



# Snow Load Report

## 1. Roof and Building Data

Ground Snow Load (Pg): 83.0 psf  
 Roof Pitch: 4 /12  
 Risk Category: II  
 Eave-to-Ridge (W): 16 ft.  
 Terrain Category: C  
 Exposure: Fully Exposed  
 Thermal Factor (C<sub>t</sub>): 1.10  
 Roof Surface: Metal  
 Roof System: Rafter  
 Spacing: 16 in. o/c  
 Overhang: 12 in.

## 2. Design Loads

Top Chord Dead Load: 7 psf  
 Bottom Chord Dead Load: 10 psf  
 SF (Slope Factor) = 1/Cosine(Φ) = 1.05 (Dead loads specified on a projected horizontal basis take into account the effect of the pitch via a slope factor.)  
 Adj. TCDL (TCDL x SF): 7.4 psf

## 3. Design Assumptions

Code Standard: ASCE 7-10  
 Number of Plies: 1 PLY  
 Bottom Chord Pitch: 0 /12

## 4. Snow Load Calculations

Calculate flat roof snow load p<sub>f</sub> using the following equation:

$$p_f = 0.7C_eC_tI_s p_g$$

where:

p<sub>f</sub> = Flat Roof Snow Load in psf  
 C<sub>e</sub> = 0.90 = Exposure Factor, as determined by ASCE 7-10 Table 7-2 (Terrain Cat. C, Exp. Fully Exposed)  
 C<sub>t</sub> = 1.10 = Thermal Factor, as determined by ASCE 7-10 Table 7-3  
 I<sub>s</sub> = 1.00 = Importance Factor, as determined by ASCE 7-10 Table 1.5-2 (Risk Cat. II)  
 p<sub>g</sub> = 83.0 psf = Ground Snow Load in psf

$$p_f = 0.7C_eC_tI_s p_g = 0.7(0.90)(1.10)(1.00)(83.0) = 57.5 \text{ psf}$$

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A minimum roof snow load,  $p_m$  shall apply to monoslope, hip and gable roofs with slopes less than 15 degrees using the following equations:

Where  $p_g$  is 20 psf or less:  $p_m = I_s p_g$

Where  $p_g$  exceeds 20 psf:  $p_m = I_s(20)$

**Roof slope is greater than 15 degrees, the minimum roof snow load,  $p_m$ , does not apply.**

For locations where  $p_g$  is 20 psf or less, but not zero, all roofs with slopes (in degrees) less than  $W/50$  with  $W$  in feet shall included a 5 psf rain-on-snow surcharge load. This additional load applies only to the sloped roof (balanced) load case and need not be used in combination with drift, sliding, unbalanced, minimum, or partial loads.

**Roof slope in degrees ( $18.43^\circ$ ) is greater than  $W/50 = 0.3$ , the 5.0 psf rain-on-snow surcharge load does not apply.**

Calculate sloped roof snow load  $p_s$  using the following equation:

$$p_s = C_s p_f$$

where:

$p_s$  = Sloped Roof Snow Load in psf

$C_s = 1 - [(18.43 - 10)/60] = 0.86$  = Roof Slope Factor, as determined by ASCE 7-10 Sec. 7.4.1-7.4.4 and Figure 7-2

$p_f$  = Flat Roof Snow Load in psf

**Roof surface (Metal) is considered a "slippery" roof. For a  $C_t = 1.10$  the roof slope factor  $C_s$  is given by the dashed line of ASCE 7-10 Figure 7-2b.**

$$p_s = C_s p_f = (0.86)(57.5) = 49.4 \text{ psf}$$

Calculate unbalanced snow load for hip and gable roofs as shown in ASCE 7-10 Figure 7-5.

Unbalanced snow loads are required for roof pitches between 1/2 on 12 to 7 on 12.

Using the following equations:

$$\gamma = 0.13 p_g + 14 \text{ (snow density)}$$

$$h_d = .43 \sqrt[3]{l_u} \sqrt{p_g} + 10 - 1.5 \text{ (drift height) [if } l_u < 20 \text{ ft., use } l_u = 20 \text{ ft.]}$$

$$l_d = \frac{8}{3} h_d \sqrt{S} \text{ (width of drift surcharge)}$$

$$p_d = h_d \gamma / \sqrt{S} \text{ (drift surcharge snow load)}$$

where:

$\gamma$  = Snow density in pcf, not to exceed 30 pcf.

$h_d$  = Drift height in feet, as determined by eqn. or ASCE 7-10 Fig. 7-9.

$l_u = W$  = Ridge to eave distance in feet, windward side of roof.

$S = 12/\text{Roof Pitch}$

$l_d$  = Width of drift surcharge in feet.

$p_d$  = Drift Surcharge Snow Load in psf



FIGURE 7-5 Balanced and Unbalanced Snow Loads for Hip and Gable Roofs.

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For a roof rafter system with  $W \leq 20$  ft., the simplified unbalanced snow load is given by the third diagram of ASCE Figure 7-5.

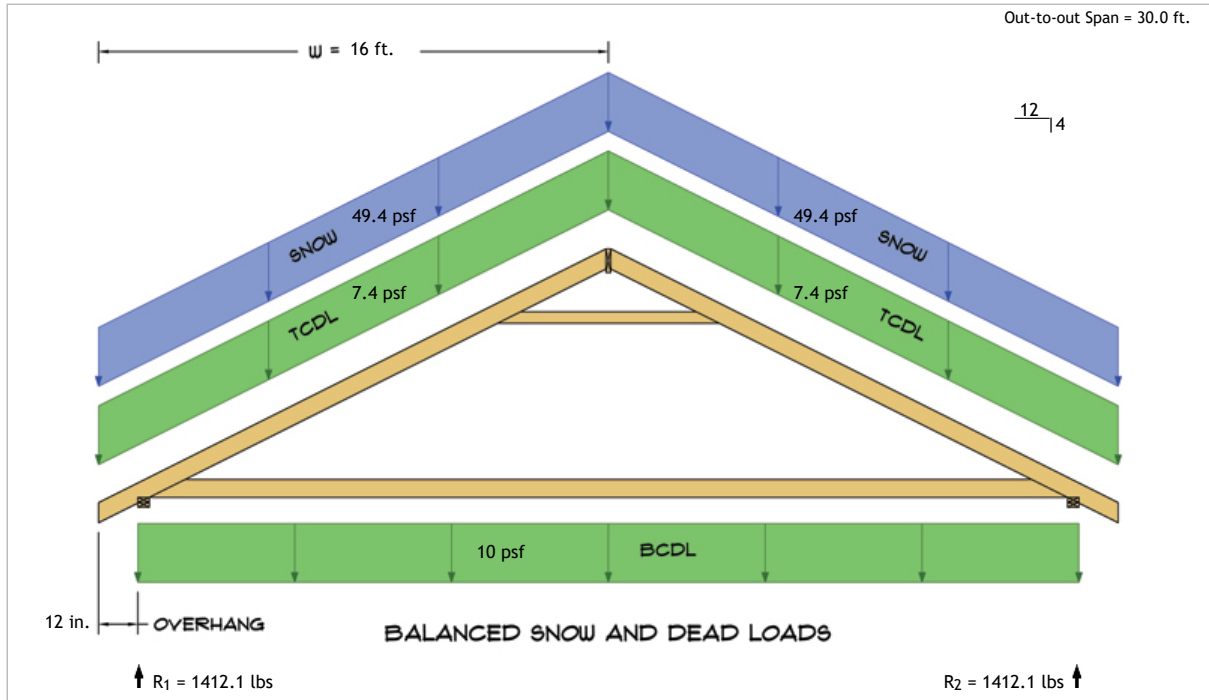
$$p_{\text{windward}} = 0.0 \text{ psf}$$

$$p_{\text{leeward}} = I_s p_g = (1.00)(83.0) = 83.0 \text{ psf}$$

On warm roofs apply a distributed  $2p_f$  snow load on all overhanging portions as per ASCE 7-10 section 7.4.5.

No other loads except dead loads shall be present on the roof when this uniformly distributed load is applied.

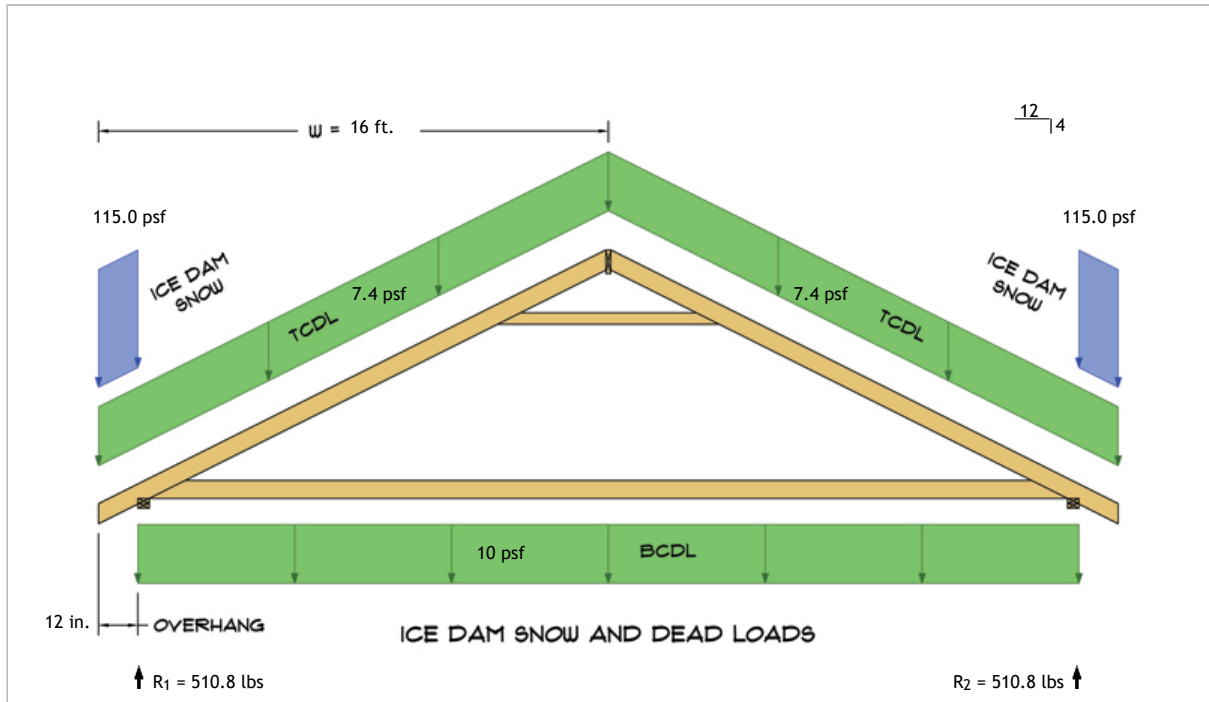
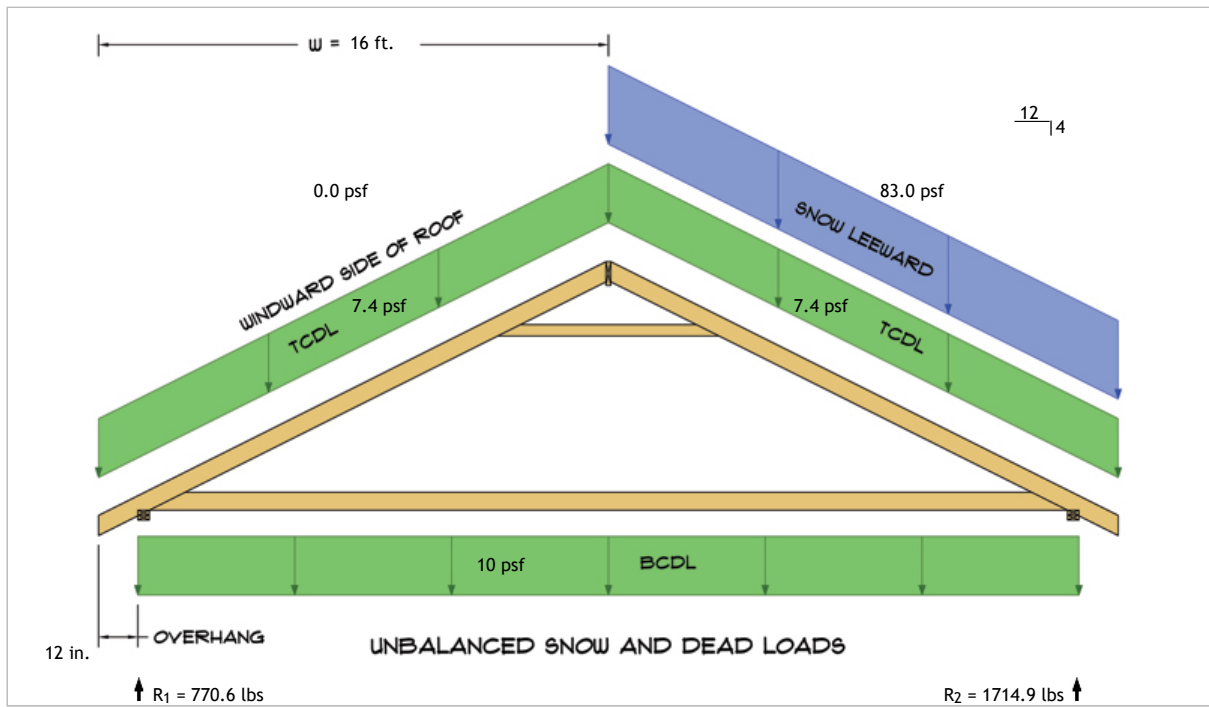
$$2p_f = (2)(57.5) = 115.0 \text{ psf}$$



$$R_1 = D + S = 357.4 \text{ lbs} + 1054.7 \text{ lbs}$$

$$R_2 = D + S = 357.4 \text{ lbs} + 1054.7 \text{ lbs}$$

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