Steel Frames

Quiz 5

March 13, 2008

A W14 x 82 (A992 Gr50) is used as part of a braced building frame. The frame member is 26' long but is braced at midheight (13') for buckling about the weak axis. The member supports a factored axial load of 250 kips and a factored bending moment about the strong axis of 190 ft-kip. The no translation magnification factor B_1 can be assumed to be 1.11 and L_b should be assumed to be 26'.

Is the section acceptable based on the AISC Code?

W 14 x 82

$\frac{r_x}{r_y} = 2.44$ so 13' WEAK AXIS CONTROLS $\phi P_n = 810^K$

$\phi M_n = 521 - 8.16(26 - 8.76) = 380.3$ ft-K

$\frac{P_u}{\phi P_n} = \frac{250}{810} = 0.3086$

$.3086 + \frac{8}{9}\left(\frac{1.11\,(190)}{380.3}\right) = 0.80 \leq 1.0$

SO O.K.

$\frac{P_r}{P_c} + \frac{8}{9}\left[\frac{M_{rx}}{M_{cx}} + \frac{M_{cy}}{M_{cy}}\right]$

$\rho P_r + b_x M_{rx} + b_y M_{ry}$

$.00123(250) + .~~00183~~(1.11)(190) =$

$.00234$