1

ex

Given

Slab thickness = 120 mm

beam thickness = ~~700~~ mm

beam width = 250 mm

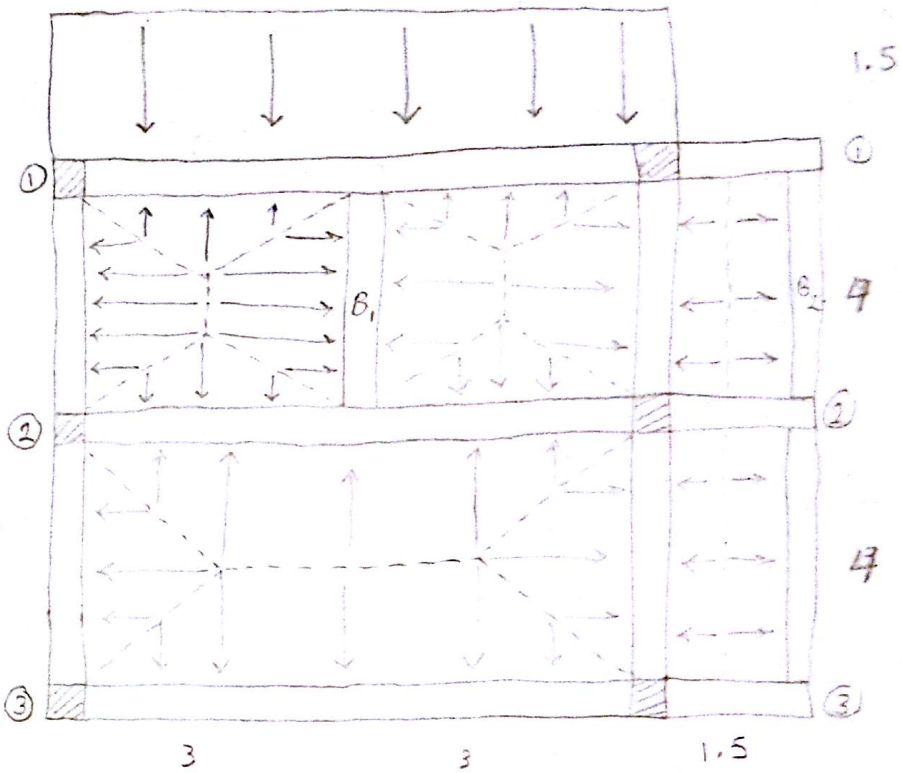
room F.C = 1.5 kN/m²

Live load = 2.0 kN/m²

Walls intensity = 3.0 kN/m²

Floor height = 3 m

section



Solution

* Draw load distribution of all slabs ?

* Calculate loads on beame Axe (2-2) ?

For Beam Axe (2-2)

③ o.w = $\gamma_{conc} * b * (t - t_s)$

= 25 * 0.25 (0.7 − 0.12) = 3.6 kN/m`

② w.w = $\gamma_{brick} * h_w$

= 3 * (3 − 0.7) = 6.9 kN/m`

③ Loads on slap

$\partial_s = \gamma_{conc} * t_s + F.C$

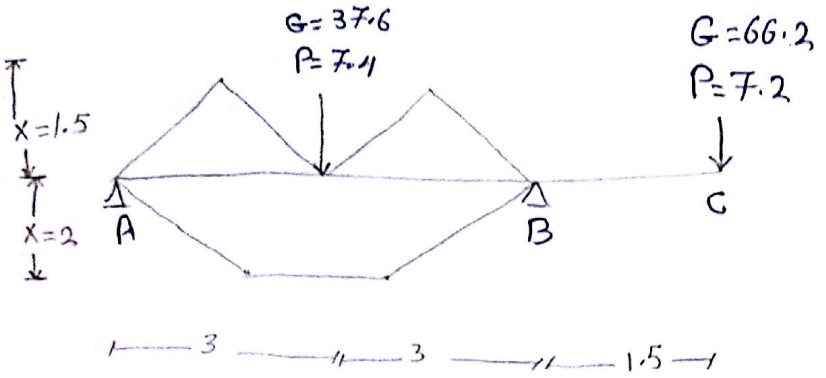
= 25 * 0.12 + 1.5

= 4.5 kN/m²

P_s = L.L = 2 kN/m²

2

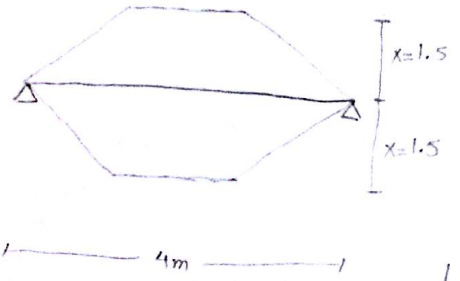
Beam AX (2-2)



Beam (B1)

$$\frac{L}{2X} = \frac{4}{2\times1.5} = 1.33$$

من الجدول ص ٦٨



$\alpha = 0.803$

$\beta = 0.615$

عند حساب رد فعل كمرة يتم حساب (Load for shear) وفقط لها إذا كان لها (moment) و (shear)

Load for shear

$$g = ow + w_w + (g_s \cdot \beta \cdot X) * 2$$

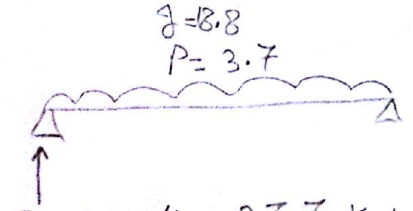
$$= 3.6 + 6.9 + (4.5 * 0.615 * 1.5) * 2$$

$$= 18.8 \text{ kN/m}$$

$$P = (P.S * \beta * X) * 2$$

$$= 2 * 0.615 * 1.5 * 2$$

$$= 3.7 \text{ kN/m}$$



$$G = 18.8 * \frac{4}{2} = 37.7 \text{ kN}$$

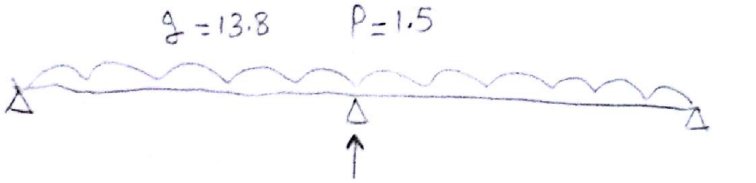
$$P = 3.7 * \frac{4}{2} = 7.4 \text{ kN}$$

3

Beam 2

$$q = ow + ww + q_s \cdot X = 3.6 + 6.9 + 4.5 * 0.75 = 13.8$$

$$P = P_s \cdot X = 2 * 0.75 = 1.5$$



$G = 1.2 * q * L = 1.2 * 13.8 * 4 = 66.2$

$P = 1.2 * P * L = 1.2 * 1.5 * 4 = 7.2$

Beam AXe (2-2)

Part BC

$$q = ow + wL = 3.6 + 6.9 = 10.5 \ kN/m'$$

$$P = 0.0$$

Part AB

$$\frac{Area}{span} = \frac{2\Delta}{span} = \frac{2 * 0.5 * 3 * 1.5}{6} = 0.75$$

for $\trapezium \Rightarrow \frac{L}{2X} = 1.5$ → $\alpha = 0.853$, $\beta = 0.667$

Load for Shear

$$q = ow + ww + q_s * \left[\beta X + \frac{Area}{span}\right]$$

$$= 3.6 + 6.9 + 4.5 * [0.667 * 2 + 0.75] = 19.9$$

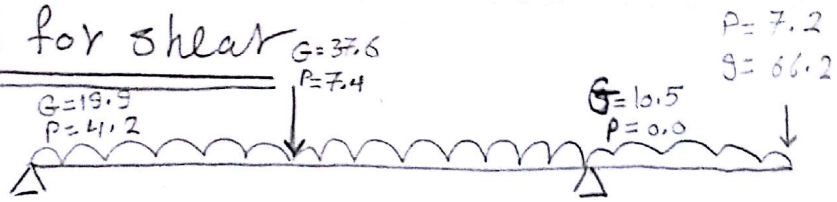
$$P = P_s * \left[\beta X + \frac{Area}{span}\right] = 2 * [0.667 * 2 + 0.75] = 4.2$$

Load for moment

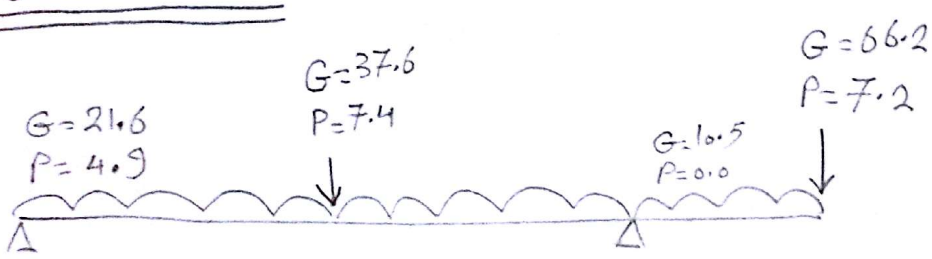
$$q = ow + ww + q_s * \left[\alpha X + \frac{Area}{span}\right] = 21.6$$

$$P = 4.9$$

Load for shear



Load for moment



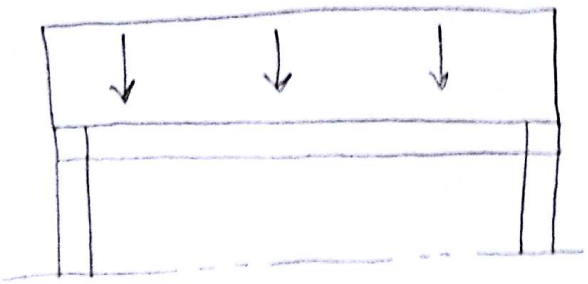
Case of total load only

حالة ال ult ، ult فقط

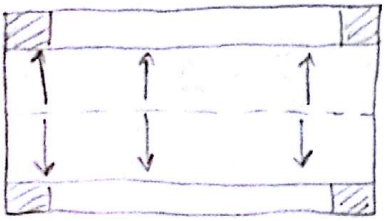
*لما يكون موجود حمل ميت فقط على الكمرة أضربه في (1.4)

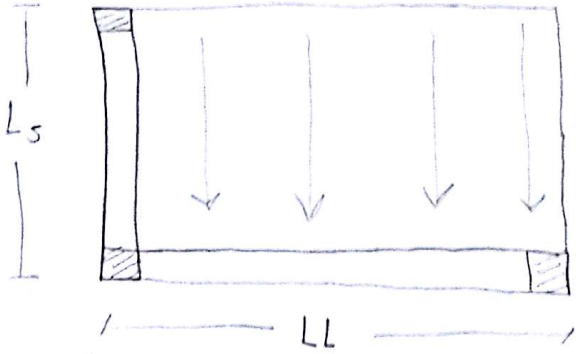
load dist. cases

1 one beam



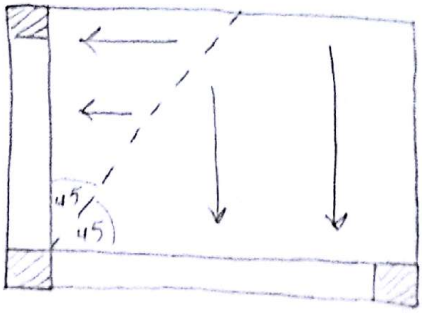
2 two beam





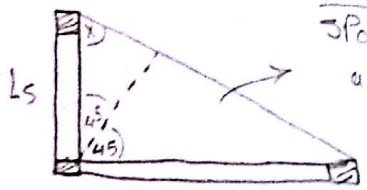
if $\frac{LL}{Ls} > 2.0$

∴ الحمل يذهب للكمرة الطويلة



$\frac{LL}{Ls} < 2.0$

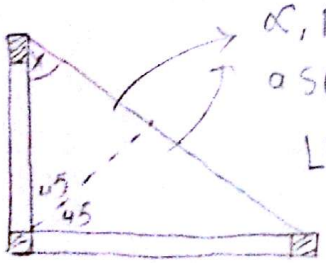
$\frac{Area}{span}$ يتوزع كالآتي ويحسب



$\frac{Area}{span}$

$\alpha(X) \neq 45^\circ$

$LL > Ls$



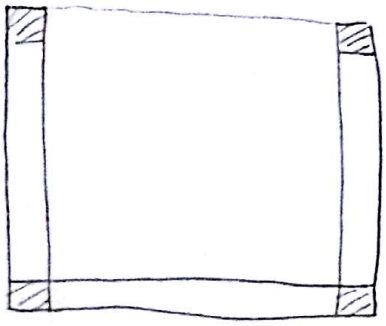
α, β

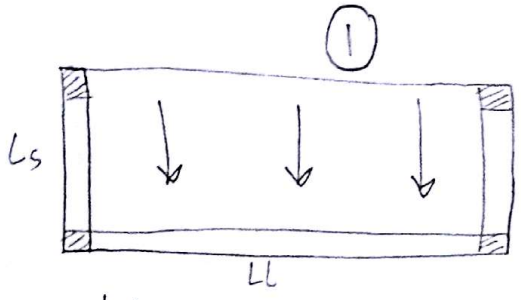
$\alpha(X) = 45^\circ$

$LL = Ls$

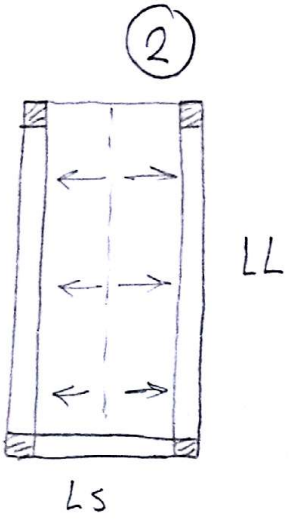
6/

[3] three beems

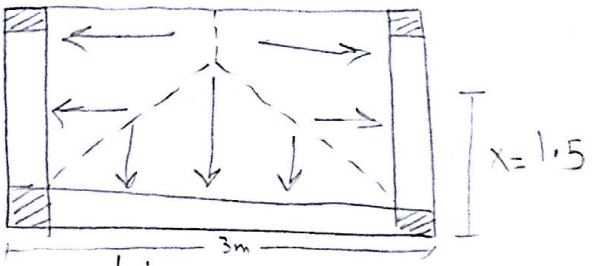




$\frac{LL}{Ls} > 2$

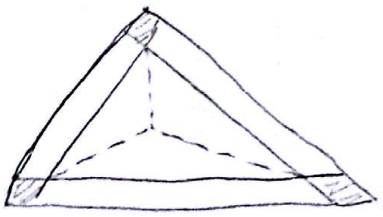


if $\frac{LL}{Ls} > 2$ (one way)



$\frac{LL}{Ls} < 2$

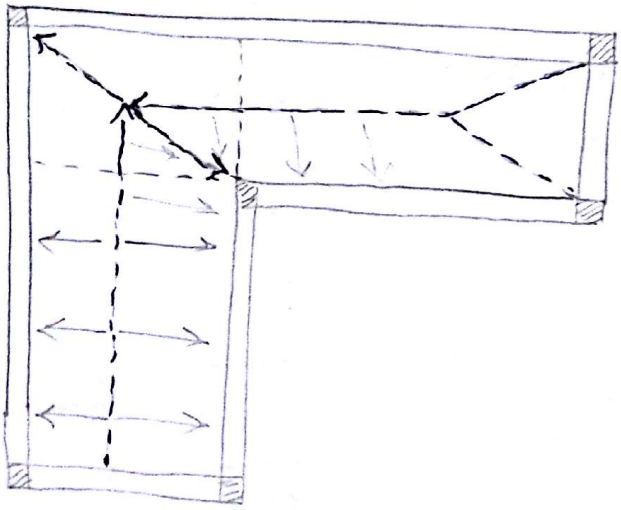
[3] الكمرات الثلثة

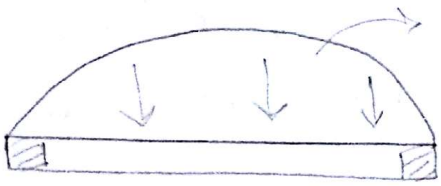


Area / span

Area = $\frac{1}{3}$ △

7





$$\frac{\text{Area}}{\text{Span}}$$