Punction check

Column size = 225 x 450mm

$f_{cu}f_y$ = 25 - 410mm

Area of Footing = 6.027m²

Size of footing = 2500 x 2500

q = Net pressure = 508.824 kN/m

depth = 600

Critical Section, $\frac{d}{2}$ = 300

300 + 300 + 225 = 825mm

300 + 300 + 450 = 1050mm

Shear force V_1 = q_n x [Area of footing - (0.3+d)²]

= 508.824 [2.5 x 2.5 - (0.3+0.6)²])

V_1 = 2751.68 kN

Normal Shear Stress $I_v = \frac{V_n}{bd}$

b = peremeter of critical section

d = effective span/depth

$I_u = \frac{2751.68 \times 10^3}{(2 \times (825) + 2(1050)) \times 600}$ I_u = 1.223 N/mm²

permissible Shear Stress

$I_e' = K_s \times I_c$

$K_s = (0.5 + \beta_c)$ but not greater than 1

β_c = Ratio of Shorter to larger side of Columns

$I_c = 0.25 \sqrt{f_{cu}}$

$K_s = 1$

$I_u' = 0.25 \sqrt{25} = 1.25 N/mm^2$

$I_u = 1.223 N/mm^2$

$I_u \leq I_u'$ Hence depth assumed is OK

Checking for fb with actual size of footing

Unit weight of concrete = 24 kN/mm²

Unit weight of soil = 1.091×10^{-6} kN/mm²

Actual pressure footing below

$q = (1200 \times 2.5 \times 2.5) + (24 \times 0.600) + (1.091 \times 10^{-6} \times 0.660)$

q = 214.94 kN/m²