WOOD DESIGN

2.1 GIVEN THE HOUSE FRAMING SHOWN

FIND ROOF DEAD LOAD IN PSF ON A HORIZONTAL PLANE

WALL D IN PSF OF WALL SURFACE AREA

WALL D IN 16" FT

BASIC UNIT ROOF LIVE LOAD IN PSF

BASIC ROOF LIVE LOAD IF SLOPE IS CHANGED TO 3/12

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ROOF DEAD LOAD = MEASURED ON THE SLOPE

SLOPE LENGTH = 15' \( \frac{4^{2} \times 12}{12} \) = 15.81'

\[ 2 \times 4 = \frac{1.32}{16} = \frac{12}{16} = 1.29 \text{ PSF} \]

SHINGLE = 2 PSF

GYPSUM = 2.2 PSF

FIBER = 1.1 \times \frac{5}{3} = \frac{5.5}{3} \text{ PSF}

SHEATHING = \frac{3}{8} \times 3 \text{ PSF} = 1.13 \text{ PSF}
a) Total roof dead load = 12.62 \rightarrow 12.62 \text{ psf on slope}

\[
\left(\frac{15.6}{15}\right) \times 12.62 \text{ psf} = 12.6 \text{ psf on horizontal plane}
\]

b) 2x4: 1.094 \left(\frac{12}{14}\right) = 0.82 \text{ psf}

Gypsum: 2.2 \text{ psf}

Stucco: \left(\frac{125 \times 14.4}{12}\right) \left(\frac{\sqrt{3}}{12}\right) = 9 \text{ psf}

\[
\frac{12 \text{ psf of wall}}{}
\]

c) Wall dead as a line load

WALL: 12 \text{ psf} \left(\frac{2}{3}\right) = 9 \frac{6}{14} \text{ ft}

ROOF: \frac{12.8 \times 15}{2} = 94 \frac{1}{14} \text{ ft} \quad (\div 2 \text{ because } 12 \text{ goes to roof beam})

HEADERS (2 - 2x4): 2.2 \frac{1}{14} \text{ ft}

194.2 \frac{1}{14} \text{ ft}

d) Basic unit roof live load

e) \quad R_1 = 1 \quad \text{ for either case}

R_2 = 1

\[
\therefore \text{ Roof } L_1 = 20 \text{ psf horizontal def}\n
= 20 \times \frac{15}{15.61} \approx 19 \text{ psf scope to projection}
\]
2.4 Roof Framing of Industrial Building

- Flat Roof 1/4"/ft slope
- Roofing: 5 Ply-Felt
- Sheathing: 15/32" Plywood
- Subpurlin: 2x4 @ 24'
- Purlin: 4x14 @ 8' centers
- Girder: 6 3/4" x 33 @ 20' centers

Assume uniform loads

**Loads**

- 5-Ply Felt: 6 psf
- 15/32 Plywood: \( \frac{15}{32} \times 3 = 1.4 \text{ psf} \)
- Subpurlin: 2x4 @ 24': \( 1.094 \times \frac{12}{24} = 0.55 \text{ psf} \)
- Purlin: 4x14 @ 8': \( 9.44 \times \frac{12}{8} = 11.31 \text{ psf} \)
- Girder: 6 3/4" x 33: \( \frac{222.8 \times (1\frac{1}{100})}{(60 \times 24)} = 440.42 \times \frac{14}{20} = 2.32 \text{ psf} \)

Total dead = 11.5 lb/ft²
b) TRIBUTARY DEAD LOAD TO SUBFRAME

\[ = 6 + 1.4 \times 0.55 \text{ psf} = 7.95 \text{ psf} \times \frac{2'}{15.9} \text{ lb/ft} \]

\[ = 73.3 \text{ lb/ft} \]

c) TRIBUTARY DEAD LOAD TO PURLOU

\[ = 7.95 \times 1.21 = 9.42 \text{ psf} \times \frac{8'}{73.3} \text{ lb/ft} \]

\[ = 73.3 \text{ lb/ft} \]

d) TO GIRDER

\[ = 9.42 + 2.32 = 11.48 \text{ psf} \times \frac{20'}{230} \text{ lb/ft} \]

\[ = 230 \text{ lb/ft} \]

e) TRIBUTARY DEAD TO COLUMN C1

\[ \frac{11.5}{50} = 11.5 \frac{1}{50} \text{ k} \]

f) ROOF UNIT LIVE LOAD

\[ = 20 \text{ psf} \]