Effective depth = 400 – 60 = 340 *mm* (For base slab effective cover = 60 mm)

$$\frac{M_u}{bd^2} = \frac{71119.245 \times 10^3}{1000 \times 340^2} = 0.615$$

Percentage of steel $p_t = 50 \left[\dfrac{1 - \sqrt{1 - \dfrac{4.6}{20} \times 0.615}}{\dfrac{415}{20}} \right] = 0.177\%$

Minimum percentage of steel when Fe 415 is used = 0.2%

$$A_{st} = \frac{0.2}{100} \times 1000 \times 340 = 680\ mm^2$$

Spacing of 12 *mm* diameter bars = $\dfrac{113 \times 1000}{680} = 166\ mm$

Provide 12 mm ϕ bars @ 160 mm c/c

Design of the Heel Slab

The bending moment calculations for a 1 *metre* wide strip of the heel slab are shown in the table below

B.M. Calculations for a 1 metre wide strip of the heel slab

Load due to	*Magnitude of the load (N)*	*Distance from b (m)*	*Moment about b (Nm)*
Backing 1.6 × 5 × 18000	144000	0.8	115200
DL of heel slab 1.6 × 0.4 × 25000	16000	0.8	12800
			128000
Deduct for upward pressure			
a b ih 26367 × 1.6	42187.2	0.8	33749.76
i g h $\frac{1}{2} \times 1.6 \times 47075.2$	37660.16	$\frac{1.6}{3}$	20085.42
Total deduction			53835.18
B.M. for heel slab			74164.82

B.M.for the heel slab = M = 74164 . 82 *Nm*

Ultimate moment M_u = 1.5 × 74164.82 = 111247.23 *Nm*

$$\frac{M_u}{bd^2} = \frac{111247.23 \times 10^3}{1000 \times 360^2} = 0.858$$

Percentage of steel $p_t = 50 \left[\dfrac{1 - \sqrt{1 - \dfrac{4.6 \times 0.858}{20}}}{\dfrac{415}{20}} \right] = 0.251\%$

$$A_{st} = \frac{0.251}{100} (1000 \times 360) = 904\ mm^2$$

Spacing of 16 *mm* diameter bars = $\dfrac{201 \times 1000}{904} = 222$ *mm say* 220 *mm c/c*

It is convenient to match the spacing of reinforcements of stem and heel slab. Accordingly, we will provide,

16 mm ϕ bars @ 220 mm c/c for the heel slab, and

16 mm ϕ bars @ 110 mm c/c for the stem.

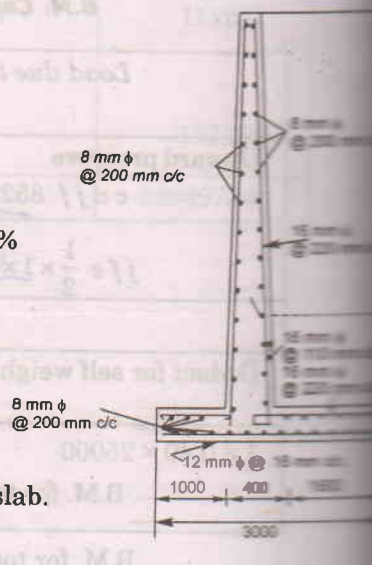

Fig. 29.25