

0071124004 DB2

အကျယ်အဝန်း 0.20 x 0.50 m.

Moment max = 4,549 kg-m.

$$M_c = R_b d^2 = \frac{8.67 \times 20 \times 45^2}{100} = 3487.05 \text{ kg-m.}$$

$M_c < M_{max}$.

$M' = 4,549 - 3,487.05 = 1,061.95 \text{ kg-m}$

$A_{s1} = \frac{M_c}{f_y d} = \frac{3487.05 \times 100}{1500 \times 0.9 \times 45} = 5.74 \text{ cm}^2$

$A_{s2} = \frac{M'}{f_y (d-d')} = \frac{1061.95 \times 100}{1500 \times (45-5)} = 1.77 \text{ cm}^2$

$A_s = 5.74 + 1.77 = 7.51 \text{ cm}^2$

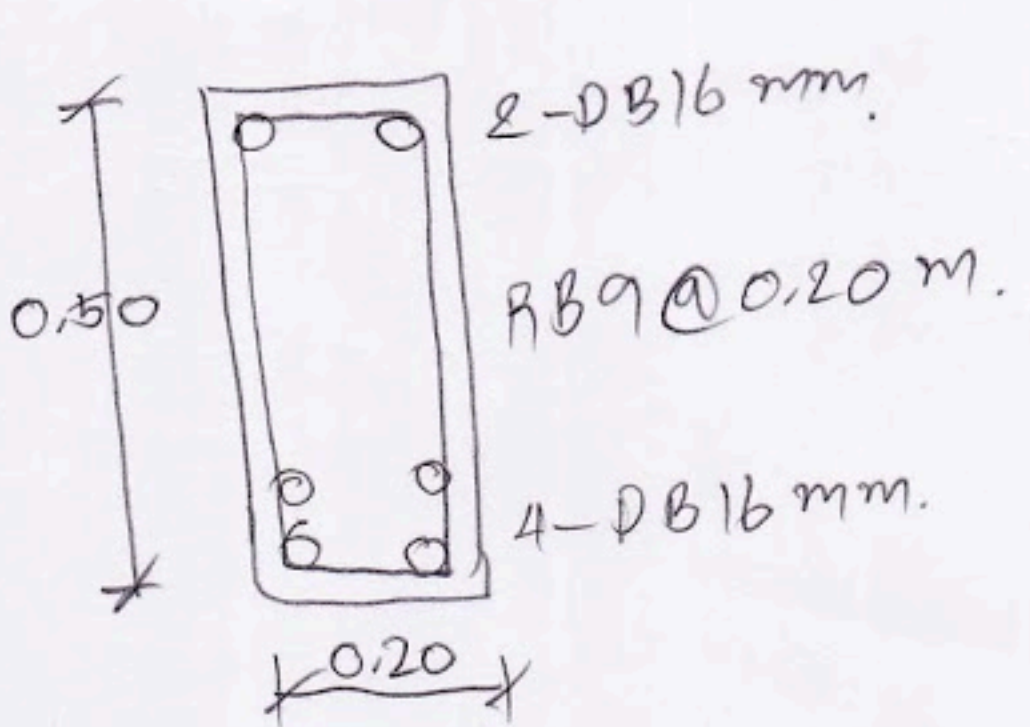
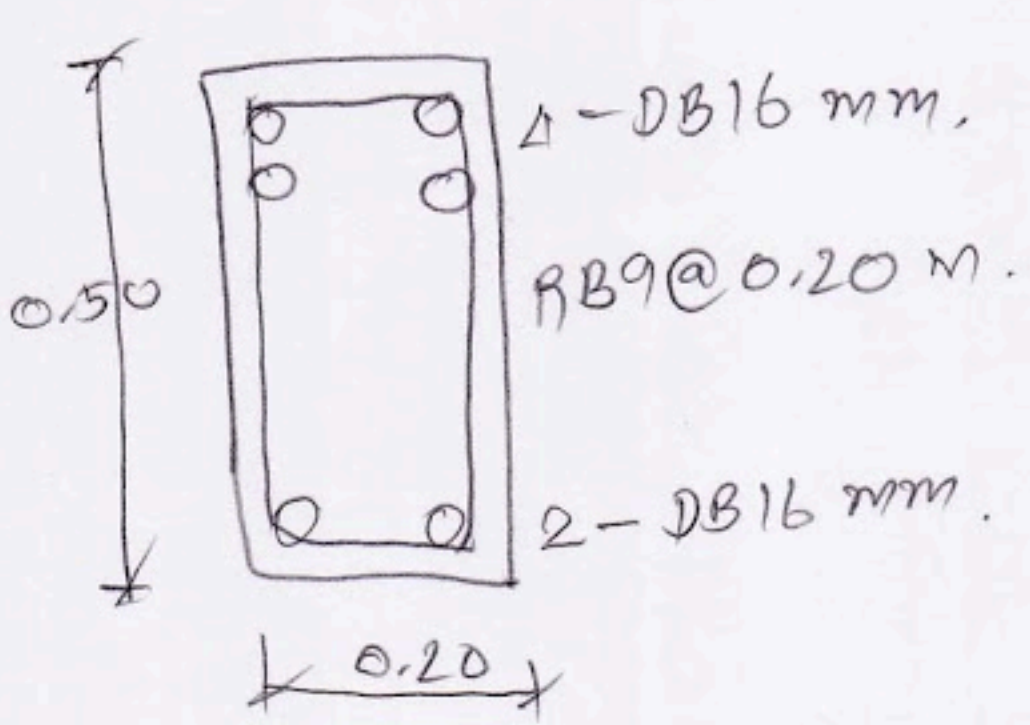
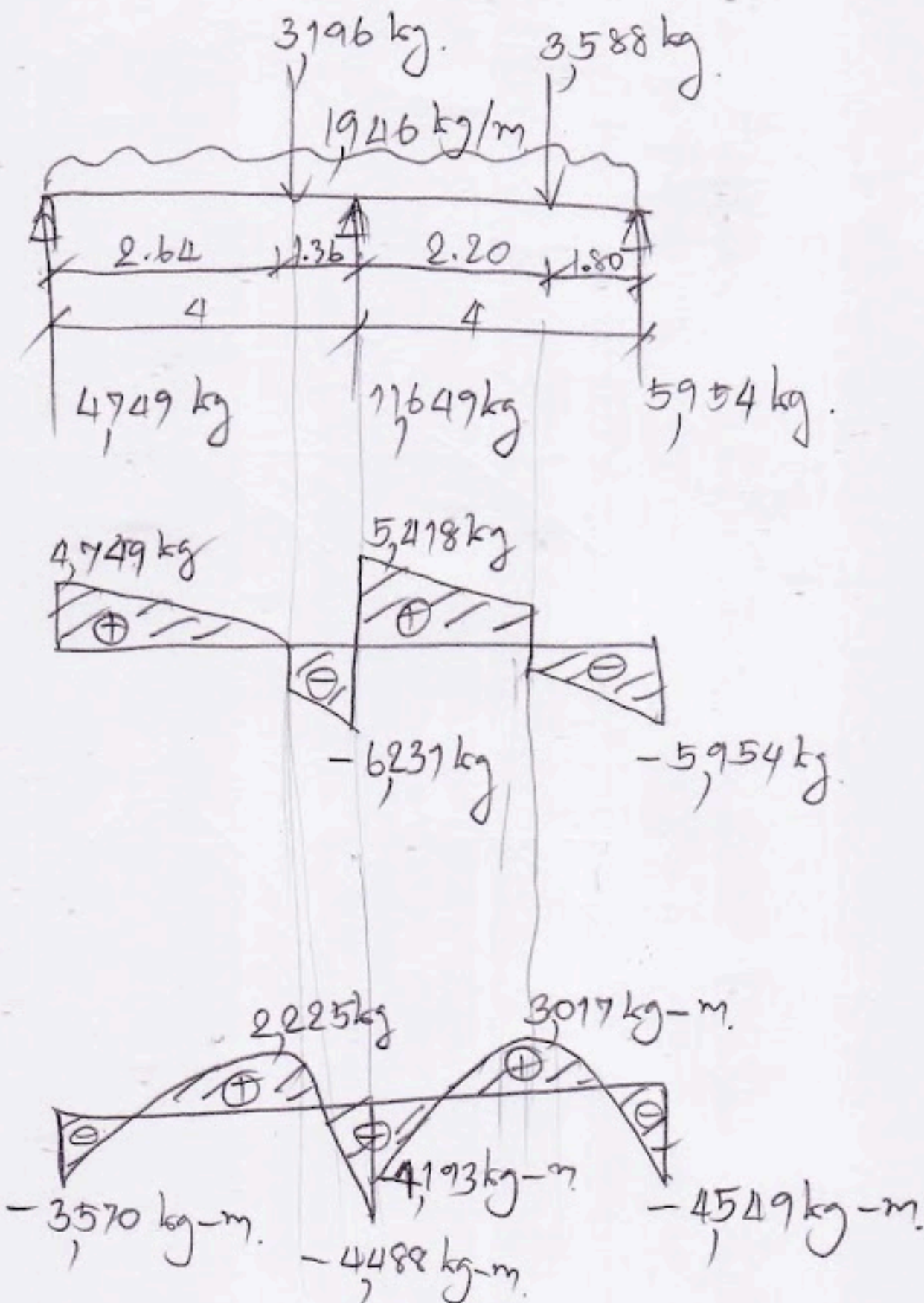
Q2 4-DB16 mm, $A_s = 8.04 \text{ cm}^2$

$V = \frac{6231}{20 \times 45} = 6.92 \text{ ksc.} > V_{er}$

အကျယ်အဝန်း 0.20 x 0.50 m RB9 $S = \frac{A_v f_v d}{V}$

$S = \frac{127 \times 200 \times 45}{6231 - (3.78 \times 20 \times 45)} = 24 \text{ cm.}$

Q2 RB9 @ 0.20 cm.



00777777 B1

սիմետրիա 0.20x0.50.m.

Moment max = 3360 kg-m.

$M_c = Rbd^2 = 8.61 \times 0.2 \times 45^2 = 3487.05 \text{ kg-m}$

$M_c > M_{max}$.

$A_s = \frac{M}{f_s j d}$

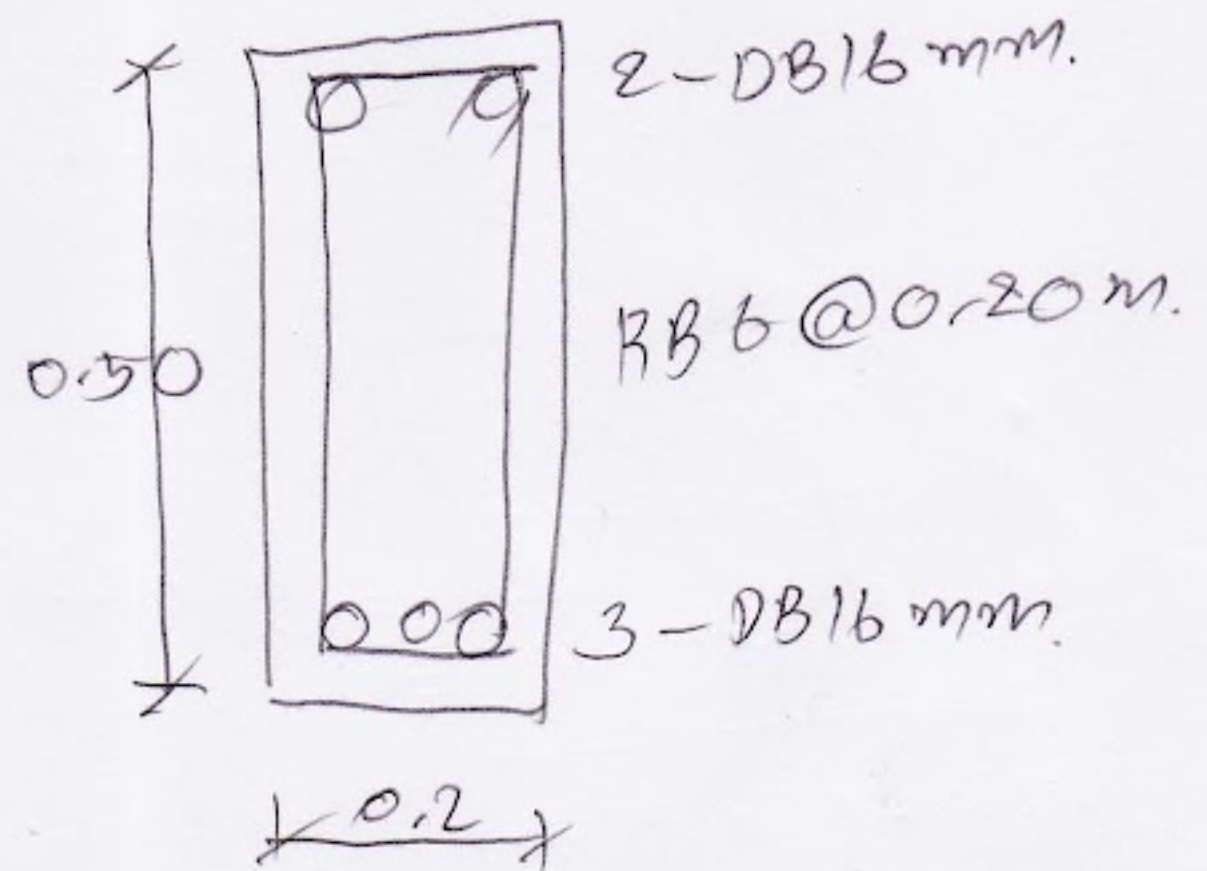
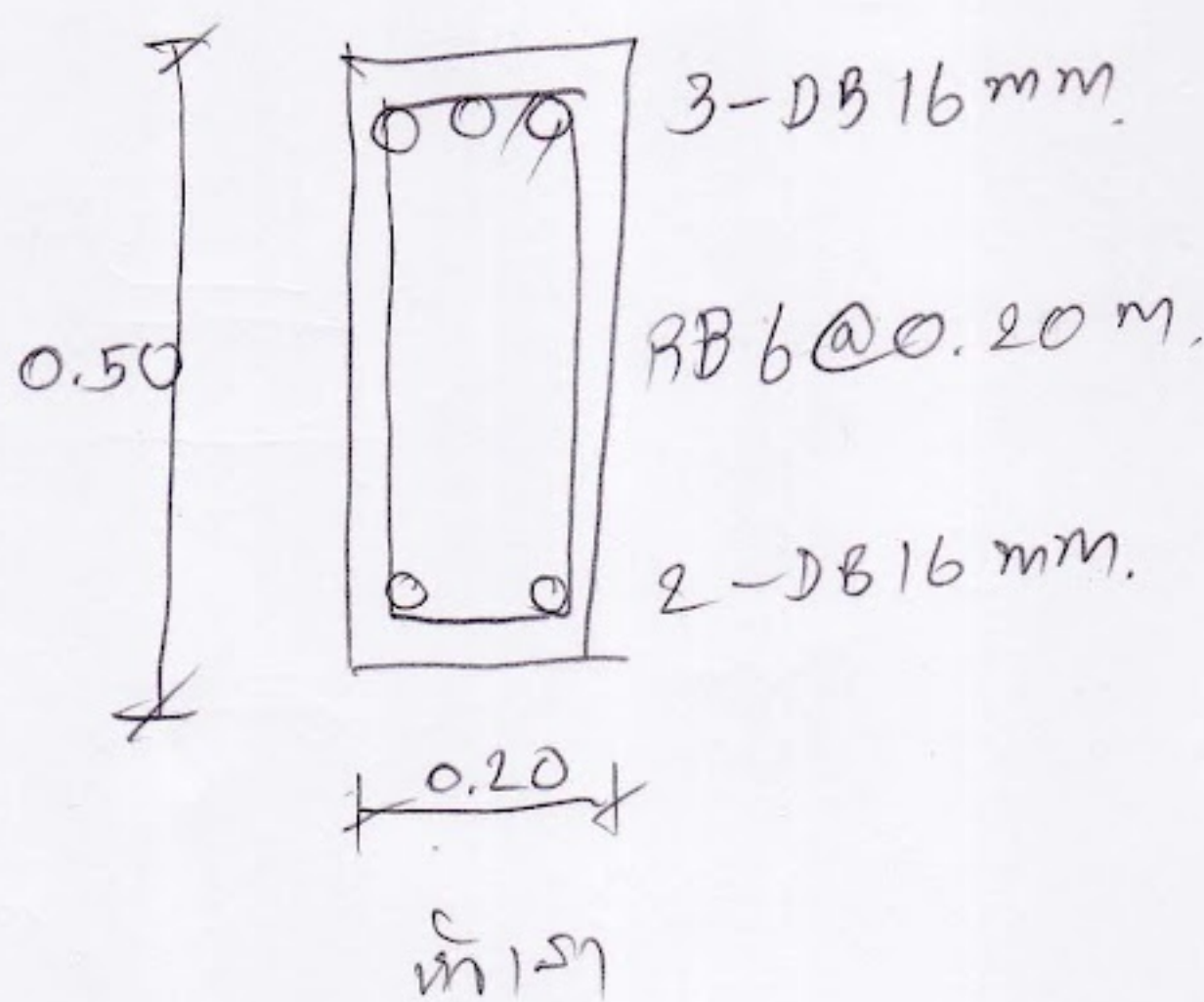
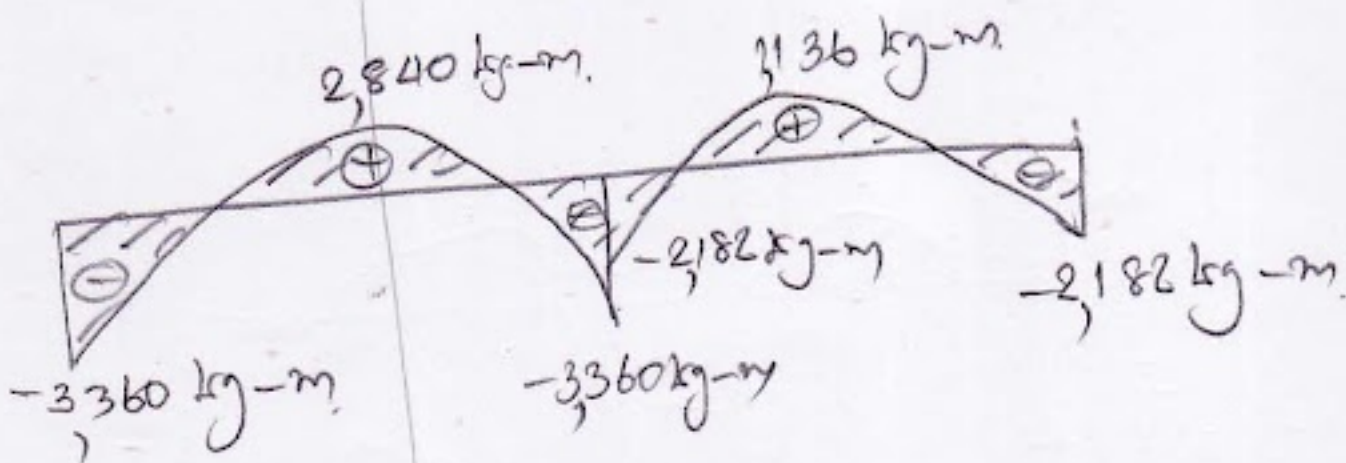
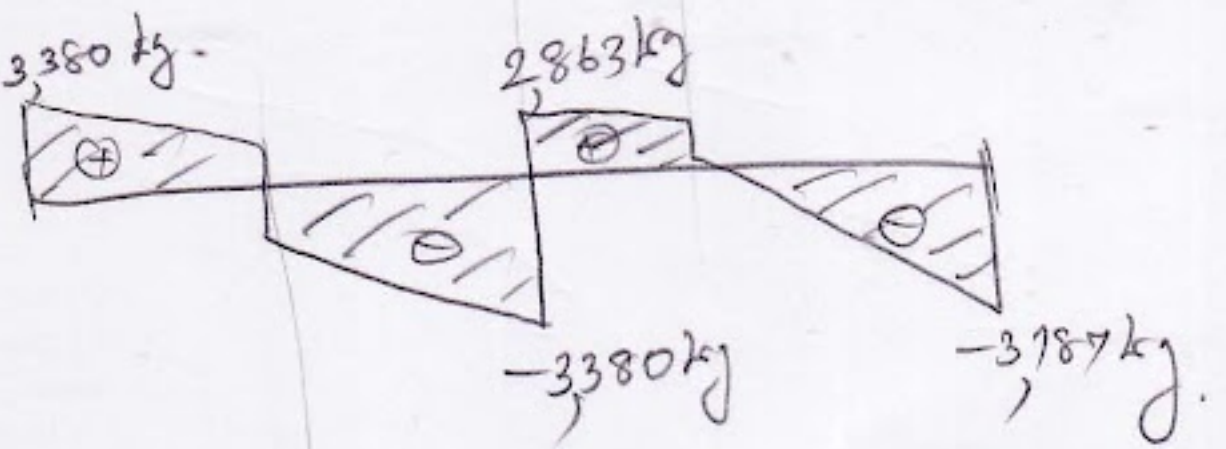
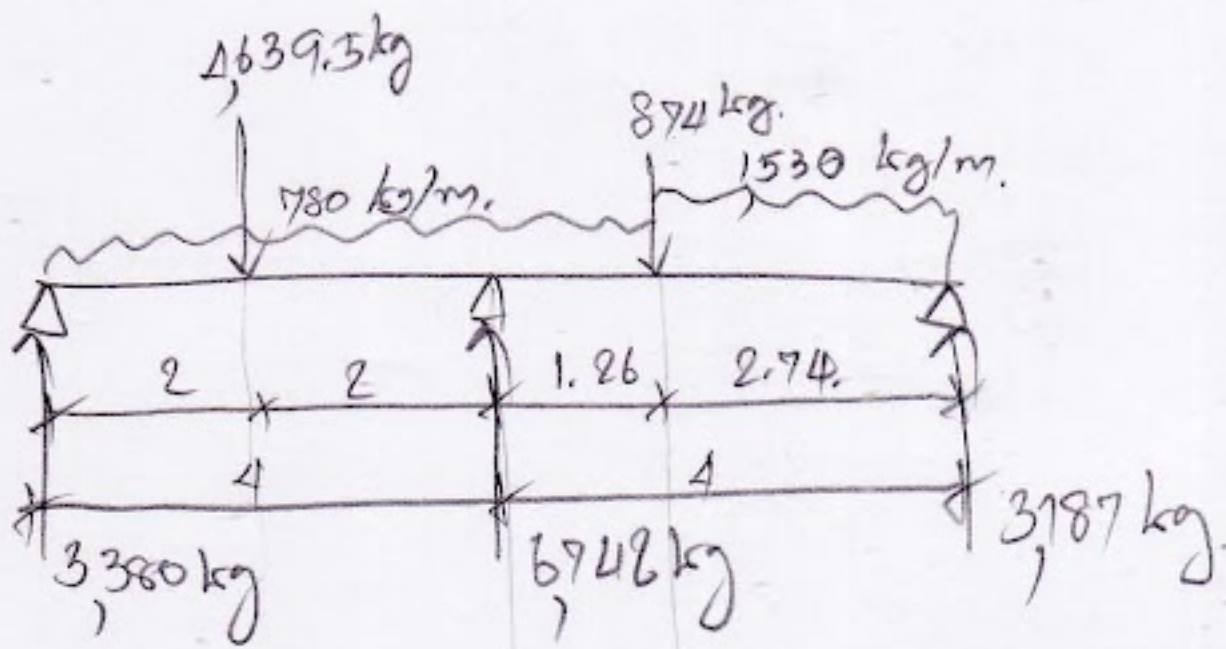
$A_s = \frac{3487.05 \times 100}{1500 \times 0.9 \times 45} = 5.74 \text{ cm}^2$

Գր 3-DB16 mm, $A_s = 6.03 \text{ cm}^2$

$v = \frac{3380}{20 \times 45} = 3.76 \text{ tsc.} < v_{01} \text{ OK}$

տեղիքը համարում $d \approx 50 \frac{d}{2}$

Գր RB6 @ 0.20 m.



continuous DBI

ကန့်သတ်ချက် 0.20x0.50m.

Moment man. = 2,735 kg-m

$$M_c = Rbd^2 = 8.61 \times 0.2 \times 45^2 = 3,487.05 \text{ kg-m.}$$

$M_c > M_{man}$

$$A_s = \frac{M}{f_s j d} = \frac{2,735 \times 100}{1,500 \times 0.9 \times 45} = 4.50 \text{ cm}^2$$

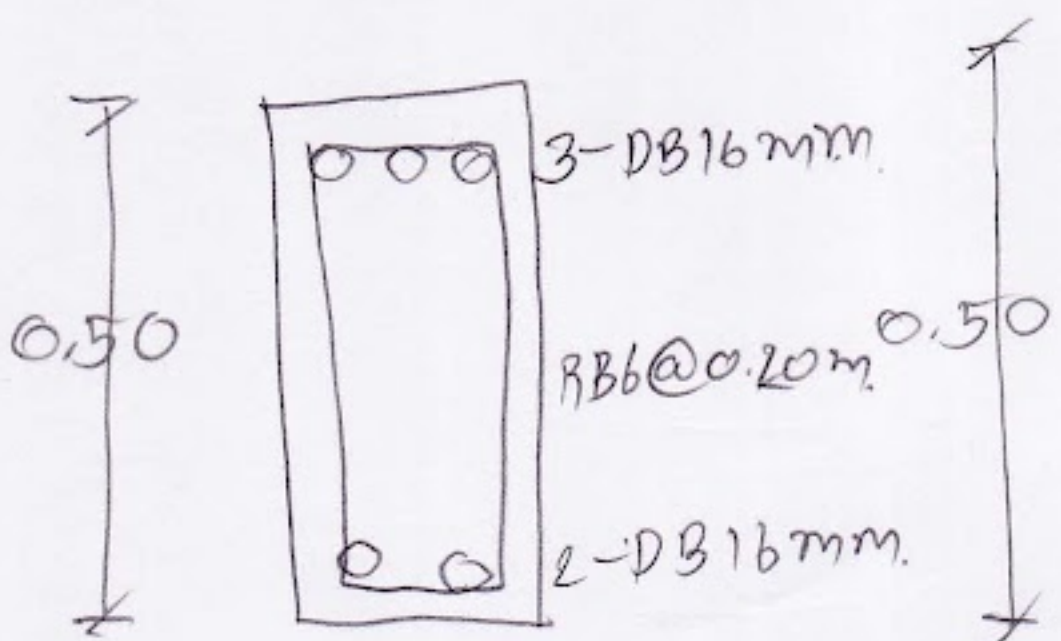
အပူ 3-DB16mm, $A_s = 6.03 \text{ cm}^2$

$$V = \frac{4,762}{20 \times 45} = 4.62 \text{ ksc} > V_{cy}$$

ကျင့်ကျင့်သတ်ချက်အရ RB6

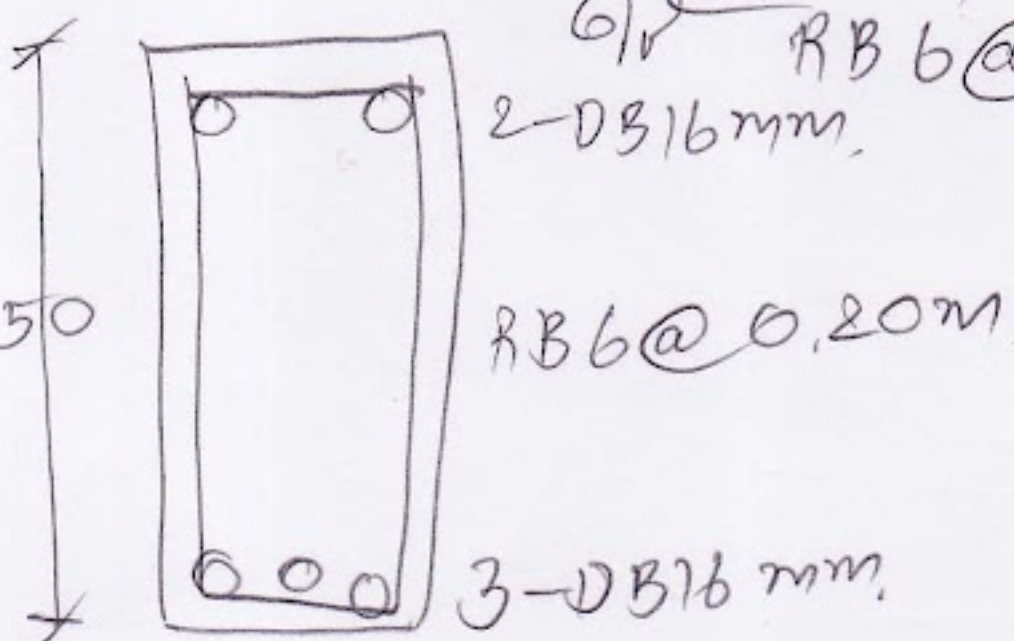
$$s = \frac{A_v \cdot f_v \cdot d}{V} = \frac{0.37 \times 1,200 \times 45}{4,762 - (3.78 \times 20 \times 45)} = 40.5 \text{ cm.}$$

အပူ RB6 @ 0.20 m, 2-DB16mm.



0.20

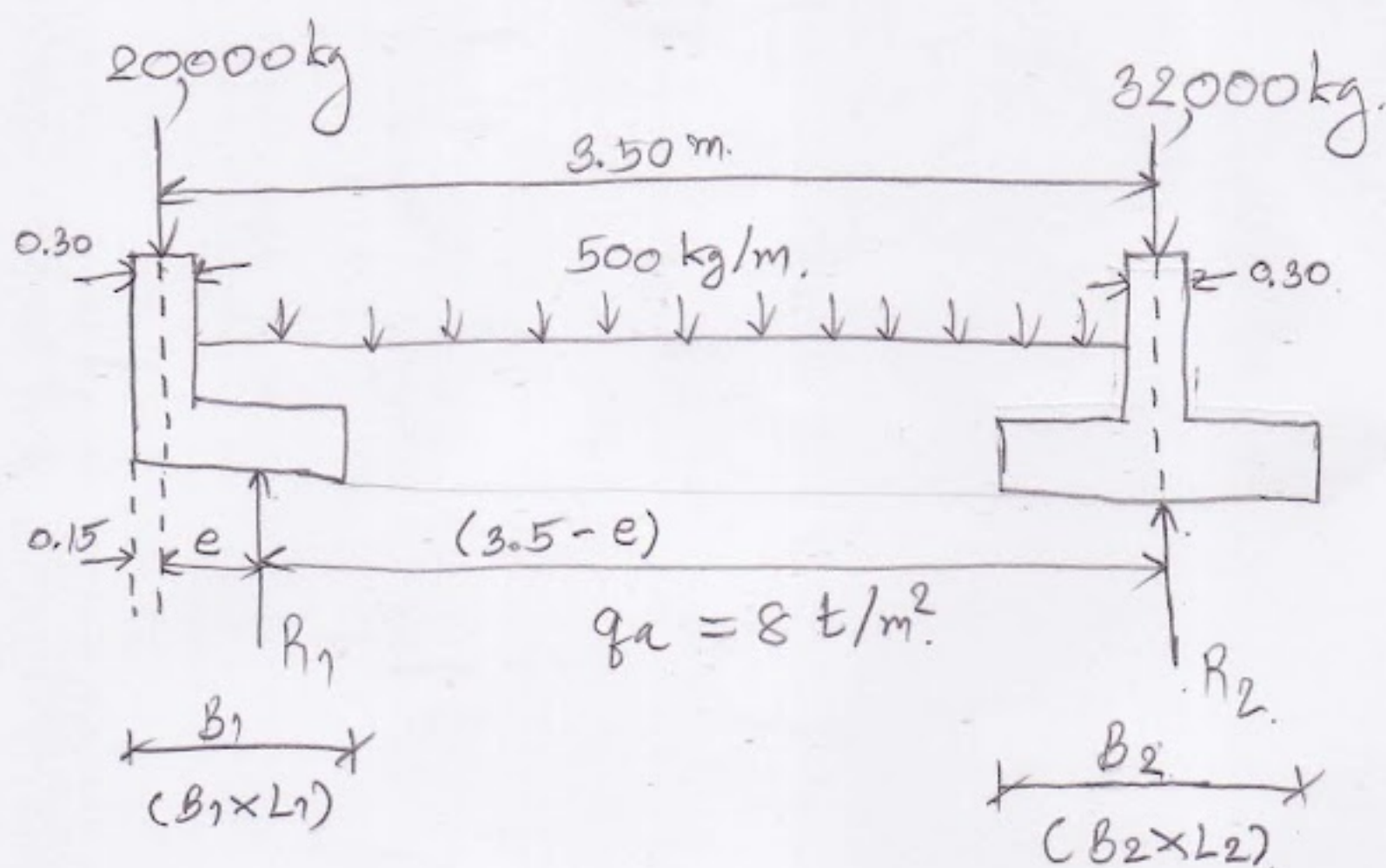
ကျင့်ကျင့်



0.20

ကျင့်ကျင့်

ஒற்றைப்பக்கம் F_1, F_2



$$\text{and } e = 0.50 \text{ m.}$$

$$\sum M_1 = 0; (20,000 \times 3.5) + (500 \times 3.5 \times 1.75) = R_1(3.5 - 0.5)$$

$$R_1 = 24,354 \text{ kg}$$

$$\sum M_2 = 0; (32,000 \times 3) - (20,000 \times 0.5) + (500 \times 3 \times 1.5) - (500 \times 0.5 \times 0.25) = R_2(3.5 - 0.5)$$

$$R_2 = 29,396 \text{ kg.}$$

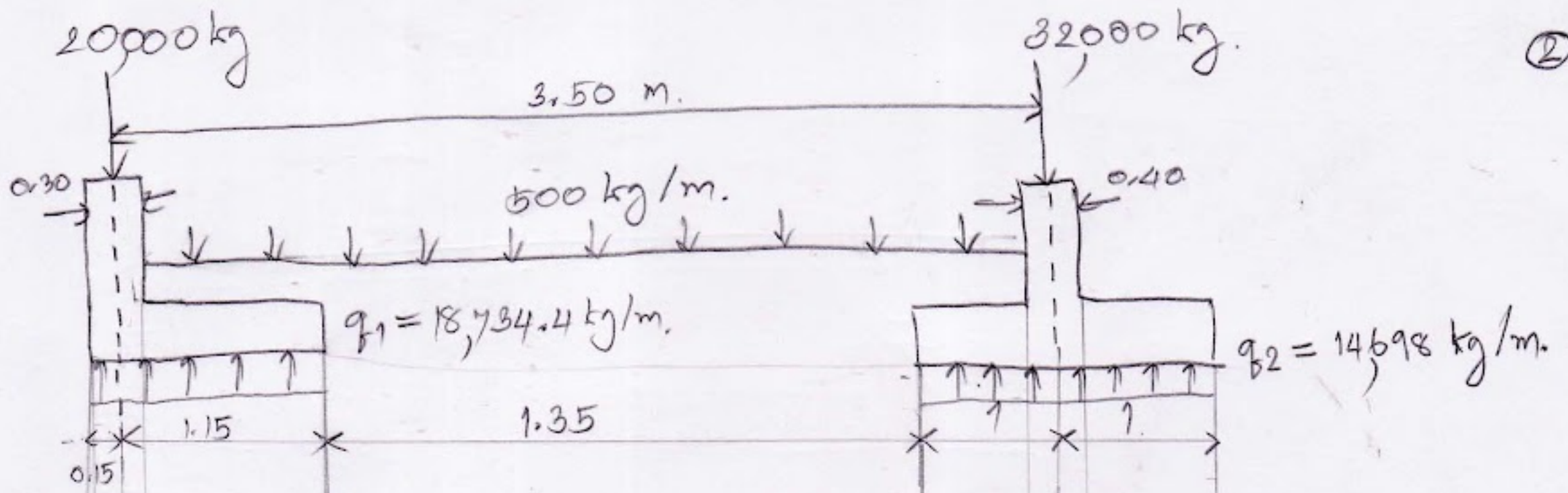
$$\sum F_y = 0; 20,000 + 32,000 + (500 \times 3.5) = 24,354 + 29,396$$

$$53,750 \text{ kg} = 53,750 \text{ kg OK.}$$

$$B_1 = 2(0.15 + e) = 2(0.15 + 0.5) = 1.30 \text{ m.}$$

$$L_1 = \frac{R_1}{B_1 \times q_a} = \frac{24,354}{1.3 \times 8,000} = 2.34 \text{ m. } \text{or } \underline{2.40 \text{ m.}}$$

$$B_2 = L_2 = \sqrt{\frac{R_2}{q_a}} = \sqrt{\frac{29,396}{8,000}} = 1.92 \text{ m. } \text{or } \underline{2.00 \text{ m.}}$$

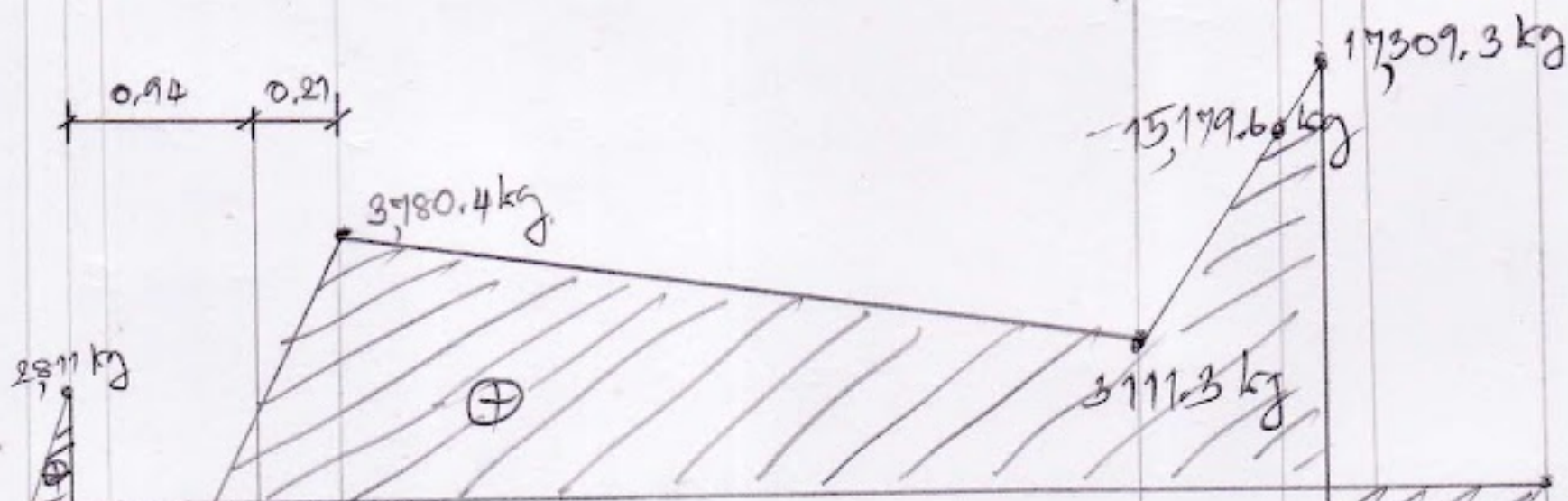


$$q_1 = \frac{24,354}{1.3 \times 2.4} = 7,806 \text{ kg/m}^2$$

$$q_2 = \frac{29,396}{2 \times 2} = 7,349 \text{ kg/m}^2$$

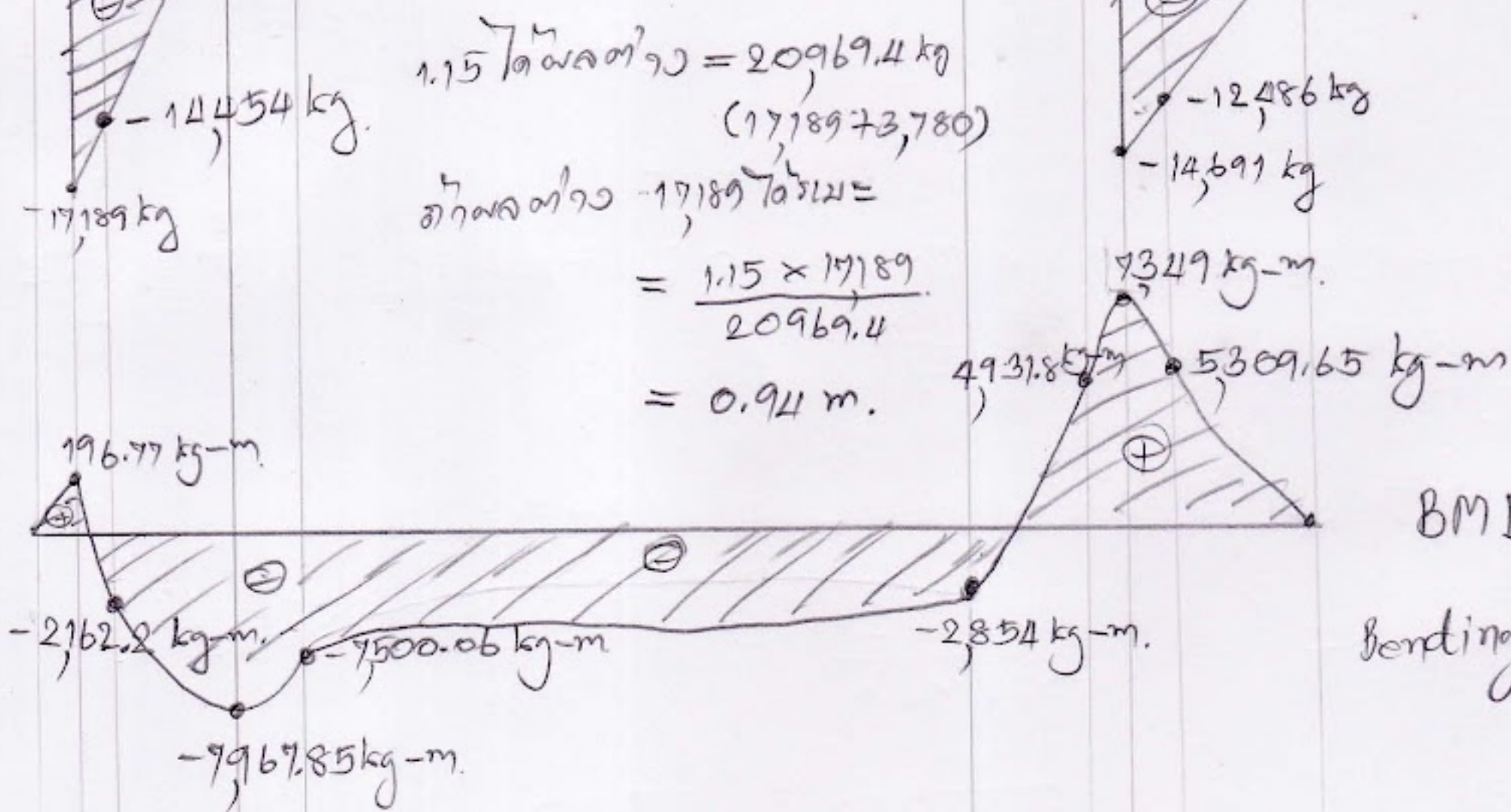
$$q_1 = 7,806 \times 2.4 = 18,734.4 \text{ kg/m}$$

$$q_2 = 7,349 \times 2 = 14,698 \text{ kg/m}$$



Shear force diagram.

SFD



BMD

Bending moment diagram.

$$1.15 \text{ ၂ီၵ်းလၵ်းၵ်း} = 20,969.4 \text{ kg} \quad (17,189 + 3,780)$$

$$\begin{aligned} \text{ၵ်းလၵ်းၵ်း} - 17,189 \text{ ၂ီၵ်းလၵ်းၵ်း} &= \\ &= \frac{1.15 \times 17,189}{20,969.4} \\ &= 0.94 \text{ m.} \end{aligned}$$

000mm strap beam.

ရက်စွဲအား $V = 3780.4 \text{ kg}$.

အားကြီး $M = -7967.85 \text{ kg-m}$.

ရက်စွဲအား $0.30 \times 0.50 \text{ m}$.

$M_c = Rbd^2 = 8.61 \times 0.30 \times 45^2 = 5230.58 \text{ kg-m}$.

$M_c < M_{max}$.

$A_{s1} = \frac{M_c}{f_s j d} = \frac{5230.58 \times 100}{1500 \times 0.9 \times 45} = 8.69 \text{ cm}^2$

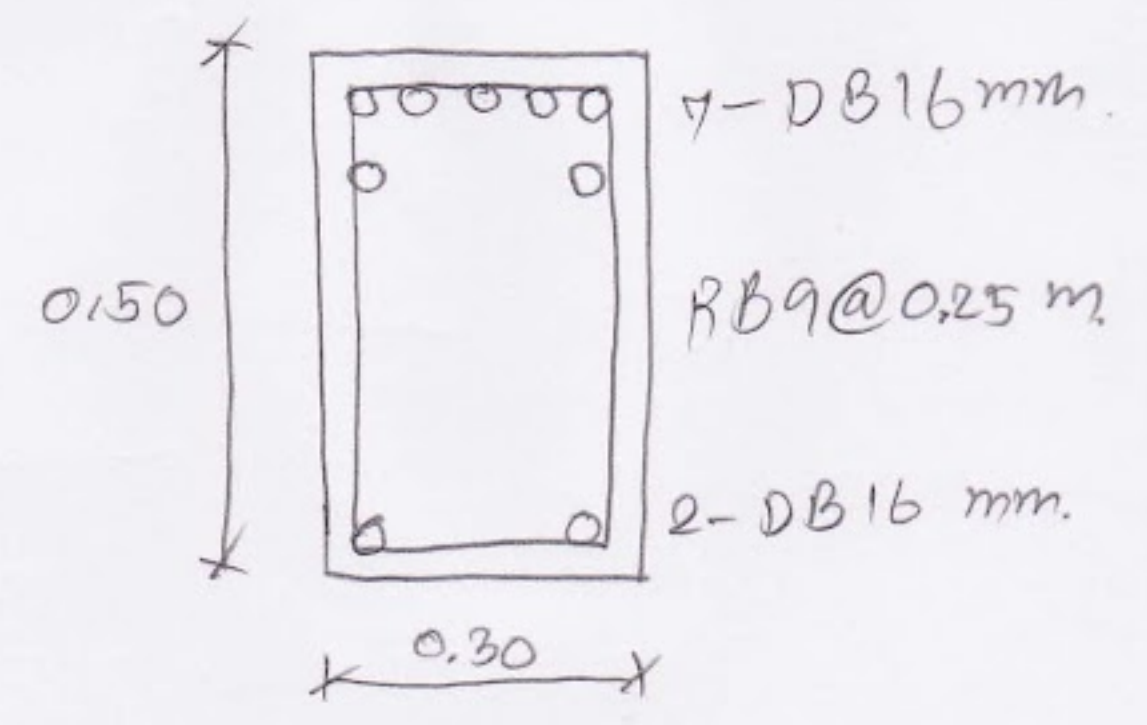
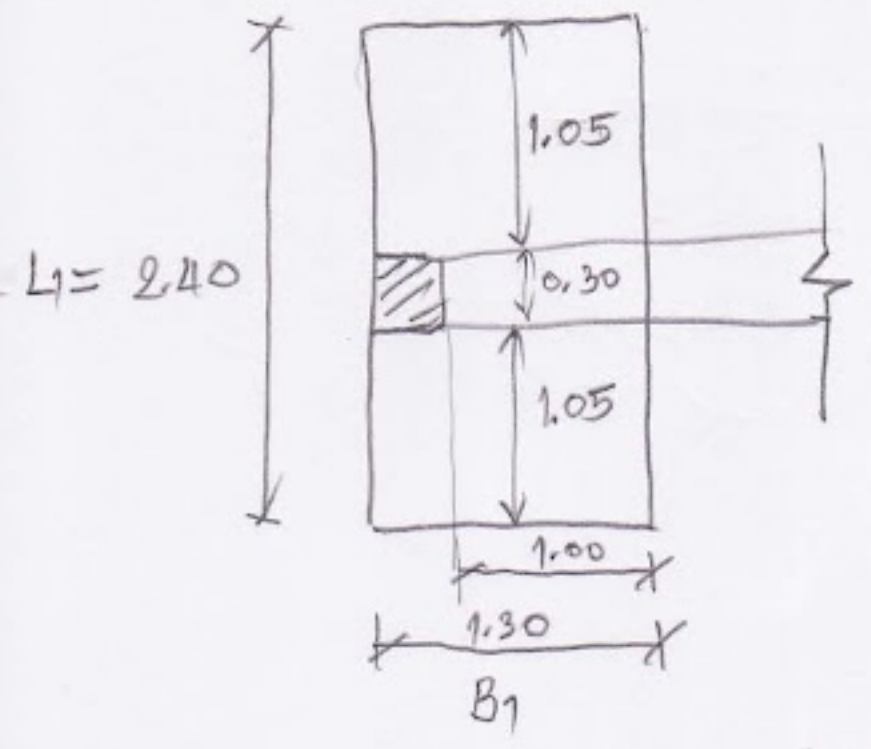
$A_{s2} = \frac{M - M_c}{f_s (d - d')} = \frac{(7967.85 - 5230.58) \times 100}{1500 (45 - 5)} = 4.56 \text{ cm}^2$

$A_s = A_{s1} + A_{s2} = 8.69 + 4.56 = 13.25 \text{ cm}^2$

ရက် $7 - \text{DB } 16 \text{ mm}$, $A_s = 14.07 \text{ cm}^2$

ရက်စွဲအား $V = \frac{3780.4}{30 \times 45} = 2.80 \text{ ksc} < V_{c1} \text{ ok}$.

ရက် $\text{RB } 9 @ 0.25 \text{ m}$.



000mm အားကြီးအား

ရက်စွဲအား $V = 14454 \text{ kg}$.

$q = 7806 \text{ kg/m}^2$

$q = 7806 \times 2.4 = 18734.4 \text{ kg/m}$.

Moment = $\frac{18734.4 \times 1^2}{2} = 9367.2 \text{ kg-m}$.

$d = \sqrt{\frac{9367.2}{8.61 \times 2.4}} = 21.29 \text{ cm}$.

ရက် $d = 30 \text{ cm}$.

$$A_s = \frac{9,367.2 \times 100}{1,500 \times 0.9 \times 30} = 23.13 \text{ cm}^2 \Rightarrow \text{9} \sqrt{12} \text{-DB16 mm.}$$

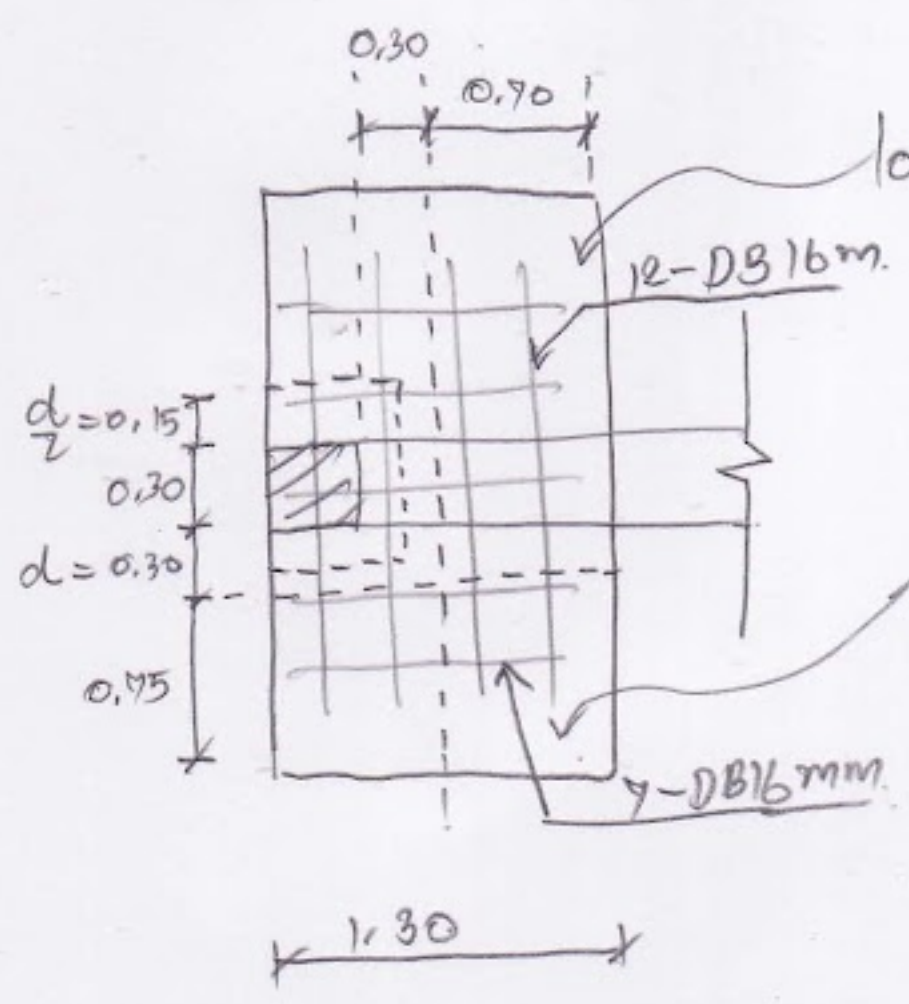
බිඳුණ L1; $q = 7,806 \times 1.3 = 10,147.8 \text{ kg/m.}$

$$M = \frac{10,147.8 \times 1.05^2}{2} = 5,594 \text{ kg-m.}$$

$$d = \sqrt{\frac{5,594}{867 \times 1.5}} = 22.36 \text{ cm.}$$

9 $\sqrt{d} = 30 \text{ cm,}$

$$A_s = \frac{5,594 \times 100}{1,500 \times 0.9 \times 30} = 13.81 \text{ cm}^2 \Rightarrow \text{9} \sqrt{7} \text{-DB16 mm.}$$



load = $7,806 \times 0.70 \times 2.4 = 13,114.08 \text{ kg.}$

ආර්. වර්ගඵලය = $210 \times 30 = 7,200 \text{ cm}^2.$

load = $7,806 \times 0.75 \times 1.3 = 7,610.85 \text{ kg}$

ආර්. වර්ගඵලය = $130 \times 30 = 3,900 \text{ cm}^2.$

$$V_L = \frac{13,114.08}{7,200} = 1.82 \text{ ksc.}$$

$$V_B = \frac{7,610.85}{3,900} = 1.95 \text{ ksc.}$$

$$V = \frac{14,454}{7,200} = 2.01 \text{ ksc.} < V_{en} \text{ ok.}$$

Punching. $m = 210 \times 30 = 6,300 \text{ cm}^2.$

load = $7,806 \times (2.4 \times 1.3 - 0.60 \times 0.45) = 22,247.1 \text{ kg.}$

$$V = \frac{22,247.1}{6,300} = 3.53 \text{ ksc.} < V_{c2} \text{ - OK.}$$

$$A_s = \frac{7797 \times 100}{1500 \times 0.9 \times 30} = 19.25 \text{ cm}^2 \Rightarrow \text{10-DB16mm.}$$

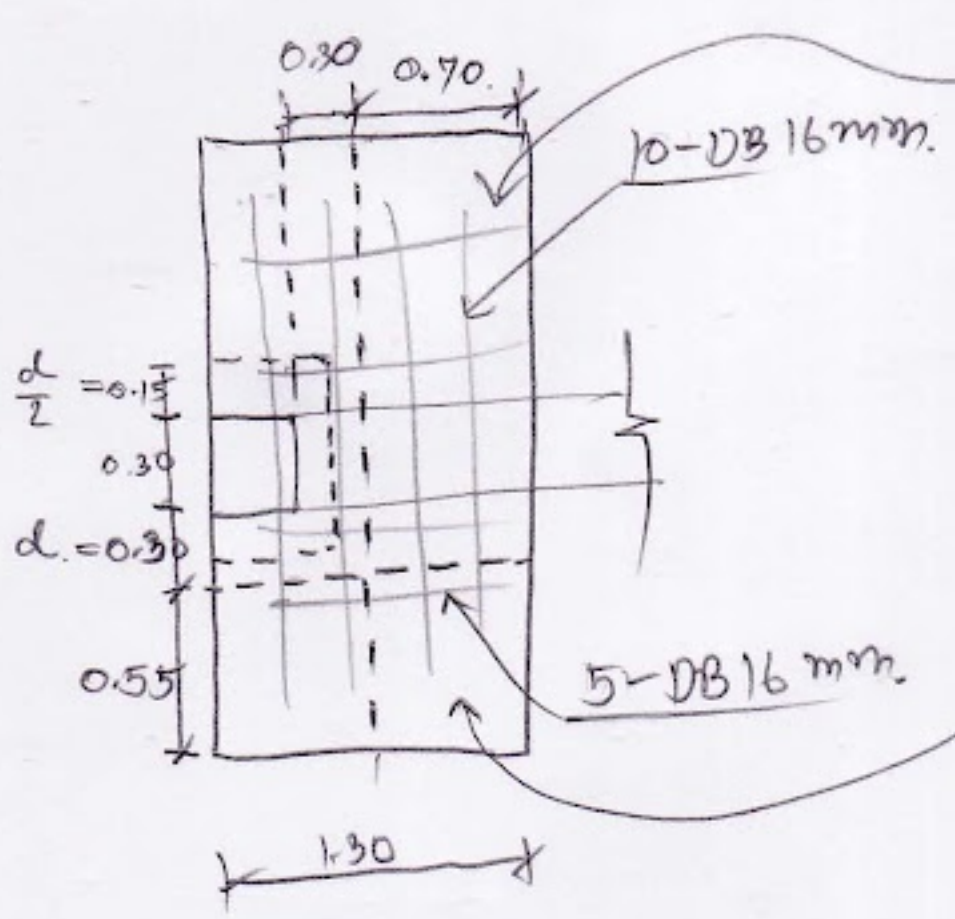
ବିକଳା L1; $q = 7797 \times 1.3 = 10136.1 \text{ kg/m.}$

$$M = \frac{10136.1 \times 0.85^2}{2} = 3661.66 \text{ kg-m.}$$

$$d = \sqrt{\frac{3661.66}{8.61 \times 1.3}} = 18.09 \text{ cm.}$$

∴ $d = 30 \text{ cm.}$

$$A_s = \frac{3661.66 \times 100}{1500 \times 0.9 \times 30} = 9.04 \text{ cm}^2 \Rightarrow \text{5-DB16mm}$$



load = $7797 \times 0.70 \times 2 = 10915.80 \text{ kg}$
 nn. $\frac{2 \times 1150 \times 100}{4} = 200 \times 30 = 6000 \text{ cm}^2$

load = $7797 \times 0.55 \times 1.3 = 5574.86 \text{ kg.}$
 nn. $\frac{2 \times 1150 \times 100}{4} = 130 \times 30 = 3900 \text{ cm}^2$

$$V_L = \frac{10915.80}{6000} = 1.82 \text{ ksc.}$$

$$V_B = \frac{5574.86}{3900} = 1.43 \text{ ksc.}$$

$$V = \frac{11897}{6000} = 1.98 \text{ ksc.} < V_{c1} \text{ ok.}$$

Punching nn. = $210 \times 30 = 6300 \text{ cm}^2$

load = $7797 \times (2 \times 1.3 - 0.6 \times 0.45) = 18167.01 \text{ kg}$

$$V = \frac{18167.01}{6300} = 2.88 \text{ ksc.} < V_{c2} \text{ ok.}$$

ออกแบบ Strap Beam

แรงปัดออก $V = 13,197 \text{ kg}$

โมเมนต์ $M = -6,316 \text{ kg-m}$

ใช้ขนาดหน้า 0.25 x 0.50 m.

$M_c = Rbd^2 = 8.61 \times 0.25 \times 45^2 = 4,358.81 \text{ kg-m.}$

$M_c < M_{max}$

$A_{s1} = \frac{M_c}{f_s d} = \frac{4,358.81 \times 100}{1500 \times 0.9 \times 45} = 7.17 \text{ cm}^2$

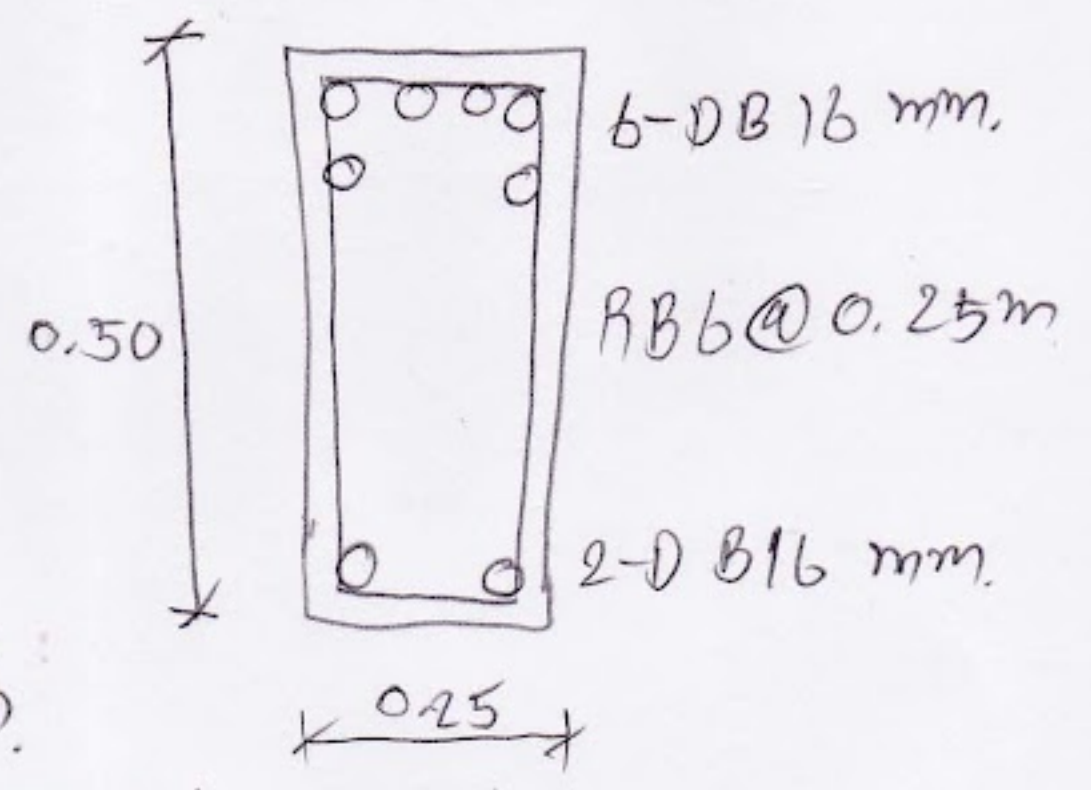
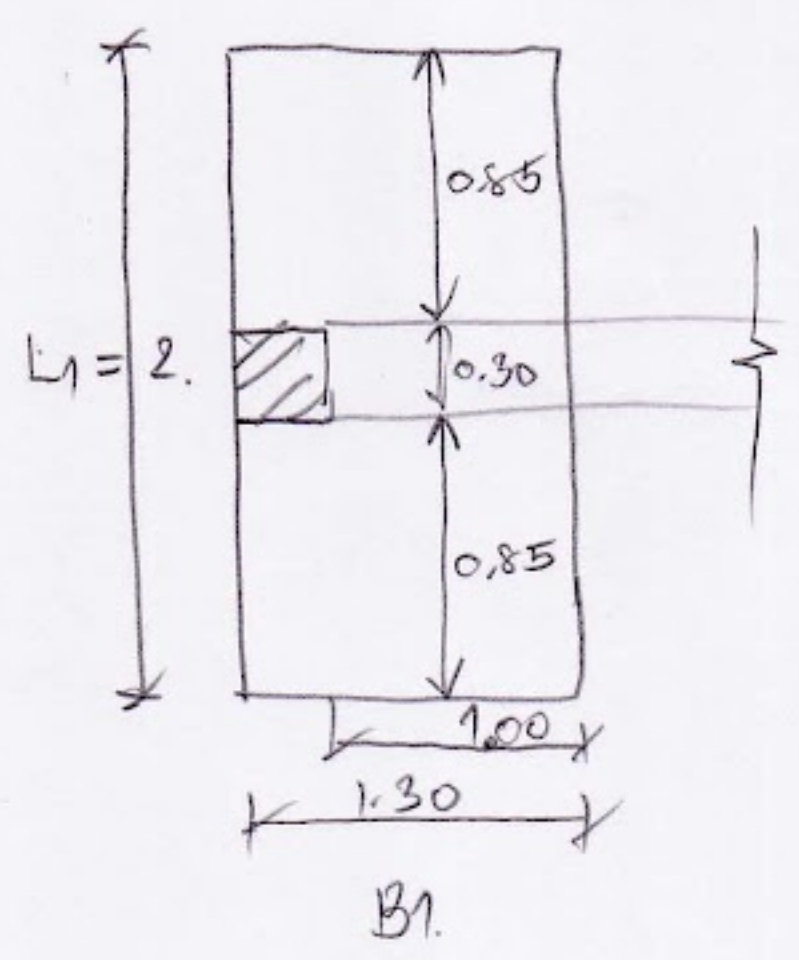
$A_{s2} = \frac{M - M_c}{f_s (d - d')} = \frac{1957.19 \times 100}{1500 (45 - 5)} = 4.35 \text{ cm}^2$

$A_s = A_{s1} + A_{s2} = 7.17 + 4.35 = 11.52 \text{ cm}^2$

ใช้ 6-DB 16 mm, $A_s = 12.06 \text{ cm}^2$

อัตราเร็วแรงปัดออก $V = \frac{3,197}{25 \times 45} = 2.84 \text{ ksc.} < V_{er} \text{ OK.}$

ใช้ RB 6 @ 0.25 m.



ออกแบบคานคอดัดงอ

แรงปัดออก $V = 11,897 \text{ kg.}$

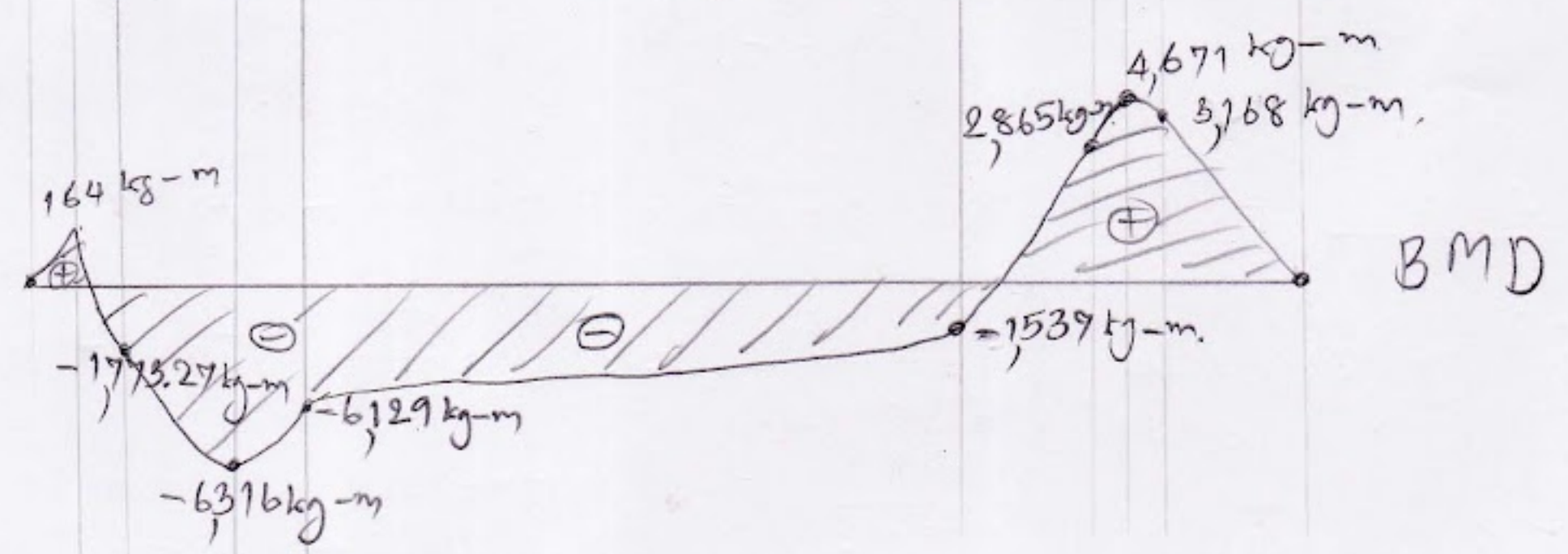
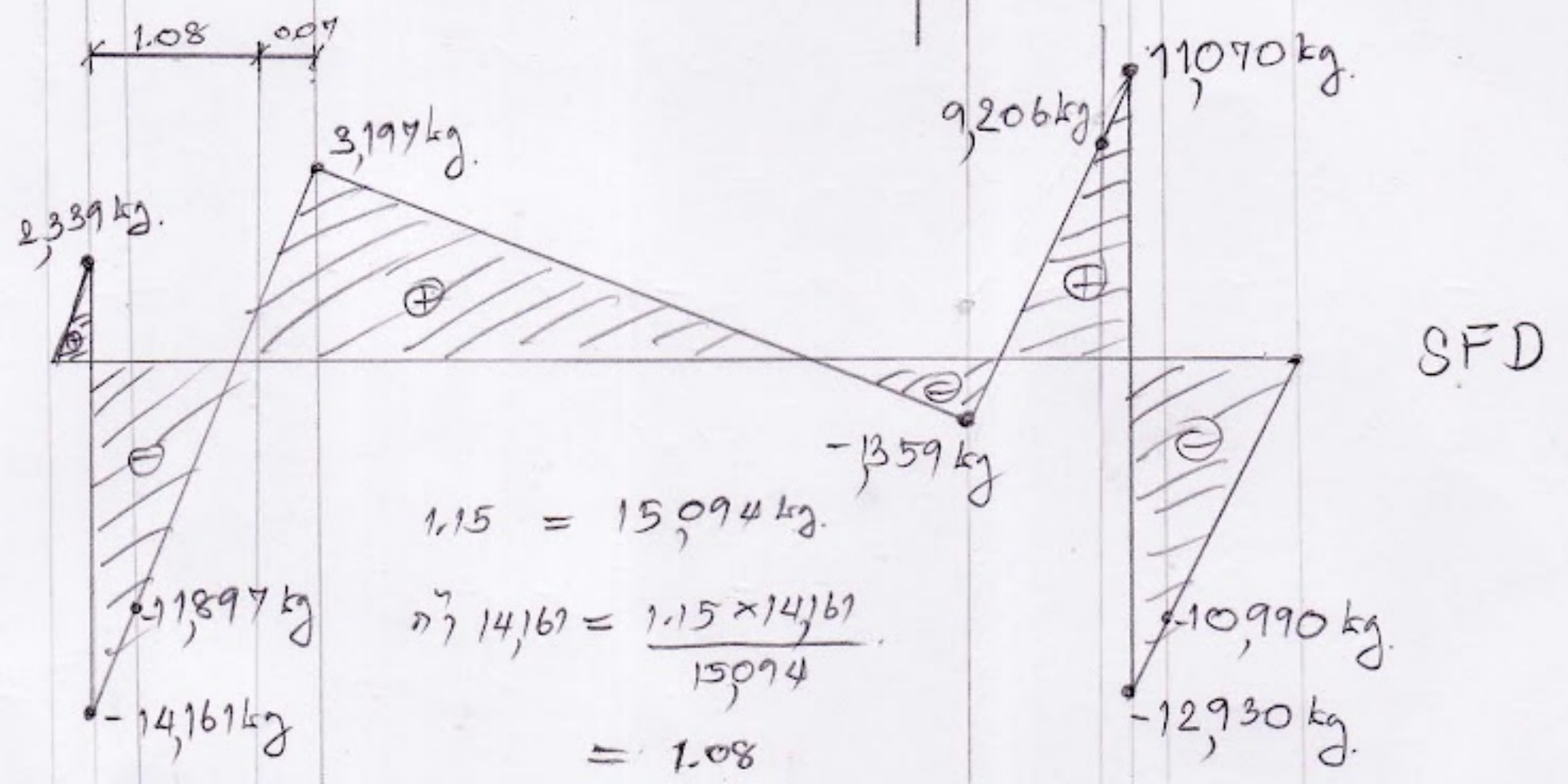
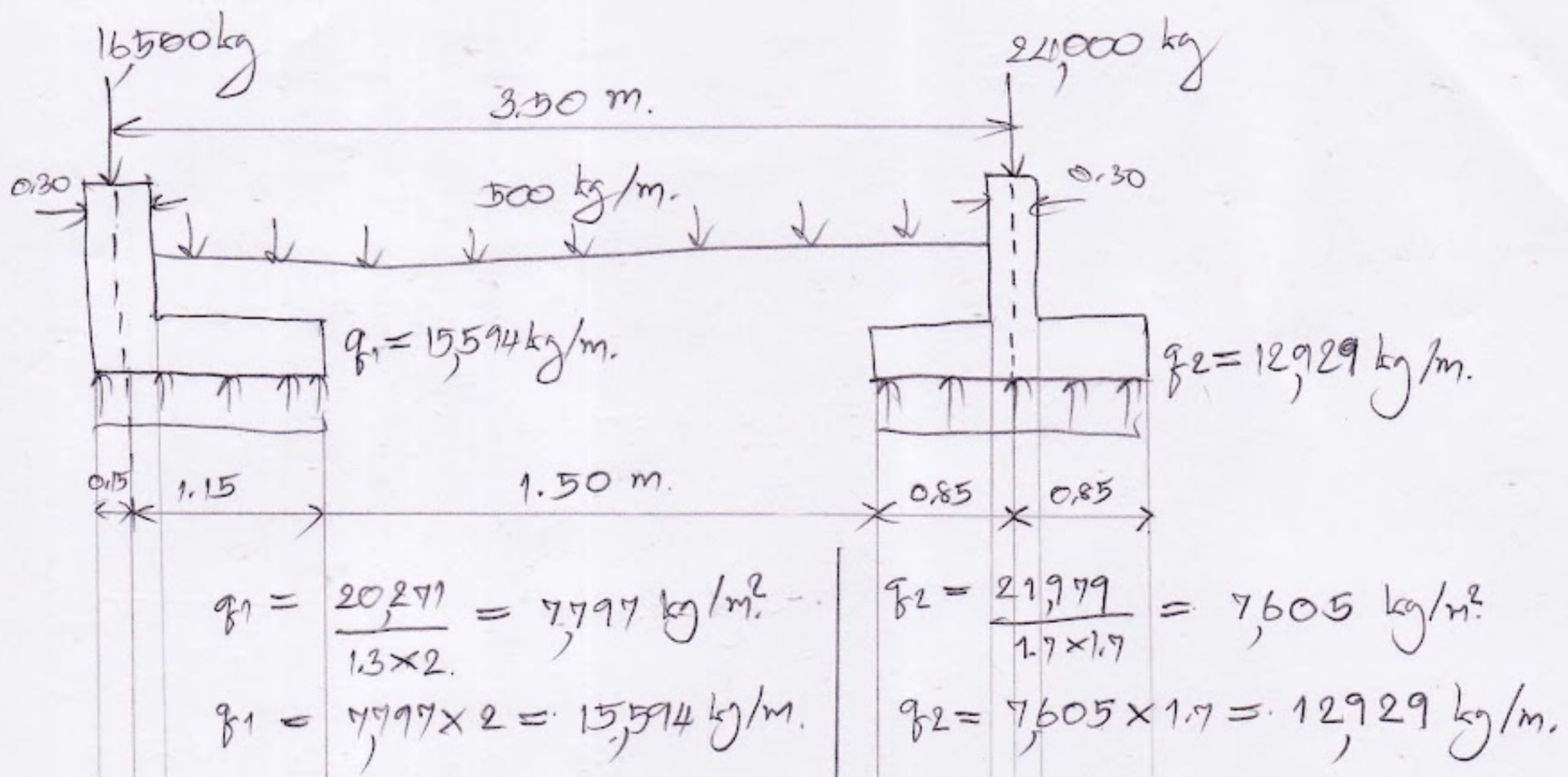
$q = 7797 \text{ kg/m}^2$

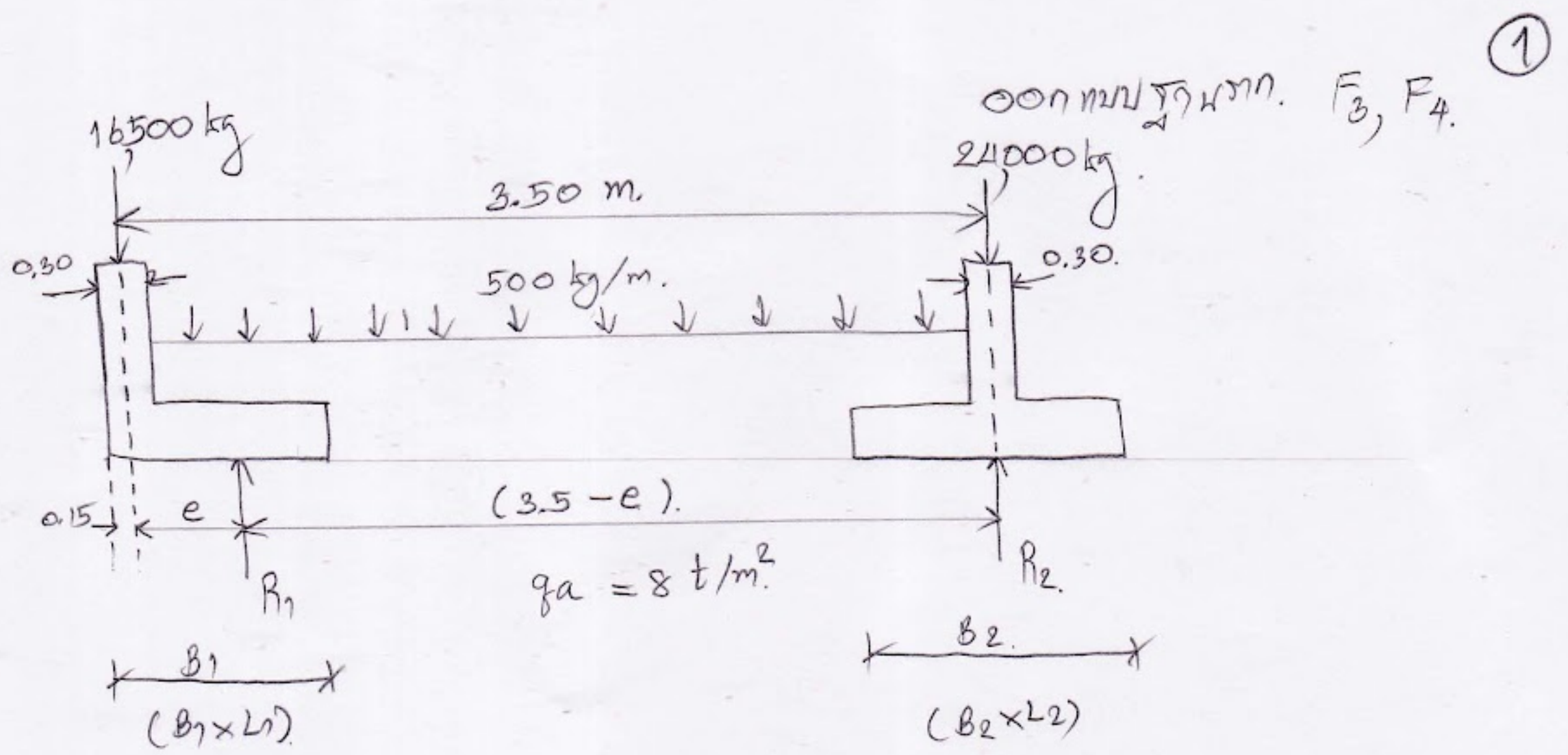
$q = 7797 \times 2 = 15,594 \text{ kg/m.}$

Moment = $\frac{15,594 \times 1^2}{2} = 7,797 \text{ kg-m.}$

$d = \sqrt{\frac{7797}{8.61 \times 2}} = 21.28 \text{ cm.}$

ใช้ $d = 30 \text{ cm.}$





$$\text{and } e = 0.50 \text{ m.}$$

$$\Sigma M_1 = 0; (16,500 \times 3.5) + (500 \times 3.5 \times 1.75) = R_1 (3.5 - 0.5)$$

$$R_1 = 20,271 \text{ kg.}$$

$$\Sigma M_2 = 0; (24,000 \times 3) - (16,500 \times 0.5) + (500 \times 3 \times 1.5) - (500 \times 0.5 \times 0.25) = R_2 (3.5 - 0.5)$$

$$R_2 = 21,979 \text{ kg.}$$

$$\Sigma F_y = 0; 16,500 + 24,000 + (3.5 \times 500) = 20,271 + 21,979$$

$$42,250 \text{ kg.} = 42,250 \text{ kg. OK.}$$

$$B_1 = 2(0.15 + e) = 2(0.15 + 0.5) = \underline{1.30 \text{ m.}}$$

$$L_1 = \frac{R_1}{B_1 \times qa} = \frac{20,271}{1.30 \times 8,000} = 1.95 \text{ m. } \underline{\underline{2 \text{ m.}}}$$

$$B_2 = L_2 = \sqrt{\frac{R_2}{qa}} = \sqrt{\frac{21,979}{8,000}} = 1.66 \text{ m. } \underline{\underline{1.70 \text{ m.}}}$$

ออกแบบฐานรากคานสั้น

$$M_{max} = 5,309.65 \text{ kg-m}$$

$$V = 15,179.6 \text{ kg}$$

$$d = \sqrt{\frac{5,309.65}{8.61 \times 2}} = 17.55 \text{ cm}$$

ให้ $d = 30 \text{ cm}$.

$$A_s = \frac{5,309.65 \times 100}{1500 \times 0.9 \times 30} = 13.11 \text{ cm}^2$$

ให้ 7-Ø 16 mm #

beam shear; $m. = 200 \times 30 = 6000 \text{ cm}^2$

$$\text{load} = 7,806 \times 0.55 \times 2 = 8,586.6 \text{ kg}$$

$$v = \frac{8,586.6}{6000} = 1.43 \text{ ksc.} < V_{c1} \text{ ok.}$$

punching shear; $m. = 240 \times 30 = 7200 \text{ cm}^2$

$$\text{load} = 7,806 \times (2^2 - 0.6^2) = 28,414.84 \text{ kg}$$

$$v = \frac{28,414.84}{7,200} = 3.95 \text{ ksc.} < V_{c2} \text{ ok.}$$

