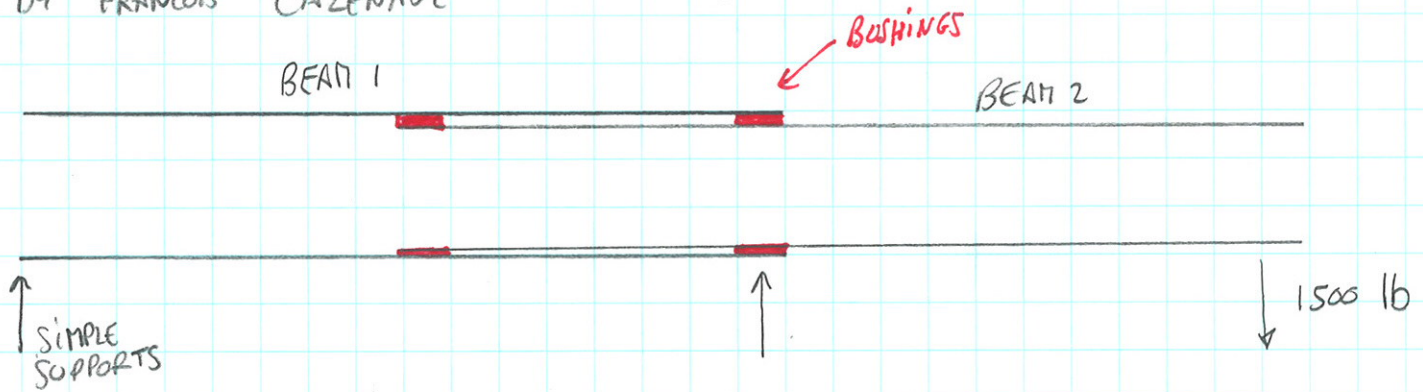


BEAM CALCULATIONS FOR PARAGON CDT DAVIT

12/14/15

BY FRANCOIS CAZENAVE



BEAM 1 : $4" \times 4" \times \frac{3}{16}" \times 43"$

$$I = 6.59 \text{ in}^4$$

$$S = 3.3 \text{ in}^3$$

BEAM 2 : $3" \times 3" \times \frac{3}{16}" \times 48"$

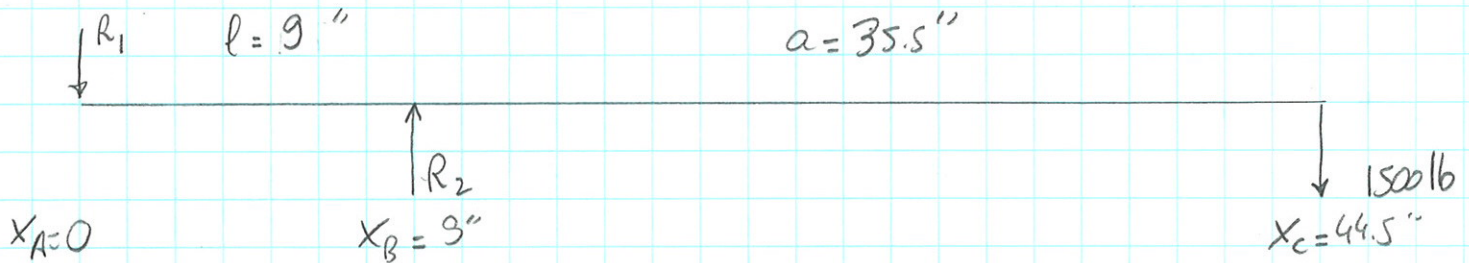
$$I = 2.6 \text{ in}^4$$

$$S = 1.73 \text{ in}^3$$

ANALYSIS FOR BEAM 2

- BEAMS ARE ONLY IN CONTACT THROUGH BUSHINGS

- USING EQUATIONS AND NOTATIONS FROM SHIGLEY'S PAGE 1017



$$R_1 = \frac{F \times a}{l} = 5916 \text{ lb}$$

$$R_2 = \frac{F}{l} \times (l + a) = 7416 \text{ lb}$$

SHEAR FORCE : $V_{AB} = 5916 \text{ lb}$

$$V_{BC} = -1500 \text{ lb}$$

MOMENT :

$$M_{AB} = 5916 \times x$$

$$M_{BC} = -1500 \times (x - l - a) = -1500x + 66750$$

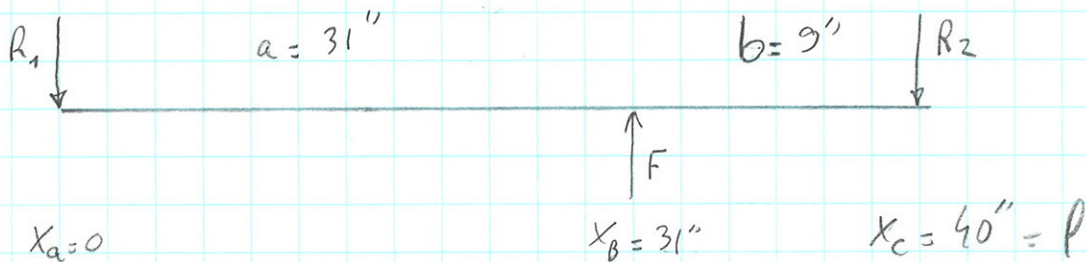
DISPLACEMENT AT END OF BEAM

$$y_c = -\frac{F a^2}{3EI} (l+a) = \frac{1500 \times 35.5^2}{3 \times 29 \times 10^6 \times 2.6} \times (35.5+9) = 0.37''$$

MAX STRESS IN BEAM (USING EQUATION 3-26B FROM SHIGLEY, PAGE 5)

$$\sigma_{\max} = \frac{M_B}{S} = \frac{5916 \times 9}{3.3} = 16136 \text{ PSI}$$

ANALYSIS FOR BEAM 1 USING RESULTING FORCE. EQUATIONS FROM SHIGLEY p.1015



$$F = 7416 \text{ lb}$$

MAXIMUM MOMENT

$$M_B = \frac{F b a}{l} = \frac{7416 \times 9 \times 31}{40} = 51726 \text{ lb.in}$$

MAXIMUM STRESS

$$\sigma_{\max} = \frac{M_B}{S} = \frac{51726}{3.3} = 15679 \text{ PSI}$$

CONCLUSION; STRESS IN BEAMS IS WELL BELOW YIELD STRESS.