Design Loads
Snow Loads
Example #1

Use the following building and site info to solve for parts a through c:

- Location = St. Anthony, Idaho
- Building Type = Residential Home
- Surface Roughness = B
- Gable Symmetrical Roof
- Roof Slope = 2:12
- Building Width = 40 ft

Determine the following:

a) Ground Snow Load
b) Minimum Snow Load
c) Flat Roof Snow Load
d) Sloped Roof Snow Load
e) Unbalanced Snow Load
f) Draw the balanced and unbalanced snow load conditions

a) GROUND SNOW LOAD = P_g → GO TO FIGURE 7.2-1
↳ Idaho ∴ GO TO TABLE 7.2-3

$P_g = 37$ psf (TABLE 7.2-3)

b) MINIMUM SNOW LOAD = P_m → SECTION 7.3.4

$$P_m = \begin{cases} I_s P_g & \text{for } P_g \le 20 \text{ psf} \\ 20 I_s & \text{for } P_g > 20 \text{ psf} \end{cases}$$

$P_g > 20$ psf ∴ $P_m = 20 I_s$

I_s → GO TO TABLE 1.5-2
RESIDENTIAL = RISK CATEGORY II
∴ $I_s = 1.0$

$P_m = 20(1.0)$
$= 20$ psf

$P_m = 20$ psf

c) FLAT ROOF SNOW LOAD = P_f → 7.3

$P_f = 0.7 C_e C_t I_s P_g$

C_e → TABLE 7.3-1
SURFACE ROUGHNESS = B
RESIDENTIAL = PARTIALLY EXPOSED
∴ $C_e = 1.0$

C_t → TABLE 7.3-2

RESIDENTIAL $\therefore C_t = 1.0$

$P_f = 0.7(1.0)(1.0)(1.0)(37\ psf)$

$= 25.9\ psf$

$\boxed{P_f = 25.9\ psf}$

d) SLOPED ROOF SNOW LOAD $= P_s \rightarrow 7.4$

$P_s = C_s P_f$

$C_s \rightarrow$ FIGURE 7.4-1

$C_t = 1.0 \therefore$ USE FIRST FIGURE

RESIDENTIAL $\therefore$ NON-SLIPPERY $\rightarrow$ USE SOLID LINE

ROOF SLOPE = 2 ON 12 $\therefore C_s = 1.0$

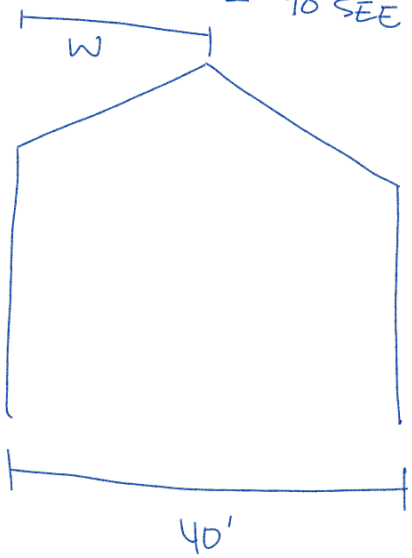
$P_s = 1.0(25.9\ psf)$

$= 25.9\ psf$

$\boxed{P_s = 25.9\ psf}$

e) UNBALANCED SNOW LOAD $\rightarrow 7.6$

USE FIGURE 7.6-2 TO SEE IT VISUALLY

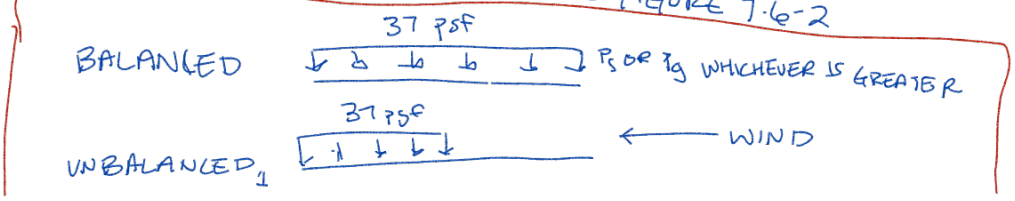


$\therefore W = \frac{40'}{2} = 20'$

$W \leq 20ft \therefore$ UNBALANCED $= I P_g = 1.0(37\ psf) = 37\ psf$

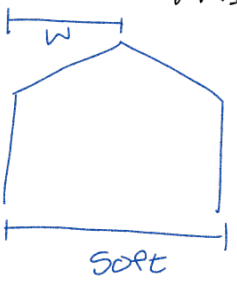
$\boxed{\text{UNBALANCED} = 37\ psf}$

f) DRAW BALANCED & UNBALANCED $\rightarrow$ USE FIGURE 7.6-2



UNBALANCED$_2$ WIND → 37 psf

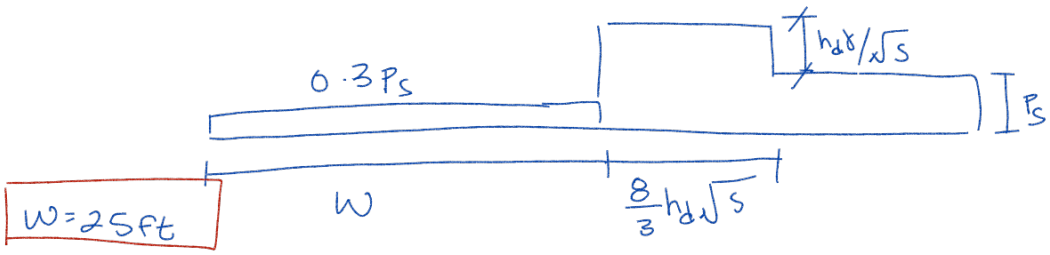
IF BUILDING WIDTH = 50 ft, DETERMINE & DRAW BALANCED AND UNBALANCED SNOW LOAD.



$\therefore W = \frac{50\,ft}{2} = 25\,ft$

$W > 20\,ft$

THEREFORE, UNBALANCED



$W = 25\,ft$

$0.3P_s = 0.3(25.9\,psf) = 7.77\,psf$

$h_d = \sqrt{I_s}\left[(0.43\sqrt[3]{l_u}\sqrt[4]{P_g+10}) - 1.5\right]$ → FIGURE 7.6-1

$= \sqrt{1.0}\left[(0.43\sqrt[3]{25}\sqrt[4]{37+10}) - 1.5\right]$

$= 1.79$

SLOPE $= \frac{1}{s}$ → $\frac{2}{12} = \frac{1}{s}$ $\therefore s = \frac{12}{2} = 6$

$\gamma = 0.13P_g + 14 = 0.13(37) + 14 = 18.81 < 30\,pcf \therefore ok$

$\frac{8}{3}h_d\sqrt{s} = \frac{8}{3}(1.79)\sqrt{6} = 11.7\,ft$

$\frac{h_d\gamma}{\sqrt{s}} = \frac{1.79\,ft(18.81\,pcf)}{\sqrt{6}} = 13.8\,psf$