ENDS 231. Assignment #8

Date: 3/18/08, *due 3/27/08*   *Pass-fail work*

Problems: from Onouye, Chapters 6 & 9 *and* 8A.
*Note: Problems marked with a * have been altered with respect to the problem stated in the text.*

(25%) 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$^2 = 1$ N/mm^2] *(axial strain and elasticity)*

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

(15%) ***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 insu-
lation 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). Deter-
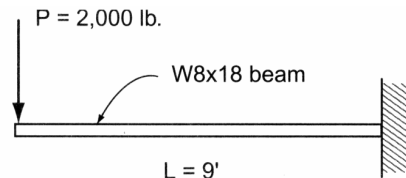mine the consequent compressive stress in the curtain wall.
(*thermal stresses*)
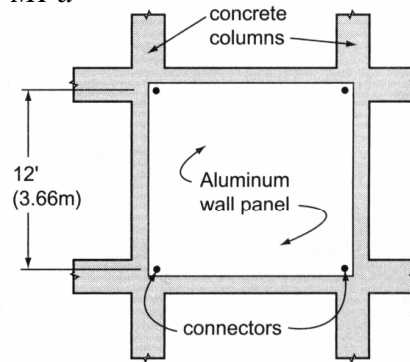
      Partial answers to check with:
 $\delta_{restrained} = 0.0895$ in, $f = 6,220$ psi

Problem 6.4.8

(15%) **9.1.1**   A cantilever beam has a span of 9 feet with a con-
centrated load of 2000 lb. at its unsupported end. If a
W8×18 is used ($F_b = 22$ ksi), is it safe? (*flexural stress*)

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

Problem 9.1.1

(25%) *9.1.4**   A beam as shown supports a floor and partition
where the floor load is assumed to be uniformly distrib-
uted **2500 lb/ft**   and the partition contributes a **5000 lb**
concentrated load. Select the lightest W8 steel section if
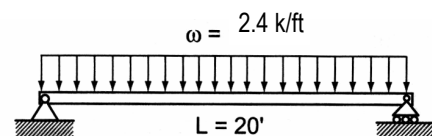$F_b = 22$ ksi. (*flexural stress*)
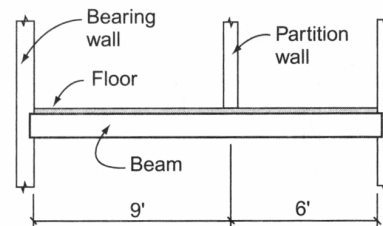
*The loads are changed to 2500 lb/ft and 5000 lb.

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

Problem 9.1.4

(20%) *9.1.9**   Select the lightest ~~14" nominal depth~~ W beam to
carry the load shown. Assume A992 steel ($F_b = 33$ ksi).
(*flexural stress*)

***The load is changed to 2.4 k/ft and the depth is not
restricted. Assume A992 steel ($F_Y = 50$ ksi, $F_b = 33$ ksi).**

Problem 9.1.9

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