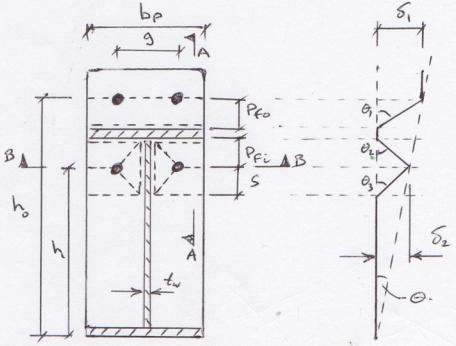
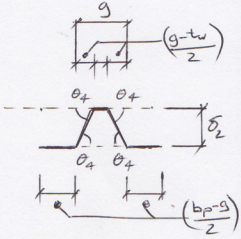
①



A-A



B-B

$$\theta_1 = \frac{\delta_1}{P_{fo}}$$

$$\theta_2 = \frac{\delta_2}{P_{fi}}$$

$$\theta_3 = \frac{\delta_2}{s}$$

$$\theta_4 = \frac{\delta_2 \cdot 2}{g - t_w}$$

$$W_i = \Sigma M_p . \theta . L$$

$$\therefore \frac{W_i}{M_p} = \Sigma \theta . L = 2.b_p.\theta_1 + (b_p - t_w)\theta_2 + (b_p - t_w)\theta_3 + (b_p - g).\theta_3 + (b_p - g).\theta_2$$
$$+ 2.P_{fi}.\theta_4 + 2.s.\theta_4 + (g - t_w).\theta_2 + (g - t_w).\theta_3 + 2(P_{fi}+s).\theta_4$$
$$= 2.b_p.\theta_1 + b_p.\theta_2 - t_w.\theta_2 + b_p.\theta_3 - t_w.\theta_3 + b_p.\theta_3 - g.\theta_3 + b_p.\theta_2 - g.\theta_2$$
$$+ 2P_{fi}.\theta_4 + 2s.\theta_4 + g.\theta_2 - t_w.\theta_2 + g.\theta_3 - t_w.\theta_3 + 2.P_{fi}.\theta_4 + 2.s.\theta_4$$

LET $t_w = 0 \Rightarrow 2.b_p.\frac{\delta_1}{P_{fo}} + 2b_p.\frac{\delta_2}{P_{fi}} + 2.b_p.\frac{\delta_2}{s} + 8.P_{fi}.\frac{\delta_2}{g - t_w} + 8s.\frac{\delta_2}{g - t_w}$

NOW, $h_o.\theta = \delta_1$ (APPROXIMATION FOR SMALL ANGLES ONLY)

$h_i.\theta = \delta_2$

$$\therefore \frac{\delta_1}{h_o} = \frac{\delta_2}{h_i} \Rightarrow \delta_2 = \frac{h_i}{h_o} \quad \text{WHERE } \delta_1 = 1$$

$$\therefore \Sigma \theta . L = 2b_p.\frac{\delta_1}{P_{fo}} + 2b_p.\frac{h_i}{h_o.P_{fi}} + 2b_p.\frac{h_i}{h_o.s} + 8.P_{fi}.\frac{h_i}{h_o(g - t_w)} + 8.s.\frac{h_i}{h_o(g - t_w)}$$
$$= 2.b_p\left[\frac{h_i}{h_o}\left(\frac{1}{P_{fi}} + \frac{1}{s}\right) + \frac{1}{P_{fo}}\right] + \frac{8.h_i}{g.h_o}(P_{fi} + s)$$

$W_e = M_{PL} \cdot \theta \qquad \Longrightarrow \theta = \frac{1}{h_0}$

$= M_R \cdot \frac{1}{h_0}$

$= W_i$

$\therefore M_{PL} = W_i \cdot h_0$

$= \Sigma m_p \cdot \theta \cdot (\ldots) \cdot h_0 \longrightarrow M_p = f_y \cdot Z - f_y \cdot \frac{t_p^2}{4}$ PER UNIT WIDTH

$= f_y \cdot t_p^2 \cdot \frac{Z \cdot b_p}{A_2} \left[h_i \left(\frac{1}{P_{fi}} + \frac{1}{s} \right) + h_0 \left(\frac{1}{P_{f0}} \right) \right] + \frac{2 \cancel{A_2} h_i}{\cancel{A} g} \left(P_{fi} + s \right)$

$= f_y \cdot t_p^2 \, Y$ WHERE $Y = \frac{b_p}{2} \left[h_i \left(\frac{1}{P_{fi}} + \frac{1}{s} \right) + h_0 \left(\frac{1}{P_{f0}} \right) \right] + \frac{2 h_i}{g} \left(P_{fi} + s \right)$