GUIDELINES FOR CONVENTIONAL LIGHT-FRAME WOOD CONSTRUCTION CONSIDERING A ONE-STORY BUILDING PER CALIFORNIA BUILDING CODE 2007, SECTION 2308

General: Conventional construction is recognized in the Ventura County Building Code (VCBC) as a prescriptive method of wood frame construction which does not require engineering design and analysis. This document provides guidelines for designing and constructing a one-story, single family dwelling, using conventional light-frame construction as provided in Section 2308 of the 2007 CBC.

The Building and Safety Division handouts referenced in this guide (B-1, B-11, B-23, B-28, B-31, B-49, B-50) can be obtained by request at the Building and Safety counter or can be downloaded from the Building and Safety website (**http://ventura.org/rma/build_safe/information/index.htm).**

Codes:

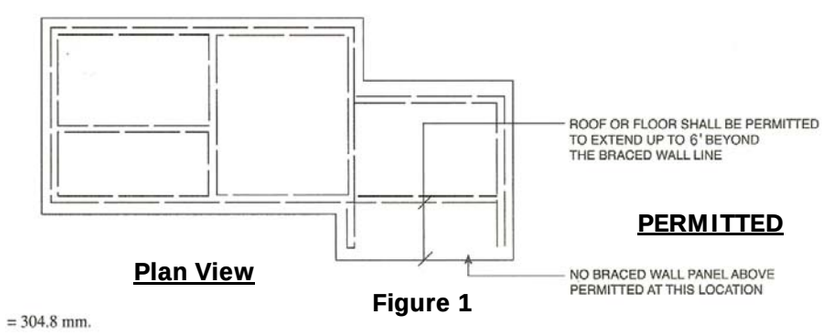
- 2007 California Building Code
- 2007 Ventura County Building Code
- 2005 National Design Specification
- ACI 318-05 American Concrete Institute

Construction Specifications:
Concrete Slab on Grade/Foundation: f'c=2500psi, Masonry: f'm=1500 psi, Min. Grout Strength= 2000 psi, Mortar=Type M or S, Reinforcing Steel: #3 and Smaller= 40,000 psi, #4 and Larger= 60,000 psi
Lumber: Roof Rafters=DFL#2, Floor Joists=DFL#1, Studs=DFL#2

This handout is intended only as a guideline for preparing plans using Conventional Construction. Plans are required.

Assumptions:

1. Plans are required to be prepared based on the Building and Safety handout B-1, titled "Requirements for Construction Plan for Residences." The reader is instructed to refer to the 2007 California Building Code for further descriptions, definitions, limitations, and for the actual code language.
2. This handout is limited to R-3, and Group U, one-story buildings. (Cripple walls exceeding 14 inches are considered a story). The maximum stud height is 10'-0".
3. Foundations are designed per the Geotechnical Report recommendations or as allowed by an approved Soil Report Waiver (Ventura County Building and Safety handout B-49 and B-50).
4. Plans are to comply with Building and Safety handout B-60 if the project is located in a Fire Hazard Severity Zone.
5. The lot is graded and approved by the Public Work Agency.
6. Typical connections per Fastening Schedule, Table B.
7. The project is located in Seismic Design Category D or E.
8. For use with Table A of this handout the acceleration parameter, $S_{DS,}$ is ≥ 1.0. Unless otherwise indicated by a Geotechnical Report for the subject property.
9. The span tables utilized in this document are limited to a snow load of 0 psf. If your project is located in a snow loading zone, see handout B-20 for loading based on elevation.
10. Roofing material: Composition Shingles, Metal, Wood Shakes, Wood Shingles, Mineral Aggregate, Built-Up, or Clay or Concrete Tiles (not exceeding 10 psf)
11. Vaulted ceilings are not permitted.
12. The minimum gabled roof pitch is 3:12.
13. **Permitted Irregularity** [Figure 1] in the floor plan for one-story buildings:
    The roof is permitted to extend up to 6 feet beyond a shearwall line.



Plan View

Figure 1

= 304.8 mm.

FIGURE 2308.12.6(4)
ROOF OR FLOOR EXTENSION BEYOND BRACED WALL LINE

DIVISION OF BUILDING AND SAFETY **COUNTY OF VENTURA** **BUILDING OFFICIAL** _____ **Jim MacDonald, C.B.O.**	**Effective: January 1, 2009** Revised: February 19, 2009 **B&S** **STD. B-91**

Assumptions:

14. **Non-permitted Irregularities** [Figures 2 and 3] in the floor plan irregularities for one-story buildings:
    A section of floor or roof is not laterally supported by shearwall line on all edges or the shearwall lines are not perpendicular to each other.

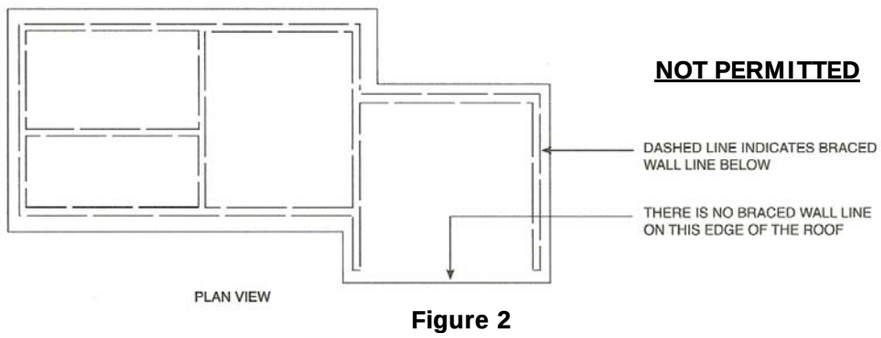


Figure 2
FLOOR OR ROOF NOT SUPPORTED ON ALL EDGES

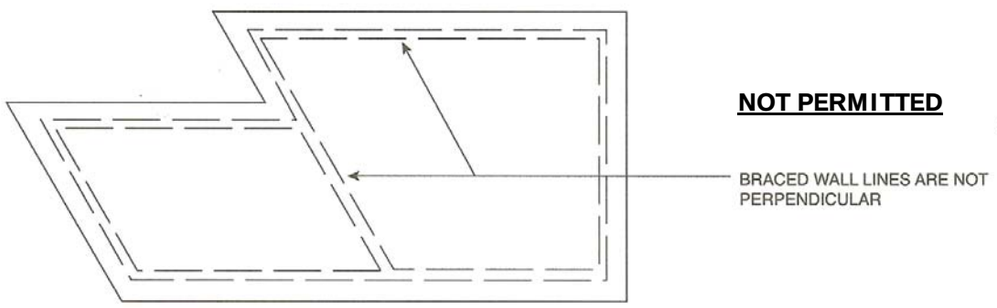
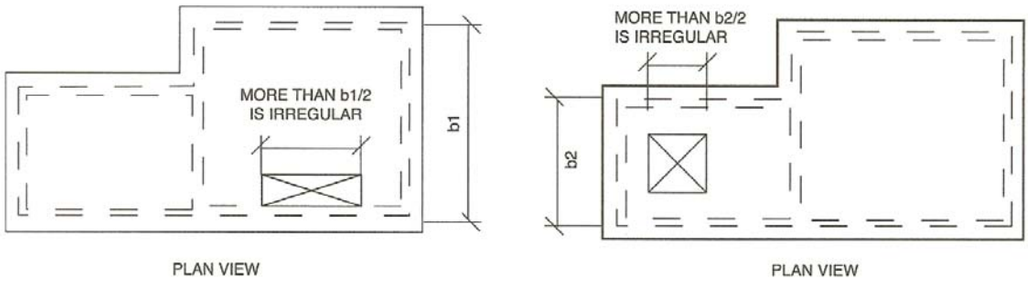


Figure 3
BRACED WALL LINES NOT PERPENDICULAR

Non-Permitted Irregularity [Figure 4]: Openings in floor and roof diaphragms having a maximum dimension greater than 50% of the distance between shearwall lines or an area greater that 25% of the area between orthogonal pairs of shearwall lines are present.



NOT PERMITTED **Figure 4** **NOT PERMITTED**

OPENING LIMITATIONS FOR FLOOR AND ROOF DIAPHRAGMS

Span Tables:

For roof hips and valley sizes, see Ventura County Building and Safety handout B-11.

ROOF RAFTER SPAN TABLE [1, 2, 3, 4,5]								
RAFTER SIZE	ON CENTER SPACING							
	12"	16"	24"	32"	42"	48"	60"	72"
2X4	10'-6"	9'-0"	7'-6"	6'-6"	5'-6"	-	-	-
2X6	15'-6"	13'-3"	11'-0"	9'-6"	8'-3"	-	-	-
2X8	16'-6"	17'-0"	13'-9"	12'-0"	10'-6"	-	-	-
2X10	24'-0"	20'-9"	17'-0"	14'-6"	12'-9"	-	-	-
4X4	-	-	-	9'-3"	8'-0"	7'-6"	6'-9"	6'-0"
4X6	-	-	-	13'-6"	11'-9"	11'-0"	9'-9"	9'-0"
4X8	-	-	-	17'-9"	15'-6"	14'-6"	13'-0"	11'-9"
4X10	-	-	-	21'-9"	19'-0"	17'-9"	16'-0"	14'-6"

[1] Table Assumes rafters do not suppport ceiling
[2] Assumes Rafter Grade DFL#2
[3] Deflection based on L/240
[4] Loading, Clay or Concrete Tile Roof: DL=15 #/sf + LL=20#/sf
[5] Standard Handout B-28

CEILING JOIST SPAN TABLE [1, 2, 3, 4, 5]			
JOIST SIZE	ON CENTER SPACING		
	12"	16"	24"
2X4	12'-3"	11'-3"	9'-9"
2X6	19'-3"	17'-6"	15'-0"
2X8	25'-6"	23'-3"	19'-0"
2X10	32'-9"	28'-3"	23'-3"

[1] Table Assumes drywalled ceiling
[2] Assumes Joist Grade DFL#2
[3] Deflection based on L/240
[4] Loading: DL=5 #/sf + LL=10#/sf
[5] Standard Handout B-23

Span Tables:

FLOOR JOIST SPAN TABLE [1, 2, 3, 4]						
JOIST SIZE	NO CEILING (50#/sf) ON CENTER SPACING			WITH CEILING (55#/sf) ON CENTER SPACING		
	12"	16"	24"	12"	16"	24"
2X6	10'-9"	9'-9"	8'-0"	10'-9"	9'-3"	7'-6"
2X8	14'-3"	12'-6"	10'-3"	13'-9"	11'-9"	9'-9"
2X10	17'-6"	15'-3"	12'-6"	16'-9"	14'-6"	11'-9"
2X12	20'-6"	17'-9"	14'-6"	19'-6"	16'-9"	13'-9"
2X14	22'-9"	19'-9"	16'-0"	21'-9"	18'-9"	15'-3"

[1] Assumes Joist Grade DFL#1

[2] Deflection based on L/360 and L/240

[3] Loading: LL=40#/sf

[4] Standard Handout B-31

HEADER SPAN TABLE [1, 2, 3]							
Max Opening	4'-0"	6'-0"	8'-0"	10'-0"	12'-0"	14'-0"	16'-0"
Bearing Wall: Roof & Clg	4x6	4x6	4x8	4x12	4x14	4x14	4x14 [4]

[1] Table Assumes DFL #1 except for the 16' opening.

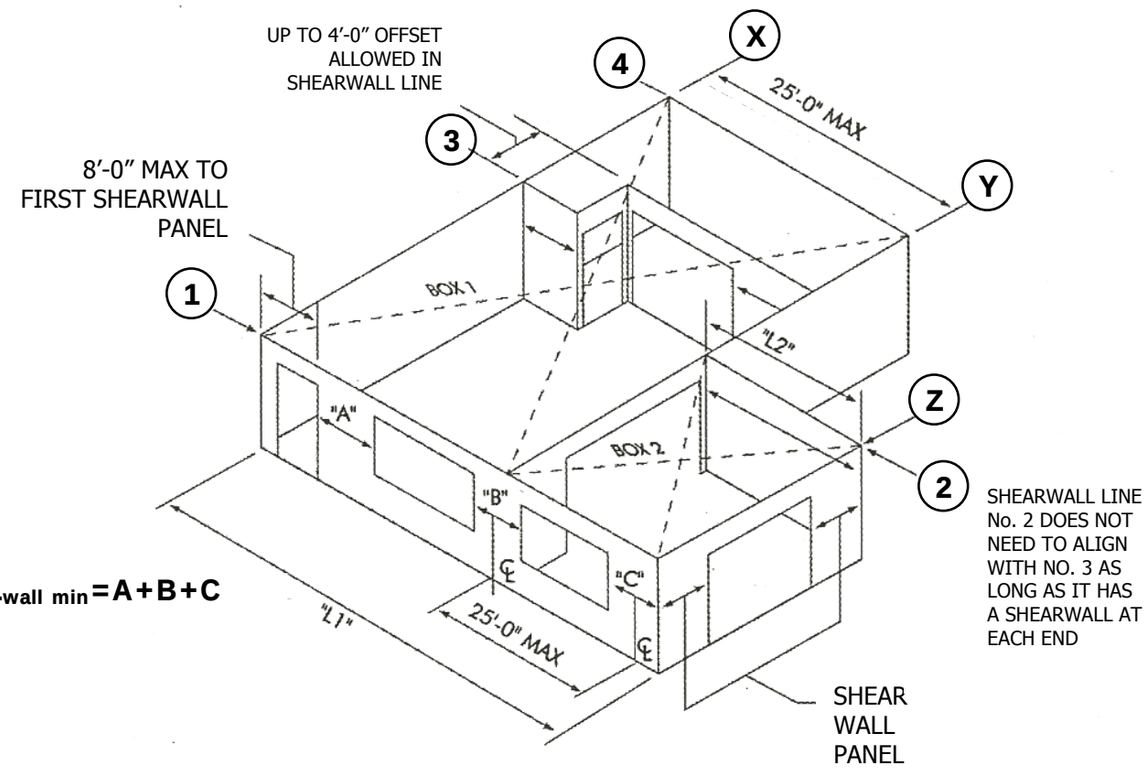
[2] Clay or Tile Roofing: DL=20 #/sf + LL=20#/sf

[3] Tributary width = 25'

[4] DFL#1 & BTR

Note: When 6x headers are specified, use one depth size smaller. For example: 4x14 use 6x12.

Shearwall Layout:
SHEARWALLS IN SEISMIC DESIGN CATEGORIES D AND E
(Minimum Shearwall Length per each 25 linear feet of Wall Length at each gridline)



$L_{wall\ min} = A + B + C$

STEP BY STEP APPLICATION OF SHEARWALL REQUIREMENTS

1. Shearwalls shall be sheathed with a minimum of 1/2" Plywood w/ 8D @ 6"o.c. E.N. and 12"o.c. F.N. (E.N.=Edge Nailing, F.N.=Field Nailing)
2. Determine the required length of shearwalls from Table A, based on sheathing (S-W) and the seismic ground motion parameter, Sds > 1.0.
3. Check the maximum 2:1 height-to-width ratio in accordance to Footnote 'a' of Table A. The minimum shearwall width required for an 8'-0" stud height is 4'-0".
4. The shearwall panels must be arranged to meet Figure 5.
5. Substituting each 4'-0" plywood shearwall with an International Code Council approved shearwall/frame is acceptable.

TABLE A
SHEARWALLS IN SEISMIC DESIGN CATEGORIES D AND E
(Minimum Shearwall Length per each 25 linear feet of Wall Length at each gridline [a])

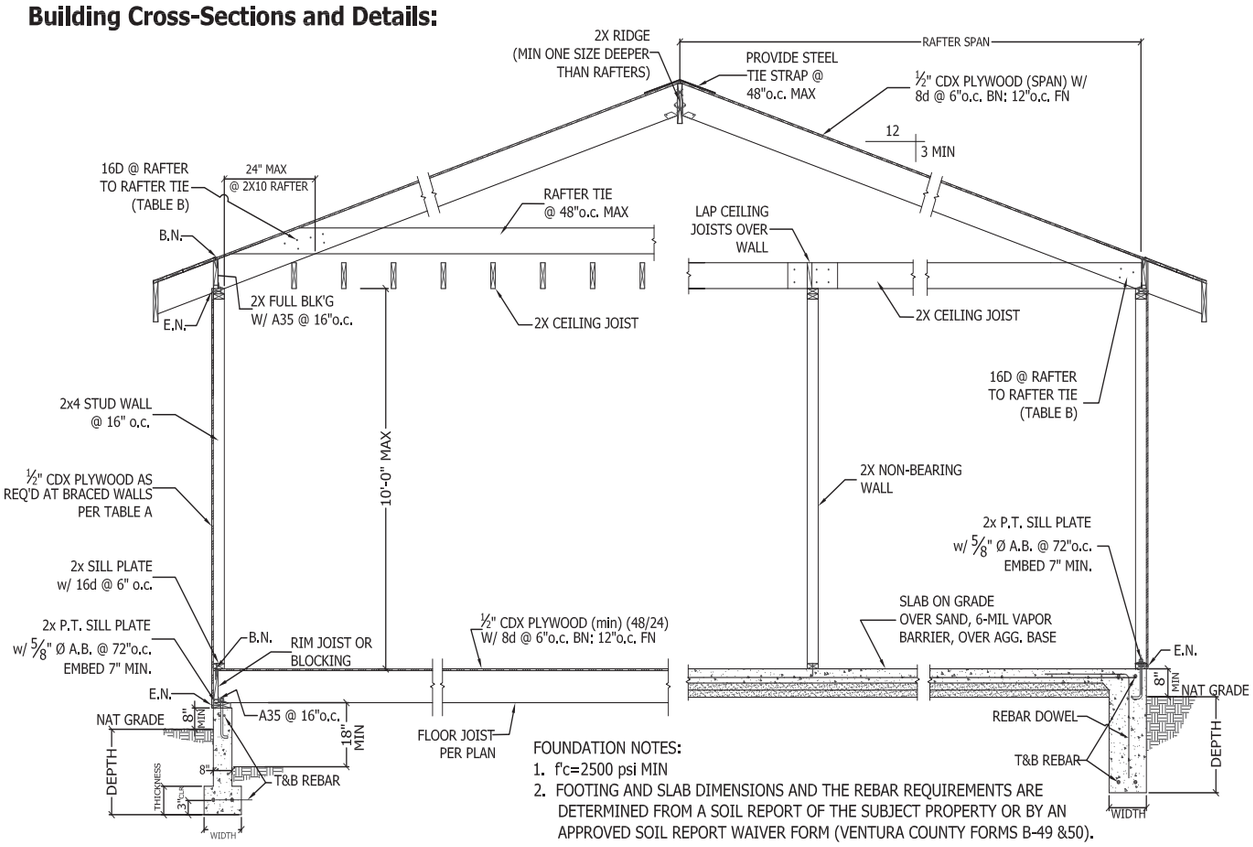
CONDITION	SHEATHING TYPE [b]	S_{ds} > 1.00
One-Story	S-W	12 feet 0 inches

FOOTNOTES:

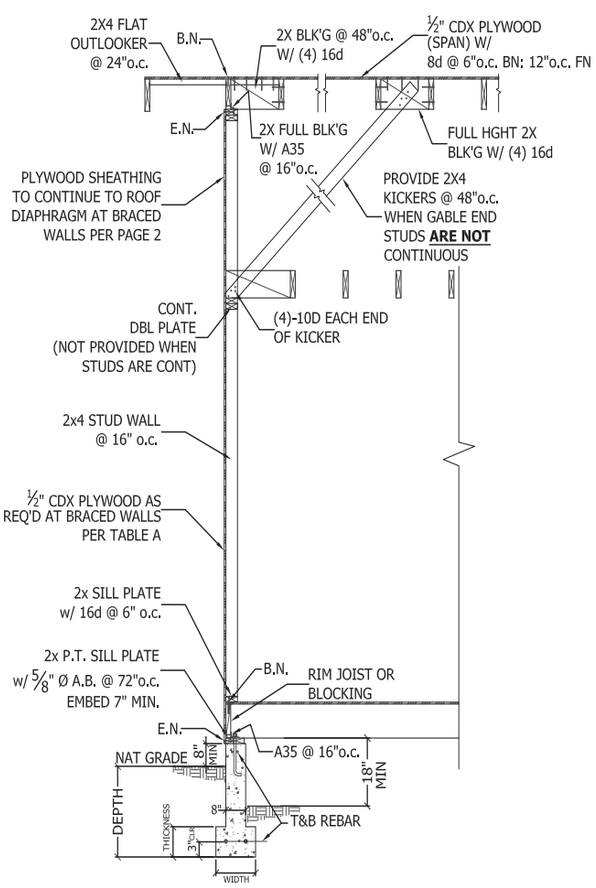
a. Minimum length of a shearwall panel with one face of the wall with S-W sheathing; h/w ratio shall not exceed 2:1. For S-W shearwall panels of the same material on two faces of the wall, the minimum length is permitted to be one-half the tabulated value but the h/w ratio shall not exceed 2:1 and design for uplift is required.

b. S-W=wood structural panels. Shearwalls sheathed with other than wood structural panels are not permitted Ventura County Building Code

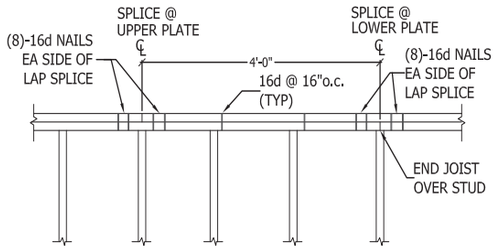
Building Cross-Sections and Details:



BUILDING CROSS-SECTION



GABLE END SECTION



TYPICAL TOP PLATE SPLICE

N.T.S

Minimum Size for Square Plate Washers	
Bolt Size	Plate Size
1/2"	3/16" x 2" x 2"
5/8"	1/4" x 2-1/2" x 2-1/2"
3/4"	5/16" x 2-3/4" x 2-3/4"
7/8"	5/16" x 3" x 3"
1"	3/8" x 3-1/2" x 3-1/2"

Foundation Anchor Bolt Notes:

1. Sill plates shall be bolted to the foundation with an anchor bolt embedded a minimum of 7" into concrete or masonry and spaced not less than 6' o.c.
2. The anchor bolt shall be determined 5/8"Ø.
3. There shall be a minimum of two bolts per sill plate piece with one anchor bolt located not more than 12" or less than 4" from each end of each piece.

Fastening Requirements:

TABLE B
FASTENING SCHEDULE

CONNECTION	FASTENING[a,m]	LOCATION
1. Joist to sill or girder	3 – 8d common (2 ½ "x 0.131") 3 – 3" x 0.131" nails	toenail
2. Bridging to joist	2 – 8d common (2 ½" x 0.131") 2 – 3" x 0.131" nails	toenail each end
3. 1" x 6" subfloor or less to each joist	2 – 8d common (2 ½ " x 0.131")	face nail
4. Wider than 1" x 6" subfloor to each joist	3 – 8d common (2 ½" x 0.131")	face nail
5. 2" subfloor to joist or girder	2 – 16d common (3 ½" x .162")	blind and face nail
6. Sole plate to joist or blocking	16d (3 ½" x 0.135") at 16" o.c. 3" x 0.131" nails at 8" o.c.	typical face nail
Sole plate to joist or blocking at shearwall panel	3" – 16d (3 ½" x 0.135") at 16" 4 – 3" x 0.131" nails at 16"	shearwall panels
7. Top plate to stud	2 – 16d common (3 ½" x .162") 3 – 3" x 0.131" nails	end nail
8. Stud to sole plate	4 – 8d common (2 ½" x 0.131") 4 – 3" x 0.131" nails	toenail
	2 – 16d common (3 ½" x .162") 3 – 3" x 0.131" nails	end nail
9. Double studs	16d (3 ½ "x 0.135") at 24" o.c. 3" x 0.131" nail at 8" o.c.	face nail
10. Double top plates	16d (3 ½" x 0.135") at 16" o.c. 3" x 0.131" nail at 12" o.c.	typical face nail
Double top plates	8-16d common (3 ½" x 0.162") 12-3" x 0.131" nails	lap splice
11. Blocking between joists or rafters to top plate	3 – 8d common (2 ½" x 0.131") 3 – 3" x 0.131" nails	toenail
12. Rim joist to top plate	8d (2 ½" x 0.131") at 6" o.c. 3" x 0.131" nail at 6" o.c.	toenail
13. Top plates, laps and intersections	2 – 16d common (3 ½" x0.162") 3 – 3" x 0.131" nails	face nail
14. Continuous header, two pieces	16d common (3 ½" x 0.162")	16" o.c. along edge
15. Ceiling joists to plate	3 – 8d common (2 ½" x 0.131") 5 – 3" x 0.131" nails	toenail
16. Continuous header to stud	4 – 8d common (2 ½" x 0.131")	toenail
17. Ceiling joists, laps over partitions (see Section 2308.10.4.1, Table 2308.10.4.1)	3 – 16d common (3 ½" x0.162") minimum, Table 2308.10.4.1 4 – 3" x 0.131" nails	face nail
18. Ceiling joists to parallel raters (see Section 2308.10.4.1, Table 2308.10.4.1)	3 – 16d common (3½" x0.162") min, Table 2308.10.4.1 4 – 3" x 0.131" nails	face nail
19. Rafter to plate (see Section 2308.10.1, Table 2308.10.1)	3 – 8d common (2 ½" x 0.131") 3 – 3" x 0.131" nails	toenail
20. 1" diagonal brace to each stud and plate	2 – 8d common (2 ½" x 0.131") 2 – 3" x 0.131" nails	face nail
21. 1" x 8" sheathing to each bearing	3 – 8d common (2 ½" x 0.131")	face nail
22. Wider than 1" x 8" sheathing to each bearing	3 – 8d common (2 ½" x 0.131")	face nail
23. Built-up corner studs	16d common (3 ½" x 0.162") 3" x 0.131" nails	24" o.c. 16" o.c.
24. Built-up girder and beams	20d common (4"x0.192") 32"o.c. 3" x 0.131" nail at 24" o.c.	face nail at top and bottom staggered on opposite sides
	2 – 20d common (4" x 0.192") 3 – 3" x 0.131" nails	face nail at ends and at each splice
25. 2" planks	16d common (3 ½" x 0.162")	at each bearing
26. Collar tie to rafter	3 – 10d common (3" x 0.148") 4 – 3" x 0.131" nails	face nail
27. Jack rafter to hip	3 – 10d common (3" x 0.148") 4 – 3" x 0.131" nails	toenail
	2 – 16d common (3½" x 0.162") 3 – 3" x 0.131" nails	face nail
28. Roof rafter to 2-by ridge beam	2 – 16d common (3½" x 0.162") 3 – 3" x 0.131" nails	toenail
	2 – 16d common (3½" x 0.162") 3 – 3" x 0.131" nails	face nail
29. Joist to band joist	3 – 16d common (3½"x 0.162") 4 – 3" x 0.131" nails	face nail
30. Ledger strip	3 – 16d common (3½" x 0.162") 4 – 3" x 0.131" nails	face nail
31. Wood structural panels and particleboard[b] Subfloor, roof and wall sheathing (to framing)	½" and less 6d[c,1] 2⅜" x 0.113" nail[n]	

Single Floor (combination subfloor-underlayment To framing)	19/32" to ¾" ⅞" to 1" 1 ⅛" to 1 ¼" ¾" and less ⅞" to 1" 1 ⅛" to 1 ¼"	1¾" x 16 gage[o] 8d[d] or 6d[e] 2⅜" x 0.113" nail[p] 2" 16 gage[p] 8d[c] 10d[d] or 8d[d] 6d[e] 8d[e] 10d[d] or 8d[e]	
32. Panel siding (to framing)	½" or less ⅝"	6d[f] 8d[f]	
33. Fiberboard sheathing[g]	½" 25/32"	No. 11 gage roofing nail[h] 6d common nail (2" x 0.113") No. 11 gage roofing nail[h] 8d common nail (2 ½" x 0.131")	
34. Interior paneling	¼" ⅜"	4d[j] 6d[k]	

For SI: 1 inch=25.4 mm.

a. Common or box nails are permitted to be used except where otherwise stated.

b. Nails spaced at 6 inches on center at edges, 12 inches at intermediate supports except 6 inches at supports where spans are 48 inches or more. For nailing of wood structural panel and particleboard diaphragms and shear walls, refer to Section 2305. Nails for wall sheathing are permitted to be common, box or casing.

c. Common or deformed shank (6d – 2" x 0.113"; 8d – 2 ½" x 0.131"; 10d – 3" x 0.148").

d. Common (6d – 2" x 0.113"; 8d – 2 ½" x 0131"; 10d – 3" x 0.148").

e. Deformed shank (6d – 2" x 0.113"; 8d – 2 ½" x 0.131"; 10d – 3" x 0.148").

f. Corrosion-resistant siding (6d - 1⅞" x 0.106"; 8d - 2⅜" x 0.128") or casing (6d – 2" x 0.99"; 8d – 2 ½" x 0.113") nail.

g. Fasteners spaced 3 inches on center at exterior edges and 6 inches on center at intermediate supports, when used as structural sheathing. Spacing shall be 6 inches on center on the edges and 12 inches on center at intermediate supports for nonstructural applications.

h. Corrosion-resistant roofing nails with 7/16 –inch diameter head and 1½ -inch length for ½ -inch sheathing and 1¾ -inch length for 25/32 –inch sheathing.

i. Panel supports at 16 inches (20 inches if strength axis in the long direction of the panel, unless otherwise marked.

j. Casing (1½" x 0.080") or finish (1½" x 0.072") nails spaced 6 inches on panel edges, 12 inches at intermediate supports.

k. Panel supports at 24 inches. Casing or finish nails spaced 6 inches on panel edges, 12 inches at intermediate supports.

l. For roof sheathing applications, 8d nails (2½" x 0.113") are the minimum required for wood structural panels.

m. N/A

n. For roof sheathing applications, fasteners spaced 4 inches on center at edges, 8 inches at intermediate supports.

o. Fasteners spaced 4 inches on center at edges, 8 inches at intermediate supports for subfloor and wall sheathing and 3 inches on center at edges, 6 inches at intermediate supports for roof sheathing.

p. Fasteners spaced 4 inches on center at edges, 8 inches at intermediate supports.