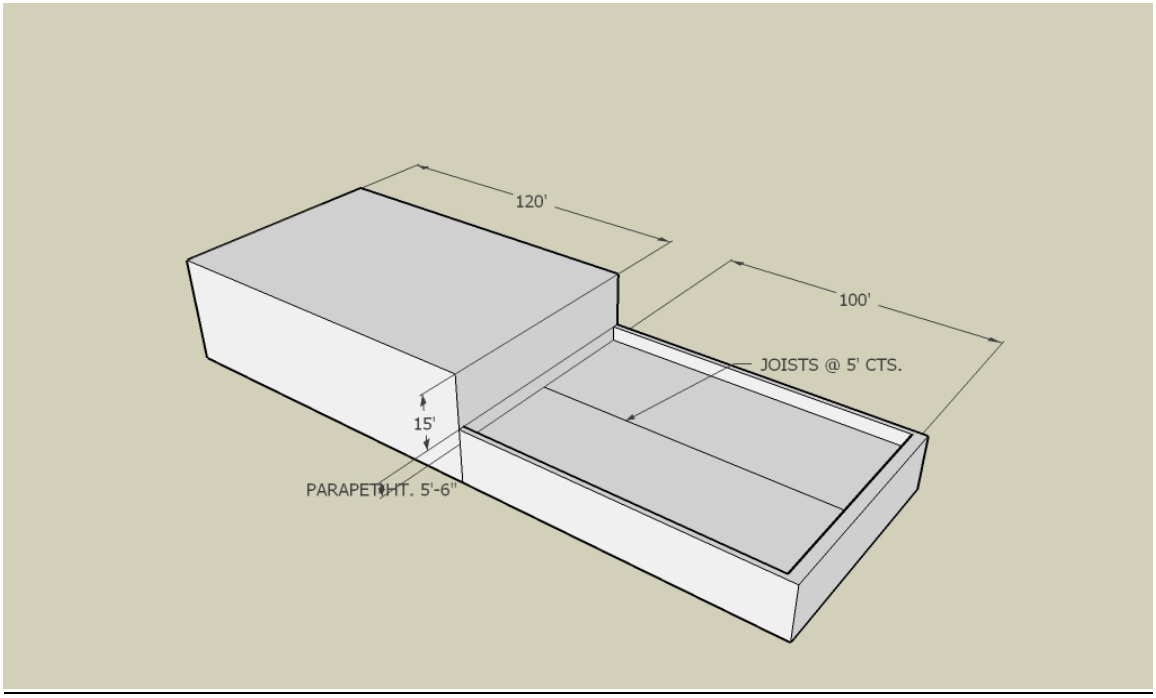
SNOW LOAD PROBLEM 2008

GIVEN

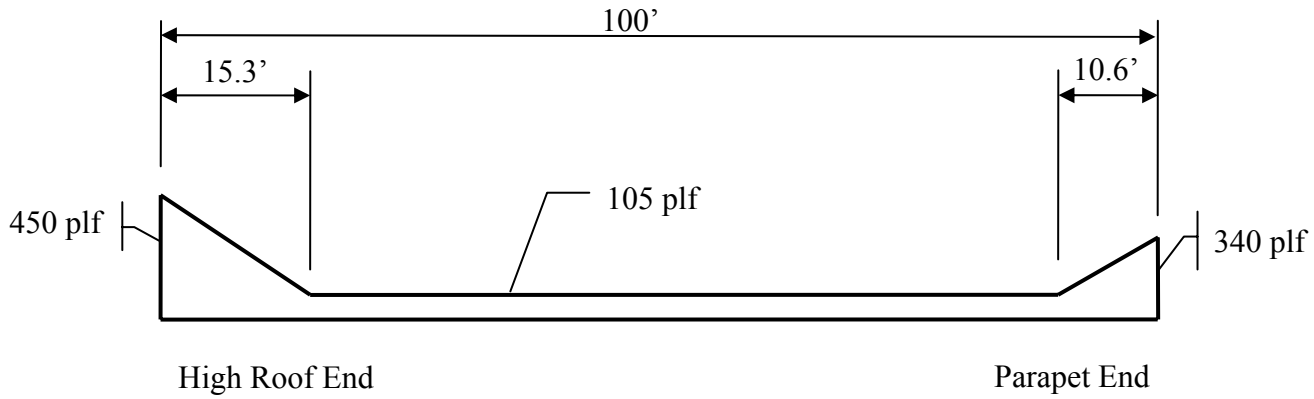
- Single story heated industrial building, configuration as shown below.
- Flat roof (sloped at 1/4 inch per foot)
- The building is located in a suburban area of Madison, Wisconsin.

DETERMINE

- Snow load diagram for joist centered in lower roof as indicated.



SOLUTION




**1. Ground Snow Load**

$p_g$ = 30 psf (Figure 7-1, Madison, Wisconsin).

**2. Exposure Factor**

Terrain Category B (suburban area) and Partially Exposed Roof

$C_e$ = 1.0 (Table 7-2).

**3. Thermal Factor**

Heated/insulated structure

$C_t$ = 1.0 (Table 7-3).

**4. Importance Factor**

I = 1.0 (Table 7-4 Category II).

**5. Flat Roof Snow Load** (Section 7.3)

$p_f = 0.7\ C_e\ C_t\ I\ p_g$ (Eq. 7-1)

$= 0.7 \times 1.0 \times 1.0 \times 1.0 \times 30$ psf = 21 psf

**6. Drift on Lower Roof** (Section 7.7)

Drift Height is Larger of Windward and Leeward Drifts (Figure 7-7)

Leeward Drift Height, $h_d = 0.43(l_u)^{1/3}(p_g + 10)^{1/4} - 1.5$ (Figure 7-9)

$= 0.43(120)^{1/3}(30 + 10)^{1/4} - 1.5 = 3.83$ ft. Controls

Windward Drift Height = 0.75 x $h_d$ per Figure 7-9

$= 0.75[0.43(l_u)^{1/3}(p_g + 10)^{1/4} - 1.5]$

$= 0.75[0.43(100)^{1/3}(30 + 10)^{1/4} - 1.5] = 2.64$ ft.

Drift Width, w = 4 x $h_d$ ($h_d$ less than $h_c$ – Figure 7-8)

= 4 x 3.83 ft = 15.3 ft.

Snow Density, $\gamma = 0.13p_g + 14 = 0.13(30) + 14 = 17.9$ pcf

Maximum Drift Surcharge Load, $p_d = h_d\gamma$

= 3.83 ft x 17.9 pcf= 69 psf

Height of Flat Roof Snow, $h_b = p_f/\gamma$ = 21 psf / 17.9 pcf = 1.17 ft.

**7. Drift at Roof Projection / Parapet** (Section 7.8)

Drift Height = 0.75 x $h_d$ per Fig. 7-9 with $l_u$ = to length of roof upwind of parapet.
= 0.75[0.43(100)1/3(30 + 10)1/4 – 1.5] = 2.64 ft.
Total Snow Height at Drift = $h_b$ + Drift
= 1.17 ft + 2.64 ft = 3.81 ft. < 5.5 ft. (Parapet Ht.)
Drift Width, w = 4 x Drift Height = 4 x 2.64 ft = 10.6 ft.
Maximum Drift Surcharge Load = 2.64 ft x 17.9 pcf = 47 psf.

**8. Joist Loads**

Joists @ 5'-0" Cts.
Uniform Snow Load Not At Drift = 21 psf x 5 ft = 105 plf
Maximum Drifting Snow Load at Parapet = (21 psf + 47 psf) 5 ft = 340 plf
Maximum Snow Load at High Roof End = (21 psf + 69 psf) 5 ft = 450 plf