Given: 4" in thick stone concrete slab; 3" in concrete block
Metal lath & Gypsum plaster ceiling (see sketch below)

Find: Determine dead load for design in lb/sf of floor area

Solution: Using SEI/ASCE 705, the minimum design loads are as follows

- **Stone Concrete Slab**: \( \frac{12 \text{ lb}}{5 \text{ ft}^2} \times 4\text{"} = 48 \text{ lb/sf} \)
- **Concrete Fill**: \( \frac{9 \text{ lb}}{5 \text{ ft}^2} \times 3\text{"} = 27 \text{ lb/sf} \)
- **Metal Lath & Gypsum Ceiling**: \( \frac{10 \text{ lb}}{5 \text{ ft}^2} \times 1\text{"} = 10 \text{ lb/sf} \)

Total = 85 lb/sf
Given cross section of T-Beam made from reinforced stone core, height 14" and 9" and 15" for reinforcing rods.

Find weight per foot or length.

Solution: Break into sections & determine area of each section from 55/89SC density for RSC = 150 lb/ft^2 & for steel = 492 lb/ft^3

8" Rectangular Area \( \frac{18 \times 8}{144 \times 12^2} \) = 2.667 SF

Less Area of 4 Rows \( \frac{7\pi(0.0625)}{4} \) = 0.0122 SF

= 2.655 SF + 150 lb/ft^3 = 398.3 lb/ft

4 Rows @ 492 lb/ft^3 = 0.0122 SF = 6 lb/ft

8" Triangular Area \( \frac{1}{2}(8)(6) = 24 \times 144 \times 12^2 \) = 0.333 SF

0.333 SF + 150 lb/ft^3 = 50 lb/ft

Area = \( \frac{12 \times 28}{144 \times 12^2} \) = 1.167 SF

Less Area of 4 Rows (0.0122SF) = 1.1548 SF + 150 lb/ft^3 = 173.2 lb/ft

4 Rows = 6 lb/ft

Total = 398.3 lb/ft + 50 lb/ft + 12 lb/ft + 173.2 lb/ft

Total = 633.5 lb/ft
Given: 1½" thick wood sheathing boards, 13 specific unit of loads

Find: Dead load of roofing - per square foot supported in the X and Y directions by purlins

Solution:

\[
50 \text{lb/ft}^3 \times \left( \frac{1.5 \text{ lb}}{12 \text{ ft}^2} \right) = 6.25 \text{ lb/ft}^2 \quad \text{Wood sheathing load}
\]

\[
2.0 \text{ lb/ft}^2 \quad \text{Asphalt Shingle load}
\]

\[
= 8.25 \text{ lb/ft}^2 \quad \text{Total load}
\]

Load on purlins in X direction:

\[
8.25 \sin 30^\circ = 4.125 \text{ lb/ft}^2
\]

Y direction:

\[
8.25 \cos 30^\circ = 7.14 \text{ lb/ft}^2
\]
Given: Fully enclosed agricultural building located on flat terrain in Oklahoma.

Find: External pressure acting over the windward wall, the leeward wall, and the side walls. Also determine the internal pressure in the building which acts on the walls. Use linear interpolation to determine $8h$.

Solution: Using Figure 1-12, $V = 90$ MPH; Agricultural Bldg $I = 0.87$.

$K_z = 1$  $K_p = 1$

$\beta_z = 0.00256 K_z K_d V^2 I$; $\beta_z = 0.00256 K_z (0.87)(90^2)(0.87) = 18.04 K_z$

$\tan 10^\circ = \frac{h'}{25}$  $h' = 25 \sin 10^\circ = 4.41$  $h = 15 + \frac{4.41}{2} = 17.20$

Using Table 1-5, determine $K_z$:

- $0-15$ 0.85
- $0.90-0.85$ 0.90
- $20-17.2$ 20-15

Since $K_z = 0.872$, $\beta_z = 18.04(0.872) = 15.73 = g_h$

For internal pressure, $P = g_h (GCP_i)$ where $GCP_i = 0.18$

$\implies P = 15.73(0.18) = 2.83$

For pressure on windward wall, $P = g_z GCP$ where $g_z = 15.73$  $G = 0.85$  $C_p = 0.8$

$\implies P = g_z G CP - g_h (GCP_i) = 15.73(0.85)(0.8) + 2.83$

$\implies P_{\text{wind}} = 7.87 \text{ or } 13.5 \ (\text{psf})$

Cont. on next page.
For pressure on leeward wall determine \( \frac{4h}{B} \)

Since \( \frac{4h}{B} = 0.5 \)

\( C_p = -0.5 \) and \( g = 9h \)

\[ p = 9h G C_p - 9h (G C_p) \]

\[ p = 15.73 (0.85) (-0.5) \pm 2.83 \]

\[ p = -3.86 \text{ or } -9.52 \text{ (psf)} \]

For pressure on sidewalls \( C_p = -0.7 \) and \( g = 8h \)

\[ p = 8h G C_p - 8h (G C_p) \]

\[ p = 15.73 (0.85) (-0.7) \pm 2.83 \]

\[ p = -6.53 \text{ or } -12.19 \text{ (psf)} \]
Given: Flat roof house slope 8% located in open field where ground snow load $p_2 = 1.20 \text{ kN/m}^2$

Find: Snow load required to design roof of house

Solution: Since $p_2 = 1.20 \text{ kN/m}^2$ which is greater than $0.96 \text{ kN/m}^2$ of slope $7.5%$

$p_f = I (0.96 \text{ kN/m}^2)$ where $I = 0.8$ for storage/agricultural fac.

Therefore $p_f = 0.8(1.2 \text{ kN/m}^2) = 0.96 \text{ kN/m}^2$