Snow Load Report

1. Roof and Building Data

Ground Snow Load (Pg):	54.0 psf
Roof Pitch:	4 /12
Risk Category:	II
Eave-to-Ridge (W):	13 ft.
Terrain Category:	C
Exposure:	Fully Exposed
Thermal Factor (C_t):	1.10
Roof Surface:	Asphalt Shingles
Roof System:	Common Truss
Spacing:	24 in. o/c
Overhang:	12 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:

$$p_f = 0.7 C_e C_t I_s p_g$$

where:

p_f = Flat Roof Snow Load in psf
C_e = 0.90 = Exposure Factor, as determined by ASCE 7-10 Table 7-2 (Terrain Cat. C, Exp. Fully Exposed)
C_t = 1.10 = Thermal Factor, as determined by ASCE 7-10 Table 7-3
I_s = 1.00 = Importance Factor, as determined by ASCE 7-10 Table 1.5-2 (Risk Cat. II)
p_g = 54.0 psf = Ground Snow Load in psf

$p_f = 0.7 C_e C_t I_s p_g = 0.7(0.90)(1.10)(1.00)(54.0) = 37.4$ psf

Subject	Customer	Location	Job No.
Snow Loads	VERONA MEADOWS GOLF RANGE	2905 Shady Oak Lane Verona, WI 53593	24-09

Engr.			Rev.
Gregory A. Karn, AIA	**ARCH-AIDE, LLC Architects**		-

Date			Page
9/13/2024	8194 N. Riley Rd. Verona, WI 53593 ph. (608) 335-8159 https://www.facebook.com/ARCHAIDE		1

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 = 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 = 1.00 = 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 (Asphalt Shingles) is considered a "non-slippery" roof. For a C_t = 1.10 the roof slope factor C_s is given by the solid line of ASCE 7-10 Figure 7-2b.

$$p_s = C_s p_f = (1.00)(37.4) = 37.4 \text{ psf}$$

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:

$\gamma = 0.13p_g + 14$ (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.

$p_{windward} = 0.3p_s = (0.3)(37.4) = 11.2$ psf
$p_{leeward} = p_s = 37.4$ psf

$\gamma = 0.13(54.0) + 14 = 21.02$ pcf

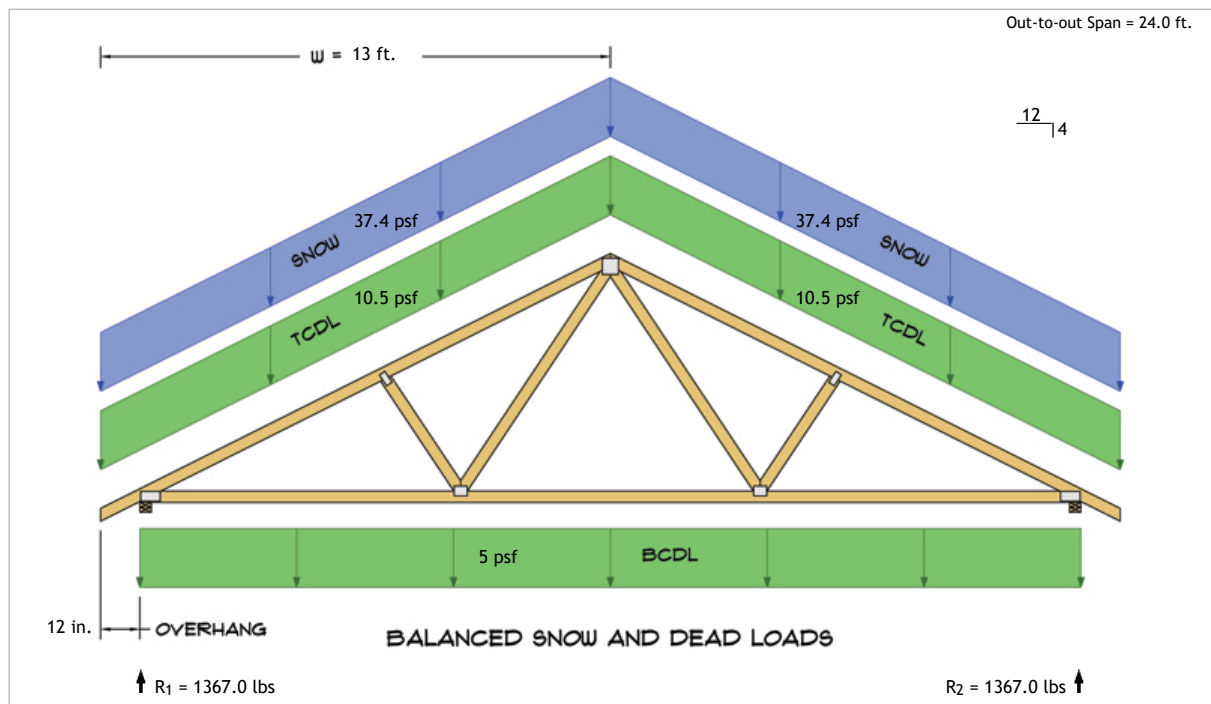$h_d = .43\sqrt[3]{20}\sqrt[4]{54.0 + 10} - 1.5 = 1.80$ ft. [l_u = 20 ft.]

$l_d = \dfrac{8}{3} \times 1.80 \times \sqrt{12/4} = 8.32$ ft.

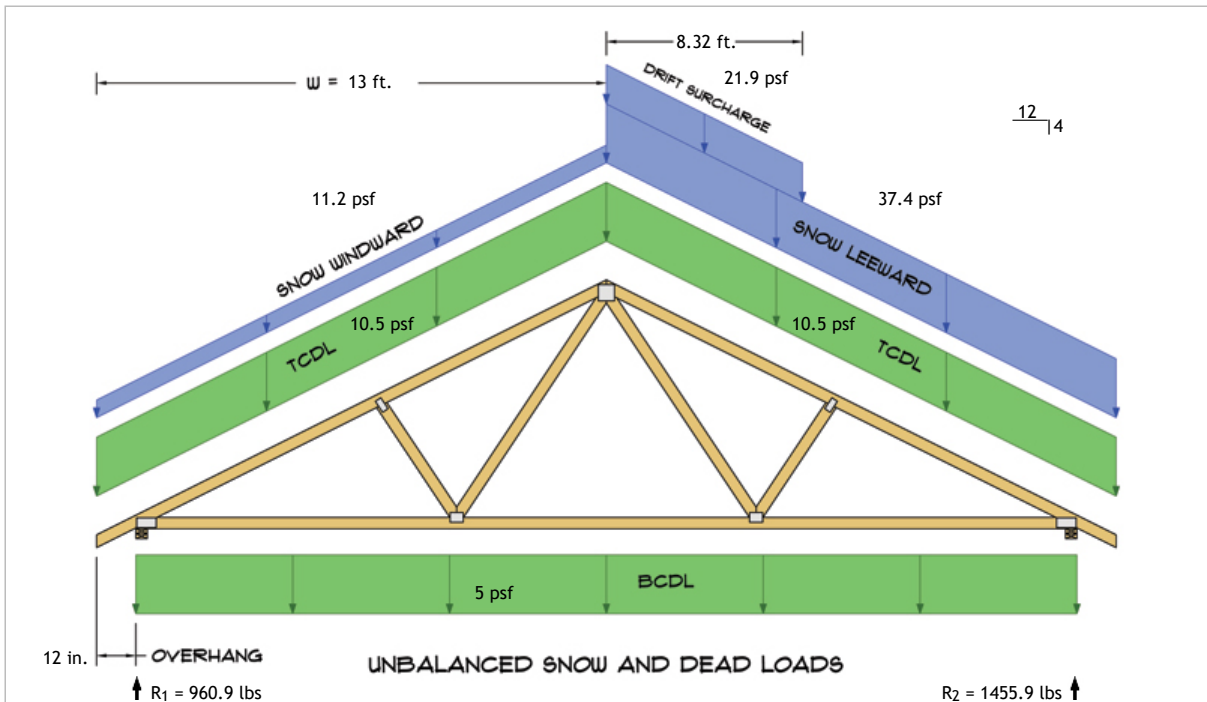$p_d = \dfrac{1.80 \times 21.02}{\sqrt{12/4}} = 21.9$ psf

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.
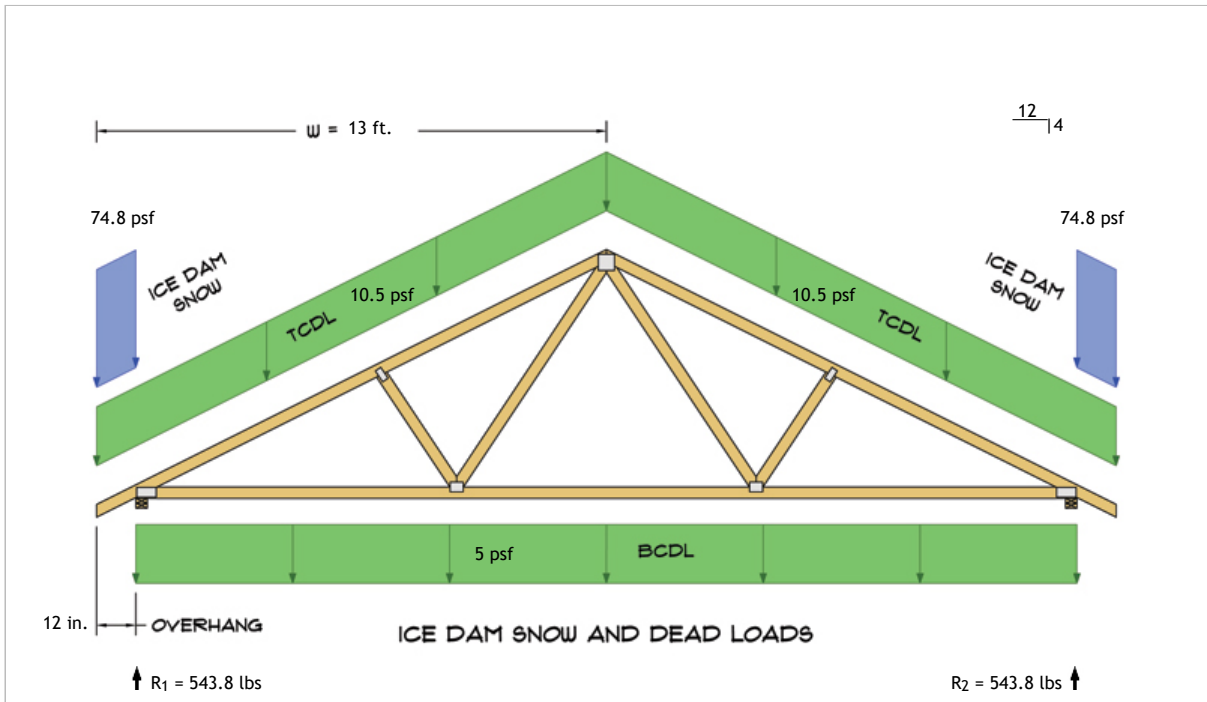
$2p_f = (2)(37.4) = 74.8$ psf

R1 = D + S = 394.1 lbs + 973.0 lbs
R2 = D + S = 394.1 lbs + 973.0 lbs

UNBALANCED SNOW AND DEAD LOADS

8.32 ft.

21.9 psf

DRIFT SURCHARGE

w = 13 ft.

12 | 4

11.2 psf

SNOW WINDWARD

37.4 psf

SNOW LEEWARD

10.5 psf

TCDL

10.5 psf

TCDL

5 psf

BCDL

12 in.

OVERHANG

R_1 = 960.9 lbs

R_2 = 1455.9 lbs

$R_1 = D + S = 394.1$ lbs $+ 566.8$ lbs
$R_2 = D + S = 394.1$ lbs $+ 1061.8$ lbs

ICE DAM SNOW AND DEAD LOADS

w = 13 ft.

12 | 4

74.8 psf

74.8 psf

ICE DAM SNOW

10.5 psf

TCDL

10.5 psf

TCDL

ICE DAM SNOW

5 psf

BCDL

12 in.

OVERHANG

R_1 = 543.8 lbs

R_2 = 543.8 lbs

$R_1 = D + S = 394.1$ lbs $+ 149.7$ lbs
$R_2 = D + S = 394.1$ lbs $+ 149.7$ lbs

Subject	Customer	Location	Job No.
Snow Loads	VERONA MEADOWS GOLF RANGE	2905 Shady Oak Lane Verona, WI 53593	24-09

Engr.		Rev.
Gregory A. Karn, AIA	**ARCH-AIDE, LLC Architects**	-
Date	8194 N. Riley Rd. Verona, WI 53593	Page
9/13/2024	ph. (608) 335-8159 https://www.facebook.com/ARCHAIDE	4

ARCH-AIDE ARCHITECTS