1–1. The floor of a heavy storage warehouse building is made of 6-in.-thick stone concrete. If the floor is a slab having a length of 15 ft and width of 10 ft, determine the resultant force caused by the dead load and the live load.

**SOLUTION**

From Table 1–3

\[ DL = [12 \text{ lb/ft}^2 \cdot \text{in.}(6 \text{ in.})] (15 \text{ ft})(10 \text{ ft}) = 10,800 \text{ lb} \]

From Table 1–4

\[ LL = (250 \text{ lb/ft}^2)(15 \text{ ft})(10 \text{ ft}) = 37,500 \text{ lb} \]

Total load

\[ F = 48,300 \text{ lb} = 48.3 \text{ k} \]

Ans.
**1-2.** The wall is 12-ft high and consists of 2 × 4 studs. On each side is acoustical fiberboard and 4-in. clay brick. Determine the average load in lb/ft of length of wall that the wall exerts on the floor.

**SOLUTION**

2 × 4 wood studs : \((4 \text{ lb/ft}^2)(12 \text{ ft})\) = 48 lb/ft

Fiberboard : \((2)(1 \text{ lb/ft}^2)(12 \text{ ft})\) = 24 lb/ft

Clay brick : \((2)(39 \text{ lb/ft}^2)(12 \text{ ft})\) = 936 lb/ft

\[
\frac{1008 \text{ lb/ft}}{1008 \text{ lb/ft}} \quad \text{Ans.}
\]
1–3. A building wall consists of 12-in. clay brick and 1/2-in. fiberboard on one side. If the wall is 10 ft high, determine the load in pounds per foot that it exerts on the floor.

**SOLUTION**

From Table 1–3

12 in. clay brick: \[(115 \, \text{lb/ft}^2)(10 \, \text{ft}) = 1150 \, \text{lb/ft}\]

1/2 in. fiberboard: \[(0.75 \, \text{lb/ft}^2)(10 \, \text{ft}) = 7.5 \, \text{lb/ft}\]

Total \[1157.5 \, \text{lb/ft} = 1.16 \, \text{k/ft} \quad \text{Ans.}\]
*1–4. The “New Jersey” barrier is commonly used during highway construction. Determine its weight per foot of length if it is made from plain stone concrete.

SOLUTION

Cross-sectional area = \(6(24) + \left(\frac{1}{2}\right)(24 + 7.1950)(12) + \left(\frac{1}{2}\right)(4 + 7.1950)(5.9620)\)

= 364.54 in\(^2\)

Use Table 1–2

\[ w = 144 \text{ lb/ft}^3 \left( \frac{364.54 \text{ in}^2}{144 \text{ in}^2} \right) = 365 \text{ lb/ft} \]
1–5. The precast floor beam is made from concrete having a specific weight of 150 lb/ft³. If it is to be used for a floor in an office of an office building, calculate its dead and live loadings per foot length of beam.

SOLUTION

Dead load:
\[ DL = 150 \text{ lb/ft}^3 \left[ 4.5(0.5) + 2(1.5) - 2 \left( \frac{1}{2} \right)(0.5)(2) \right] \text{ ft}^3 = 638 \text{ lb/ft} \quad \text{Ans.} \]

Live load: From Table 1–4
\[ LL = (50 \text{ lb/ft}^2)(4.5 \text{ ft}) = 225 \text{ lb/ft} \quad \text{Ans.} \]
1–6. The floor of a light storage warehouse is made of 150-mm-thick lightweight plain concrete. If the floor is a slab having a length of 7 m and width of 3 m, determine the resultant force caused by the dead load and the live load.

**SOLUTION**

From Table 1–3

\[ DL = [0.015 \text{ kN/m}^2 \cdot \text{mm (150 mm)}] (7 \text{ m}) (3 \text{ m}) = 47.25 \text{ kN} \]

From Table 1–4

\[ LL = (6.00 \text{ kN/m}^2) (7 \text{ m}) (3 \text{ m}) = 126 \text{ kN} \]

Total Load

\[ F = 126 \text{ kN} + 47.25 \text{ kN} = 173 \text{ kN} \]

Ans.
1–7. The pre-cast T-beam has the cross-section shown. Determine its weight per foot of length if it is made from reinforced stone concrete and eight \( \frac{3}{8} \)-in. cold-formed steel reinforcing rods.

**SOLUTION**

Concrete:

\[
A_c = 8(48) + 6(28) + 2\left(\frac{1}{2}\right)(6)(8) - 8\pi\left(\frac{3}{8}\right)^2 = 596.5 \text{ in.}^2 = 4.142 \text{ ft}^2
\]

Wt. per foot = 150(4.142) = 621.3 lb/ft

Steel:

\[
A_s = 8\pi\left(\frac{3}{8}\right)^2 = 3.534 \text{ in.}^2 = 0.02454 \text{ ft}^2
\]

Wt. per foot = 492(0.02454) = 12.08 lb/ft

Total wt. per foot = 621.3 + 12.08 = 633 lb/ft

Ans.
**1–8.** The building wall consists of 8-in. clay brick. In the interior, the wall is made from 2 × 4 wood studs, plastered on one side. If the wall is 10 ft high, determine the load in pounds per foot of length of wall that the wall exerts on the floor.

**SOLUTION**

From Table 1–3

\[ DL = (79 \text{ lb/ft}^2)(10 \text{ ft}) + (12 \text{ lb/ft}^2)(10 \text{ ft}) = 910 \text{ lb/ft} \]

**Ans.**
1–9. A building wall consists of exterior stud walls with brick veneer and 13 mm fiberboard on one side. If the wall is 4 m high, determine the load in kN/m that it exerts on the floor.

**SOLUTION**

For stud wall with brick veneer

\[ w = (2.30 \text{ kN/m}^2)(4 \text{ m}) = 9.20 \text{ kN/m} \]

For fiberboard

\[ w = (0.04 \text{ kN/m}^2)(4 \text{ m}) = 0.16 \text{ kN/m} \]

Total weight = $9.2 + 0.16 = 9.36 \text{ kN/m}$

Ans.
1–10. The interior wall of a building is made from 2 × 4 wood studs, plastered on two sides. If the wall is 12 ft high, determine the load in lb/ft of length of wall that it exerts on the floor.

**SOLUTION**

From Table 1–3

\[
\begin{align*}
  w &= (20 \text{ lb/ft}^2)(12 \text{ ft}) \\
  &= 240 \text{ lb/ft} \\
  \text{Ans.}
\end{align*}
\]