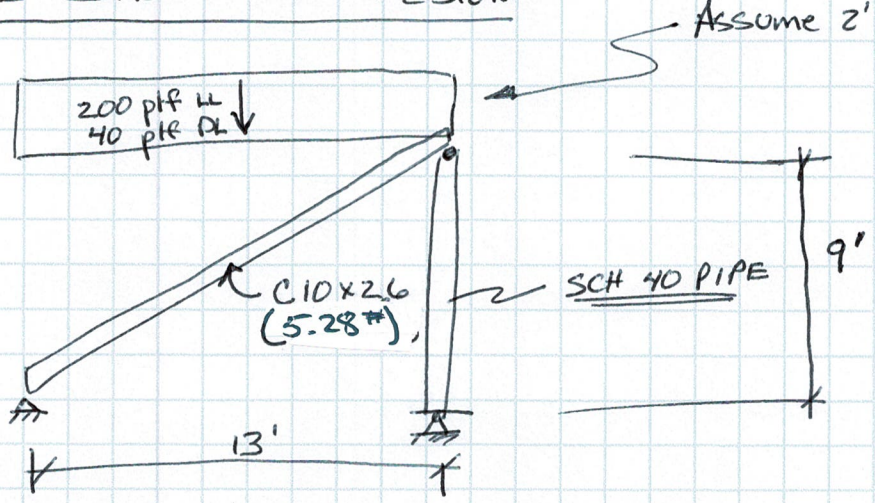
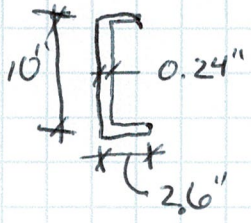
Stair Structural Design

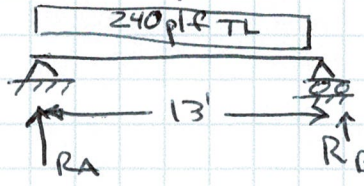


Stringer Material: Aluminum 6061 - T6
C10x2.6



Weight = 5.28 plf
S_x = 9.413 in^3
I_x = 47.06 in^4
F_y = 40 Ksi
MOE = 10×10^6 psi

DESIGN



$R_B = R_A = (240 lb/ft)(\frac{13 ft}{2}) = 1{,}560 lb$

STRength

$$M = \frac{wL^2}{8} = \frac{(240 lb/ft)(13 ft)^2}{8} = 5{,}070 ft \cdot lb = 60{,}840 in \cdot lb.$$

$$f_b = \frac{M}{S} = \frac{60{,}840 in \cdot lb}{9.413 in^3} = 6{,}464. psi \ll 40{,}000 psi$$

Deflection

$$\Delta = \frac{5wL^4}{384EI} = \frac{(5)(240 lb/ft)(\frac{1 ft}{12 in})(156 in)^4}{(384)(10 \times 10^6 psi)(47.06 in^4)} = 0.328$$

$$= L/476 \therefore \underline{OK}$$

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