

## POST AND FRAME STRUCTURES (Pole Barns)

**Post and frame structures.** The following requirements serve as minimum standards for post and frame structures within all of the following structural limitations:

1. Residential accessory structures
2. Single story
3. Metal roof on purlins with bracing and metal wall panels on girts, with bracing, or in lieu of bracing provide solid exterior structural sheathing
4. No attic storage
5. Maximum building width of 48 feet including the overhang
6. Maximum wall height of 16 feet
7. Maximum mean roof height of 20 feet
8. Maximum post spacing of 8 feet

Post and frame structures and portions thereof outside the above structural limitations of this standard shall be accompanied by structural calculations as required by the residential building official or designed under the provisions of section R106 of the 2012 IRC. Post and frame structures shall comply with the structural design requirements of section R301 of the 2012 IRC.

**Definition.** Post and frame structures consist of primary members (posts, beams and single span trusses or ceiling joists and rafters) and secondary members (roof purlins, wall girts, bracing and sheathing) where all loads are transmitted from the sheathing and the secondary members to the primary members which transfer them to the ground through vertical posts bearing on footings embedded in the soil.

**Footings & Foundations.** Footings and foundations shall comply with applicable provisions of Section R401 of the 2012 IRC. Post frame structures shall have poured in-place concrete footings installed below all posts. The top of the footing shall be a minimum of 40 inches below finished grade and have footing diameters complying with Table 1.

**Table 1- Post frame pier footing diameters** <sup>1,2,3</sup>

	Building width (length of truss) including overhang (feet)						
	25	28	32	36	40	44	48
Diameter (inches) 10# roof snow load	18	22	24	26	28	28	30

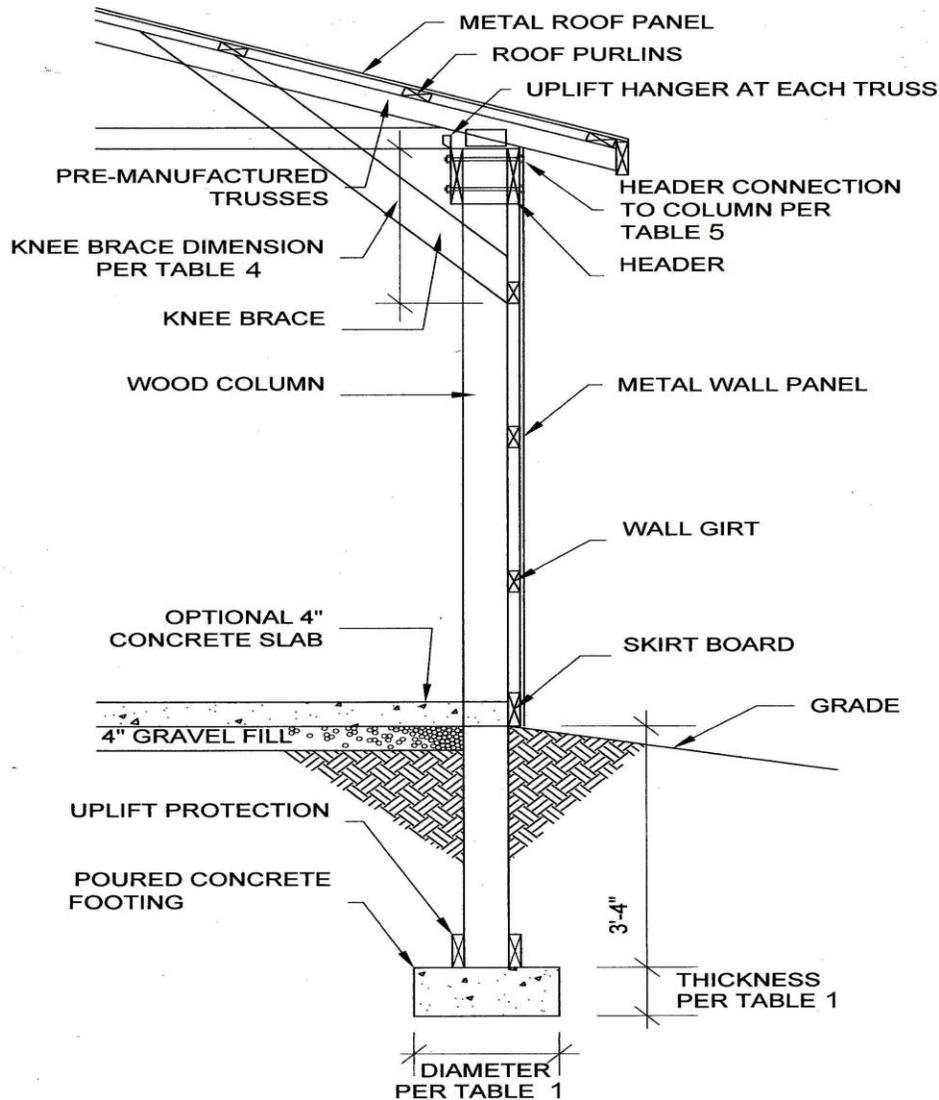
1. Pier footing thickness shall be a minimum one-half of the diameter of the footing.
2. Based upon 2000 PSF soil bearing capacity and truss loads of 20 or 30 PSF live or snow load top chord, 10 PSF dead load top chord, 5 PSF dead load on the bottom chord and no live load on the bottom chord .
3. Fractional widths shall be rounded to the next higher pier footing diameter.

**Column and wall construction.** Columns shall be three (3) ply unspliced, reinforced spliced or solid wood and shall not be less than 6 inch by 6 inch nominal size. Columns shall comply with the requirements of Section R317 of the 2012 IRC (Protection of

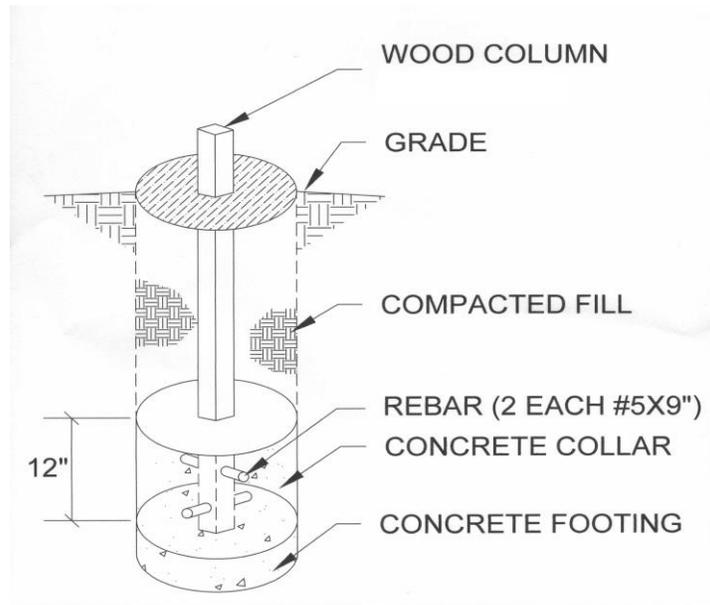
Wood) and shall be restrained to prevent lateral displacement. Built up columns shall be fastened as illustrated in Figure 3.

**Column uplift protection:** Columns shall have uplift protection by one of the following methods:

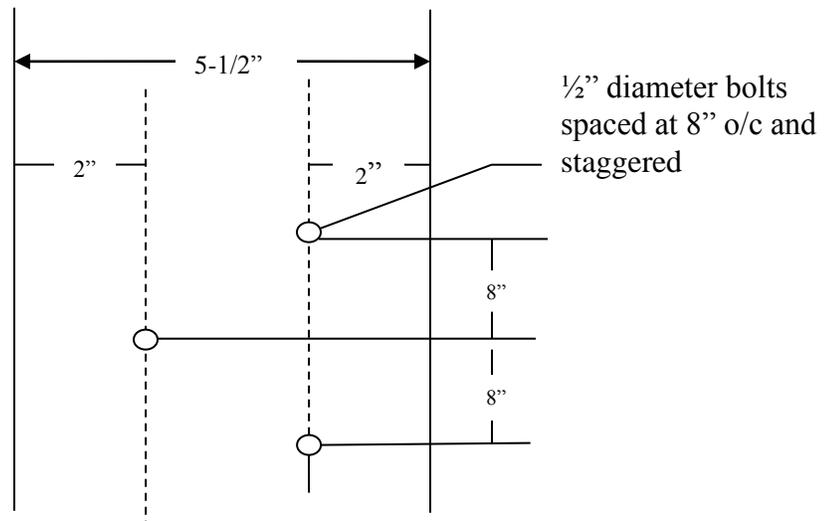
1. Two 2x6x12 inch column uplift protection blocks attached to each side of the base of the column. The column uplift protection blocks must be placed horizontally, attached per Table 5 and comply with Section R317.
2. 12 inch high, concrete collar poured on top of footing around the post, with 2-#5x9 inch rebar placed through the post at 3 inches and 9 inches from bottom of post in opposite directions. The rebar ends shall be installed in accordance with ACI 332 for the specified distance in inches from contact with the soil. See Figures 1 and 2.



**Figure 1**  
**Post and frame wall section.**  
**No scale**



**Figure 2**  
**Column uplift protection exception**  
**No scale**



**Figure 3**

**Column spacing.** The maximum spacing for columns shall be 8 feet.

**Skirt boards.** Skirt boards shall be treated lumber meeting the requirements of Section R317 and attached per Table 5.

**Wall girts:** Girts shall be a minimum 2x4 spaced not more than 24” on center and attached per Table 5.

**Load bearing beams and headers:** Load bearing beams and headers shall comply with Table R502.5.1 of the 2012 IRC.

**Exception.**

1. Bearing beams are not required if the trusses or ceiling joists and rafters bear directly on the columns.
2. Openings on the gable end walls of post and frame buildings supporting a door or roof total load not exceeding 5 square feet per lineal feet of wall area, headers must be sized per Table 2.

**Table 2 Gable end header sizes**

Opening Width (feet)	10	12	16
Header Size (inches)	2-2x8	2-2x10	2-2x12

**Exterior Structural Sheathing or Wall Bracing.**

Provide exterior structural sheathing or wall bracing to resist all racking and shear forces. Bracing must comply with the applicable provisions of section R602.10 of the 2012 IRC or by installing 2x6 diagonal braces between two adjoining columns at 8 feet on center. The diagonal brace shall be placed from the top header or girt to the next adjoining column at the skirt board. The bracing shall be placed installed on each side of the building and shall be a minimum of 25 feet on center and within 12 feet of the end of the building and attached to the wall girts and columns per Table 5. Any splices of the diagonal brace required due to excessive length, must lap over two consecutive wall girts.

**Beams supporting trusses or rafters and ceiling joists attachment to column.** Bearing beams supporting roof trusses or rafters and ceiling joists shall be connected to the columns by one of the following methods:

- a) Bolts that are ½ inch diameter through-bolted to the side of the column;
- b) Bolts that are ½ inch diameter, directly attached to a 3-ply column notch, enclosing the truss or rafter at the top of column; or
- c) Other fasteners with minimum shear or withdraw values stated in Table 3.

**Number of fasteners.** The minimum numbers of through bolts or other fasteners with minimum shears or withdraw values required per Table 3.

**Table 3 - Beam or truss connection at columns minimum fasteners or total shear or withdraw values<sup>1,2,3</sup>**

	Building Width (Length of Truss) including overhang (feet)						
	24	28	32	36	40	44	48
Shear or withdraw (pounds) 10# snow load	3360	3920	4480	5040	5600	6160	6720
Number of Bolts, 10 # roof snow load	2	2	2	3	3	3	3

1. Based upon truss loads of 20 or 30 PSF live or snow load top chord, 10 PSF dead load top chord, 5 PSF live load on the bottom chord and no live load on the bottom chord.
2. Based upon post spacing at intervals not exceeding 8 feet.
3. When beams are attached at each side of the column and fasteners do not extend through both beams such as through-bolts, the required values are one-half the amount shown above for each beam.

**Knee bracing:** A 2x6 brace shall extend from the column to the top chord of the truss or rafter adjacent to the post at a 45 degree angle. The vertical distance down from the bottom chord of the truss or ceiling joist to the point where the brace attaches to the post shall be in compliance with Table R324.5 as shown on Figure R324. Trusses or rafter must be spaced such that they align with the column intervals. Attachment of knee brace shall be per Table R324.7.

**Table 4 - Knee brace vertical distance.**

Wall Height	Vertical Dimension
8'-0" and 9'-0"	1'-6"
10'-0" and 11'-0"	2'-0"
12'-0" and 13'-0"	3'-0"
14'-0" through 16'-0"	4'-0"

**Roof Construction.** Top chord of roof trusses or roof rafters shall be braced with exterior sheathing or metal roof on purlins with bracing.

**Roof Purlins.** Roof purlins shall be a minimum of 2x4 SPF #2 laid flat of spans up to 4 feet, and 2x4 SPF #2 laid on edge for spans up to 8 feet.

**Roof Bracing.** Provide exterior structural sheathing or bracing to resist racking and shearing forces in roof. Bracing shall occur in the roof on all 4 sides of the building and shall consist of 2x6 diagonal braces perpendicular and parallel to rafters or trusses and attached to the bottom side of rafters or top chords of trusses. These braces shall start at a point just below the first purlin, rafter or truss in from the eave purlin and at each corner column. The brace shall be placed on a 45 degree angle and end below the location of a purlin, rafter or truss within 8'-0" in from the wall. If the building width or length exceeds 24'-0" then install additional braces in the same manner. Spacing of braces shall not exceed a maximum spacing of 2 feet on center in any direction.

**Attachment details.** Structural fastener details for post and frame buildings shall comply with Table 5.

**Table 5 - Fastener Schedule for Structural Members**

Fastener Schedule for Structural Members		
Description of Building Element	Number and Type of Fastener	Attachment type
Uplift blocking to column	5-16d Hot Dipped Galvanized	Each block
Skirt board to column	2-16d Hot Dipped Galvanized	Face nail
Wall girt to column	2-16d Hot Dipped Galvanized	Face nail
Diagonal bracing to column	2-16d Hot Dipped Galvanized	Toe nail
Diagonal bracing to skirt board	2-16d Hot Dipped Galvanized	Face nail
Diagonal bracing to wall girts	2-10d Hot Dipped Galvanized	Face nail
Knee brace to column	2-10d	Face nail
Knee brace to top chord of truss or rafter	3-16d Hot Dipped Galvanized	Face nail
Knee brace to bottom chord of truss or ceiling joist	3-10d	Face nail
Roof purlin to truss or rafter with span of 2' or 4'	2-16d	Face nail
Roof purlin to truss or rafter with span of 8'	Mechanical fastener with uplift protection greater than 225 lbs.	Per manufacturer