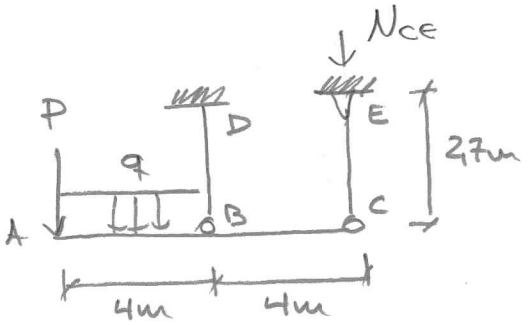
BITSMA 0916B

- SEÇÃO TRANSVERSAL CE : 10cm x 10cm
- CARGAS : q = 6kN/m PERM.
  P = 40kN ACID.



- EDIFICAÇÃO : GARAGEM
- MADEIRA CONÍFERA C30; AMBIENTE CLASSE 1 DE UMIDADE, CARGAS DE LONGA DURAÇÃO E PEÇAS DE 1ª CATEGORIA;
- $L_{0x} = L_{0y}$;

① PROPRIEDADES: $k_{mod} = 0,7 \times 1,0 \times 0,8 = 0,56$

$f_{cod} = 0,56 \times 3\,kN/cm^2 / 1,4 = 1,2\,kN/cm^2$

$E_{cod} = 0,56 \times 1450\,kN/cm^2 = 812\,kN/cm^2$

② COMB. DE AÇÕES

$N_{CE\,q}$: $\Sigma M_B = 0$ ↺⊕ $N_{CE_q} \times 4 - q4^2/2 = 0$

$N_{CEq} = 1/4 \times q4^2/2 = 2q$

$N_{CEq} = 2m \times 6kN/m = \underline{12kN}$

$N_{CE\,P}$: $\Sigma M_B = 0$ ↺⊕ $N_{CE_P} \times 4 - P \times 4 = 0$

$N_{CEp} = P = \underline{40kN}$

$N_{Sd} = 1,4 \times 12kN + 1,4 \times 40kN = \underline{72,8kN}$

③ VERIF. DE ESTABILIDADE

$\lambda = \frac{L_0}{h}\sqrt{12} = \frac{270cm}{10cm}\sqrt{12} = 93,531 \rightarrow$ ESBELTA

$I = b^4/12 = 10^4/12 = 833,33\,cm^4$

$F_E = \frac{\pi^2 \times 812\,kN/cm^2 \times 833,33\,cm^4}{(270cm)^2} = \underline{91,611\,kN}$ Q01

$e_i = 0 > h/30 = 10cm/30 = 1/3\,cm$

$e_a = 270cm/300 = 0{,}9\,cm \qquad \phi = 0{,}8$

$N_{gk} + (\psi_1 + \psi_2) N_{qk} = 12kN + (0{,}7 + 0{,}6)\,40kN = 64\,kN$

$e_{xg} = 0$

$e_c = (0 + 0{,}9)\left\{ \exp\left[\frac{0{,}8 \times 64}{91{,}611 - 64}\right] - 1 \right\} = 4{,}8487\,cm$

$e_{tot} = 0{,}9 + 1/3 + 4{,}8487 = 6{,}082\,cm$

$M_{sd} = 72{,}8\,kN \times 6{,}082\,cm \left(\frac{91{,}611}{91{,}611 - 72{,}8}\right) = 2156{,}3\,kN\,cm$

$W = b^3/6 = 10^3/6 = 166{,}67\,cm^3$

$\sigma_{Nsd} = 72{,}8\,kN/(10\,cm)^2 = 0{,}728\,kN/cm^2$

$\sigma_{Msd} = 2156{,}3\,kN\,cm/166{,}67\,cm^3 = 12{,}938\,kN/cm^2$

$\frac{\sigma_{Sd}}{\sigma_{Rd}} = \frac{(12{,}938 + 0{,}728)\,kN/cm^2}{1{,}2\,kN/cm^2} = 11{,}389$ // Q02 FALHOU HORRIVELMENTE!