Snow Load Report

1. Roof and Building Data

Ground Snow Load (Pg):	40.0 psf
Roof Pitch:	4 /12
Risk Category:	I
Eave-to-Ridge (W):	56 ft.
Terrain Category:	C
Exposure:	Partially Exposed
Thermal Factor (C_t):	1.20
Roof Surface:	Metal
Roof System:	Rafter
Spacing:	288 in. o/c
Overhang:	60 in.

2. Design Loads

Top Chord Dead Load:	10	psf
Bottom Chord Dead Load:	5	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): 10.5 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_f using the following equation:

$$p_f = 0.7C_eC_tI_sp_g$$

where:

p_f = Flat Roof Snow Load in psf
C_e = 1.00 = Exposure Factor, as determined by ASCE 7-10 Table 7-2 (Terrain Cat. C, Exp. Partially Exposed)
C_t = 1.20 = Thermal Factor, as determined by ASCE 7-10 Table 7-3
I_s = 0.80 = Importance Factor, as determined by ASCE 7-10 Table 1.5-2 (Risk Cat. I)
p_g = 40.0 psf = Ground Snow Load in psf

$$p_f = 0.7C_eC_tI_sp_g = 0.7(1.00)(1.20)(0.80)(40.0) = 26.9 \text{ psf}$$

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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°) is greater than W/50 = 1.1, 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-[(18.43-15)/55] = 0.94 = 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 = 1.20 the roof slope factor C_s is given by the dashed line of ASCE 7-10 Figure 7-2c.

$p_s = C_s p_f = (0.94)(26.9) = 25.2$ 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:

$\gamma = 0.13 p_g + 14$ (snow density)
$h_d = .43\sqrt[3]{l_u}\sqrt[4]{p_g + 10} - 1.5$ (drift height) [if $l_u < 20$ ft., use $l_u = 20$ ft.]
$l_d = \frac{8}{3} h_d \sqrt{S}$ (width of drift surcharge)
$p_d = h_d \gamma / \sqrt{S}$ (drift surcharge snow load)

where:

γ = 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/Roof Pitch
l_d = Width of drift surcharge in feet.
p_d = Drift Surcharge Snow Load in psf

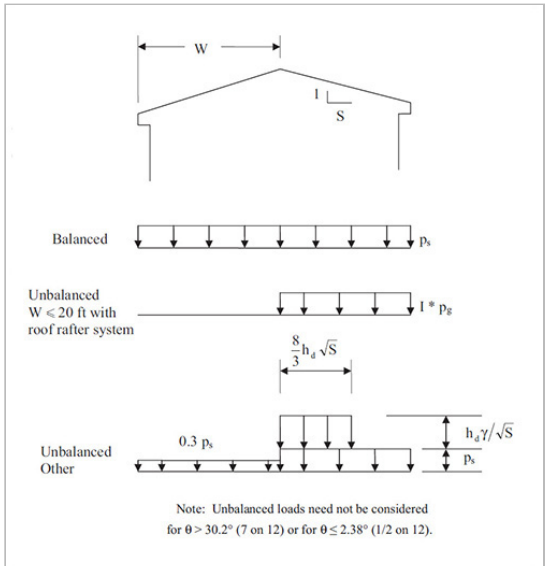

FIGURE 7-5 Balanced and Unbalanced Snow Loads for Hip and Gable Roofs.

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$p_{windward} = 0.3p_s = (0.3)(25.2) = 7.6$ psf
$p_{leeward} = p_s = 25.2$ psf

$\gamma = 0.13(40.0) + 14 = 19.20$ pcf

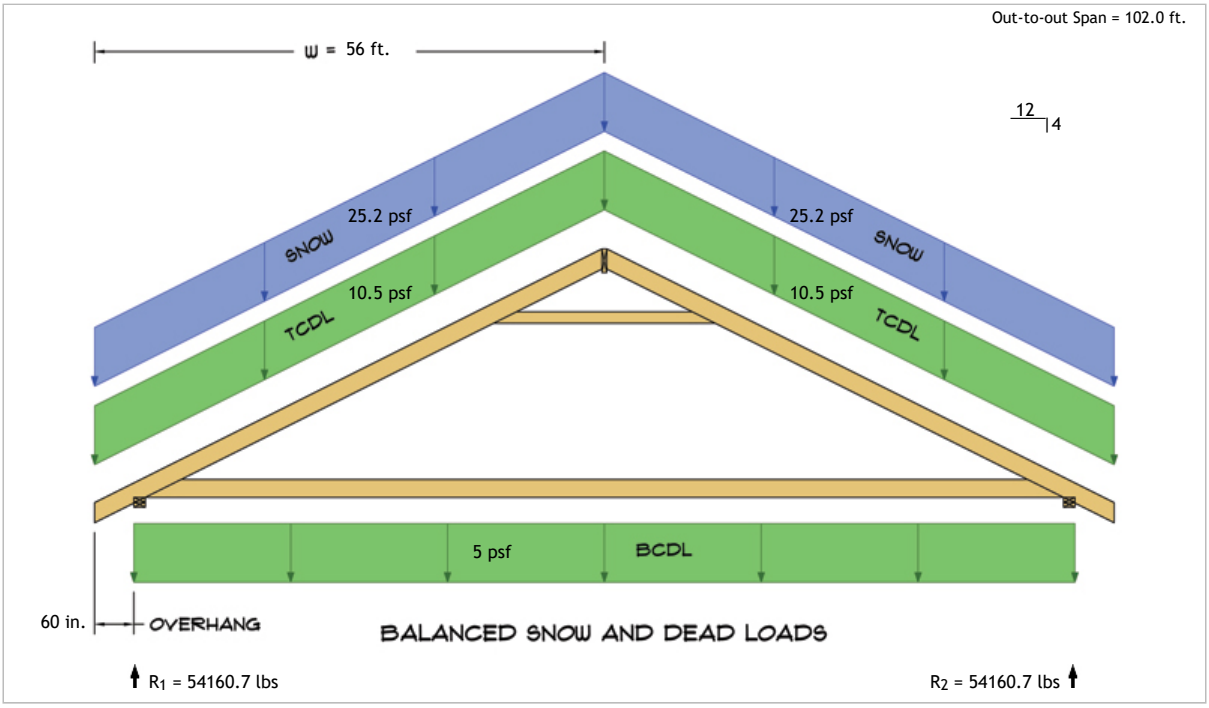
$h_d = .43\sqrt[3]{56}\sqrt[4]{40.0 + 10} - 1.5 = 2.87$ ft. [$l_u = 56$ ft.]

$l_d = \frac{8}{3} \times 2.87 \times \sqrt{12/4} = 13.28$ ft.

$p_d = \frac{2.87 \times 19.20}{\sqrt{12/4}} = 31.9$ 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.

$2p_f = (2)(26.9) = 53.8$ psf



R_1 = D + S = 20287.0 lbs + 33873.7 lbs
R_2 = D + S = 20287.0 lbs + 33873.7 lbs

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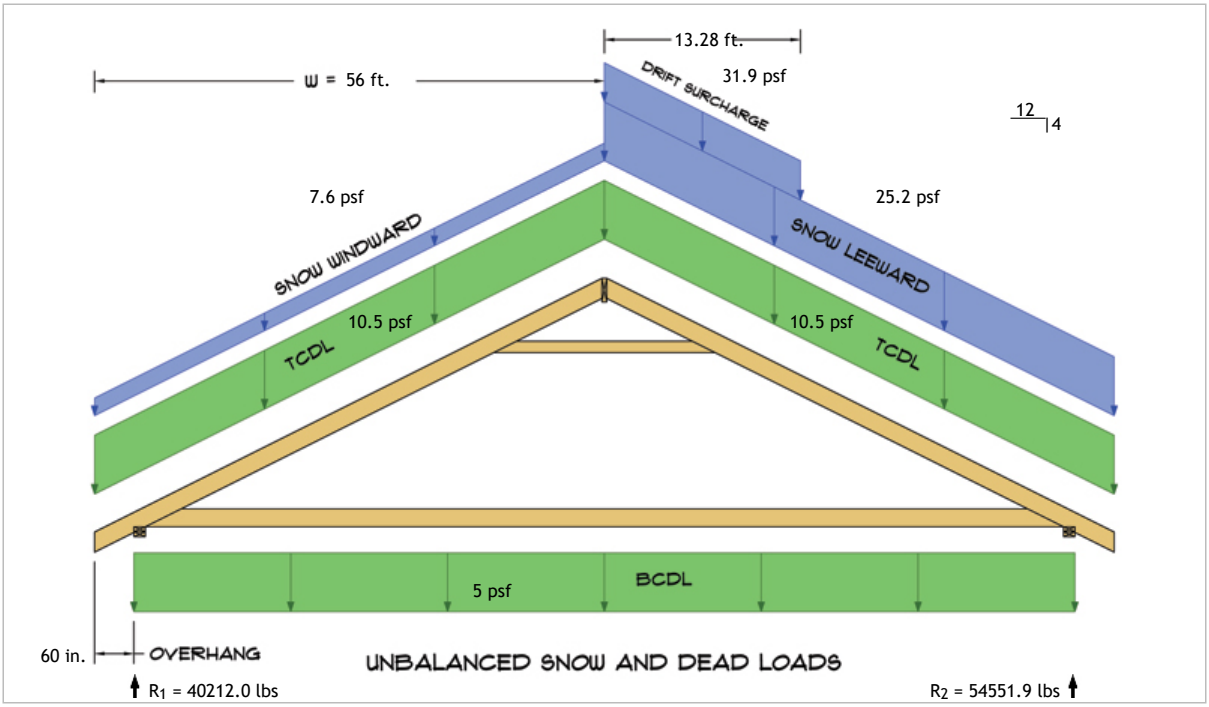
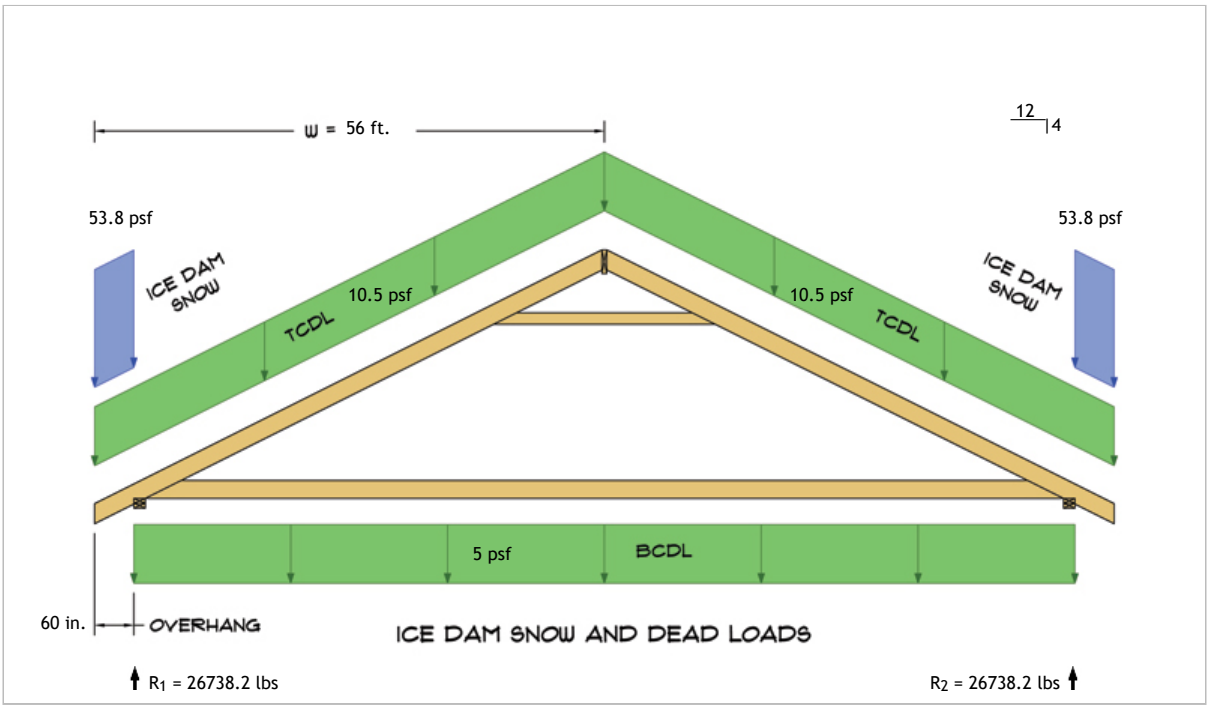


R_1 = D + S = 20287.0 lbs + 19925.0 lbs
R_2 = D + S = 20287.0 lbs + 34264.9 lbs



R_1 = D + S = 20287.0 lbs + 6451.2 lbs
R_2 = D + S = 20287.0 lbs + 6451.2 lbs

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