بسم الله الرحمن الرحيم

Slabs

* one or tow way slab :-

$r = \frac{L_L}{L_s} > 2 \rightarrow$ one way

طول ← L_L

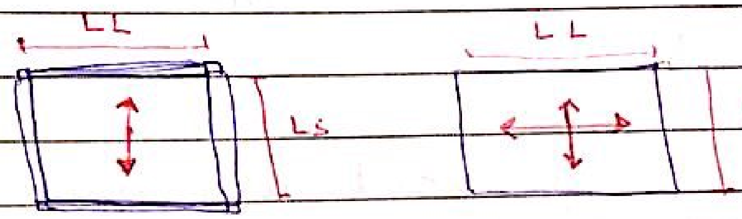
قصير ← L_s

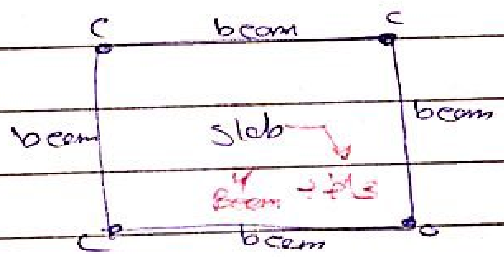
توزيع ال load ال slab يكون في الاتجاه القصير ← يروح لل Beam اللي في L_L اللي طولها

$r = \frac{L_L}{L_s} \le 2 \rightarrow$ tow way

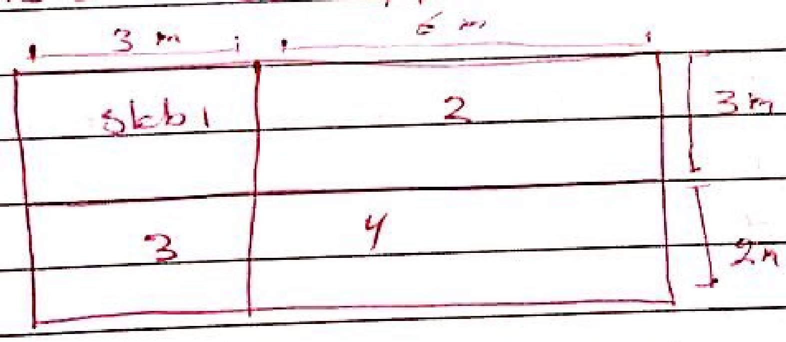
توزيع ال load ال slab يكون في الاتجاهين الطويل ← كل ال Beam

load الها





Example : Select types of slabs



For slab 1 $\quad r_1 = \frac{3}{3} = 1 < 2 \rightarrow$ tow way

slab 2 $\quad r_2 = \frac{6}{3} = 2 \le 2 \rightarrow$ tow way

slab 3 $\quad r_3 = \frac{3}{2} = 1.5 < 2 \rightarrow$ tow way / slab 4 $\quad r_4 = \frac{6}{2} = 3 > 2$ one way

Slabs

بسم الله الرحمن الرحيم

تحليل ال Slab ، Beam ، column

↳ اول شي لازم اكون عارفة نوع ال slab ← مقطع ، type ← one or two way

way → بنطلع حساب ال r

* one way solid slab
(توزيع ال load — التوزيع)

↓ $r = \frac{L_L}{L_s} > 2$

for simply supported

١- لازم اعرف ال Load. ال slab نفسه

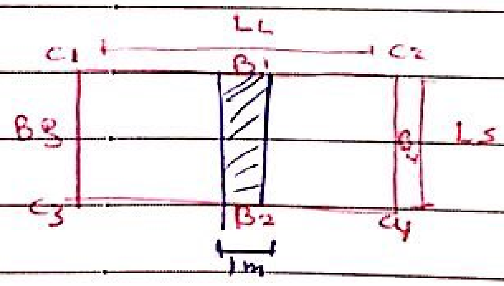
$\boxed{W_s = W}$ → الوزن الي عطيته نأخذه

*Note → $W_s > W_L$ → لانو توزيع ال load بال short Direction

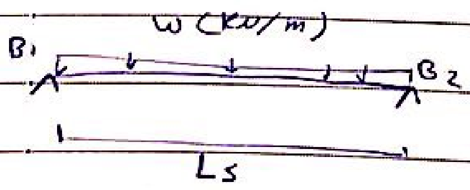
* slab Analysis :

١- انا أخذ strip بـ 1m بال short Direction ، $w = w \times 1m = kN/m'$

٣- نجد ال max V ، max M



$W = w \times 1m = kN/m'$



$V_{max} = \frac{wL}{2}$

$M_{max} = \frac{wL^2}{8}$

* Beam Analysis :- 2-Type → a. major   b. secondary

load تاخد ال +

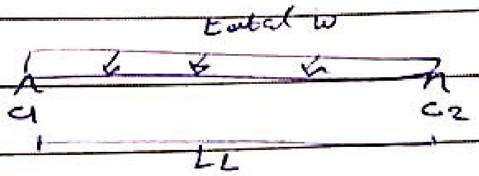
a. beam major → Beam in Long Direction

$w = \frac{w\, L_s\, L_L}{2\, L_L}$.١

total $w = w + w_{beam}$ ٢- قيمة

٣. نجيب V_{max} / M_{max}

B1 & B2



$V = \frac{wL}{2}$ $M = \frac{wL^2}{8}$

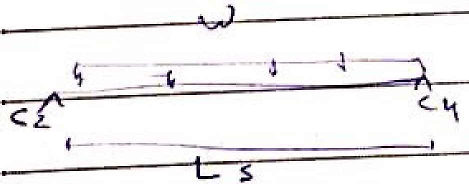
~~load تاخد ال~~

b. beam secondary → Beam in short Direction

L = own weight .١

٢. V, M

B3 & B4



$V = \frac{wL}{2}$ $M = \frac{wL^2}{8}$

* colum Analysis :- عشان نجيب الـ load من الـ Beam
نجيب الـ shear الأكبر للـ Beams اللي ماشية

C = shear for Beam

→ Axial load

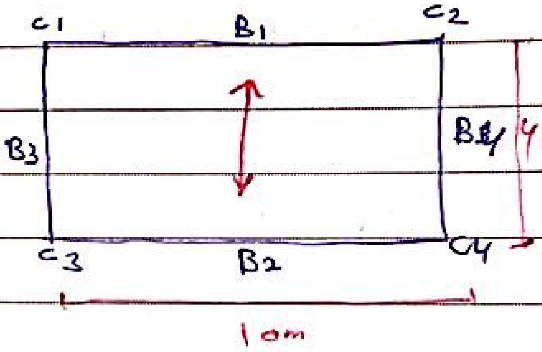
بسم الله الرحمن الرحيم

loaded slab

النوع

*Example:- For $\boxed{\text{solid slab}}$, load on floor $\boxed{w = 20\,kN/m^2}$, own weight for each beam $= \boxed{5\,kN/m'}$, determines

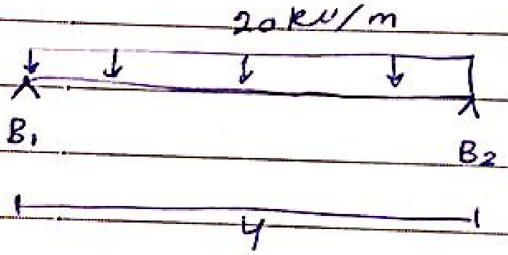
1. V_{max} & M_{max} in slab.
2. " " " " B_1.
3. " " " " B_4.
4. total axial load on C_2, C_3



Sol:-

$r = \frac{10}{4} = 2.5\,m > 2\,m \rightarrow$ one way

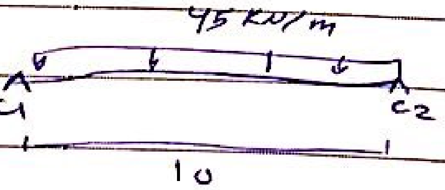
1. $w = 20 * 1 = 20\,kN/m'$



$V_{max} = \frac{20 * 4}{2} = \boxed{40\,kN}$

$M_{max} = \frac{20 * 4^2}{8} = \boxed{40\,kN}$

2. $w = \frac{20 * 4 \times 10}{2 * 10} = 40\,kN/m$ $\quad w_t = 40 + 5 = 45\,kN/m$



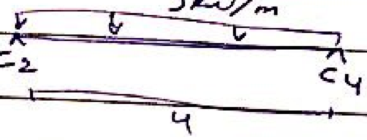
$V_{max} = \frac{45 \times 10}{2} = \boxed{225\,kN}$

$M = \frac{45 \times 10^2}{8} = \boxed{562.5\,kN.m}$

بسم الله الرحمن الرحيم

(0)

3. $w = 5\,kN/m$



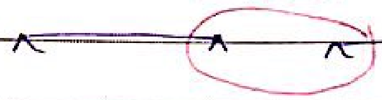
$V = \frac{5 \times 4}{2} = \boxed{10\,kN}$

$M = \frac{5 \times 4^2}{8} = \boxed{10\,kN.m}$

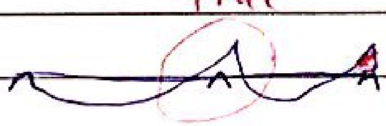
4. $C_2 = 225 + 10 = 235$

For Continuous Beam :-

False ← الفعلي



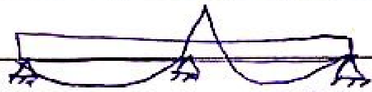
True



* Equations :-

a. 2-Beam "Continuous"

$-\,wL^2/8$



$+\frac{wL^2}{10}$ $+\frac{wL^2}{10}$

b. 3 or more Beam "Continuous"

$-\,wL^2/10$ $-\frac{wL^2}{12}$ $-\frac{wL^2}{10}$

$+\frac{wL^2}{10}$ $+\frac{wL^2}{12}$ $+\frac{wL^2}{12}$ $+\frac{wL^2}{10}$

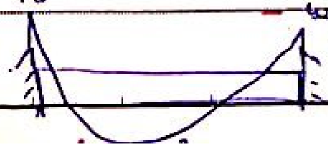
c. hinge - fixed

$-\frac{wL^2}{8}$

$+\frac{9wL^2}{128}$

E. Fixed - Fixed

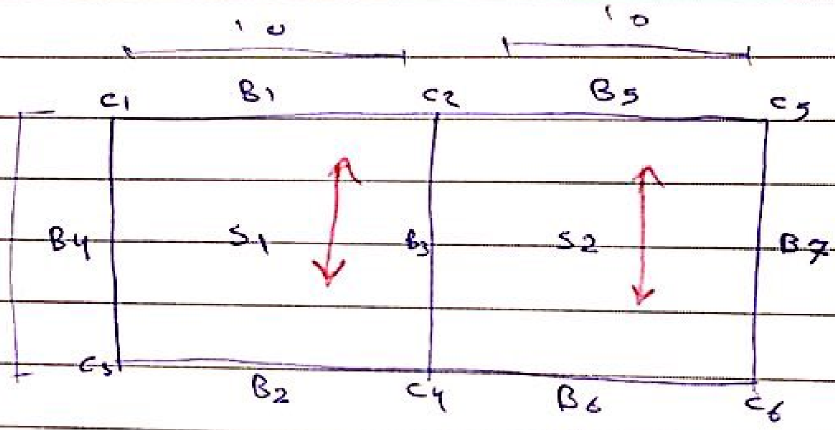
$-\frac{wL^2}{10}$ $-\frac{wL^2}{10}$



بسم الله الرحمن الرحيم

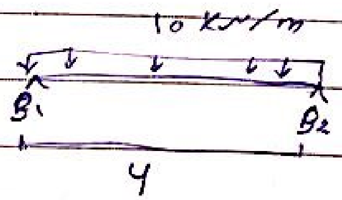
* Example : for $\boxed{\text{soild slab}}$, $\boxed{w_1 = 10\ kN/m^2}$, $w_2 = 20\ kN/m^2$
own wieght for Beam = $\boxed{8\ kN/m^2}$, determine:

1. V and M_{max} for S_1
2. // // // S_2
3. // // // B_1
4. // // // B_5
5. Axial load for C_2, C_6



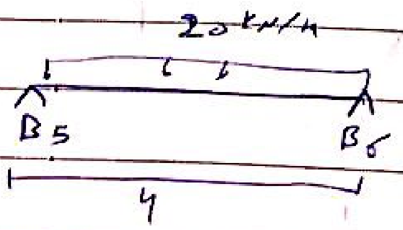
$r = \frac{10}{4} = 2.5\ m > 2m \rightarrow$ one way

1. S_1 $w = 10 \times 1 = 10\ kN/m'$



$V = \frac{10 \times 4}{2}$ $M = \frac{10 \times 4^2}{8}$

2. S_2 $w = 20 \times 1 = 20\ kN/m$



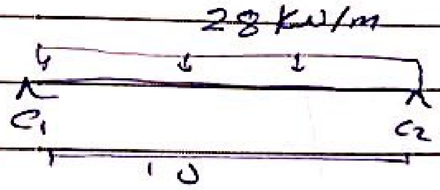
$V = \frac{20 \times 4}{2}$ $M = \frac{20 \times 4^2}{2}$

بسم الله الرحمن الرحيم

Slabs

3. **B1** $w = \frac{10 \times 10 \times 4}{2 \times 10} = 20\ kN/m$

total $w = 20 + 8 = 28\ kN/m$



$V_{max} = \frac{28 \times 10}{2}$

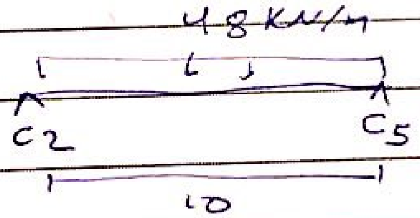
تأخذ الأكبر

$M_{max}^{+} = \frac{28 \times 10^2}{10}$,

$M_{max}^{-} = \frac{28 \times 10^2}{8}$.

4. **B5** $w = \frac{20 \times 10 \times 4}{2 \times 10} = 40\ kN/m$

total $w = 40 + 8 = 48\ kN/m$



$V_{max} = \frac{48 \times 10}{2}$

تأخذ الأكبر

$M_{max}^{+} = \frac{48 \times 10^2}{10}$

$M_{max}^{-} = \frac{48 \times 10^2}{8}$

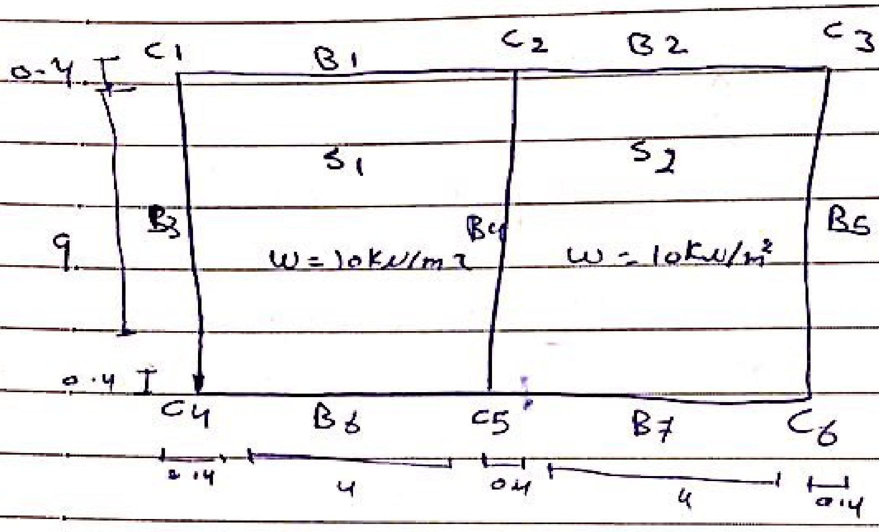
5. C_2 = shear B_1 + shear B5 + shear B_3

C_6 = shear B7 + shear B6

بسم الله الرحمن الرحيم

Example 2:-

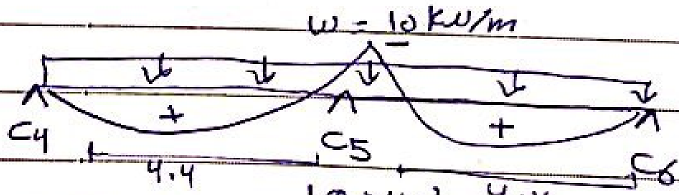
1. Max bending moment
2. B4, B1 Calculate shear and M o.w = 4 kN/m



sol: $r = \frac{9.4}{4.4}$ → center to center

$= 2.136 > 2$ → one way / solid slab

slab:- $w = 10 \times 1 = 10$ kN/m



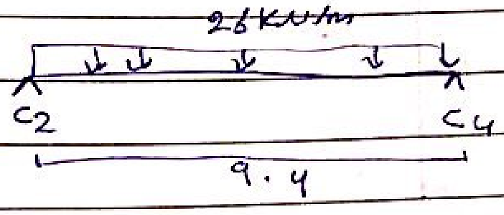
$+ve\ M = \frac{10 \times 4.4^2}{10} = 19.36$ kN.m

$-ve\ M = \frac{10 \times 4.4^2}{8} = 24.2$ kN.m

Beams :-

B4 $w = \dfrac{10 * 4.4 * 9.4}{2 * 9.4} = 22\ kN/m$ from S1 & S2

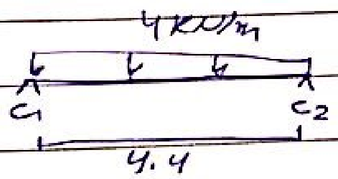
total $w = \cancel{22} 22 + 4 = \cancel{26}\ 48\ kN/m$



$V = \dfrac{\cancel{26}\ 48 * 9.4}{2} = 225.6$

$M = \dfrac{48 * 9.4^2}{8} = 530.16$

B1 $w = 4\ kN/m$



$V = \dfrac{4 * 4.4}{2} = 8.8\ kN/m$

$M = \dfrac{4 * 4.4^2}{8} = 9.68\ kN.m$

* Girders :-

كمرة يكون عليها طول البلاطة ولا يوجد فيه Colum Beam

G رمزه

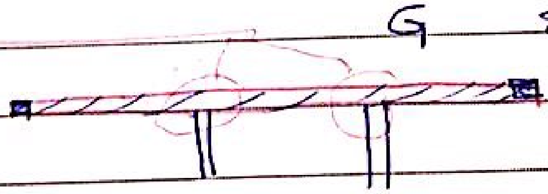
Beam لا يعتمد على

اكثر من Beam

reaction shear

جاي من ال Beams الاربعة

الراكبات عليه

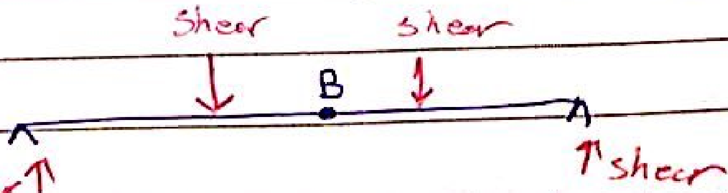


* طريقة حل الوسط فيه

١. نقطع الـ M عادي

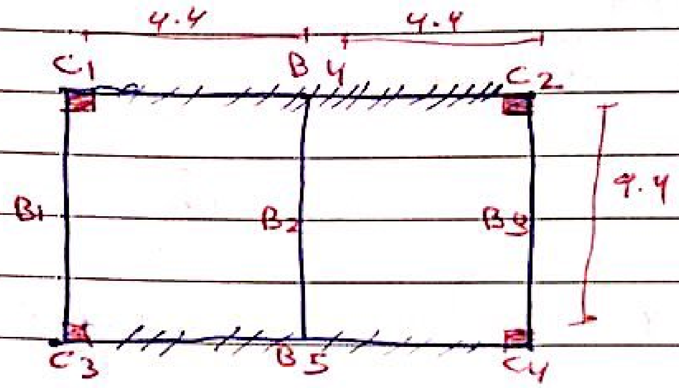
٢. نرسم شكل ومنه نرسم M

٣. نأخذ سكشن عند الـ B

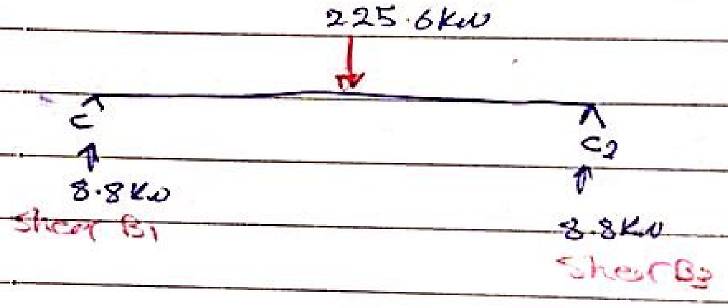


Example 3:-

Calculate shear force in C_1 & C_2 from B4



C_1 = shear B_1 + shear B4

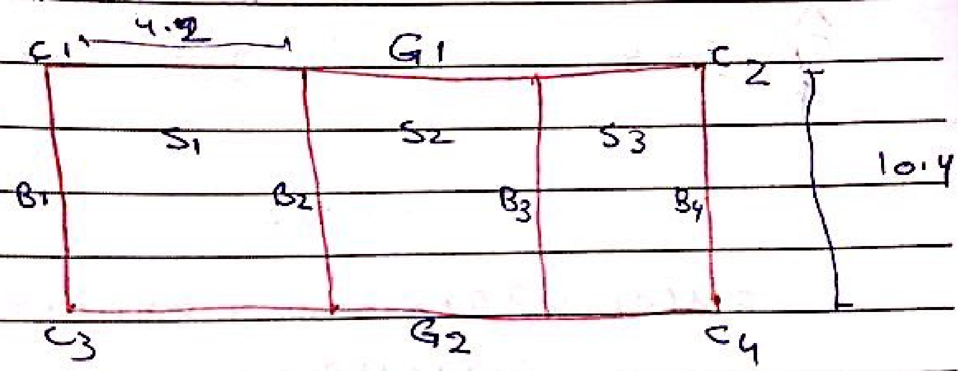


$$C_1 = \frac{4 \times 8.8}{2} + \frac{225.6}{6} = 130.4\ kN$$

Scanned with CamScanner

Example 4:

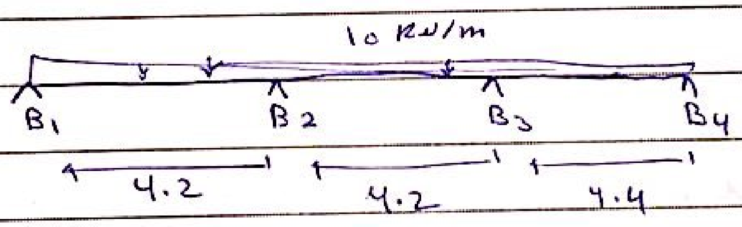
$w = 10\ kN/m^2$



$r = \frac{10.4}{4.2} = 2.476 > 2 \Rightarrow$ oneway / Solid slab

Slab :-

$w = 10 \times 1 = 10\ kN/m$



$+ve\ M = \frac{10 \times 4.2^2}{10} = 17.64\ kN.m$

$-ve\ M = \frac{10 \times 4.2^2}{12} = 14.7\ kN.m$

.Beam :-

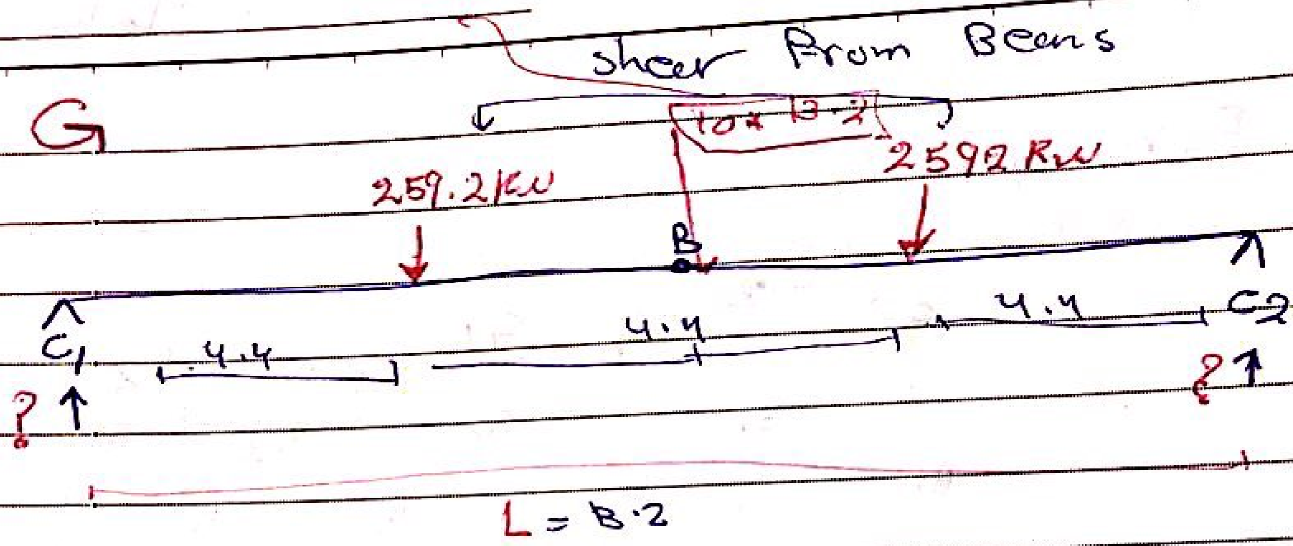
B_1 $w = \frac{10 \times 4.2 \times 10.4}{2 \times 10.4} = 21\ kN/m$ $V = \checkmark$ $M = \checkmark$

total $w = 21 + 4 = 25\ kN/m$

B_3 $w = \frac{10 \times 4.2 \times 10.4}{2 \times 10.4} = 21$ from S_2 & S_3 $V = \checkmark$

total $= 21 + 21 + 4 = 46\ kN/m$ $M = \checkmark$

$ow * \frac{1}{2} L$



$\Sigma M_{C1} = 259.2 \times 4.4 + 259.2 * 8.8 + 10 * 13.2 * \frac{1}{2} * 13.2$

$= C_2 \times 13.2$

$C_2 = 325.2 = C_1 \rightarrow$ reaction or shear from G_1

total $C_2, C_1 = 325.2 + \underbrace{140.4}_{\text{shear from } B_1, B_4} = 465.6$

M form G:

Sol 1: $\Sigma M_B = 0$: $M * -325.2 \times 6.6 + 259 * 2.2 + 10 * 6.6 * 3.3 = 0$

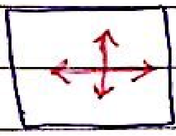
$M = 1358.28$ kN.m

sol 2:

بسم الله الرحمن الرحيم

Tow way solid slab

$r = \frac{L_L}{L_s} \le 2$, solid slab



Load يتوزع بالاتجاهين

لذلك W_s ينقسم W_L

$W_L = \frac{W}{1+r^4}$ $\qquad$ $W_s = \frac{W r^4}{1+r^4}$

$W = W_s + W_L$

* slab :- 1. W_s, W_L

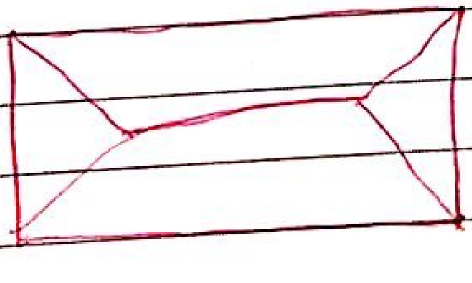
٢. ناخذ strip 1m ← بال s و ال L

٣. نجد M , V

short : $V = \frac{W_s L_s}{2}$ $\qquad$ $M = \frac{W_s L_s^2}{8}$

Long : $V = \frac{W_L L_L}{2}$ $\qquad$ $M = \frac{W_L L_L^2}{8}$

* Beam :-



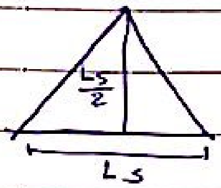
كل ال Beam يجيها load

لكن يختلف توزيع الـ load

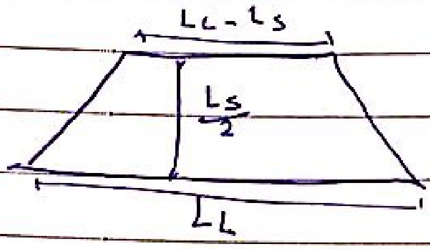
بالاتجاه القصير يجيله الأكثر

و ال الطويل ال اقل

* Beams:



$$A = \frac{1}{2} \times L_s \times \frac{L_s}{2} = \frac{L_s^2}{4}$$



$$A = \frac{1}{2}\left(L_L + (L_L - L_s)\right) \times \frac{L_s}{2}$$

B_1, B_2 الرئيسي

كال مفصل

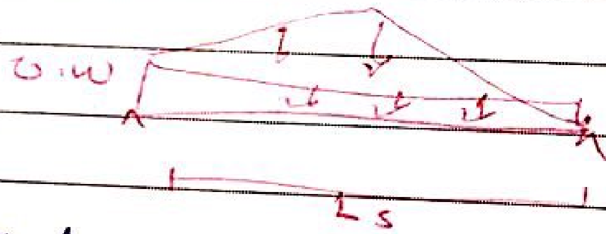
$$V_{max} = \frac{o.w\, L_L}{2} + \frac{w \times \text{Area}}{2}$$

$$M_{max} = (o.w + EUDL)\frac{L^2}{8}$$

$$EUDL = \frac{w\, L_s\, r}{2+r} = kN/m$$

kN/m^2 , m

B_3, B_4 الثانوي



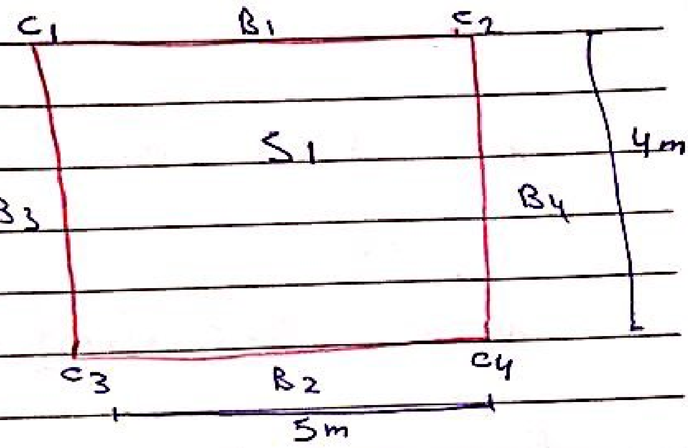
$$V_{max} = \frac{o.w\, L_s}{2} + \frac{w \times A_{\Delta}}{2}$$

$$M_{max} = (o.w + EUDL)\frac{L^2}{8}$$

$$EUDL = \frac{w\, L_s}{3}$$

Example 5:-

$w = 20\ KN/m^2$

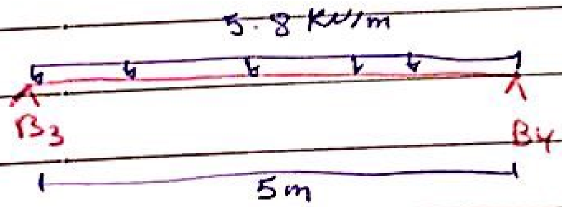


$r = \frac{5}{4} = 1.25 < 2 \rightarrow$ tow way / soild slab

* slab :-

Long

$W_L = \frac{20}{1+1.25^4} = 5.8\ KN/m$

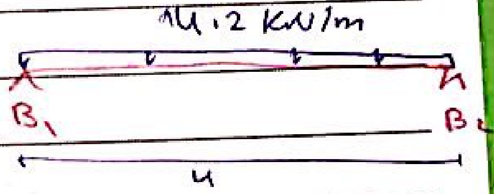


$V = \frac{5.8 * 5}{2} = 14.5\ KN$

$M = \frac{5.8 * 5^2}{8} = 18.125\ KN.m$

Short

$w_s = \frac{20 * 1.25^4}{1+1.25^4} = 14.2\ KN/m$

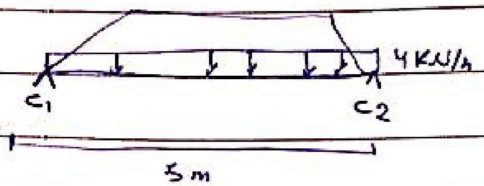


$V = \frac{14.2 \times 4}{2} = 28.4\ KN$

$M = \frac{14.2 * 4^2}{8} = 28.4\ KN.m$

بسم الله الرحمن الرحيم

*** Beam sq — from B_1, B_2**



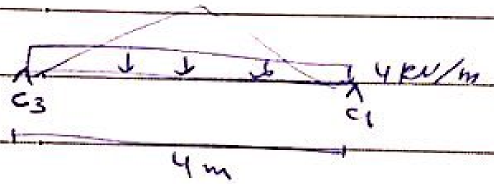
$$V = \frac{4 \times 5}{2} + \frac{20 \times 6}{2} = 70\,KN$$

$$M = (4 + 30.77) \times \frac{5^2}{8} = 108.6\,KN.m$$

$$\text{Area} = \frac{1}{2} \times (5+1) \times \frac{4}{2} = 6$$

$$E_4 = \frac{20 \times 4 \times 1.25}{2 + 1.25} = 30.77\,KN.m$$

from B_3, B_4



$$V = \frac{4 \times 4}{2} + \frac{20 \times 4}{2} = 48\,KN$$

$$M = (4 + 26.667) \times \frac{4^2}{8} = 61.33\,KN.m$$

$$\text{Area}\ \Delta = \frac{1}{2} \times 4 \times \frac{4}{2} = 4$$

$$E_4 = \frac{20 \times 4}{3} = 26.667$$

C_1, C_2 shear

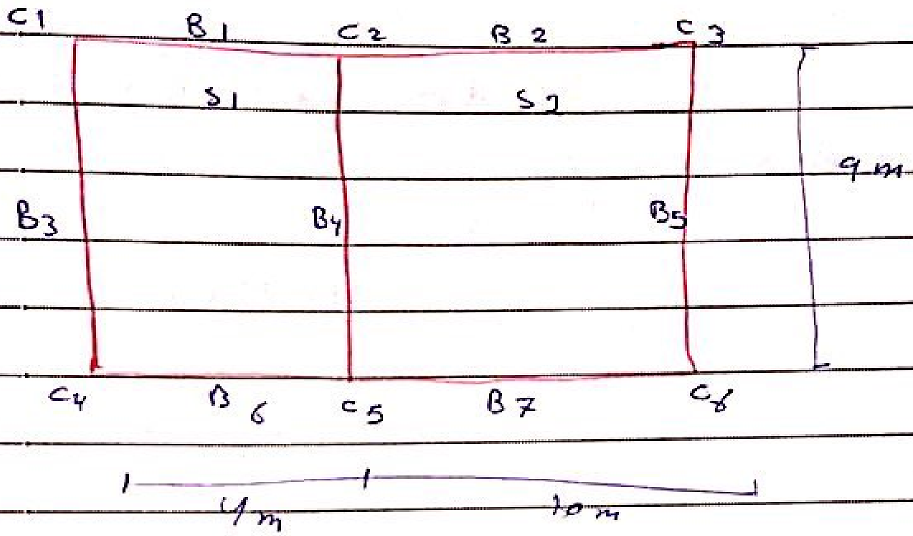
c_1 = shear B_3 + shear B_1 = 48 + 70 = 118 KN

c_2 = shear B_1 + shear B_4 = 70 + 48 = 118 KN

Example 6:-

خط الاحتمال

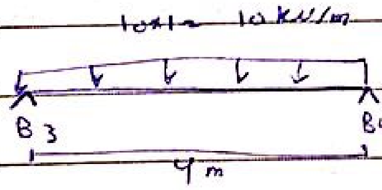
$W = 10\ kN/m^2$, $ow = 4\ kN/m$



Slab 1

$r = \frac{9}{4} = 2.25 > 2 \rightarrow$ one way

one way / soild slab



$V = \frac{10 \times 4}{2} = 20\ kN$ $M = \frac{10 \times 4^2}{8} = 20\ kN.m$

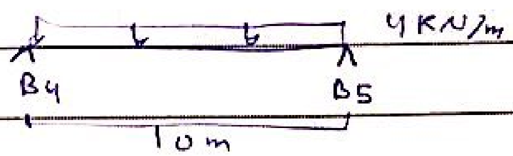
slab 2

$r = \frac{10}{9} = 1.11 < 2 \rightarrow$ tow way

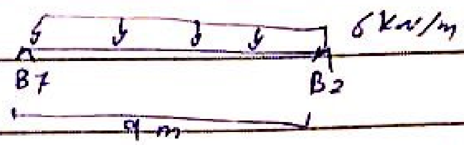
tow way / soild slab

$W_s = \frac{10 \times 1.11^4}{1 + 1.11^4} = 6\ kN/m$

$W_L = \frac{10}{1 + 1.11^4} = 4\ kN/m$



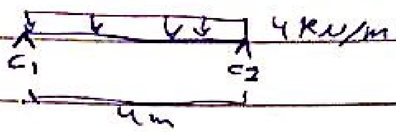
$V = \frac{4 \times 10}{2} = 20\ kN$ $M = \frac{4 \times 10^2}{8} = 50\ kN.m$



$V = \frac{6 \times 9}{2} = 27\ kN$ $M = \frac{6 \times 9^2}{8} = 60.75\ kN.m$

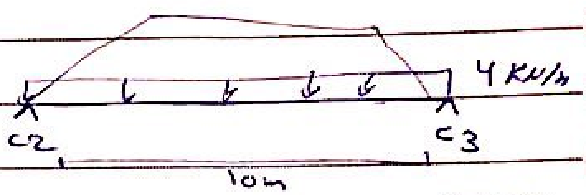
بسم الله الرحمن الرحيم

B_1 , B_6



$V = \frac{4 \times 4}{2} = 8\,KN$ $\quad M = \frac{4 \times 4^2}{8} = 8\ KN.m$

B_2 , B_7



$A_{\text{trapezoid}} = \frac{1}{2} \times (10+1) \times 4.5 = 24.75$

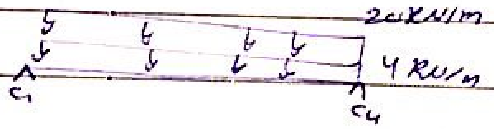
$V = \frac{4 \times 10}{2} + \frac{10 \times 24.75}{2}$

$= 143.75\ KN$

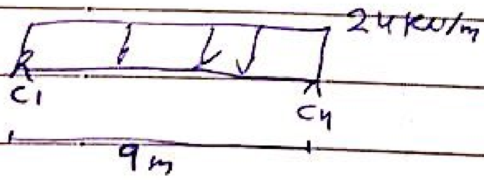
$Eu\,BM = \frac{20 \times 9 \times 1.11}{2 + 1.11} = 64.2\ KN.m$

$M = (4 + 64.2) \times \frac{10^2}{8} = 853\ KN.m$

B_3



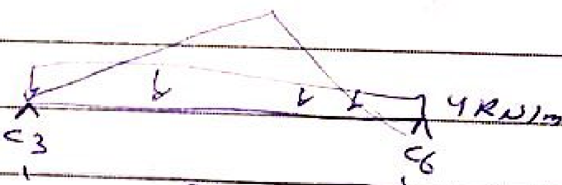
$W = \frac{10 \times 4 \times 9}{2 \times 9} = 20\ KN/m$



$V = \frac{24 \times 9}{2} = 108\ KN$ $\quad M = \frac{24 \times 9^2}{8}$

$= 243\ KN.m$

B_5



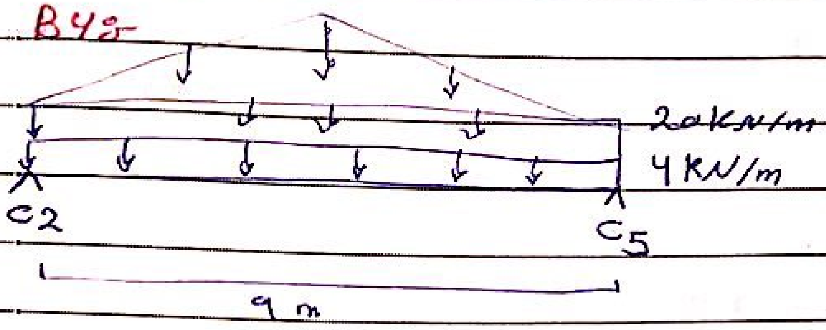
$Area\ \Delta = \frac{1}{2} \times 9 \times 4.5 = 20.25$

$V = \frac{5 \times 9}{2} + \frac{10 \times 20.25}{2} = 123.75\ KN$

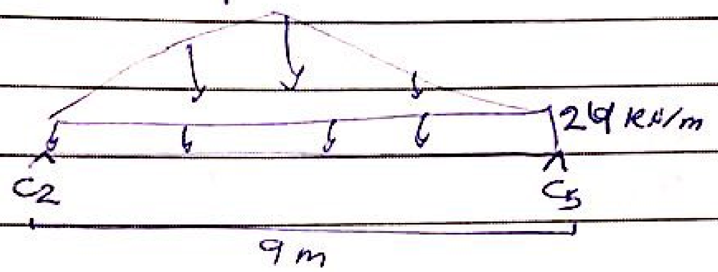
$Eu.\,BM = \frac{10 \times 9}{3} = 30$

$M = (4 + 30) \times \frac{9^2}{8} = 344.25\ KN.m$

B4:-



$$w = \frac{10 \times 9 \times 9}{2 \times 9} = 20 \ kN/m$$



$$A_\Delta = \frac{1}{2} \times 9 \times 4.5 = 20.25$$

$$V = \frac{24 \times 9}{2} + \frac{10 \times 20.25}{2} = 209.25 \ kN$$

$$Eq. BM = \frac{10 \times 9}{3} = 30$$

$$M = (24 + 30) \times \frac{9^2}{8} = 546.75 \ kN.m$$

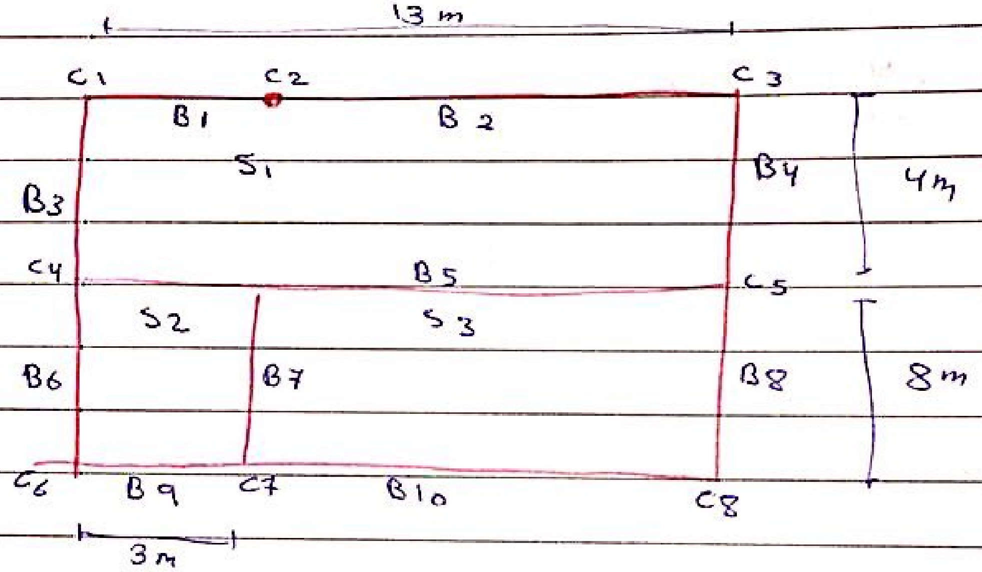
بسم الله الرحمن الرحيم

* خط الاستقرارية:-

* احجز سؤالين

Example 7:-

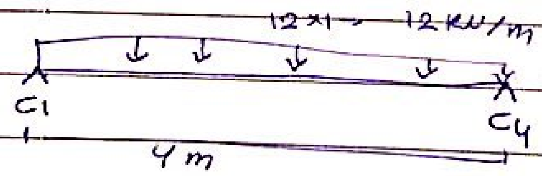
$w = 12\ KN/m^2$, $o.w = 6\ KN/m$



* For slab 1 :-

$r = \frac{13}{4} = 3.25 > 2 \rightsquigarrow$ one way

one way / solid slab

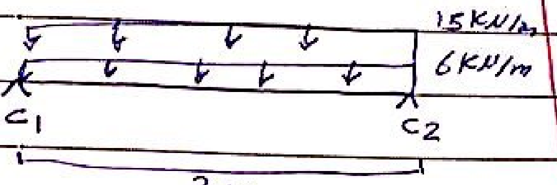


$V = \frac{12 * 4}{2} = 24\ KN$

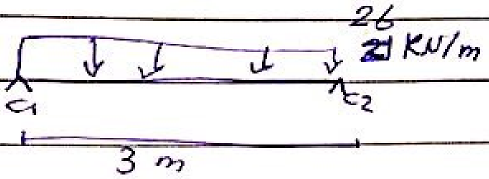
$M = \frac{12 * 4^2}{8} = 24\ KN.m$

Slab 1:-

B1:-



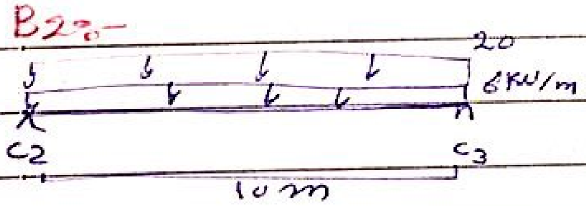
$W = \frac{10 \times 4 \times 13}{2 \times 13} = \cancel{15}\ 20$ KN/m



$V = \frac{26 \times 3}{2} = \cancel{31.5}\ 39$ KN

$M = \frac{26 \times 3^2}{8} = \cancel{23.625}\ 29.25$ KN.m

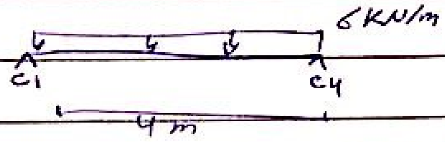
B2:-



$V = \frac{26 \times 10}{2} = 130$ KN

$M = \frac{26 \times 10^2}{2} = 325$ KN.m

B3 , B4 :-



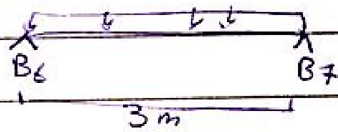
$V = \frac{6 \times 4}{2} = 12$ KN $\quad M = \frac{6 \times 4^2}{8} = 12$ KN.m

Slab 2:-

$r = \frac{8}{3} = 2.66 > 2 \rightarrow$ one way

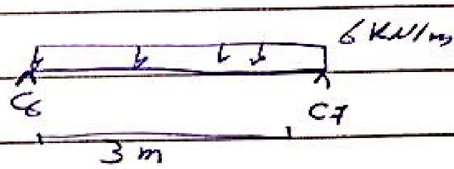
one way / soild slab

$12 \times 1 = 12$ KN/m



$V = \frac{12 \times 3}{2} = 18$ KN $\quad M = \frac{12 \times 3^2}{8} = 13.5$ KN.m

B9:-



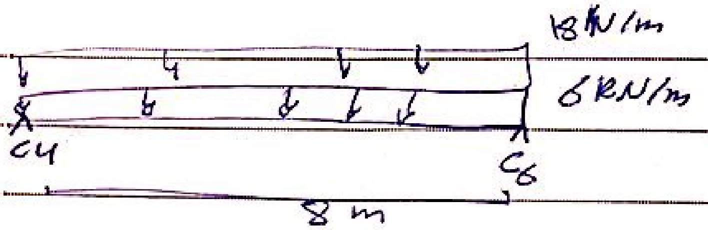
$V = \frac{6 \times 3}{2} = 9$ KN

$M = \frac{6 \times 3^2}{8} = 6.75$ KN.m

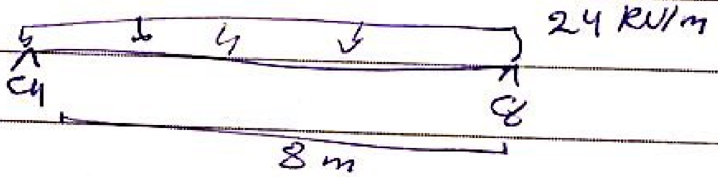
بسم الله الرحمن الرحيم

Slabs

B6:-



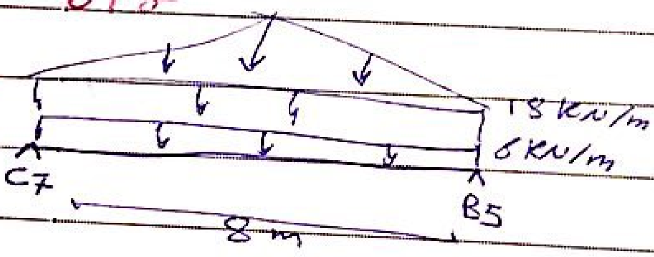
$$W = \frac{12 \times 3 \times 8}{2 \times 8} = 18\ KN/m$$



$$V = \frac{24 \times 8}{2} = 96\ KN$$

$$M = \frac{24 \times 8^2}{8} = 192\ KN.m$$

B7:-



$$A_{\Delta} = \frac{1}{2} \times 8 \times \frac{8}{2} = 16$$

$$V = \frac{24 \times 8}{2} + \frac{12 \times 16}{32} = 192\ KN$$

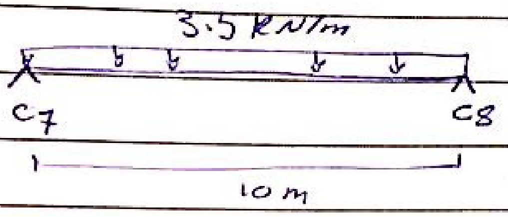
$$E4 = \frac{12 \times 8}{3} = 32$$

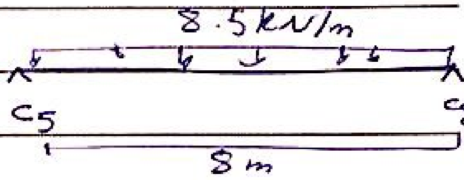
$$M = (24 + 32) \times \frac{8^2}{8} = 448\ KN.m$$

* Slab 3 :-

$r = \frac{10}{8} = 1.25 < 2 \rightsquigarrow$ tow way

tow way / soild slab





$W_L = \frac{12}{1+1.25^4} = 3.5 KN/m$

$W_S = \frac{12 \times 1.25^4}{1+1.25^4} = 8.5 KN/m$

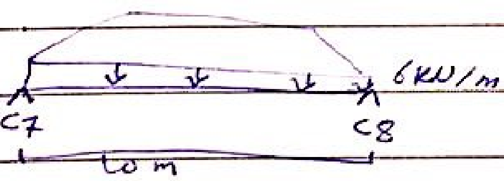
$V = \frac{3.5 \times 10}{2} = 17.5 KN$

$V = \frac{8.5 \times 8}{2} = 34 KN$

$M = \frac{3.5 \times 10^2}{8} = 43.75 KN.m$

$M = \frac{8.5 \times 8^2}{8} = 68 KN.m$

B10 :-



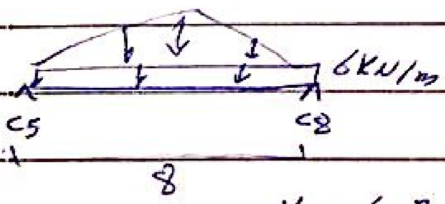
$A_{⏢} = \frac{1}{2} \times (10+2) \times \frac{8}{2} = 24$

$E_4 DL = \frac{12 \times 8 \times 1.25}{2+1.25} = 37$

$V = \frac{6 \times 10}{2} + \frac{12 \times 24}{2} = 174 KN$

$M = (6+37) \times \frac{10^2}{8} = 537.5$

B8 :-



$A_{\Delta} = 16$

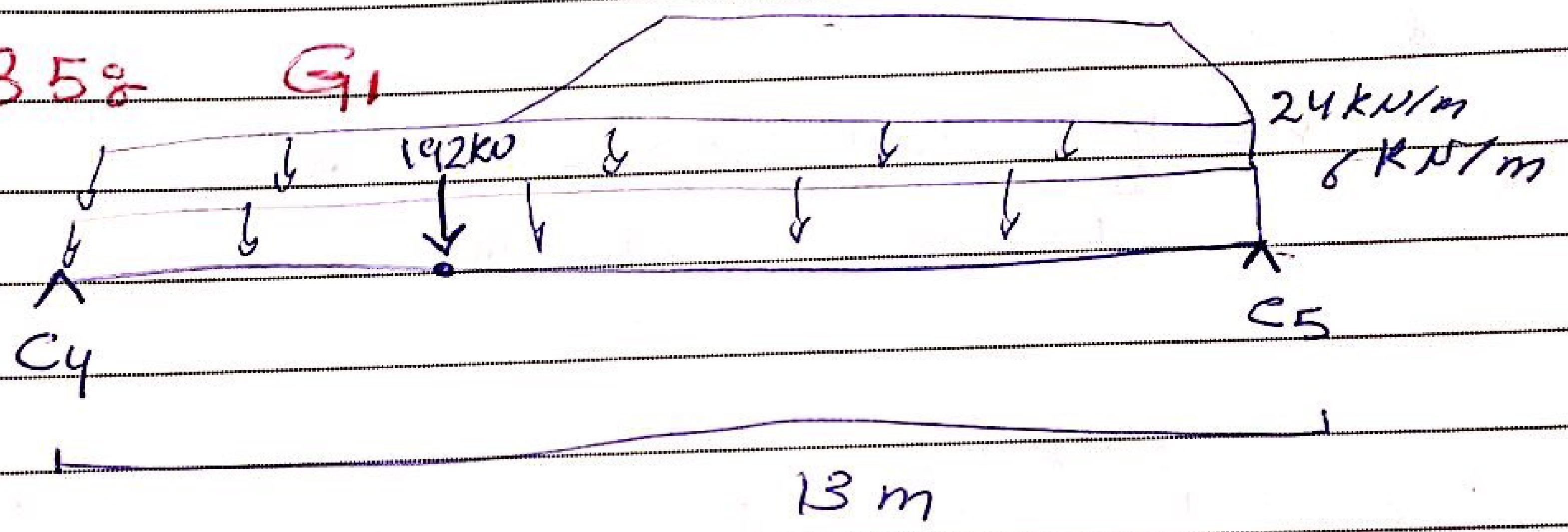
$E_4 . DL = 32$

$V = \frac{6 \times 8}{2} + \frac{16 \times 12}{2} = 120 KN$

$M = (6+32) \times \frac{8^2}{8} = 304 KN.m$

بسم الله الرحمن الرحيم

B 5% G1

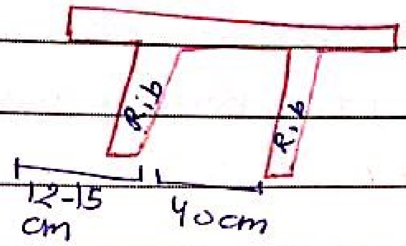


(٢٤)

Hollow slabs:

one way — العصب باتجاه واحد

two way — الـ rib باتجاهين



Study Area

$S = 40 + 12 = 52\,cm$ (rib)

$+ 15 = 55\,cm$

Area by rib = $L_s . S$

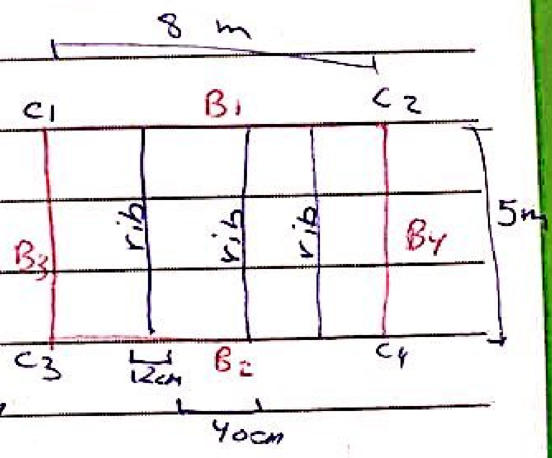
Load for rib = $L_s . S . w$ — ↓ load kN/m^2

Load / m = $w \times S$ — ↓↓↓ kN/m

Example :- $w = 18\,kN/m^2$

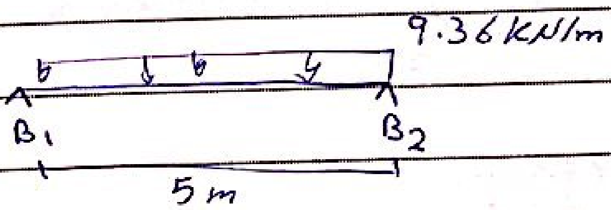
Determine:-

max shear & max M in rib?



$S = 40 + 12 = 0.52\,m$

Load / m $= 18 \times 0.52 = 9.36\,kN/m$



$V = \frac{9.36 \times 5}{2} = 23.4\,kN$ $\quad M = \frac{9.36 \times 5^2}{8} = 29.25\,kN.m$

Slabs

بسم الله الرحمن الرحيم

* one way Ribbed slab:-

اللود ينتقل باتجاه واحد هو الاتجاه القصير اي معناة ان ال Beam
بالاتجاه الطويل يعتبر Beam اساسي ويحمل لود كبير، اما ال Beam
بالاتجاه القصير يعتبر Beam ثانوي ولا يحمل لود الا حمل ال o.w فقط.

* tow way Ribbed slab:-

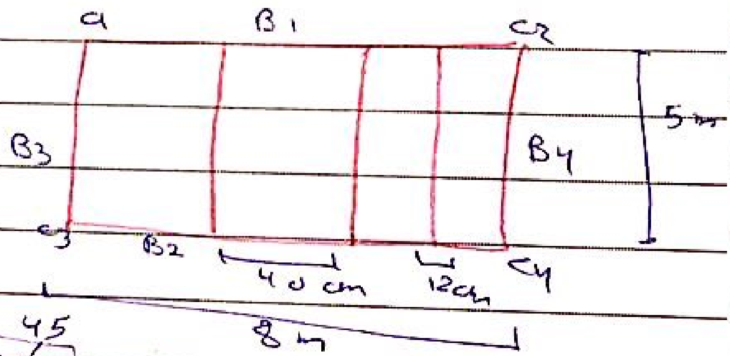
اللود ينتقل بالاتجاهين يعني انه الاربع Beam تحمل لود ولكن
بنسب معينة

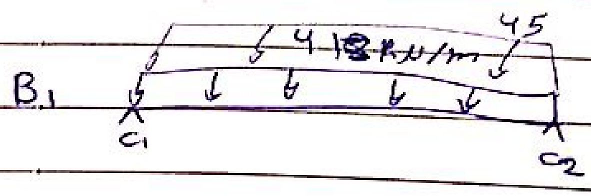
Examples:-

$W = 13\ kN/m^2$

$o.w = 4\ kN/m$

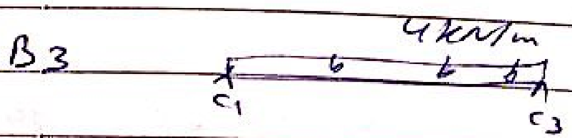
1. V & M B_1
2. V & M B_3
3. Aixal C_1





$W = 45\ kN/m$ $V = \_$

$M = \_$



$V = \_$

$M = \_$

Ex9:-

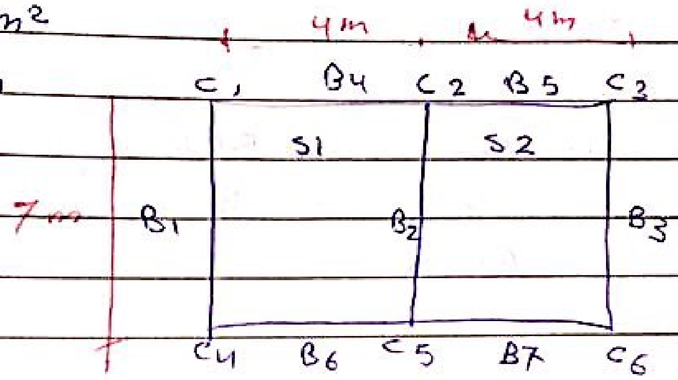
cal max V & M in rib and B2

$w = 12\ kN/m^2$

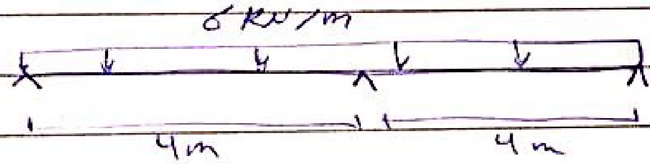
$ow = 4\ kN/m$

$S = 0.4 + 0.1$

$= 0.5\ m$



rib

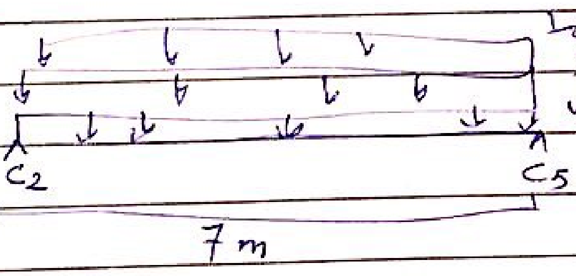


$w \times S$
$= 12 \times 0.5$
$= 6\ kN/m$

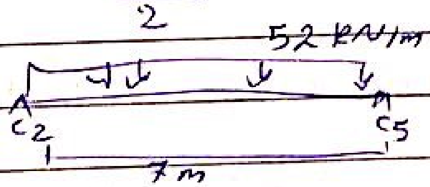
$V = \frac{6 \times 4}{2}$ $\quad M = \frac{6 \times 4^2}{8}$

$= \frac{6 \times 4^2}{10}$

B4



$\frac{1}{2}S_1 = \frac{1}{2}S_2 = \frac{12 \times 4}{2} = 24\ kN/m$



بسم الله الرحمن الرحيم

Ex :-

$w = 20\ KN/m^2$

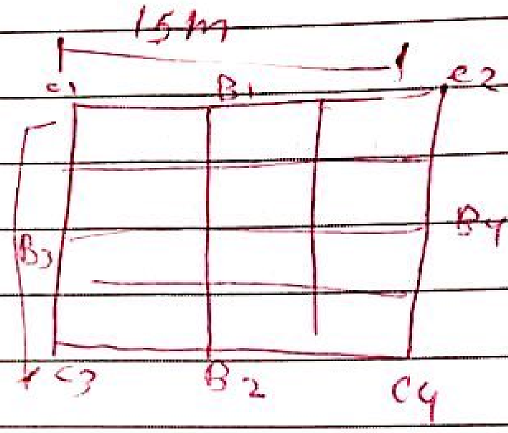
$O.W = 5\ KN/m$

$B_1 = B_2 = 0.75m$

detr :- 1. V_{max} & M_{max} Slab

2. " " " B_1

3. Axial c_2

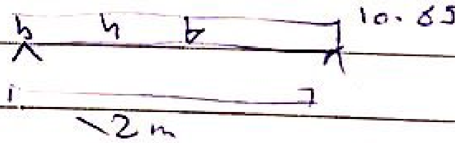


Slab :-

Short

$w_s = 14.2$

$L/rib = 14.2 * 0.75 = 10.65$



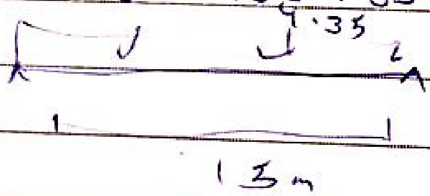
$V = L$

$M = V$

Long

$wL = 5.8$

$5.8 * 0.75 = 4.35$



$V = L$

$M = L$

C_2 = shear B_1 + Shear B_4 oR

$C_2 = \frac{1}{4}$ Load of slab $+ \frac{1}{2}$ load Beam

$\frac{1}{4} * A * w + \frac{1}{2} * L_{Beam} * o.w$

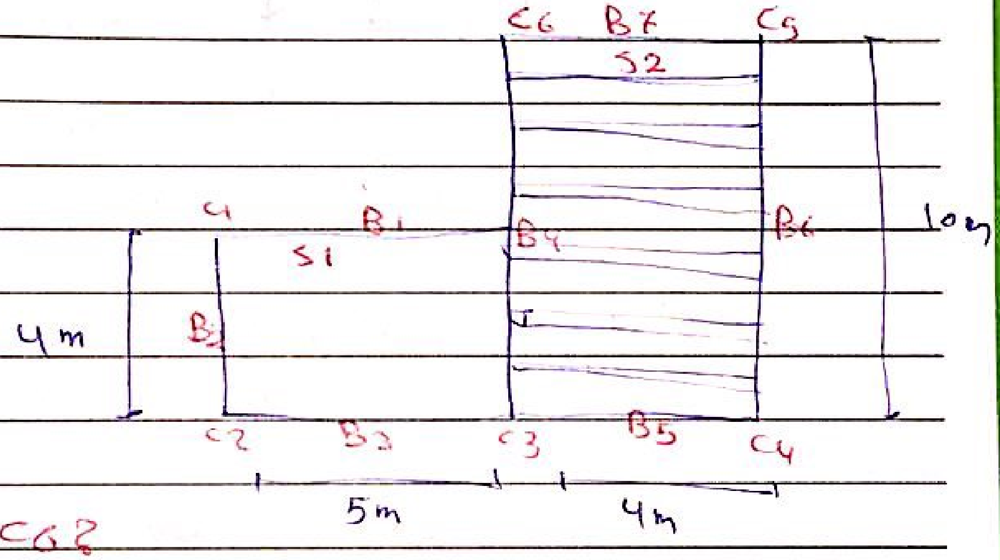
*Example: حل الأمثلة

$W = 20\ kN/m^2$

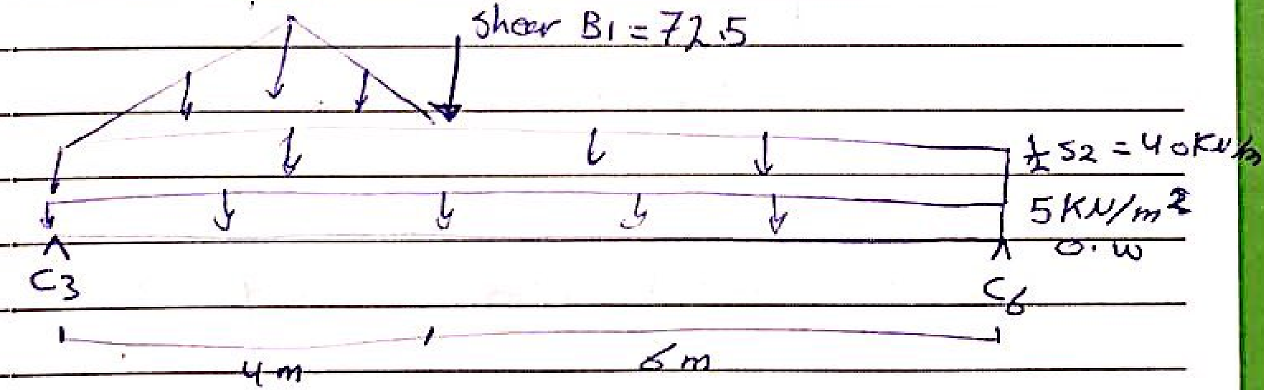
$O.W = 5\ kN/m$

$S = 52\ cm = 0.52\ m$

Determine V & M at B4

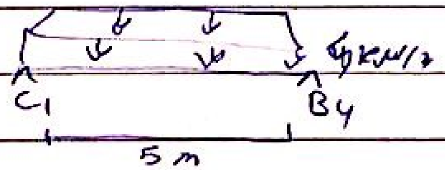


Axial C6?



$\frac{1}{2} S_2 = \frac{20 * 4}{2} = 40\ kN/m$

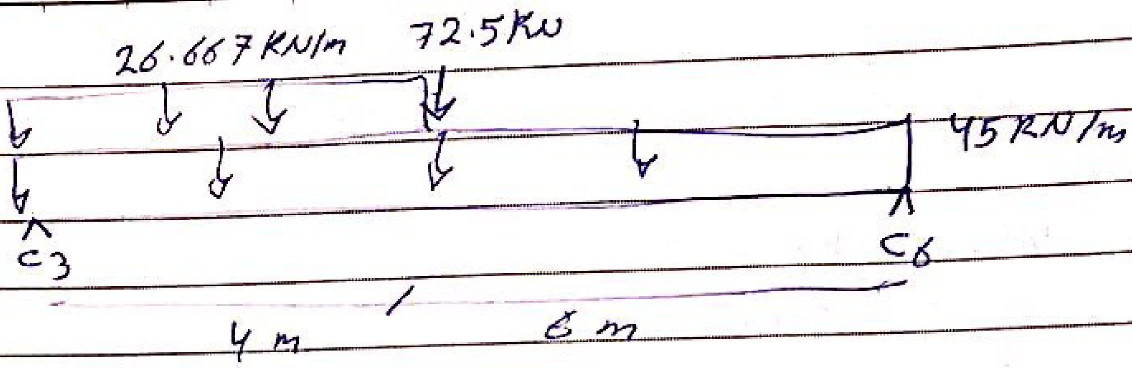
shear B1

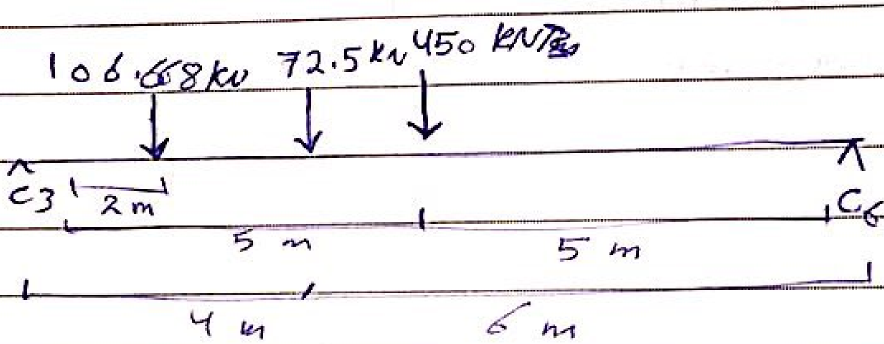


$V = \frac{5 * 5}{2} + \frac{20 * \frac{1}{2} * 5 * 2}{2}$

$= 72.5$

$\rightarrow = \frac{20 * 4}{3} = 26.667\ kN/m$





$$\sum M_{at\, C_3} = (C_6 \times 10) - (\overset{106.668}{\cancel{26.667}} \times 2) - (72.5 \times 4) - (450 * 5) = 0$$

$C_6 = 286.1336$ KN

From B4

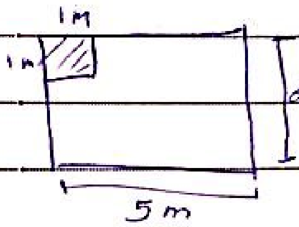
C_6 From B7 $= \frac{1}{2} \times 4 \times 5 = 10$ kN

$C_6 = 286.1336 + 10 = 296.1336$

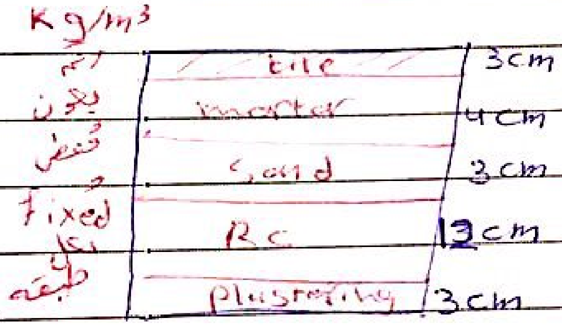
* Load on solid slab :-

$$W_u = 1.2 D_L + 1.6 L_L$$

* Ex : calc D_L = ?



5m Study Area = 1m * 1m   اختار *
= 1m²



plastering → 1cm لكل

1 cm → 21 Kg/m²

3cm → ?

$21 * \frac{3cm}{1cm} = 63 Kg/m^2 * 1m^2$

$= 63 Kg$

slab → الوزن * الارتفاع

$2500 kg/m^3 * 0.12 = 300 * 1m^2 = 300 kg$

sand → الوزن * الارتفاع

$1500 kg/m^3 * 0.03 = 45 kg/m^2$

mortar → الوزن * الارتفاع

$2100 kg/m^3 * 0.04 = 84 kg/m^2$

Tile → 1 cm لكل

1cm → 20 kg/m²

3cm → X 60 kg/m²

$DL = \Sigma = 552 Kg/m^2$

$Par = 100 Kg/m^2$

$total\ D_L = 652 Kg/m^2$

$L_L = 400 Kg/m^2$

$W = 14.22 KN/m^2$

* Load on one way hollow slab

Ex:

0.52m Study Area :نأخذ
"S"

total الـ ← $1m^2$ * Tile-plastering ← بحجم نأخذ
* 0.52

Block:

o.w = عدد الـ Block * الوزن = 5 * 15Kg = 75Kg

59cm لكل
X نص Block
لكل طرف

$0.52\,m^2 \rightarrow 75Kg$

$1m^2 \rightarrow ?$

$= 144.23\ Kg/m^2$

* ملاحظة: عدد الـ Block في أي Area كانت

$0.52\,m^2 \rightarrow 5$ Block

Area $m^2 \rightarrow ?$

rib: وزن

$2500\,kg/m^3 * 0.18 * 0.12 = 54\,Kg$

$54 \rightarrow 0.52$

$? \rightarrow 1m^2 = 103.8\ Kg/m^2$

$\Sigma = 748 + 100 = 848$