

Calc to Prove Roof Joists For Rear Garage at:-

1, WILLIAMS PLACE, PENYDARREN, MERTHYR TYDFIL.

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$$\text{Area per joist} = 5.0 \times 0.6 = 3.0 \text{ m}^2.$$

$$\text{Span.} = 4.9 \text{ m.}$$

$$\text{Loads} = \text{d.L. } 0.5 \text{ kN/m}^2$$

$$\text{L.L. } 0.75 \text{ kN/m}^2$$

$$\text{Total } 1.25 \text{ kN/m}^2.$$

$$\text{Load} = 3.0 \times 1.25 = 3.75 \text{ kN/m}^2.$$

$$\text{BM} = 3.75 \times 4.9/8 = 2.30 \text{ kNm.}$$

$$Z = 50 \times 225^2/6 = 0.422 \times 10^6 \text{ mm}^3, \quad I = 0.422 \times 225/2 \times 10^6 = 47.475 \times 10^6 \text{ mm}^4$$

CHECK BENDING

$$\text{Actual Stress} = M/Z = \frac{2.30 \times 10^6}{0.422 \times 10^6} = 5.45 \text{ N/mm}^2$$

$$\begin{aligned} \text{Allowable bending stress} &= (\text{using SC3 timber}) \quad 5.3 \times K_3 \times K_8 \\ &= 5.3 \times 1.25 \times 1.1 = 7.3 \text{ N/mm}^2 \text{ OK.} \end{aligned}$$

CHECK SHEAR.

$$\text{Allowable} = 0.67 \text{ N/mm}^2 \times K_3 \times K_8 = 0.67 \times 1.25 \times 1.1 = 0.92 \text{ N/mm}^2.$$

$$\text{Actual} = \frac{3.75 \times 10^3}{2 \times 50 \times 225} = 0.17 \text{ N/mm}^2 \text{ OK.}$$

CHECK DEFLECTION. $E_{\text{mean}} = 8800$

$$\text{Actual Deflection} = \frac{5 \times 3750 \times 4.9^3 \times 10^9}{384 \times 8800 \times 47.475 \times 10^6} + \frac{12 \times 3750 \times 4900}{5 \times 8800 \times 50 \times 225}$$

$$= 13.75 + 0.45$$

$$= 14.2 \text{ mm.}$$

$$\text{Allowable Deflection} = 4900 \times 0.003 = 14.7 \text{ mm OK.}$$

$\therefore$ Use 50x225mm joists at 600mm centres, with
line of noggins at Centreline.