(2) Check bearing capacity

Bearing length at inside of flange

b_{bf} $= b_s + 2.5t_f$
$= 150 + 2.5 \times 15.6$
$= 189$ mm

Bearing length at the neutral axis

b_b $= b_{bf} + d_2/2$
$= 189 + 251$
$= 440$ mm

From Table 5.2-5:

(a) Design bearing yield capacity of the web

$$\frac{\phi R_{by}}{b_{bf}} = 3.67 \text{ kN/mm}$$

$\therefore \quad \phi R_{by} = 3.67 \times 189 = 694\text{kN}$

(b) Design bearing buckling capacity of the web

$$\frac{\phi R_{bb}}{b_b} = 0.903 \text{ kN/mm}$$

$\therefore \quad \phi R_{bb} = 0.903 \times 440 = 397$ kN

Hence $\phi R_b = \text{min.}\ [\phi R_{by}, \phi R_{bb}] = 397$ kN

$> R^*$ (=300kN) COMPLIES

The 530UB92.4 – Grade 300 section is satisfactory.

5.2.4 Shear and Bending Interaction

5.2.4.1 Method

The design web shear capacity determined in Section 5.2.2.4 may be significantly reduced when the section is subject to a large design bending moment at the same location. The reduced design shear capacity (ϕV_{vm}) is determined in accordance with Clause 5.12.3 of AS 4100 as:

$\phi V_{vm} = \phi V_v$ for $M^* \le 0.75(\phi M_s)$

or $= \phi V_v \left[2.2 - \left(\frac{1.6M^*}{\phi M_s} \right) \right]$ for $0.75(\phi M_s) < M^* \le \phi M_s$

where ϕV_v = design web shear capacity (see Section 5.2.2.4)

M^* = design bending moment

ϕM_s = design section moment capacity (see Section 5.2.2.1)

Designers must ensure that $V^* \le \phi V_{vm}$.

Note: If either $V^* \le 0.6(\phi V_v)$ or if $M^* < 0.75(\phi M_s)$ then no check on the interaction of shear and bending is necessary.

5.2.5 Bending and Bearing Interaction

Unlike for hollow sections, there is no specific guidance given in the body of AS4100 for checking the adequacy of open section member webs subject to combined bending and bearing. There is, however, some guidance given in (the informative) Appendix I of AS4100 to undertake a