# CONTINUOUS SLAB DESIGN:

Design a continuous one way slab for an office floor. The slab is continuous over Tee-beams spaced at 4m intervals. Assume live load of 4kN/m² and adopt M20 grade concrete and Fe415 steel.

## GIVEN:

L.L, $q = 4\ kN/m^2$

$f_{ck} = 20\ N/mm^2$, $f_y = 415\ N/mm^2$

## DEPTH OF SLAB:

$$\text{Depth} = \frac{\text{Span}}{30} = \frac{4000}{30} = 134mm$$

$d = 140mm$, $D = 160mm$

## LOADS:

Self weight of slab $= 0.16 \times 25 = 4\ kN/m^2$, F.F $= 1\ kN/m^2$

Total dead load, $g = 5\ kN/m^2$

Live load, $q = 4\ kN/m^2$

## EFFECTIVE SPAN:

Eff. span = c/c of supports

$l = 4m$.

## MOMENTS AND SHEAR FORCE:

Pg. no. 36, Table 12, 13.

Max. negative moment @ support next to end support.

$$M_u\ (-ve) = 1.5\left[\frac{gL^2}{10} + \frac{qL^2}{9}\right] = 22.66\ kNm. \qquad L = 4m.$$

$$M_u\ (+ve) = 1.5\left[\frac{gL^2}{12} + \frac{qL^2}{10}\right] = 20.65\ kNm$$

$$V_u = (1.5 \times 0.6)(g+q)l = 32.4\ kN.$$

CHECK FOR DEPTH :

$$M_u = 0.138 f_{ck} b d^2 \Rightarrow d = \sqrt{\frac{22.66 \times 10^6}{0.138 \times 20 \times 10^3}} = 90.6\text{mm} < 140\text{mm}.$$

∴ The provided depth is safe.

REINFORCEMENTS :

$$M_u = 0.87 f_y A_{st} d \left[1 - \frac{A_{st} f_y}{b d f_{ck}}\right]$$

$A_{st} = 485\ mm^2$.

Provide 10mm dia bars @ 150mm centres at support. The same reinforcement is provided for positive moment @ midspan.

Distribution reinforcement $= 0.12\% bd = 192\ mm^2$.

Provide 10mm dia bars @ 300mm c/c

CHECK FOR SHEAR :

$$\tau_v = \frac{V_u}{bd} = \frac{32.4 \times 10^3}{1000 \times 140} = 0.23\ N/mm^2$$

Table 19 $\Rightarrow \tau_c = 1.25 \times 0.36 = 0.45\ N/mm^2 > \tau_v$

∴ The slab is safe against shear.

CHECK FOR DEFLECTION CONTROL :

$$(l/d)_{provi} = \frac{4000}{140} = 28.5$$

$K_t = 1.35$

$$(l/d)_{max} = \frac{20+26}{2} \times 1.35 = 29.9.$$

∴ The slab is safe against deflection.

(Diagram as image)

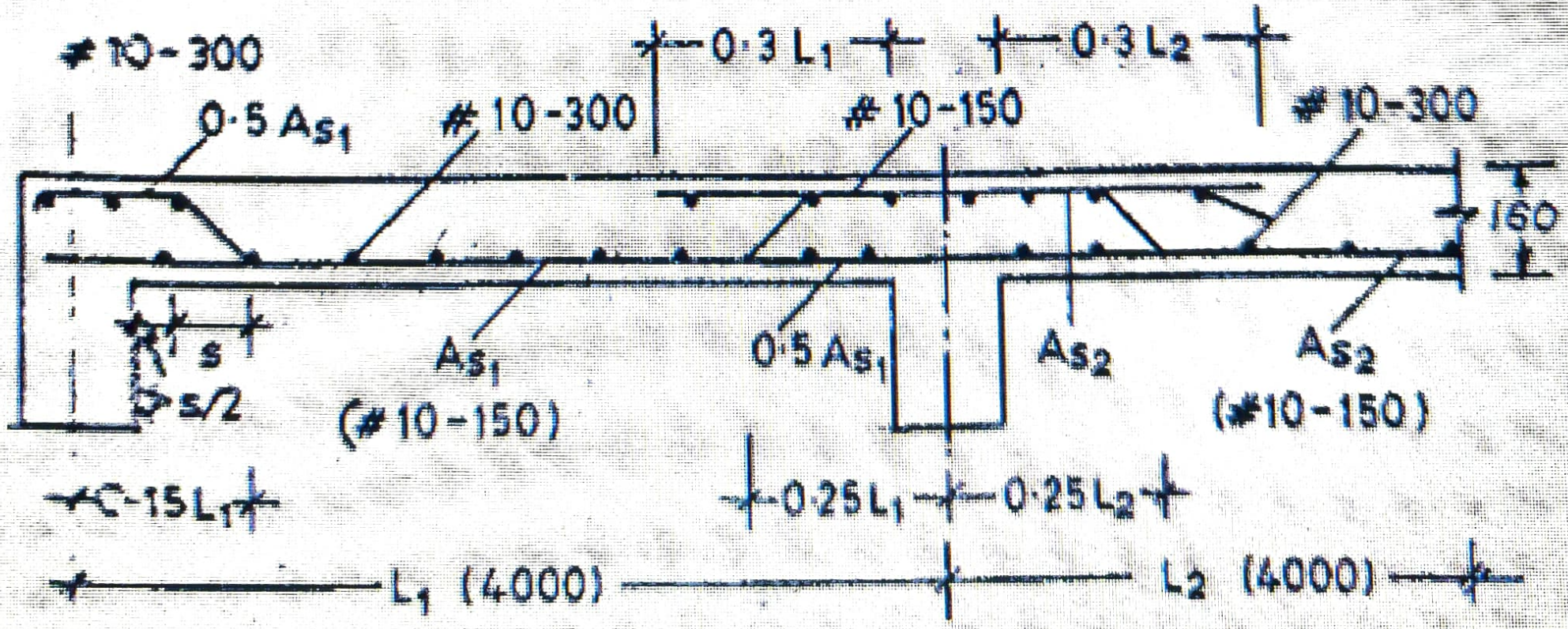


**Fig. 9.8 Reinforcement Details in One Way Continuous Slab**