

### ENDS 231. Assignment #8

Date: 3/20/07, due 3/29/07

Pass-fail work

Problems: all but 8A) from Onouye, Chapters 6 & 9.

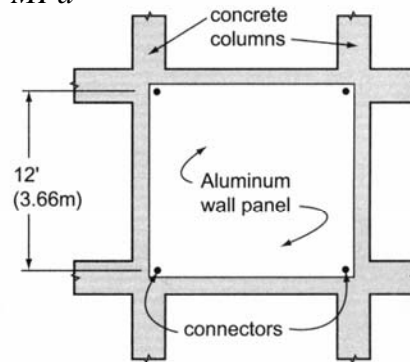
Note: Problems marked with a \* have been altered with respect to the problem stated in the text.

8A) A short 400 mm-square concrete pier is reinforced with four longitudinal #25 bars (25.23 mm diameter). It supports a load of 450 kN. Compute the stress in each material when  $E_c = 24.9 \times 10^3$  MPa and  $E_s = 207 \times 10^3$  MPa. (No figure.) [1 MPa =  $10^6$  N/m<sup>2</sup> = 1 N/mm<sup>2</sup>]

Partial answer to check with:  $f_c = 2.6$  MPa,  $f_s = 21.4$  MPa

**\*Use US customary units.**

6.4.8 An aluminum curtain wall panel 12' (3.66 m) high is attached to large concrete columns (top and bottom) when the temperature is 65°F (18.3°C). No provision is made for differential thermal movement vertically. Because of insulation between them, the sun heats up the wall panel to 120°F (48.9°C) but the column only to 80°F (26.7°C). Determine the consequent compressive stress in the curtain wall.

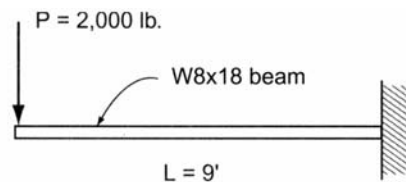


Problem 6.4.8

Partial answers to check with:

$$\delta_{restrained} = 0.0895 \text{ in}, f = 6,220 \text{ psi}$$

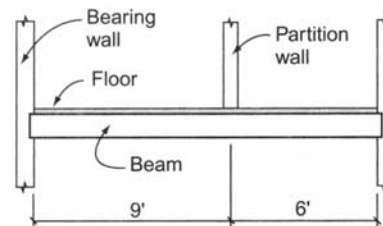
9.1.1 A cantilever beam has a span of 9 feet with a concentrated load of 2000 lb. at its unsupported end. If a W8x18 is used ( $F_b = 22$  ksi), is it safe?



Problem 9.1.1

Partial answers to check with:  $f_b = 14.2$  ksi (OK)

9.1.4 A beam as shown supports a floor and partition where the floor load is assumed to be uniformly distributed (~~500 lb/ft.~~) and the partition contributes a ~~1000 lb.~~ concentrated load. Select the lightest W8 steel section if  $F_b = 22$  ksi.

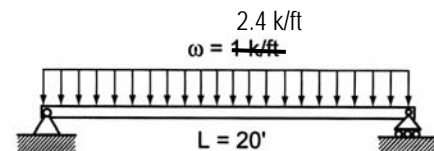


Problem 9.1.4

**\*Change the loads to 2500 lb/ft and 5000 lb.**

Partial answers to check with:  $S_{req'd} \geq 46.97 \text{ in.}^3$

9.1.9 Select the lightest ~~14" nominal depth~~ W beam to carry the load shown. Assume ~~A36 steel~~ ( $F_b = 22$  ksi).



Problem 9.1.9

**\*Change the load to 2.4 k/ft. Assume A992 steel ( $F_Y = 50$  ksi,  $F_b = 33$  ksi).**

Partial answers to check with:  $S_{req'd} \geq 43.64 \text{ in.}^3$