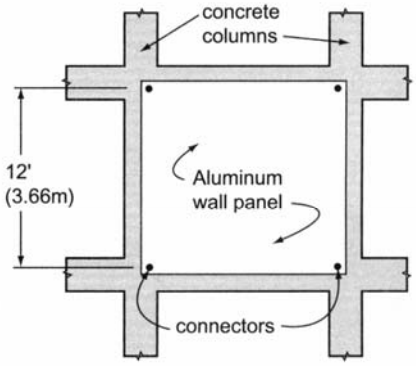
ENDS 231. Assignment #7

Date: 6/20/06, *due 6/26/06* *Worth 30 pts.*

Problems: from Onouye, Chapters 6 & 9.
*Note: Problems marked with a * have been altered with respect to the problem stated in the text. Multiframe 2D may be used.*

***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.

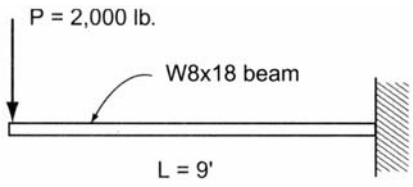


Problem 6.4.8

Partial answers to check with:
$\delta_{restrained}$ = 0.0895 in, f = 6,220 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 W8×18 is used (F_b = 22 ksi), is it safe?

***Also determine if it is safe for shear if F_V = 14.5 ksi? Find the maximum deflection at the free end. Use E = 29 × 10^3 ksi.**

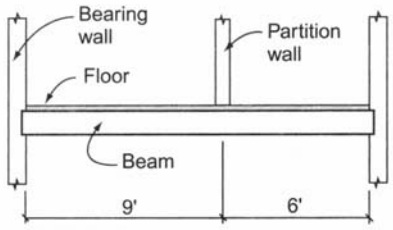


Problem 9.1.1

Partial answers to check with: f_b = 14.2 ksi (OK), f_v = 1.07 ksi (OK), Δ=0.47 in.

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.

***Change the loads to 2500 lb/ft and 5000 lb. Also consider for design that the maximum deflection due to the distributed load (only) is L/240. Find f_v. Calculate the total deflection at midspan (7.5 ft) from the distributed load and the partition wall force. Use E = 29 × 10^3 ksi.**



Problem 9.1.4

Partial answers to check with: $S_{req'd} \geq 46.97$ in.^{3}, $I_{required} \geq 26.1$ in.^{4}, Δ=0.53 in.

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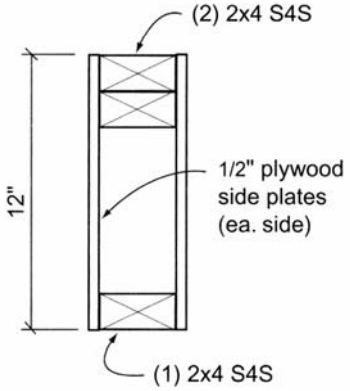
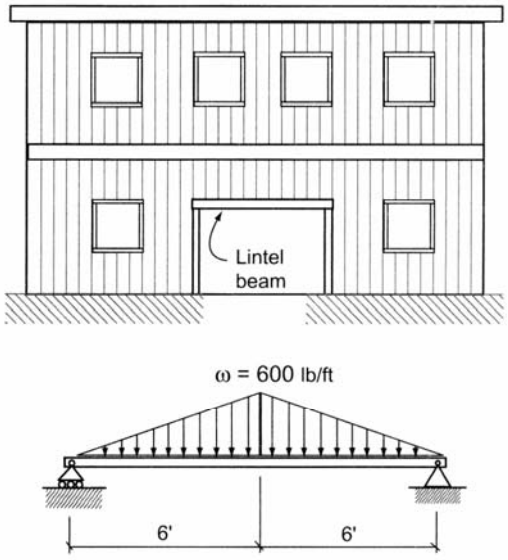
9.1.14 A lintel beam 12' long is used in carrying the imposed loads over a doorway opening. Assuming that a built-up box beam is used with a 12" overall depth as shown, determine the maximum bending stress and shear stress developed.

*** Also determine the required pitch spacing for the bottom 2x4 with 1 nail each side (2) with a shear capacity of 300 lb.**





Problem 9.1.14

Partial answers to check with: $\hat{y}$ = 6.71 in, I_x = 496.2 in.^{4}, f_b = 1168 psi, f_v = 195 psi (Q = 53.8 in^3), p =5.3 in. (Q = 31.3 in^3)
Note: The negative area method is quicker for finding I_x.