

R.C TANKS

Wall as beam



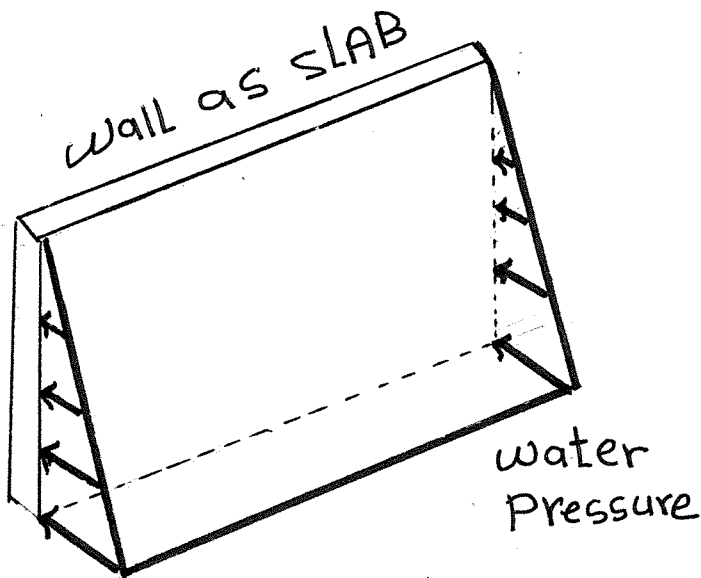
Elevated



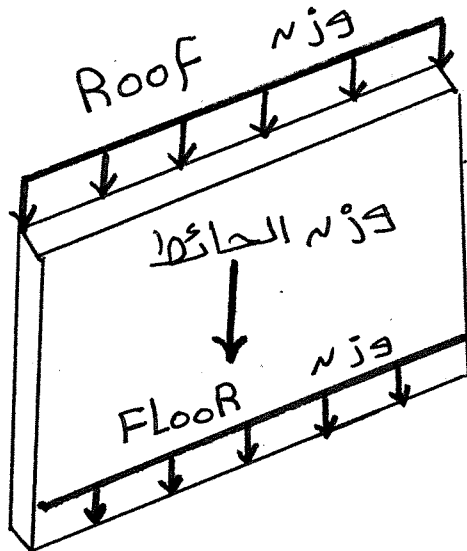
wall as Beam

إيه الكلام ده مش المقروض خالصنا wall قبل كده؟؟؟
 أنت فعلاً اشتغلت عليه نتيجة ضغط المياه فقط أكنه

SLAB



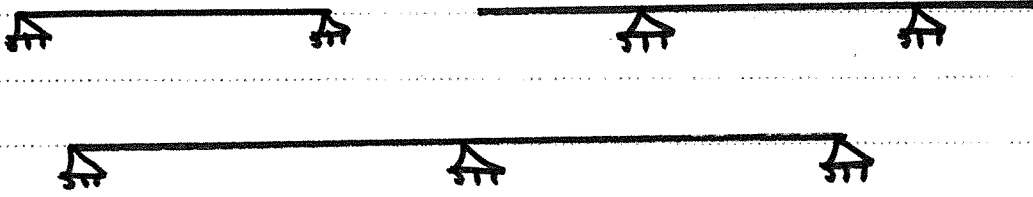
الصورة خيرو
 1000 كلمة



wall as Beam

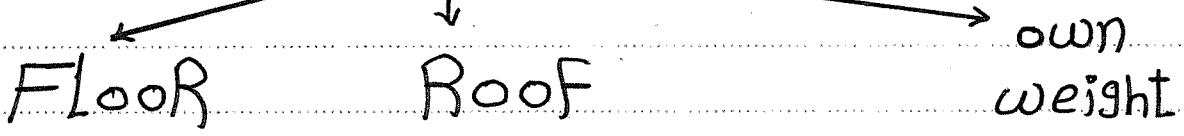
خطوات الحل :-

1- structure system :-



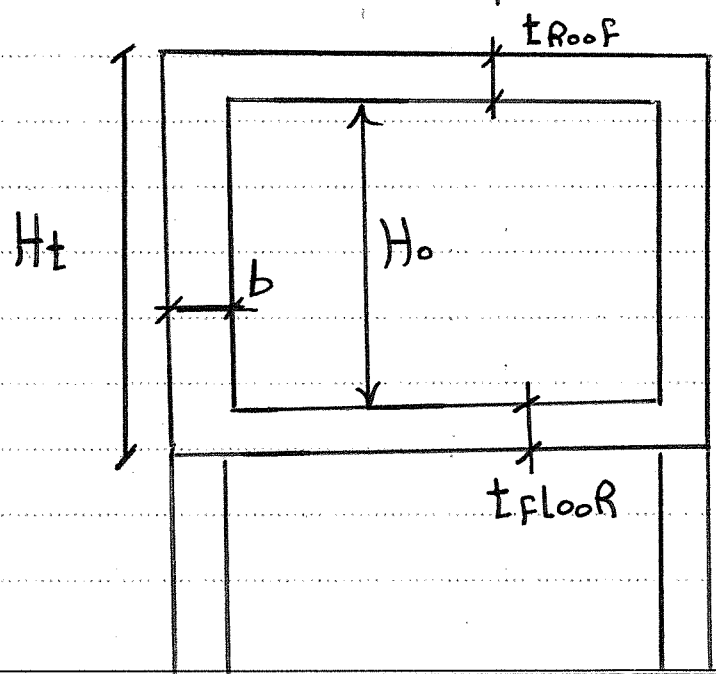
يحدد من PLAN حيث الحوائط مرتكزة على الأعمدة إلى نهاية الخزانة.

2- loading :-



$$\text{own weight} = b * H_t * \delta_c$$

← العرض → الارتفاع الكلي



Roof , SLAB of Floor

تشریح

$$\omega_{\text{Roof}} = \frac{t}{\text{Roof}} * \gamma_c + \text{Cover} + L \cdot L = \dots \text{KN/m}^2$$

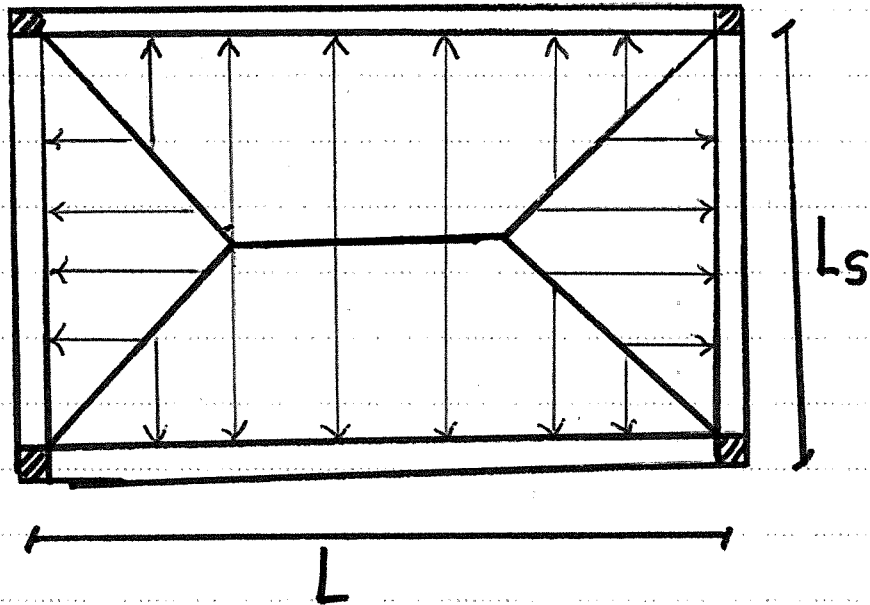
$$\omega_{\text{Floor}} = \frac{t}{\text{Floor}} * \gamma_c + \text{Cover} + \gamma * H_0 = \dots \text{KN/m}^2$$

الخاصة بالسائل \rightarrow

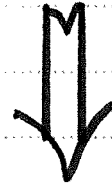
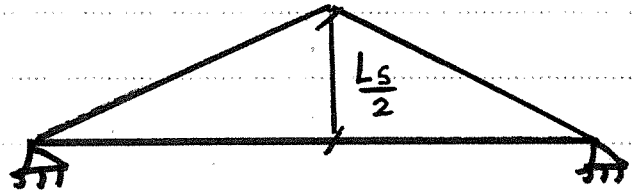
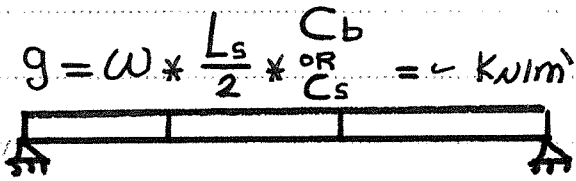
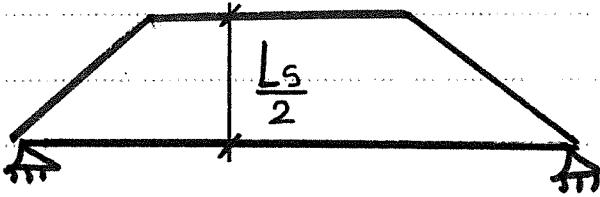
بعد كده بتشرح بلاطة Roof - Floor على

زاوية 45° سواء كانت بلاطة O.W.S

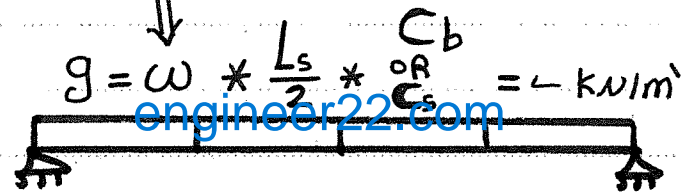
أو O.W.S تشرحنا على 45°.



شكل التشریح هیكونه مثلثه أو شبه منحرف :-



الحمل الموزع



$$C_b = 1 - \frac{1}{3\lambda^2}$$

$$C_s = 1 - \frac{1}{2\lambda}$$

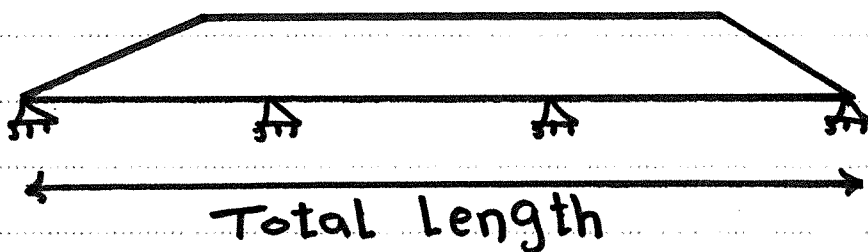
$$\lambda = \frac{L}{L_s} \rightarrow \begin{array}{l} \text{الفویل} \\ \text{القصير} \end{array}$$

$$C_b = \frac{2}{3} \text{ حساب moment}$$

$$C_s = \frac{1}{2} \text{ حساب Shear}$$

أو Reaction على العمود .

حالة خاصة :- وجود ركيزة أو أكثر في داخل شكل

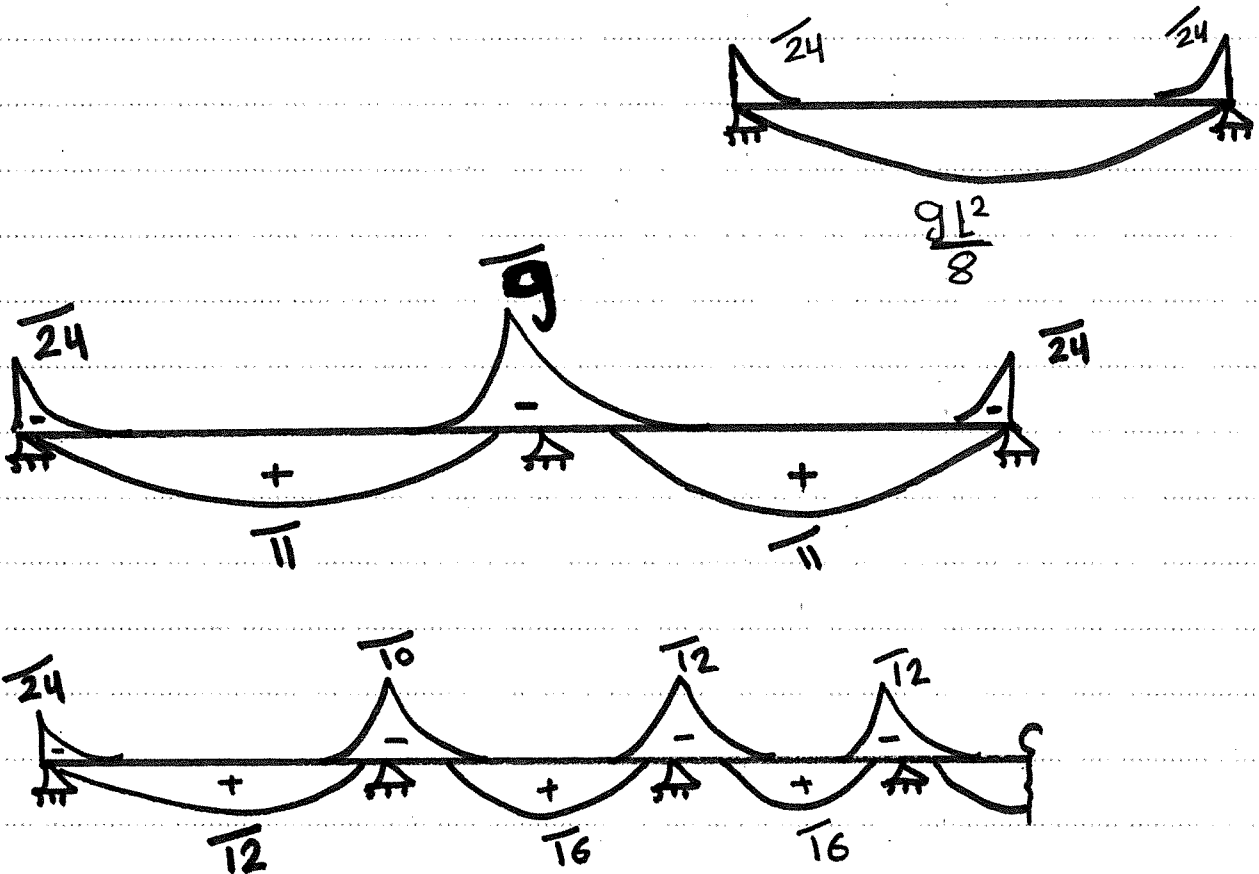


التشریح :-

الحالة دي بيتو حساب مساحة الشكل وقسمتها على
المول الكلى ← هتسوفها في المسائل.

3-moment :-

قيم العزوم من الداتا ثابتة .



4- Design :-

$$A_s = \frac{m_u * 10^6}{\frac{F_y}{\delta_s} * B_{cr} * y_{ct}} \geq A_{s \min}$$

$$m_u = 1.5 m_w$$

Data sheet

Simple Beam

$$y_{ct} = \begin{cases} \rightarrow 0.86 * SPAN & \text{العزم الموجب في الكمرات المستمرة} \\ \rightarrow 0.43 * SPAN & \\ \rightarrow 0.37 * SPAN & \text{العزم السالب في الكمرات المستمرة} \end{cases}$$

لازم متقلش عن الرقم ده في أي حالة $y_{ct} \leq 0.87 H$

$$A_{s_{min}} = \frac{0.15}{100} * b * H = \text{--- mm}^2$$

minimum

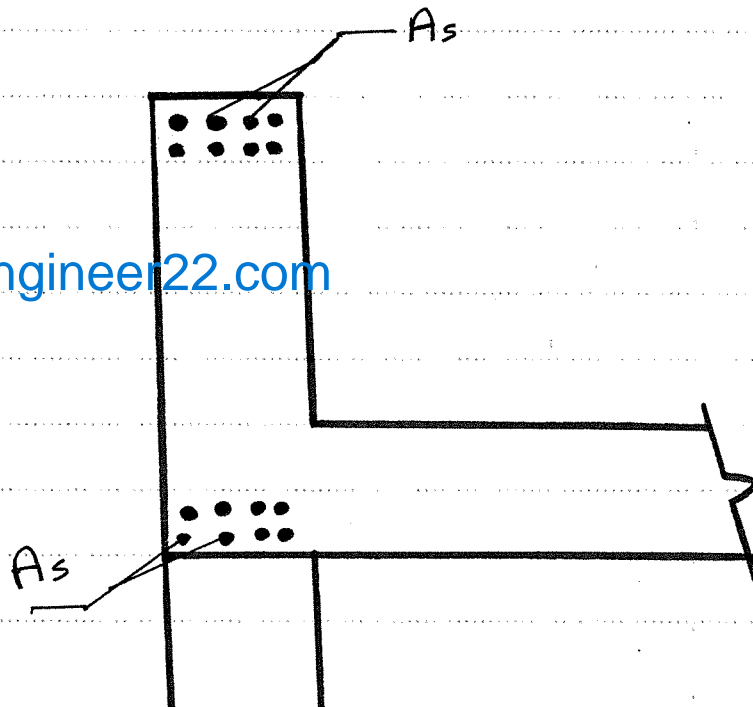
خذ المفاجأة دي دائماً الحديد بيكون

5-Drawing:-

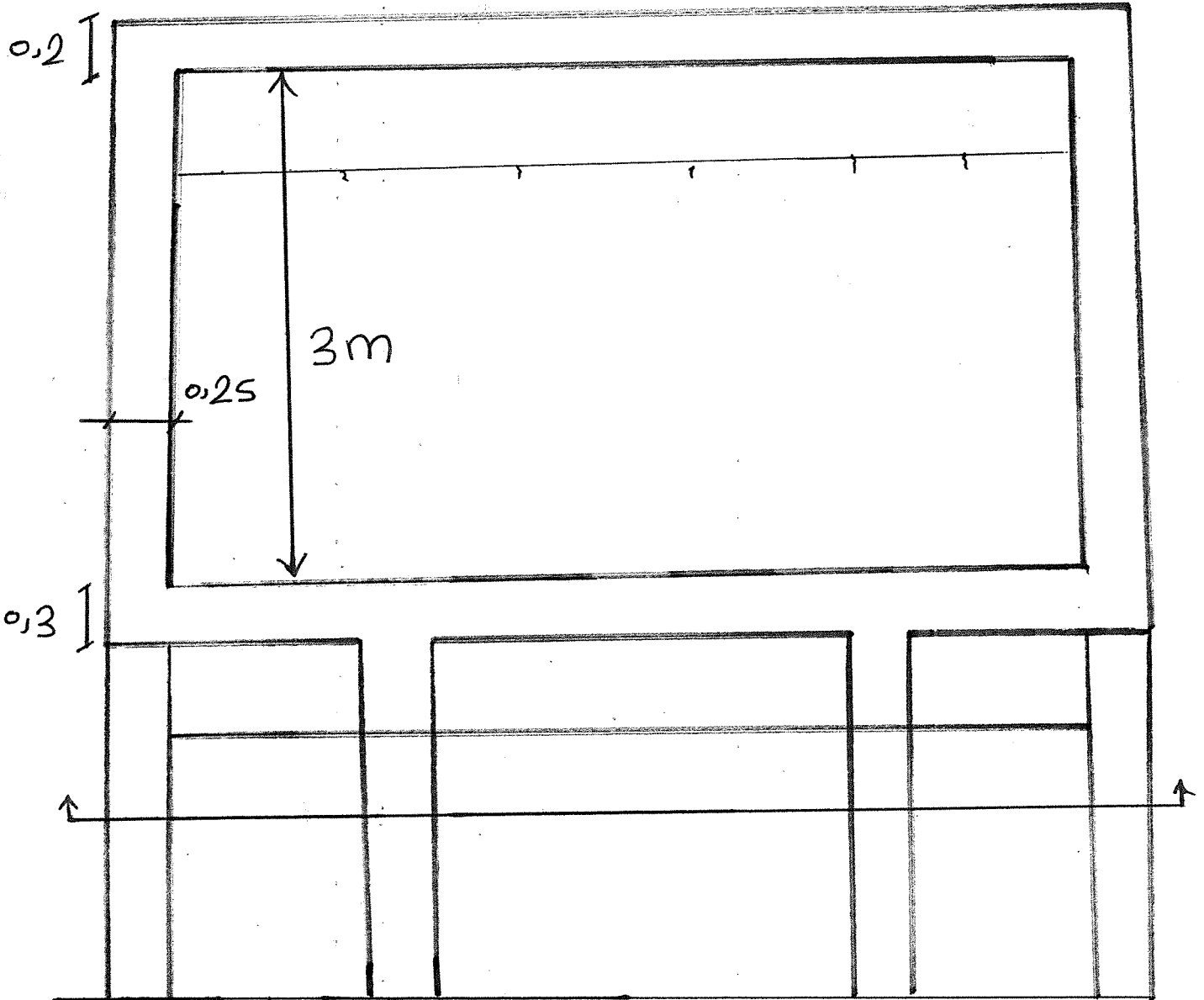
Wall as Beam

أماكن وضع حديد

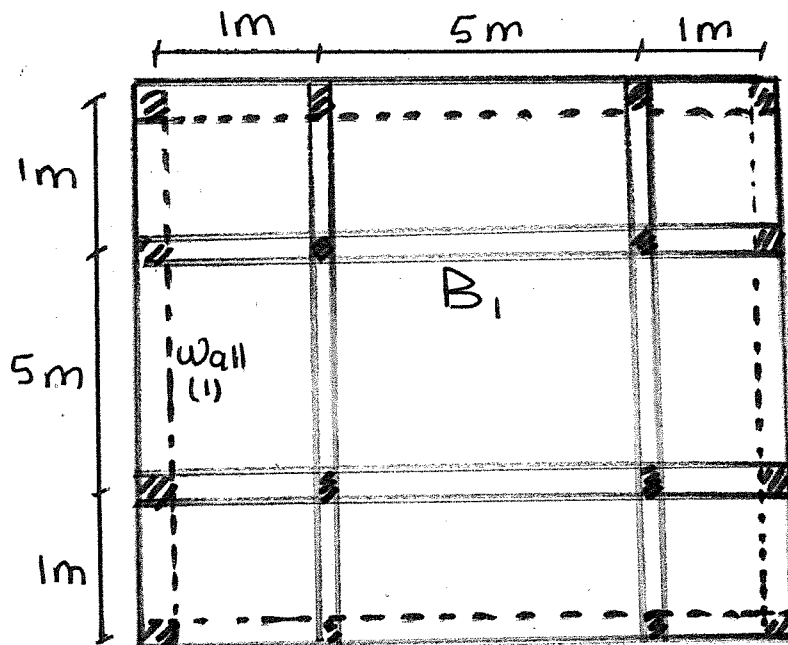
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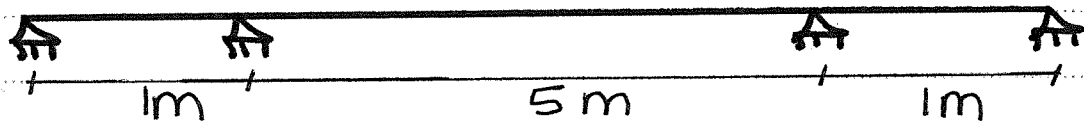
EXAMPLE: → Roof : Cover = 1 kN/m^2
 Live = 1 kN/m^2
 → Floor : Cover = 1.5 kN/m^2



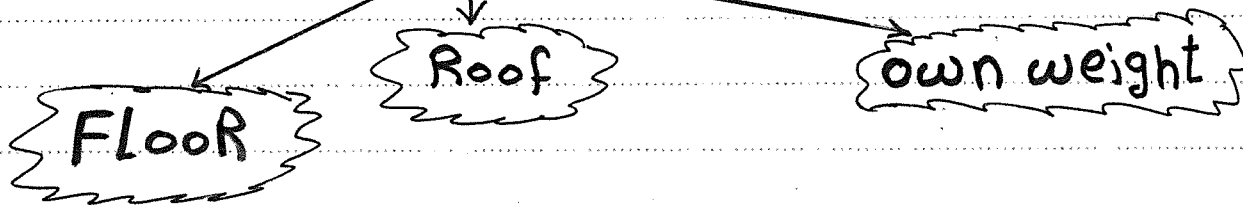
Design:-
 wall (i)
 as Beam
 ~ ~ ~



1- main system :-



2- Loading :-



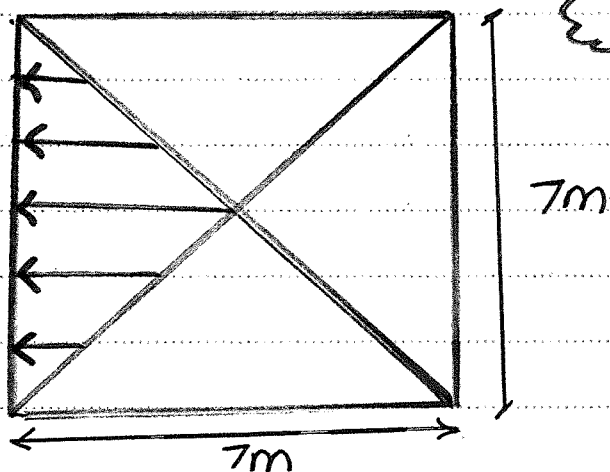
$$\text{own weight} = b * H_t * \gamma_c$$

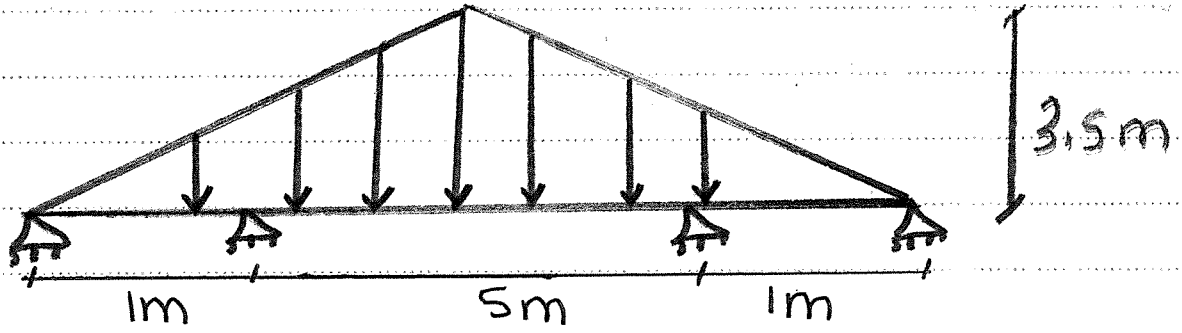
$$= 0.25 * 3.5 * 25 = \boxed{21.87} \text{ kN/m}$$

Roof

$$\omega_{\text{Roof}} = [t_R * \gamma_c + \text{Cover} + \text{Live}]$$

$$= 0.2 * 25 + 1 + 1 = \boxed{7} \text{ kN/m}^2$$





الوضع ده لما تلاق فيه ركائز جوه الشكل تحسب مساحه الشكل وتقسمه على الطول الكلى للحائط .

$$\therefore W_{\text{uniform}} = \frac{\frac{1}{2} * 7 * 3.5 * 7}{7} = 12.25 \text{ kN/m}^2$$

ω_{Roof}

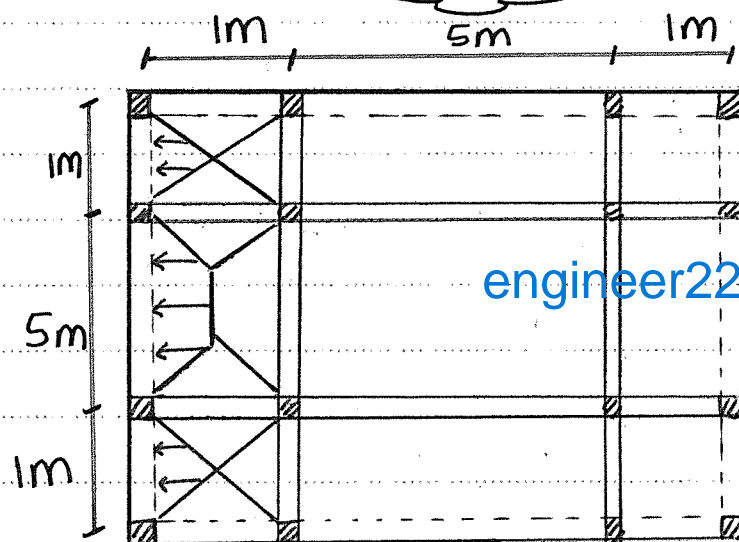
{ FLOOR }

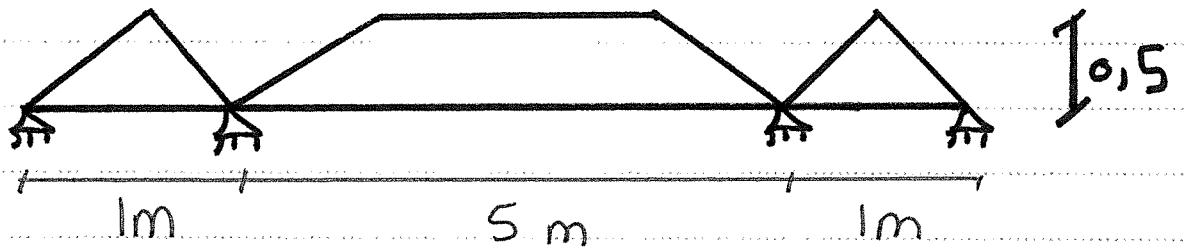
$$\omega_{\text{Floor}} = t_f * \gamma_c + \text{cover} + \gamma * H_o$$

$$= 0.3 * 25 + 1.5 + 10 * 3 = \boxed{39} \text{ kN/m}^2$$

{ تشریح }

البلاطة $\omega.s$ هيا كماه
تشریح على 45°

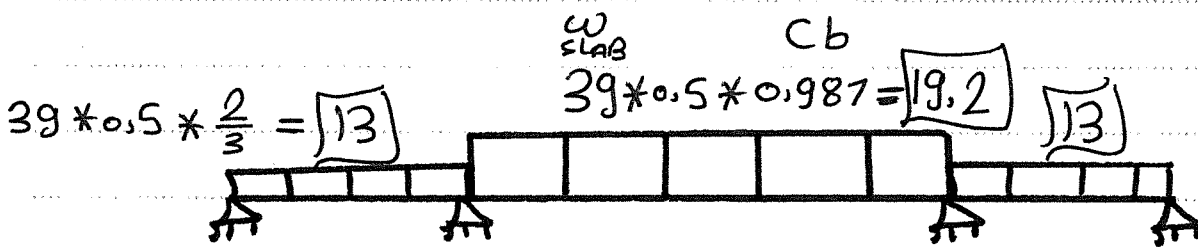




$$C_b = \frac{2}{3} \quad \leftarrow \text{المثلث}$$

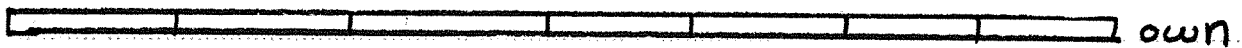
$$C_b = 1 - \frac{1}{3\lambda^2} = 0,987 \quad \leftarrow \text{شبه المتعرج}$$

$$\lambda = b/a = 5/1 = 5$$

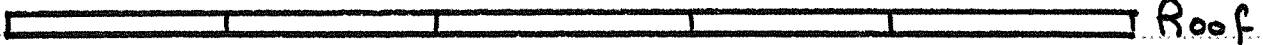


Total Load

21,87



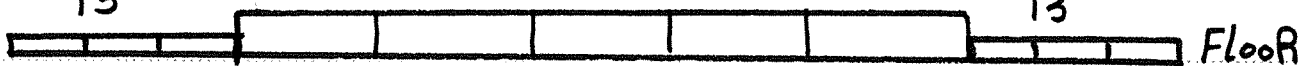
12,25



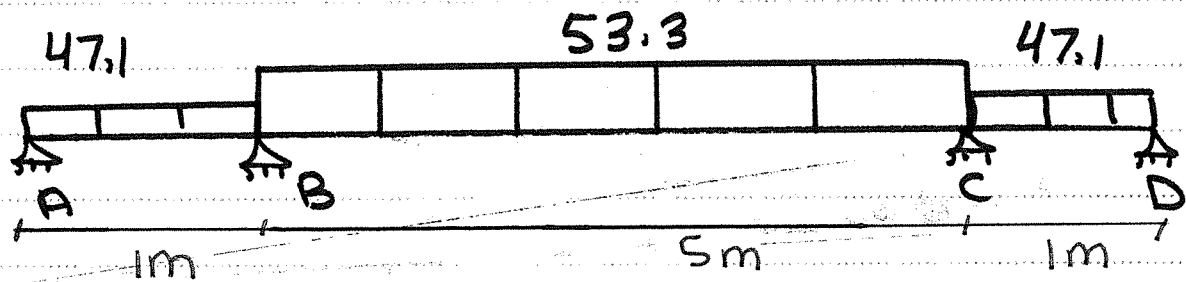
13

19,2

13



3-moment



$$m_A = m_D = 0$$

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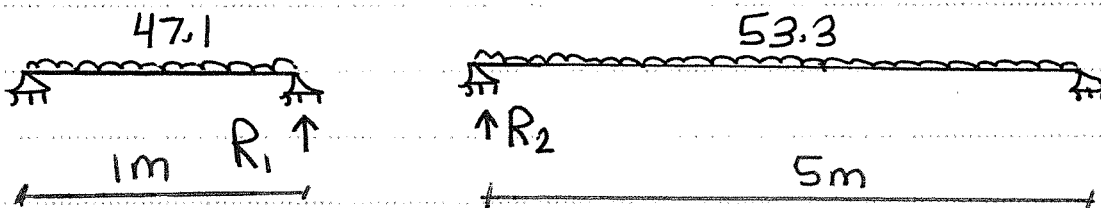
$$m_B = m_C = ??$$

3m eq

قوة الجور < 20%

$$\therefore m_A [1] + 2m_B [1+5] + m_C [5] = -6 [R_1 + R_2]$$

$m_B \leftarrow$

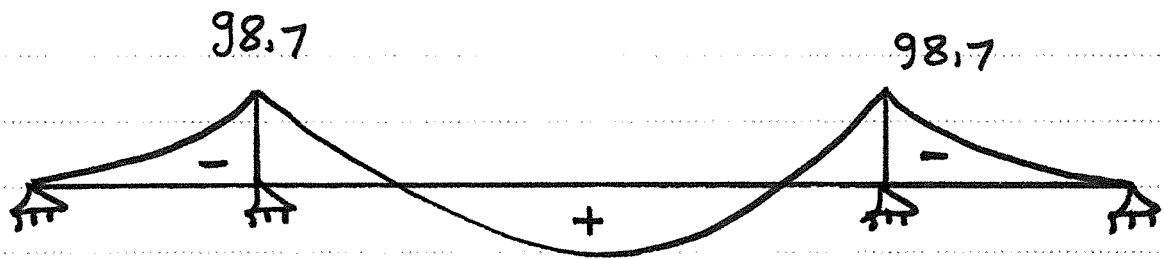


$$R_1 = \frac{47.1 \times 1^3}{24} = 1.96$$

$$R_2 = \frac{53.3 \times 5^3}{24} = 277.6$$

$$\therefore 17 m_B = -1677.4$$

$$\therefore m_B = -98.7 \text{ kN}\cdot\text{m}$$



$$m^+ = \frac{\omega l^2}{8} - m^- = \frac{53.3 * 5^2}{8} - 98.7 = \boxed{67.9}$$

$$m_u^- = 1.5 * 98.7 = 148 \text{ kN}\cdot\text{m}$$

$$m_u^+ = 1.5 * 67.9 = 101.85 \text{ kN}\cdot\text{m}$$

5- Design:-

$$A_{s \min} = \frac{0.15}{100} * b * H_t = 1312.5 = 7\#16$$

↳ 250 ↳ 3500

$$m_u^- = 148 \text{ kN}\cdot\text{m}$$

$$y_{ct} = 0.37 * \text{span} = 0.37 * 5 = 1.85 \text{ m} < 0.87 H$$

$$= 0.87 * 3.5 = 3.05$$

OK

$$A_s = \frac{m_u * 10^6}{\frac{F_y}{\gamma_s} * \beta_{cr} * y_{ct}} = \frac{148 * 10^6}{\frac{420}{1.15} * 0.75 * 1850} = 292 < A_{s \min}$$

#16 ↙

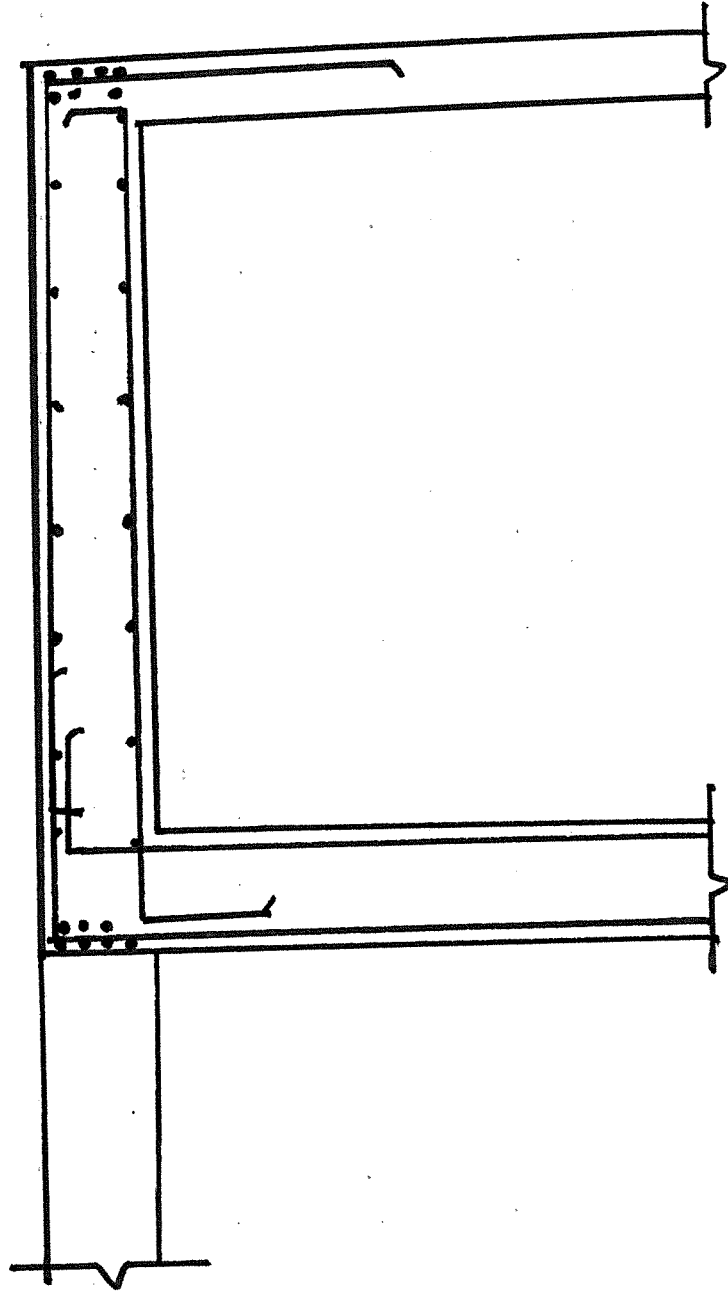
Take $A_{s \min}$

سفلت و علوی

و غالباً بیضی min

7#16

7#16



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