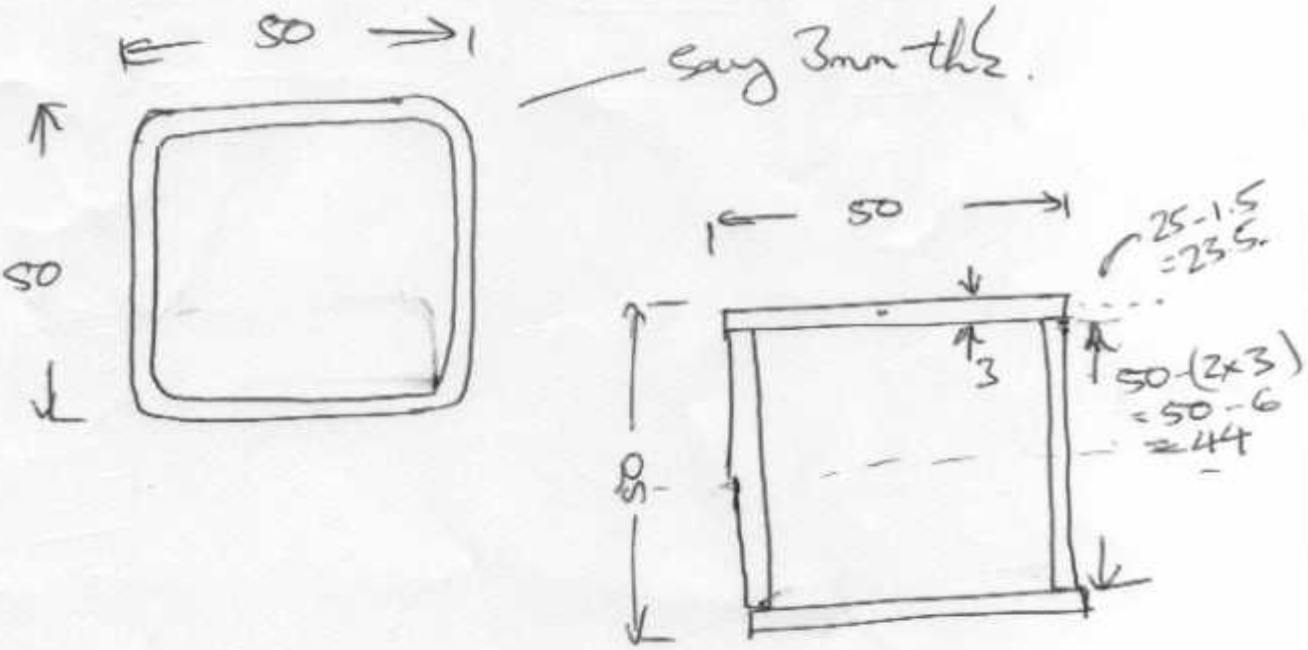
13.12.09

Slenderness ratio $\frac{L}{r}$

r is least radius of gyration of section

$$r = \sqrt{\frac{I}{A}}$$



(5)

13.12.09

"0" for "Head"

$\frac{450}{4} = 112.5$

$50.3 \times 4 = 27$

$I_n = I_0 + I_g$

$= 50.3.235^2 + \frac{50.3^3}{12} + 44.3.0^2 + \frac{3.44^3}{12}$

(×2)

$= 82837.5^{K1} + 112.5^{K2} + 0 + 21296^{K3}\ (\times 2)$

$= 104246 \times 2$

$I_n = 208492\ mm^4$

82837.5
112.5
21296
104246.0 ×2

$r = \sqrt{\frac{I}{A}} = \sqrt{\frac{208492}{564}}$

$r = 19.5mm$

14.12.09

$$f_{cr} = \frac{\pi^2 E I_{min}}{L_e^2}$$

Previous error - I — m^4
currently — mm^4 $/10^{3^4}$ · $/10^{12}$

$E_{st} = 200 \times 10^9 \text{ Pa} = 2 \times 10^{11} \text{ Pa}$

$I_n = 208492 \text{ mm}^4$

$2.1 \times 10^5 \text{ mm}^4$

$\frac{2.1 \times 10^5}{10^{12}} = 2.1 \times 10^{-7} \text{ m}^4$

$$f_{cr} = \frac{\pi^2 \cdot 2 \times 10^{11} \cdot 2.1 \times 10^{-7}}{5^2}$$

$$f_{cr} = \frac{\pi^2 \cdot 4.2 \times 10^4}{25} \left[= \frac{4.15 \times 10^5}{L_e^2} \right]$$

$f_{cr} = 1.65 \times 10^4 \text{ N}$

$= 1.65 \text{ Tonnes-force}$

[Crush load = 15.5 Tonnes force]