one floor, plus a stud assembly or a horizontal joist assembly, only (inches)	Maximum spacing when supporting one floor, plus a stud assembly or a horizontal joist assembly (inches)	Maximum spacing when supporting two floors, plus a stud assembly or a horizontal joist assembly (inches)	Laterally unsupported stud height ^b (feet)	Maximum spacing (inches)	
2 x 3 ^c	—	—	—	—	10	16	
2 x 4	10	24 ^c	16 ^c	—	24	14	
3 x 4	10	24	24	16	24	14	
2 x 5	10	24	24	—	24	16	
2 x 6	—	—	16	24	20	24	

For 30° h, 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.093 m².
a. Listed heights are distances between points of lateral support placed perpendicular to the plane of the wall. Increases in unsupported height are permitted where justified by analysis.
b. Stud height is the height of exterior walls.
c. A habitable attic assembly supported by 2 x 4 studs is limited to a roof span of 22 feet. Where the roof span exceeds 22 feet, the wall studs shall be increased to 2 x 6 or the studs shall be designed in accordance with accepted engineering practice.

Supporting two floors and a roof				
>10	2 x 6	2 x 6	2 x 4	2 x 4
12	2 x 6	2 x 6	2 x 6	2 x 6
14	2 x 6	2 x 6	2 x 6	2 x 6
16	NA ^a	NA ^a	2 x 6	2 x 6
18	NA ^a	NA ^a	2 x 6	2 x 6
20	NA ^a	NA ^a	NA ^a	2 x 6
22	NA ^a	NA ^a	NA ^a	NA ^a
24	NA ^a	NA ^a	NA ^a	NA ^a

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- R602.3.2 Top Plates-
Provides a means of tying the building together.
Serves as a beam supporting joists and rafters that are not located directly over studs.
Serves as chords for floor and roof diaphragms.
R602.5 Interior non-load bearing walls-allows 2x3 studs 24 inches on center or 2x4 studs flat 16 inches on center when not part of a braced wall line.

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- R602.6.1 Drilling and notching of top plate
- Removal of any top plate material will reduce the tension/compression capacity of the plate.
- Removal of more than 50% requires 1 ½ " metal strap.

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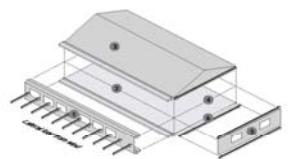
- R602.7 Headers-determined by table R502.5(1) for exterior bearing walls and table R502.5(2) for interior bearing walls and section R602.7.2 for non-bearing wall headers.
- Table R502.5(2) may be used to prescriptively size basement girders in one story dwellings only.

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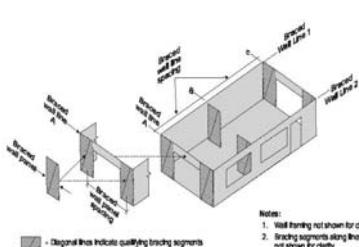
- R602.9 Cripple walls—shall be framed with studs not smaller than the studding above, when wall exceeds 4' in height studs shall be sized as required for an additional story.

Section R602 Wood Wall Framing

- R602.10 Wall Bracing-buildings shall be braced in accordance with this section. **2012 Added R602.12 Simplified wall bracing. (not applicably in CT only allowed in 90 mph or less)**
- Where the building or any portion thereof can not comply they shall be designed and constructed in accordance with R301.1
- The type, amount and number of bracing panels are dependent on the magnitude of the lateral loads.
- R602.10.1 Braced wall lines-it is important to realize that braced wall lines are not always exterior walls. Interior braced wall lines may be required depending on the size of the structure and the wind speeds.



- ④ Wheelwell roofing/wall carries load to foundation at bottom of wall and roof diaphragm at top of wall
- ④ Connections at bottom and top of wall transfer these loads into the foundation and diaphragm
- ④ Roof or floor diaphragm carries load to leaning walls
- ④ Connections between roof/floor and wall transfers load from diaphragm to bracing walls
- ④ Bracing/wall carries load from diaphragm to foundation
- ④ Transfer of loads from the shear walls to the foundation



Notes:

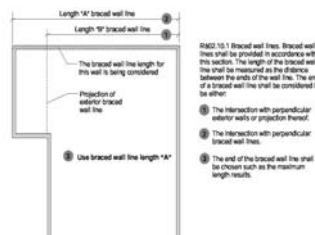
1. Wall thinning not shown for clarity.
2. Bracing segments along lines 1 and 2 not shown for clarity.

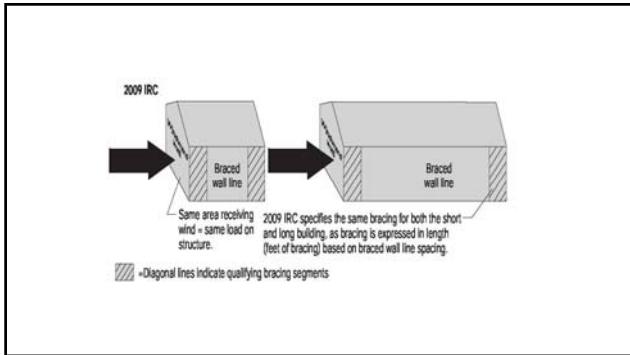
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- R602.10.1.1 Braced wall panels-must extend the full height of the wall from sole plate to top plate.
- The permitted height ranges from 8' to 12' some methods only allow 10'.
- They shall be either intermittent or continuous sheath panels.
- 3 methods of mixing-1) Story to story, 2) braced wall line to braced wall line on a given story, 3) Mixing in one braced wall line.

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- R602.10.1.2 Length of bracing-For 1 & 2 Family-dwellings- the length is base on Table R602.10.1.2(1) by the wind speed from Appendix R.
- The length is adjusted by the factors in the footnotes to the table.
- In no case shall the minimum length after adjustments be less than 48".
- **The 2012 IRC has a single table for all of the adjustment factors.**
- **Table R602.10.3(2) Wind adjustment factors to the required length of wall bracing.**





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- Table R602.10.1.2(1)- is based on an exposure category of B, a 30' mean roof height, 10' eave-to-ridge height, 10' wall height per story and 2 braced wall lines per direction of wind.

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TABLE R602.1.2(4)(A)(4) *continued*
BRACING REQUIREMENTS BASED ON WIND SPEED
(in a horizontal braced wall line spacing)

For 30: 1 foot = 30.5 mm, 1 inch = 25.4 mm, 1 mile = 1.609 km, 1 ft-lb = 1.356 N-m
a. Tabulated bracing lengths are based on Wind Exposure Category B, a 30 ft mean roof height, a 15 ft eave-to-ridge height, a 10 ft wall height, and two braced wall lines along each end in a given plan direction. Methods of bracing shall be as described in Sections R602.10.2, R602.10.4 and R602.10.5. Intermediate shall be permitted.

NUMBER OF STOREYS	EXPOSURE FACTORS		
	Exposure B	Exposure C	Exposure D
1	1.0	1.2	1.5
2	1.0	1.3	1.6
3	1.0	1.4	1.7

b. For other mean roof heights and exposure categories, the required bracing length shall be multiplied by the appropriate factor from the following table. Intermediate shall be permitted.

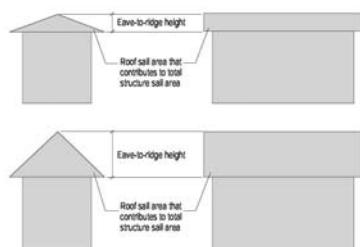
c. For other mean roof-to-ridge heights, the required bracing length shall be multiplied by the appropriate factor from the following table. Intermediate shall be permitted.

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SUPPORT CONDITION	ROOF EAVE-TO-RIDGE HEIGHT			
	5 ft or less	10 ft	15 ft	20 ft
Roof only	0.7	1.0	1.3	1.6
Roof + floor	0.85	1.0	1.15	1.3
Roof + 2 floors	0.9	1.0	1.1	NP

d. For a maximum 9-foot wall height, multiplying the table values by 0.95 shall be permitted. For a maximum 8-foot wall height, multiplying the table values by 0.90 shall be permitted. For a maximum 12-foot wall height, the table values shall be multiplied by 1.1.

e. For three or more braced wall lines in a given plan direction, the required bracing length on each braced wall line shall be multiplied by the appropriate factor from the following table.



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NUMBER OF BRACED WALL LINES	ADJUSTMENT FACTOR
3	1.30
4	1.45
≥ 5	1.60

f. Bracing lengths are based on the application of gypsum board finish (or equivalent) applied to the inside face of a braced wall panel. When gypsum board finish (or equivalent) is not applied to the inside face of braced wall panels, the calculated lengths shall be multiplied by the appropriate factor from the following table:

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BRACING METHOD	ADJUSTMENT FACTOR
Method LIB	1.8
Methods DWB, WSP, SFB, PBS, PCP, HPS	1.4

g. Bracing lengths for Method GB are based on the application of gypsum board on both faces of a braced wall panel. When Method GB is provided on only one side of the wall, the required bracing amounts shall be doubled. When Method GB braced wall panels installed in accordance with Section R602.10.2 are fastened at 4 studs per 8' height, including top and bottom plates, and are braced at all horizontal joints, multiplying the required bracing percentage for wind load by 0.7 shall be permitted.

h. Method LIB bracing shall have gypsum board attached to at least one side according to the Section R602.10.2 Method GB requirements.

i. Required bracing for the Method LIB shall be multiplied by 0.80 when it is installed in one-story buildings and in the top story of two or three story buildings. Bracing shall be permitted to be multiplied by 0.80 when an approved hold-down device with a minimum uplift design value of 800 pounds is fastened to the end studs of each braced wall panel in the braced wall line and to the foundation or framing below.

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- Table R602.10.1.2(1) footnote (i)-Required bracing length for methods DWB, WSP, SFB, PBS, PCP and HPS in braced wall lines located in one-story buildings and in the top story of two or three story buildings shall be permitted to be multiplied by 0.80 when and approved hold-down device with a minimum uplift design value of 800 lbs is fastened to the end studs of each braced wall panel in the braced wall line and to the foundation or framing below.*

Section R602 Wood Wall Framing

- R602.10.1.2.1 Braced wall panel uplift load path-when it exceeds 100 PLF the following options are available;
- 1) Installation of an approved uplift framing anchor of sufficient capacity to resist the net uplift force.
- 2) R104.11 permits engineering design to be used to determine other nailing schedules or details that may provide sufficient uplift resistance.

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- 3) Engineering analysis can be used to determine the uplift capacity in lieu of table 802.11. Such analysis can take into account roofing materials and other details not accounted for in the table.
- 4) Other referenced documents, such as WFCM for 1 & 2 family-dwellings can be used to generate uplift requirements and prescriptive hold-down requirements.

R602.10.1.2.1 Braced wall panel uplift load path.

1. Fastening in accordance with Table R602.3(1) where:
2. Where the net uplift value at the top of a wall exceeds 100 plf (146 N/mm), installing *approved* uplift framing connectors to provide a continuous load path from the top of the wall to the foundation. The net uplift value shall be as determined in Item 1.2 above.

Value shall be determined in accordance with Section R802.11 and shall be permitted to be reduced by 60 plf (86 N/mm) for each full wall above.

TABLE R802.11

TABLE R802.11
REQUIRED STRENGTH OF TRUSS OR RAFTER CONNECTIONS TO RESIST WIND UPLIFT FORCES*^{b,c,e,f}
(Pounds per connection)

BASIC WIND SPEED (mph (3-second gust))	ROOF SPAN (feet)						OVERHANGS ^a (feet from center)
	12	16	24	32	36	40	
85	.72	1.20	1.45	1.69	1.93	2.17	-241
90	.91	1.51	1.81	2.12	2.42	2.72	-43.22
100	1.31	2.18	2.62	3.05	3.49	3.93	-436
110	1.75	2.92	3.51	4.09	4.67	5.26	-584

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 mph = 0.447 m/s, 1 pound/foot = 14.5939 N/m, 1 pound = 0.454 kg.

a. The overhangs are the horizontal distances from the center of the connections to the eaves or gables. For Example, for 12 and 16, multiply the above loads by the Adjustment Coefficients in Table IC912.1D.

b. The overhangs are the horizontal distances from the center of the framing being spaced 24 inches on center. Multiply by 0.87 for framing spaced 16 inches on center and multiply by 0.5 for framing spaced 12 inches on center.

c. The uplift connectors are to be selected to resist the overhanging loads.

d. The uplift connectors are to be selected to resist the overhanging loads.

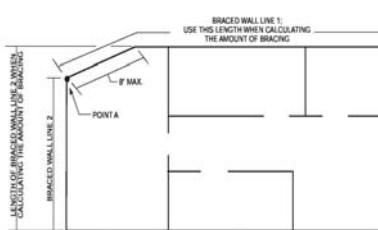
e. The uplift connectors are to be selected to resist the overhanging loads.

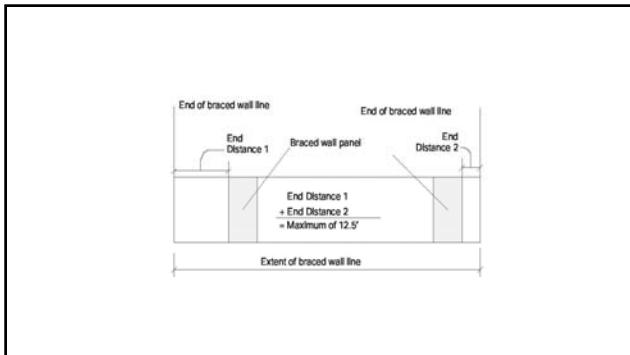
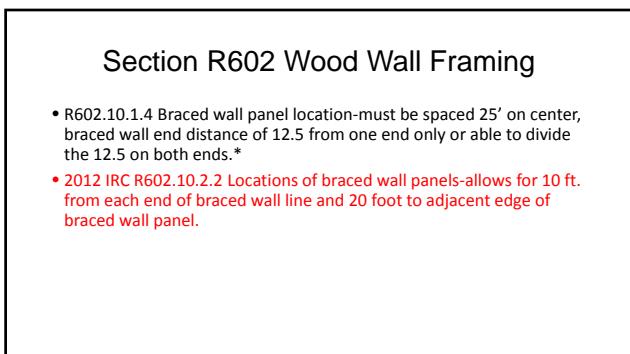
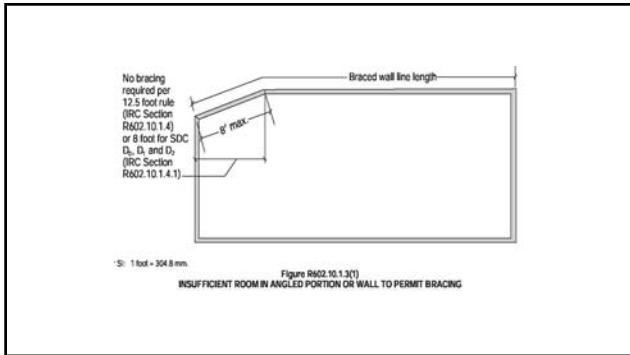
f. For wall-to-wall and wall-to-foundation connections, the capacity of the uplift connector is permitted to be reduced by 100 pounds for each full wall above. (For example, if a 600-pound rated connector is used on the roof framing, a 500-pound rated connector is permitted at the next floor level down).

Uplift = 135 PLF

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- R602.10.1.3 Angled corners-Angle walls out of plan up to 45 degrees with a maximum diagonal length of 8' allows the sheathing to be counted towards the total bracing length for a single braced wall line.*
- 2012 IRC at section R602.10.1.4 changes from angled corners to angled walls and eliminates the 45 degrees.
- What is interesting in the 2012 commentary there is table R602.10.1.4 Projected brace wall line length contributed by the angle of the wall.





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- R602.10.2 Intermittent braced wall panel construction methods-there are 11 methods, 8 traditional and 3 alternate methods.
- The minimum length required for a single panel is from 48" to 96" depending on the methods.
- The alternate methods can be substituted for any traditional method on a 1 for 1 base.*

Part Number	Description	Instrumentation	Dimensions	Notes
L10	Lot line detector	4 x 100' long detector probe with 10' probe for each detector probe		Mount 4' x 10' lot line detector probe with 10' probe for each detector probe
W100	Diagonal scan beams	Two 10' long detector probe		Two 10' long detector probe for diagonal scanning
W100	Horizontal scan beams	Two 10' long detector probe		Two 10' long detector probe for horizontal scanning
W10	Universal horizontal beams	Two 10' long detector probe		Two 10' long detector probe for horizontal scanning
C10	Opposite beam	10'		10' long detector probe for opposite beam
P100	Perimeter scanning using beam detector	Two 10' long detector probe and 10' spring		Two 10' long detector probe and 10' spring for perimeter scanning using beam detector
P100	Surveillance panel	Five 10' long detector probe and 10' spring		Five 10' long detector probe and 10' spring for surveillance panel
P100	Hardwired panel	Two 10' long detector probe		Two 10' long detector probe for hardwired panel
P100	Addressable panel	Five 10' long detector probe		Five 10' long detector probe for addressable panel
P100	Surveillance panel	See Data Sheet 1000.10.2		See Data Sheet 1000.10.2
P100	Hardwired panel or addressable panel	See Data Sheet 1000.10.4		See Data Sheet 1000.10.4

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- R602.10.2.1 Intermittent braced wall panel interior finish material requires $\frac{1}{2}$ " gypsum install on the interior wall with exceptions;
 - 1) Method GB as both sides of this method must be method GB.
 - 2) The 3 narrow wall methods, they were developed without gypsum.
 - 3) Where an approved material with in-plane shear resistance equal to gypsum is used.
 - 4) Where methods DWB, WSP, SFB, PBS, PCP & HPS lengths are multiplied by a factor of 1.5.

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- R602.10.3.1 Adjustment of length of braced wall panels-walls over 10' in height shall have the length increased by a ratio of $H/10$.
- The aspect ratio adjustment is separate from the required bracing adjustment of R301.3, item1, exception*

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- R301.3 Story Height-For wood framed walls the laterally unsupported bearing wall stud height in accordance with Table R602.3(5) plus the floor height of not more than 16".
- The exception allows and increase to 12' walls braced to the table as long as the bracing length is increased by a factor of 1.10 in table R602.10.1.2(1) (Wind) and 1.20 for table R602.10.2.1(2) (Seismic)

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- R602.10.3.2 Method ABW-shall be permitted to replace each 4' of braced wall panel required by R602.10.3, the maximum height and minimum length and hold down force of each panel shall be in accordance with table R602.10.3.2.*

TABLE R602.10.3
EFFECTIVE LENGTHS FOR BRACED WALL PANELS LESS THAN 48 INCHES IN ACTUAL LENGTH
(BRACE METHODS DWB, WSP, SFB, PBS, PCP AND HWP)

ACTUAL LENGTH OF BRACED WALL PANEL (inches)	EFFECTIVE 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 S5: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Interpolation shall be permitted.

TABLE R602.10.3.2
MINIMUM LENGTH REQUIREMENTS AND HOLD-DOWN FORCES FOR METHOD ABW BRACED WALL PANELS

DESIGN 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 < 170 mph	Minimum sheathed length R602.10.3.2, item 1 hold-down force (lb)	1800	1800	1800	2200
	R602.10.3.2, item 2 hold-down force (lb)	3000	3000	3000	3600
SDC D ₁ , D ₂ and D ₃ Wind speed < 170 mph	Minimum sheathed length R602.10.3.2, item 1 hold-down force (lb)	1800	1800	NP ^a	NP ^a
	R602.10.3.2, item 2 hold-down force (lb)	3000	3000	3000	NP ^a

For S5: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. NP = Not Permitted. Maximum length of 12 feet.

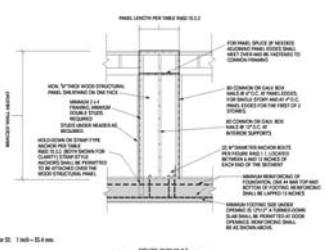
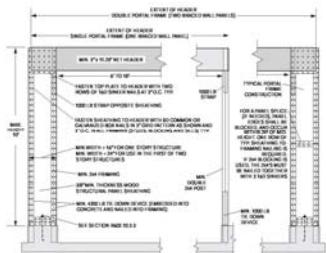


FIGURE R602.10.3.2
ALTERNATE BRACED WALL PANEL

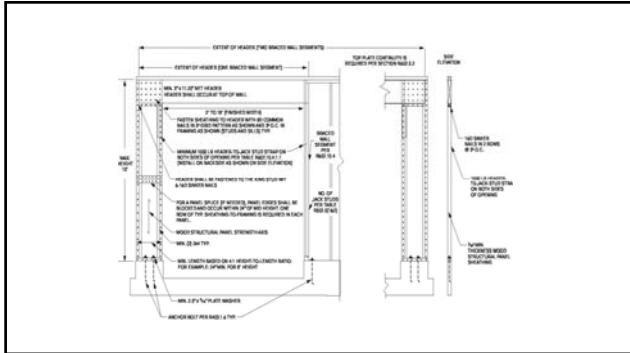
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- R602.10.3.3 Method PFH-each leg is equivalent to 4' of bracing.
- Requires hold down straps embedded in the foundation
- One anchor bolt 5/8".
- Supported directly onto the foundation.
- Foundation reinforced with #4 bars top and bottom lapped 15".
- Single story application allows 16" length
- First story of 2-story allows 24" length.



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- R602.10.3.4 Method PFG-limited to areas of low to moderate SDC A,B & C.
- No hold down devices required
- Restricted to first story of 2-story
- Is an aspect ratio-based system of 4:1
- Minimum length of 24" for 8' wall, 30" for 10' wall
- Braced wall length is equal to 1.5 times the length



Section R602 Wood Wall Framing

- R602.10.4 Continuous sheathing—All braced wall lines along exterior walls on the same story shall be continuously sheathed.
- Exception: SDC A,B, & C or wind speeds 100 mph or less permits other bracing methods on other braced wall lines on the same story.*

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- R602.10.4.1 Continuous sheathing braced wall panels—requires structural panel sheathing on all sheathable surfaces of a braced wall line above and below openings and gable end walls.
- There are three methods, CS-WSP, CS-G & CS-PH
- CS-G is a narrow length panel used for garage walls with a minimum width of 24" for a 8' wall, only allowed on one wall of a garage supporting a roof only

TABLE R602.10.4.1 CONTINUOUS SHEATHING METHODS					
METHOD	MATERIAL	MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA	
CS-WSP	Wood structural panel	1/2"		6d common (7/8" x 11 1/2") nails at 1" spacing (intermediate supports) or 16 ga. x 1 1/4" staples at 2" spacing (intermediate supports) and 6" spacing (intermediate supports)	
CS-G	Wood structural panel - adjust to gauge openings and supporting roof load only ^a	1/2"		See Method CS-WSP	
CS-PP	Continuous portal frame	See Section R602.10.4.1.1		See Section R602.10.4.1.1	

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 47.88 Pa.
a. Applies to one wall of a garage only.
b. Roof covering dead loads shall be 3 psf or less.

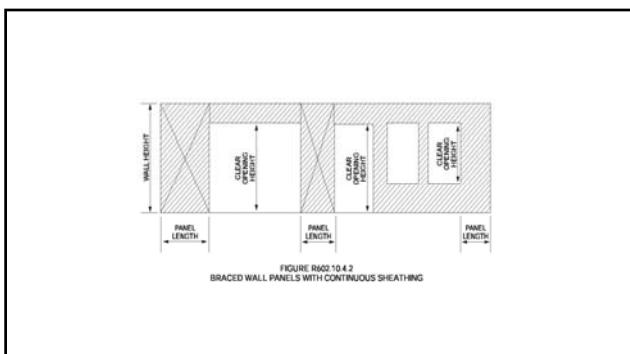


TABLE R602.10.4.2 LENGTH REQUIREMENTS FOR BRACED WALL PANELS WITH CONTINUOUS SHEATHING (inches)						
METHOD	ADJACENT COLUMN CLEAR SPACING (inches)	WALL HEIGHT (feet)				
		0	4	8	11	15
CS-WSP	84	24	27	30	33	36
	88	26	29	32	—	—
	92	28	32	35	—	—
	96	30	33	36	—	—
	100	32	35	38	—	—
	104	34	37	40	—	—
	108	36	39	42	—	—
	112	38	41	44	—	—
	116	40	43	46	—	—
	120	—	44	47	—	—
	124	—	45	48	—	—
	128	—	46	50	—	—
	132	—	47	51	—	—
	136	—	48	52	—	—
	140	—	49	53	—	—
	144	—	50	54	—	—
	148	—	51	55	—	—
	152	—	52	56	—	—
	156	—	53	57	—	—
	160	—	54	58	—	—
	164	—	55	59	—	—
	168	—	56	60	—	—
	172	—	57	61	—	—
	176	—	58	62	—	—
	180	—	59	63	—	—
	184	—	60	64	—	—
	188	—	61	65	—	—
	192	—	62	66	—	—
	196	—	63	67	—	—
	200	—	64	68	—	—
	204	—	65	69	—	—
	208	—	66	70	—	—
	212	—	67	71	—	—
	216	—	68	72	—	—
	220	—	69	73	—	—
	224	—	70	74	—	—
	228	—	71	75	—	—
	232	—	72	76	—	—
	236	—	73	77	—	—
	240	—	74	78	—	—
	244	—	75	79	—	—
	248	—	76	80	—	—
	252	—	77	81	—	—
	256	—	78	82	—	—
	260	—	79	83	—	—
	264	—	80	84	—	—
	268	—	81	85	—	—
	272	—	82	86	—	—
	276	—	83	87	—	—
	280	—	84	88	—	—
	284	—	85	89	—	—
	288	—	86	90	—	—
	292	—	87	91	—	—
	296	—	88	92	—	—
	300	—	89	93	—	—
	304	—	90	94	—	—
	308	—	91	95	—	—
	312	—	92	96	—	—
	316	—	93	97	—	—
	320	—	94	98	—	—
	324	—	95	99	—	—
	328	—	96	100	—	—
	332	—	97	101	—	—
	336	—	98	102	—	—
	340	—	99	103	—	—
	344	—	100	104	—	—
	348	—	101	105	—	—
	352	—	102	106	—	—
	356	—	103	107	—	—
	360	—	104	108	—	—
	364	—	105	109	—	—
	368	—	106	110	—	—
	372	—	107	111	—	—
	376	—	108	112	—	—
	380	—	109	113	—	—
	384	—	110	114	—	—
	388	—	111	115	—	—
	392	—	112	116	—	—
	396	—	113	117	—	—
	400	—	114	118	—	—
	404	—	115	119	—	—
	408	—	116	120	—	—
	412	—	117	121	—	—
	416	—	118	122	—	—
	420	—	119	123	—	—
	424	—	120	124	—	—
	428	—	121	125	—	—
	432	—	122	126	—	—
	436	—	123	127	—	—
	440	—	124	128	—	—
	444	—	125	129	—	—
	448	—	126	130	—	—
	452	—	127	131	—	—
	456	—	128	132	—	—
	460	—	129	133	—	—
	464	—	130	134	—	—
	468	—	131	135	—	—
	472	—	132	136	—	—
	476	—	133	137	—	—
	480	—	134	138	—	—
	484	—	135	139	—	—
	488	—	136	140	—	—
	492	—	137	141	—	—
	496	—	138	142	—	—
	500	—	139	143	—	—
	504	—	140	144	—	—
	508	—	141	145	—	—
	512	—	142	146	—	—
	516	—	143	147	—	—
	520	—	144	148	—	—
	524	—	145	149	—	—
	528	—	146	150	—	—
	532	—	147	151	—	—
	536	—	148	152	—	—
	540	—	149	153	—	—
	544	—	150	154	—	—
	548	—	151	155	—	—
	552	—	152	156	—	—
	556	—	153	157	—	—
	560	—	154	158	—	—
	564	—	155	159	—	—
	568	—	156	160	—	—
	572	—	157	161	—	—
	576	—	158	162	—	—
	580	—	159	163	—	—
	584	—	160	164	—	—
	588	—	161	165	—	—
	592	—	162	166	—	—
	596	—	163	167	—	—
	600	—	164	168	—	—
	604	—	165	169	—	—
	608	—	166	170	—	—
	612	—	167	171	—	—
	616	—	168	172	—	—
	620	—	169	173	—	—
	624	—	170	174	—	—
	628	—	171	175	—	—
	632	—	172	176	—	—
	636	—	173	177	—	—
	640	—	174	178	—	—
	644	—	175	179	—	—
	648	—	176	180	—	—
	652	—	177	181	—	—
	656	—	178	182	—	—
	660	—	179	183	—	—
	664	—	180	184	—	—
	668	—	181	185	—	—
	672	—	182	186	—	—
	676	—	183	187	—	—
	680	—	184	188	—	—
	684	—	185	189	—	—
	688	—	186	190	—	—
	692	—	187	191	—	—
	696	—	188	192	—	—
	700	—	189	193	—	—
	704	—	190	194	—	—
	708	—	191	195	—	—
	712	—	192	196	—	—
	716	—	193	197	—	—
	720	—	194	198	—	—
	724	—	195	199	—	—
	728	—	196	200	—	—
	732	—	197	201	—	—
	736	—	198	202	—	—
	740	—	199	203	—	—
	744	—	200	204	—	—
	748	—	201	205	—	—
	752	—	202	206	—	—
	756	—	203	207	—	—
	760	—	204	208	—	—
	764	—	205	209	—	—
	768	—	206	210	—	—
	772	—	207	211	—	—
	776	—	208	212	—	—
	780	—	209	213	—	—
	784	—	210	214	—	—
	788	—	211	215	—	—
	792	—	212	216	—	—
	796	—	213	217	—	—
	800	—	214	218	—	—
	804	—	215	219	—	—
	808	—	216	220	—	—
	812	—	217	221	—	—
	816	—	218	222	—	—
	820	—	219	223	—	—
	824	—	220	224	—	—
	828	—	221	225	—	—
	832	—	222	226	—	—
	836	—	223	227	—	—
	840	—	224	228	—	—
	844	—	225	229	—	—
	848	—	226	230	—	—
	852	—	227	231	—	—
	856	—	228	232	—	—
	860	—	229	233	—	—
	864	—	230	234	—	—
	868</					

Section R602 Wood Wall Framing

- R602.10.4.1.1 Continuous portal frame-Not to exceed 4 in a single braced wall line.
- Maximum of 2 braced wall segments
- Header not to exceed 22'
- Tension straps required
- Allowed on any floor level
- Vertical leg is used to determine length of bracing
- Based on a 6:1 height to length ratio
- Minimum of 16" in an 8' height, allows for pony walls from 0-4' with maximum opening of 18'

TABLE R602.10.4.1.1 TENSION STRAP CAPACITY FOR BRACING WIND PRESSURES PERPENDICULAR TO A ASPECT WOOD WALL ^a		ASPECT WOOD WALL ^b (PSF)					
MINIMUM WALL SLIP-UP-FRAME HEIGHT (IN.)	MINIMUM PORTAL HEIGHT (IN.)	MINIMUM TOTAL WALL HEIGHT (IN.)	Exposure B			Exposure C	
			8'	10'	12'	8'	10'
2 x 4 No. 2 Deck	8'	8'	18	1800	1800	1800	1800
		9'	18	1800	1800	1800	1800
		10'	18	1800	1800	1750	1800
		11'	18	1800	1800	2125	2000
		12'	18	1800	1800	2175	2125
	10'	8'	18	1800	1800	1800	1800
		9'	18	1800	1800	1800	1800
		10'	18	1875	1800	1875	1800
		11'	18	1800	1800	2125	2125
		12'	18	1800	1800	2175	2175
	12'	8'	18	1800	1800	1800	1800
		9'	18	1800	1800	1800	1800
		10'	18	1800	1800	1800	1800
		11'	18	1775	1800	1800	1800
		12'	18	1775	1800	1800	1800
2 x 6 Hard Deck	12'	8'	9	1800	1800	1825	1750
		10'	9	1800	1800	1825	1750
		11'	9	1800	1800	1825	1750
		12'	9	1725	1800	1825	1775
		13'	9	1725	1800	1825	1800

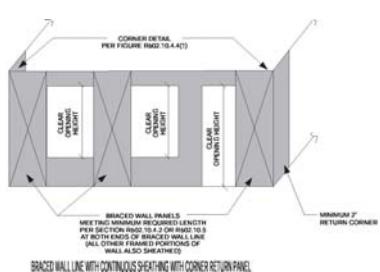
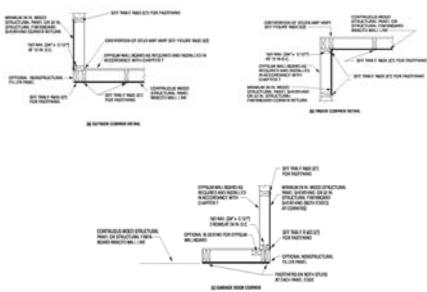
Footnotes:
a. 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound force = 4.448 N.
b. A 10' aspect wall is defined as a wall 10' high and 10' wide.
c. Strap shall be handled in accordance with manufacturer's recommendations.

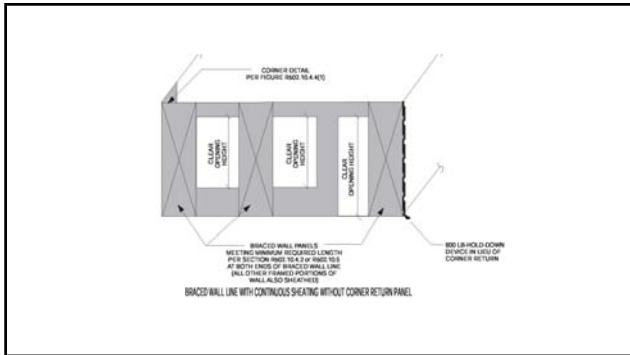
Section R602 Wood Wall Framing

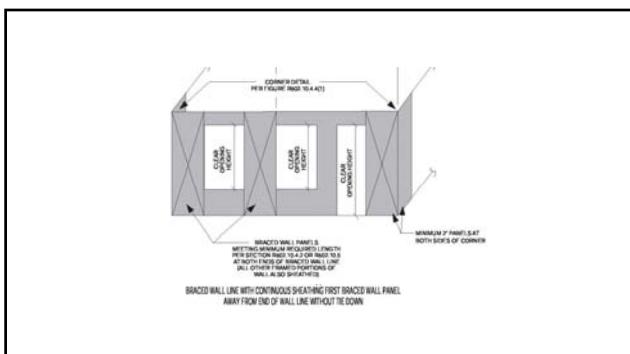
- R602.10.4.3 Length of bracing for continuous sheathing-the length is determined from table R602.10.1.2(1)
- Braced wall panels of full height are counted toward the required length of bracing based on table R602.10.4.2

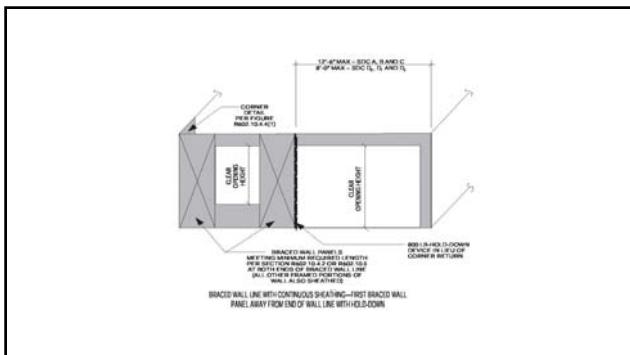
Section R602 Wood Wall Framing

- R602.10.4.4 Continuously sheathed braced wall panel locations and corner construction-Located on each end of braced wall line and at least every 25' on center.
- A minimum 24" corner return on both ends of braced wall line. No 24" corner return requires 800 lb. hold-down device fastened to the corner stud to foundation or framing below.
- If both braced wall panels meet at the corner and one is spaced away from the corner both braced panels require 800 lb. hold-down device.









Section R602 Wood Wall Framing

- R602.10.5 Continuously sheathed braced wall lines using method CS-SFB-only allowed in 100 mph wind speeds or less
- CS-G and CS-PH not applicable to CS-SFB
- The length shall comply with Table R602.5.2
- Only allowed in walls with 10' height
- Minimum 32" corner return

TABLE R602.5.2
MINIMUM LENGTH REQUIREMENTS FOR STRUCTURAL FIBERBOARD BRACED
WALL PANELS IN A CONTINUOUSLY SHEATHED WALL^a

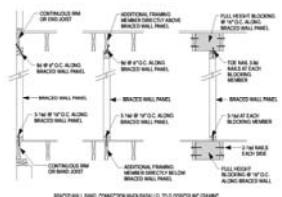
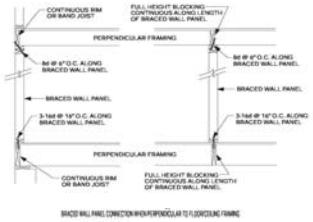
MINIMUM LENGTH OF STRUCTURAL FIBERBOARD BRACED WALL PANEL (INCHES)		MINIMUM CLEAR HEIGHT NEXT TO THE STRUCTURAL FIBERBOARD BRACED WALL PANEL (INCHES)	
8' high wall	9' foot wall	10' high wall	10' high
48	54	60	70
32	36	40	45
24	27	30	37

Top 12: 1 inch = 25.4 mm, 1 foot = 304.8 mm

a. Interpolation is permitted.

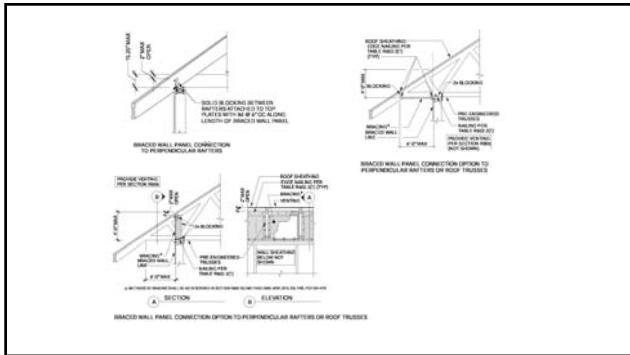
Section R602 Wood Wall Framing

- R602.10.6 Braced wall panel connections-shall be connected to floor framing or foundations.
- Done with rim joist or blocking between joist*



Section R602 Wood Wall Framing

- R602.10.6.2 Connections to roof framing-exterior braced wall panels shall be connected to roof framing.
- Complex roof shapes used in modern design have necessitated prescriptive connection details to ensure an effective load path exists.
- The roof and floor sheathing are the structural diaphragm that the wall bracing must connect to.*



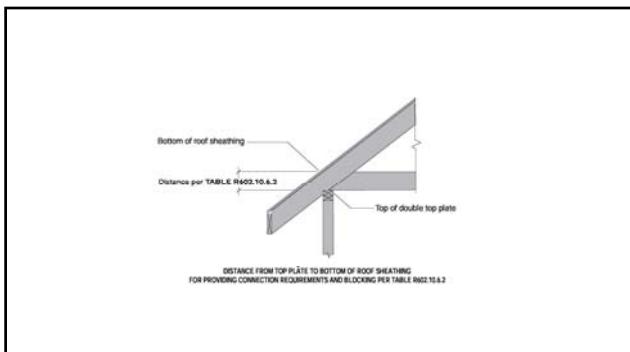


TABLE R402.10.6 CONNECTION AND BLOCKING REQUIREMENTS BETWEEN BRACED WALL PANELS AND ROOF FRAMING			
SDOC DESIGN CAT (SDOC 1000-09-0111)	DISTANCE Bottom of roof sheathing to top of top plate (See Figure R402.10.6.3)	IN BLOCKING?	
SDOC A, B, C, and wind speed less than 100 mph	9.25" or less	Not Required per Section R402.10.6.2, Item 2, Roof framing item 1, Figure R402.10.6.3	
	Greater than 9.25" to 15.25"	Required per Section R402.10.6.2, Item 2 and Figure R402.10.6.2(1)	
SDOC D, E, or wind speed 100 mph or greater	15.25" or less	Required per Section R402.10.6.2, Item 2 and Figure R402.10.6.2(2)	
All SDCs and wind speeds	15.25" to 48"	Required per Section R402.10.6.2, Item 4 or Figures R402.10.6.2(3) or R402.10.6.2(4)	

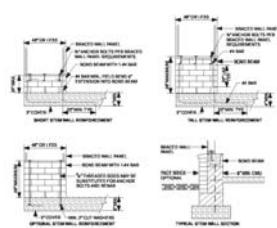
For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.45 m/s.
a. Refer to truss connection to top plate per Table R402.10.6.3(1).

Section R602 Wood Wall Framing

- R602.10.7 Braced wall panel support-contains requirements for circumstances not addressed such as cantilevered floors, elevated post and pier foundations and masonry stem walls.
- Floor cantilevers supporting braced wall lines must have solid blocking at the nearest bearing wall location for SDC A, B & C there is not details for wind speeds.

Section R602 Wood Wall Framing

- Elevated post and pier foundations supporting braced wall panels must be engineered in accordance with the IBC or referenced documents.
- Masonry stem walls 4' or less in length and height require reinforcing based on figure R602.10.7.
- Over 4' engineering design.
- Stem walls over 4' in length no reinforcing required.



Section R602 Wood Wall Framing

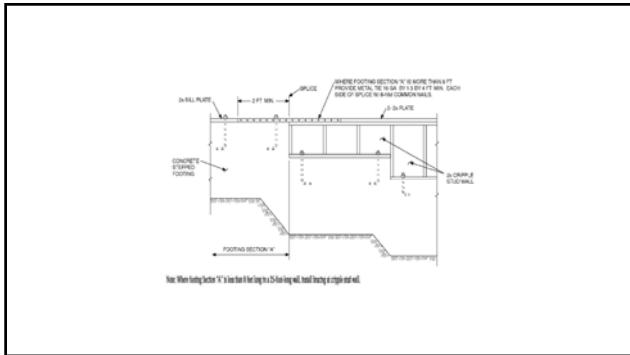
- R602.10.8 Panel joints-requires all vertical and horizontal joints in panel sheathing used for bracing occur over common framing, vertical over common studs, horizontal over blocking.
- There are 3 exceptions;
- 1) Wall segments not counted as braced wall panels, no horizontal blocking.

Section R602 Wood Wall Framing

- 2) Where the bracing provided is twice the minimum required by the table for methods WSP, SFB, GB, PBS, or HPS no horizontal blocking required.
- 3) GB panels installed horizontally, blocking horizontally not required.

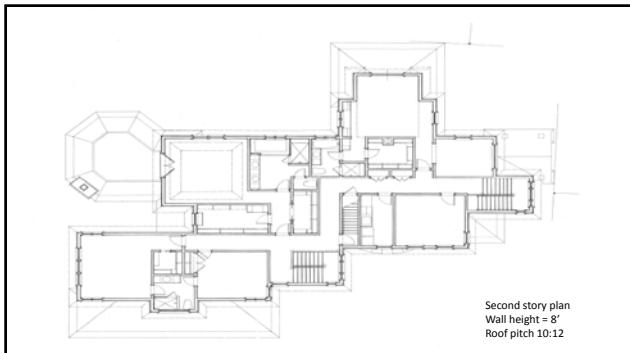
Section R602 Wood Wall Framing

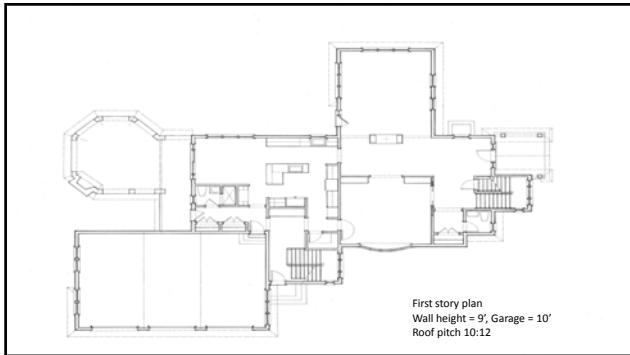
- R602.10.9 Cripple wall bracing-shall be braced with the length and type of bracing required for the wall above in accordance with Table R602.10.1.2(2) and the length of bracing shall be multiplied by a factor of 1.15 and the spacing shall be decreased to 18' from 25'.



Section R602 Wood Wall Framing

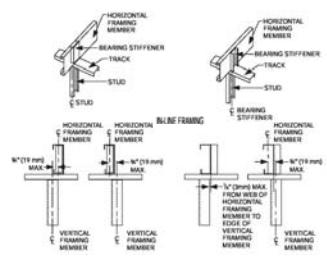
- R602.11 Wall anchorage—specifies how the braced wall line sill plates are to be anchored to the foundation and R403.1.6 specifies the minimum number, size and spacing of anchor bolts.





Section R603 Steel Wall Framing

- R603.1.2 In-line framing-is the preferred framing method, providing a direct load path from the transfer of forces from the joist to the studs.
- Allowed accepted industry practice of a $\frac{3}{8}$ " tolerance.



Section R603 Steel Wall Framing

- R603.3.1 Wall to foundation or floor connection-Shall be in accordance with table R603.3.1.

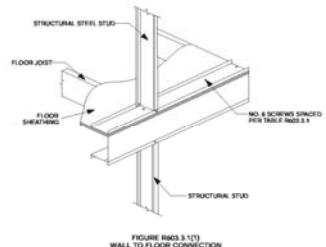


FIGURE R603.3.1(1)
WALL TO FLOOR CONNECTION

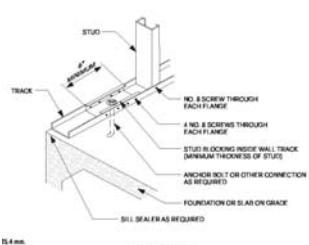


FIGURE R603.3.1(2)
WALL TO FOUNDATION CONNECTION

Section R603 Steel Wall Framing

TABLE R603.3.1 WALL TO FOUNDATION OR FLOOR CONNECTION REQUIREMENTS ^a WIND SPEED (MPH) AND EXPOSURE ^b						
WALL ANCHOR	WS 30					
3-1/2" anchor at 12" o.c. with 4-1/2" anchor at 12" o.c. and 4-1/2" anchor at 12" o.c. with 4-1/2" anchor at 12" o.c.	1-1/2" anchor at 12" o.c. with 1-1/2" anchor at 12" o.c. and 1-1/2" anchor at 12" o.c. with 1-1/2" anchor at 12" o.c.	1-1/2" anchor at 12" o.c. with 1-1/2" anchor at 12" o.c. and 1-1/2" anchor at 12" o.c. with 1-1/2" anchor at 12" o.c.	1-1/2" anchor at 12" o.c. with 1-1/2" anchor at 12" o.c. and 1-1/2" anchor at 12" o.c. with 1-1/2" anchor at 12" o.c.	1-1/2" anchor at 12" o.c. with 1-1/2" anchor at 12" o.c. and 1-1/2" anchor at 12" o.c. with 1-1/2" anchor at 12" o.c.	1-1/2" anchor at 12" o.c. with 1-1/2" anchor at 12" o.c. and 1-1/2" anchor at 12" o.c. with 1-1/2" anchor at 12" o.c.	1-1/2" anchor at 12" o.c. with 1-1/2" anchor at 12" o.c. and 1-1/2" anchor at 12" o.c. with 1-1/2" anchor at 12" o.c.
1-1/2" anchor at 12" o.c. with 1-1/2" anchor at 12" o.c. and 1-1/2" anchor at 12" o.c.	N/A	N/A	N/A	N/A	N/A	N/A
Wind uplift connector strength for 2" stud	N/A	N/A	N/A	N/A	N/A	N/A
Wind uplift connector strength for 4" stud	N/A	N/A	N/A	N/A	N/A	N/A

^a This table specifies connections for wall tracks, which will provide appropriate load capacity based on this basic wind speed and exposure category.

Section R603 Steel Wall Framing

- R603.3.3 Steel Bracing—shall be laterally braced with gypsum on both sides, structurally sheathing both sides or gypsum one side and sheathing one side or horizontal straps both sides spaced on wall height, straps are 1/12" wide with in-line blocking installed between studs at 12' intervals and termination of strap or sheathing on one side and strapping on the other side.

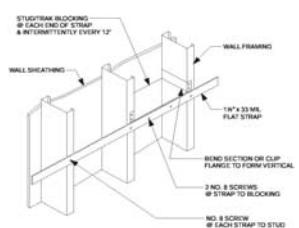
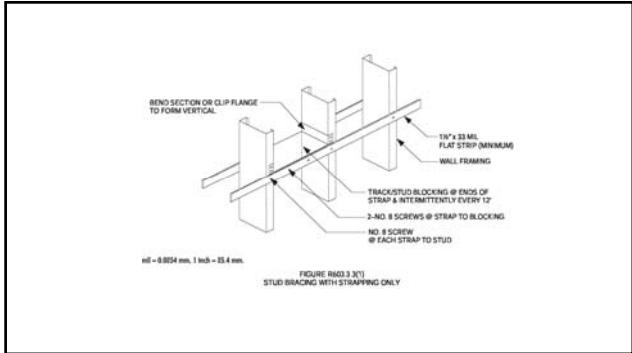


FIGURE R603.3.3(1)
STUD BRACING WITH STRAPPING AND SHEATHING MATERIAL



Section R603 Steel Wall Framing

- R603.5 Exterior wall covering-shall be installed to manufacturers instructions.
- R603.9 Structural sheathing-wood structural panel sheathing of either 7/16" OSB or 15/32" plywood must be installed on all exterior walls.

Section R603 Steel Wall Framing

- R603.9.2 Determination of minimum length of full height sheathing-Determined by table 603.9.2(1)
- Expressed in % of wall length.
- As wall height increases the wall length increases by a multiplier
- The resulting % can't be less than 20%
- Sheathing 48" wide uninterrupted by openings meets minimum length requirements.*

Section R603 Steel Wall Framing

- R603.9.3 Structural sheathing fastening-Table R603.3.2(1) requires 6" on center for edges and 12" on center in the field with #8 screws.
- When installing continuously sheathed braced wall lines using #8 screws spaced 4" on center on the edges and 12" in the field the full height sheathing is multiplied by 0.72

Section R603 Steel Wall Framing

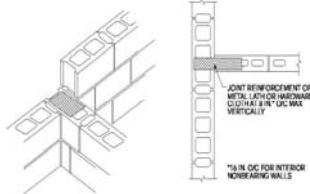
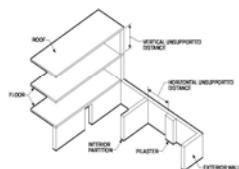
- R603.9.4 Uplift connection requirements-based on wind criteria in section R603.9.4.1.
- Where a reduction is taken for closer spacing hold-down devices will be required in accordance with R603.9.4.2
- R603.9.4.1-when wind speeds are greater than 100 mph in exposure C the uplift connections shall be provided in accordance with AISI S230, E13.3 and F7.2
- R603.9.4.2-where sheathing is adjusted by R603.9.2.3 a 4,300 lbs. hold down shall be provided at each end of full-height sheathing used to meet minimum % requirements.

Section R606 General Masonry Construction

- R606.4.1 Bearing on support-At least 2/3s the thickness of the bottom course must bear directly on the supporting construction; i.e.; foundation walls, lintels or headers.
- R606.4.2 Support at foundation-supported on at least a 8" thick foundation.
- Where the supported wall is thicker than the 8" foundation there must be corbeling with solid or mortar filled masonry.
- R606.8 Stack bond-controls cracking in unreinforced walls as long as longitudinal reinforcement is used in the horizontal beds.

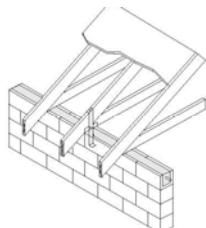
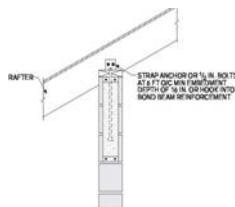
Section R606 General Masonry Construction

- R606.9 Lateral support-walls shall be laterally supported in either the horizontal or vertical direction.
- The spacing is in accordance with table R606.9
- Lateral support provided by cross-walls, pilasters, buttresses, or structural framing for horizontal and by floors and roofs for vertical.
- R606.9.1 Horizontal lateral support- between intersecting walls shall be anchored by either a bonding pattern or metal reinforcing.



Section R606 General Masonry Construction

- R606.9.2.1 Roof structures- anchored with metal straps spaced to manufacturers instructions, $\frac{1}{2}$ " bolts spaced not more than 6' on center or other approved anchors.
- Embedded 16" or hooked or welded to bond beam placed 6" from the top of the wall.
- R606.9.2.2 Floor diaphragm-anchored by metal straps to manufacturers instructions, $\frac{1}{2}$ " bolts spaced 6' or other approved methods.

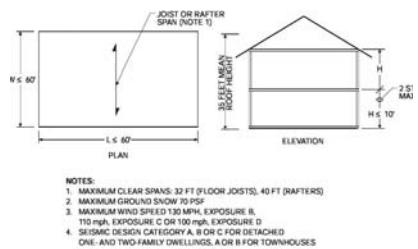


Section R606 General Masonry Construction

- R606.11 Anchorage-masonry walls depend on floors and roofs for out of plane lateral support.
- R606.13 Protection for reinforcement-must be completely embedded.
- Horizontal joints minimum 5/8" coverage, all others one bar depth over all bars but not less than $\frac{3}{8}$ ".
- Where exposed to weather or soils 2" minimum coverage.

Section R611 Exterior Concrete Wall Construction

- R611.2 Applicability limits-walls not greater than 60" in plan dimensions.
- Floors with clear spans not greater than 32'.
- Roofs with clear spans not greater than 40'.
- 35' mean roof height or 2 stories above grade.
- These limits were developed for prescriptive requirements.



Section R611 Exterior Concrete Wall Construction

- R611.3 Concrete wall systems-the shapes, thickness and cross sectional dimensions are determined by Table R611.3.
- There are three types;
- 1) Flat wall systems with minimum wall thickness of 4".
- 2) Waffle-grid system with 6" minimum for horizontal and vertical cores.
- 3) Screen-grid systems with 6" minimum for horizontal and vertical cores.

Section R611 Exterior Concrete Wall Construction

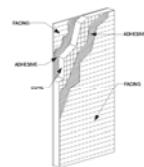
- R611.4 Stay-in-place forms—May or may not meet the energy code requirements.
- The forming material must meet the flame spread and smoke-development requirements of R302.9 and for foam plastic R316.3.
- A moisture barrier on the exterior face is generally required and should be considered a minimum acceptable practice.

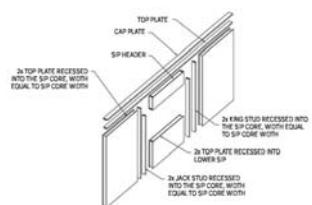
Section R611 Exterior Concrete Wall Construction

- R611.4.2 Interior covering-protected as required by R316.4 and R702.3.4, if gypsum is installed it shall be mechanically fastened.
- R316.4 Thermal barrier-used to separate foam plastics from the interior, an approved thermal barrier is defined as $\frac{1}{2}$ " gypsum or equivalent material.
- R611.4.3 Exterior wall covering-shall be protected from sunlight and physical damage by an approved exterior wall covering such as masonry veneer or stucco.

Section R613 Structural Insulated Panel Wall Construction

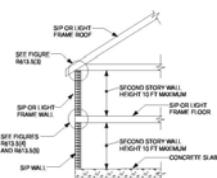
- R613.2 Applicability limits-controls construction of exterior and interior load bearing walls not greater than 60' perpendicular to joist or truss spans.
- Not greater than 40' in width parallel to joist or truss spans.
- Not greater than 2 stories with each wall not more than 10'.
- R613.4.1 Labeling-Third-party labeling is required for the entire Sip assembly once fabrication is completed.
- The label must have the manufacturers name/logo, identification of the assembly and quality assurance agency.





For 33: $2 \cdot 645 + 151 \cdot 0 \cdot 0002 \cdot 2 \cdot 645 = 254.8 \text{ mm.}$ 1.250002 and 0.0002 = 0.0015625.

Maximum deflection criterion: 1.999.
Maximum real shear load: 10 kN.



Section R613 Structural Insulated Panel Wall Construction

- R613.5 Wall construction-Sip walls shall be constructed and designed in accordance with tables R613.5(1) & R613.5(2), the walls shall be fastened to other wood building components in accordance with Tables R602.3(1) through R602.3(4)
- Framing shall be attached in accordance with R602.3(1) unless otherwise provided for in R613.

Section R613 Structural Insulated Panel Wall Construction

- R613.5.1 Top Plate connection-SIP walls shall be capped with a double top plate installed to provide overlapping at the corners and intersections.
- The lower plate must fit inside the core and the upper plate must match the width of the panel.
- R613.5.2 Bottom (sole) plate connection-SIP wall shall have full bearing on a sole plate having a width equal to the nominal width of the foam core.

Section R613 Structural Insulated Panel Wall Construction

- R613.5.3 Wall bracing-SIP panels must be evaluated as a continuously sheathed braced wall line.
- The sole plate must be connected in accordance with the braced wall panel requirements of table R602.3(1)
- R613.6 Interior load-bearing walls shall be constructed as specified for exterior walls.

Chapter 6