

ສາມສິນຄ້າມາດຕະຖານ

Passms Trend V63 TV & Sound Studio

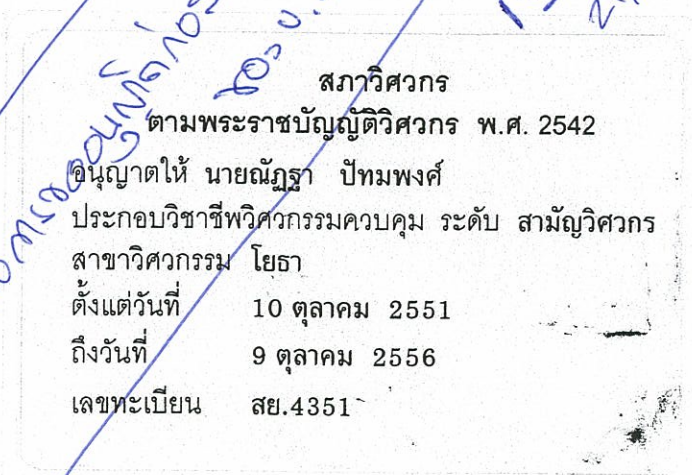
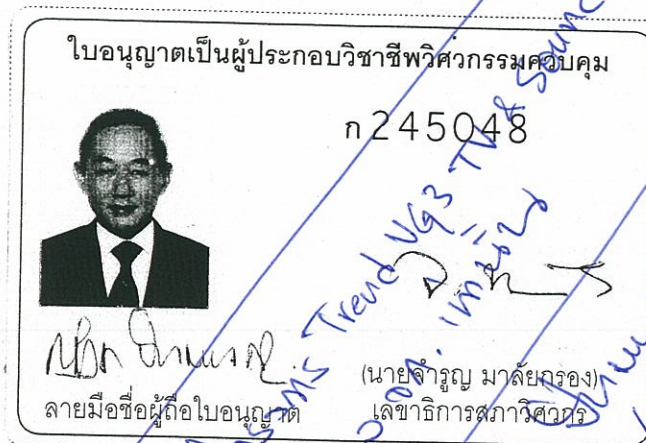
ຮ້ານ U. ສິນຄ້າມາດຕະຖານ,

August 2011

ສັນຍາການຊື້-ຂາຍ :

ທ. ນິກັດ ສິນຄ້າມາດຕະຖານ 504351

ນັກ ສິນຄ້າມາດຕະຖານ (ຊ. ນິກັດ)



Design Criteria :

Design Methods :

R/C Members : Ultimate Strength Design
Structural Steel : Working Stress Design

Material Strengths :

Concrete : $f'_c = 180 \text{ ksc}$ (Cylinder Strength @ 28 days)

Reinforcing Steel :

$\phi 6$ and $\phi 9$: $f_y = 2400 \text{ ksc}$ (SR 24)

DB 10 : $f_y = 3000 \text{ ksc}$ (SD 30)

DB 12 and larger : $f_y = 4000 \text{ ksc}$ (SD 40)

Structural Shapes : $f_c = 1500 \text{ ksc}$ (A36)

Light gage Steel : $f_s = 1200 \text{ ksc}$

Design Service Loads :

Live loads :

Roof & Stairs : 0.30 T/m^2

Typ. Interior Space : 0.50 T/m^2

Studios : 1.00 T/m^2

Dead Load :

Concrete : 2.40 T/m^3

Brick Walls : 0.18 T/m^2 per layer

np.

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪

4.00

9 @ 1.50 = 13.50

21

54

27

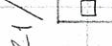
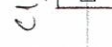
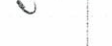
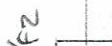
23

53

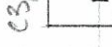
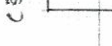
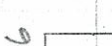
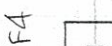
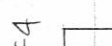
21

199.54

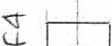
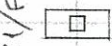
c1/f2 c1/f2



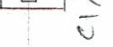
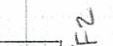
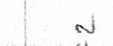
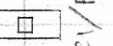
c1/f2 c2/f4



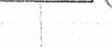
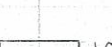
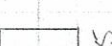
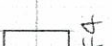
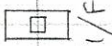
c1/f2 c2/f4



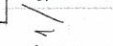
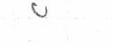
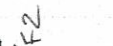
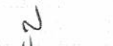
c1/f2 c1/f2



c1/f2 c2/f4



c1/f2 c1/f1



5 @ 1.50 = 7.50

Handwritten signature

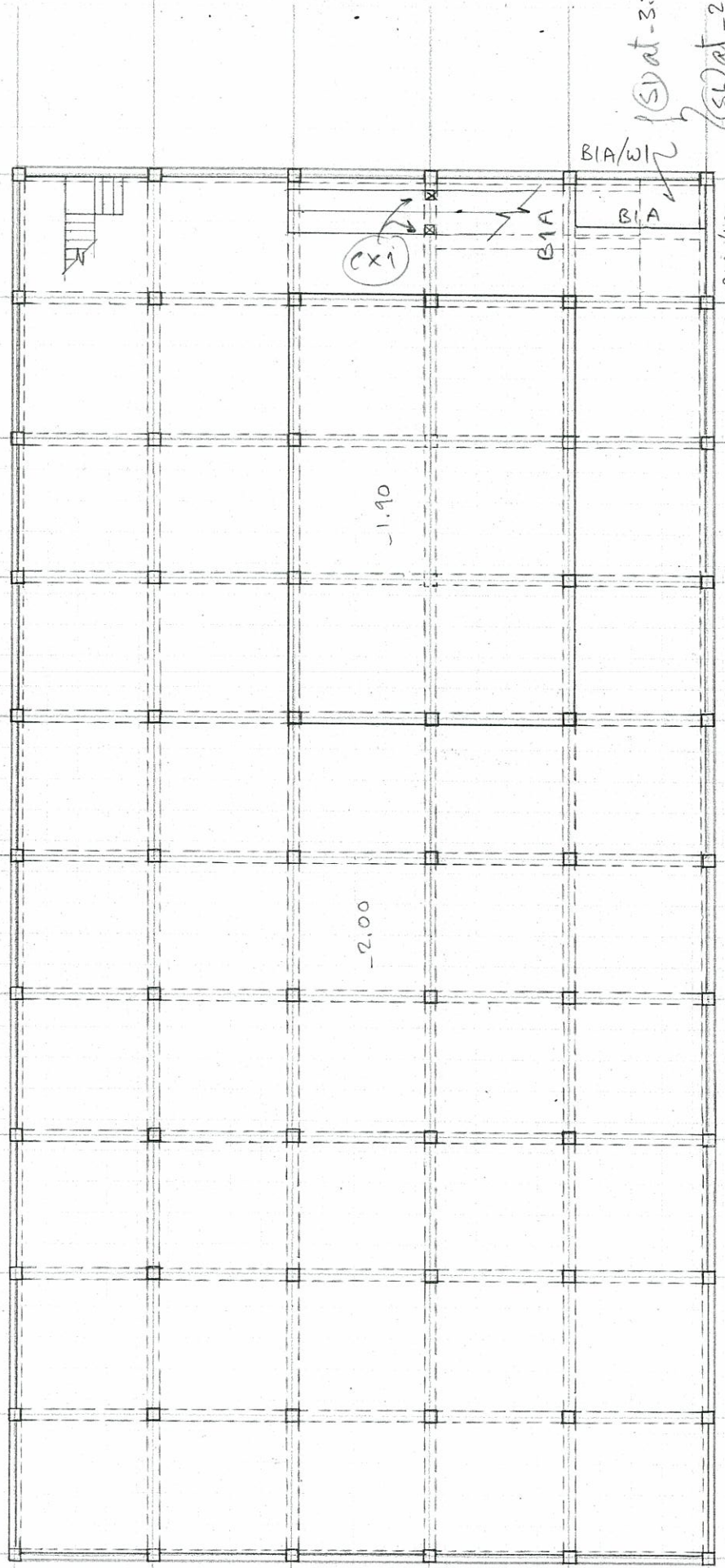
11
10
9
8
7
6
5
4
3
2
1

9 @ 4.50 = 40.50 m

4.00

A B C D E F

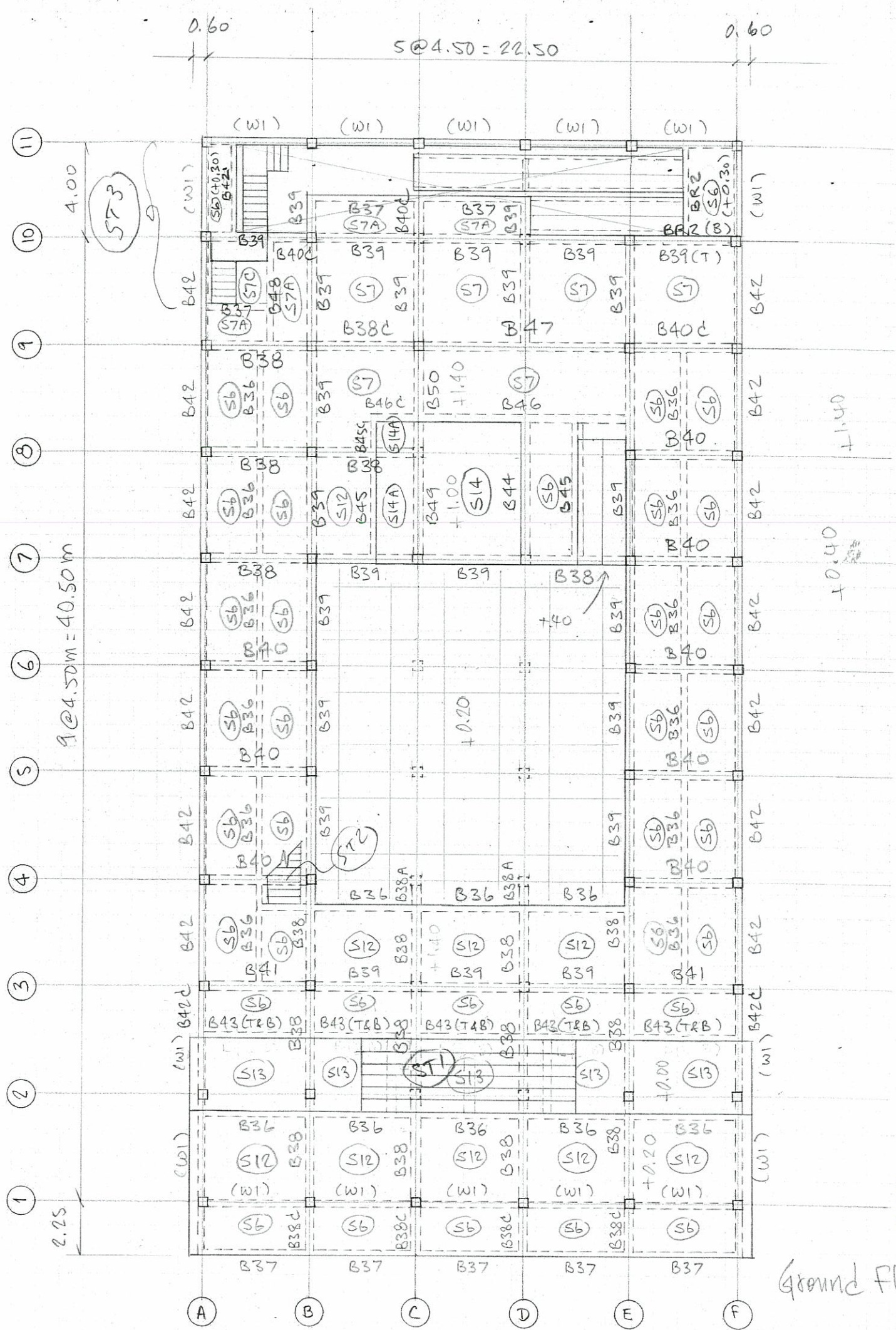
5 @ 4.50 = 22.50 m



(
All Slabs = (SI)
All Beams = (BI)
All R/e Walls = (WI)
)

Basement

DP.



Ground Fl.

11

10

9

8

7

6

5

4

3

2

1

A

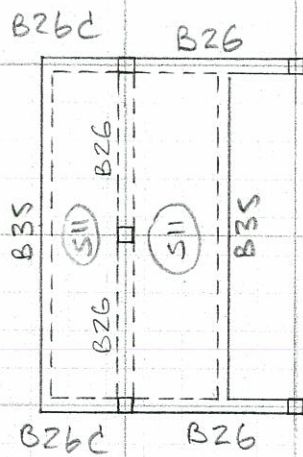
B

C

D

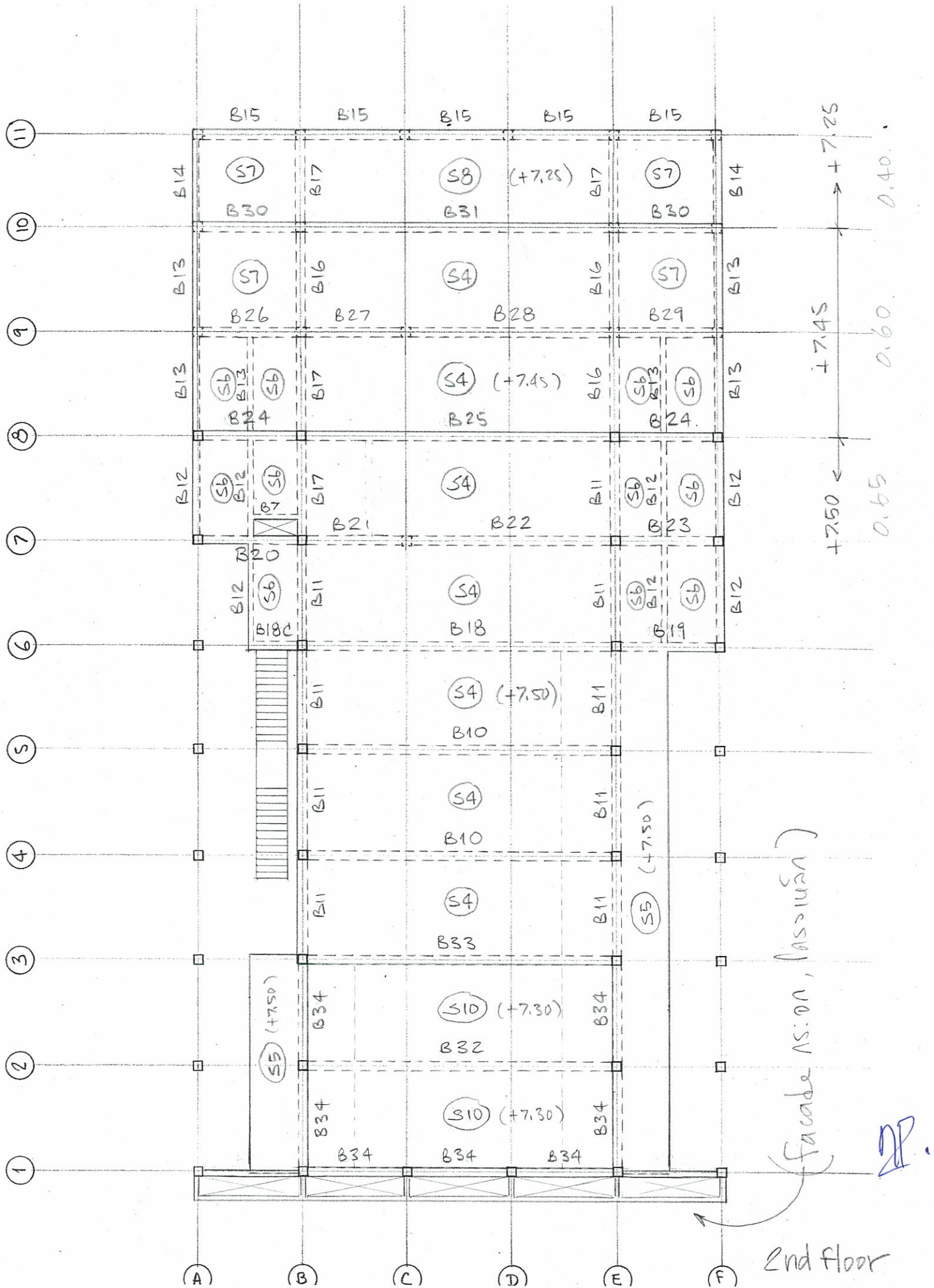
E

F



JP.

วอ> AHU
(อินทอว)



11

10

9

8

7

6

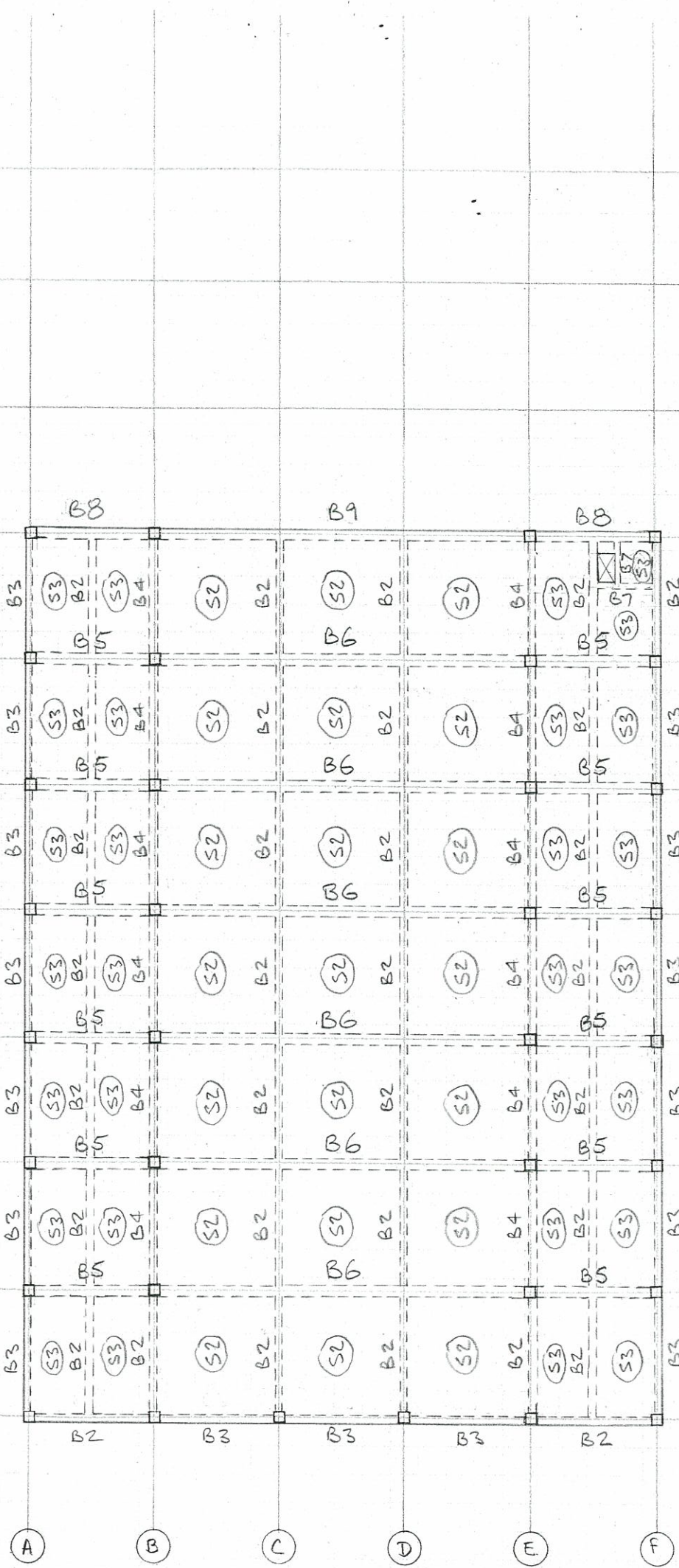
5

4

3

2

1



Roof

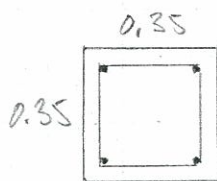
MP.

	1	2	3	4	5	6	7	8	9	10	11
A	6.08 3.24 15.39 7.59 32.30	12.15 0 15.39 15.19 42.73	12.15 0 15.19 39.49	12.15 0 15.19 39.49	12.15 0 15.19 39.49	12.15 0 15.19 39.49	12.15 6.08 12.15 15.19 45.57	6.08 12.15 12.15 15.19 45.57	0 12.15 12.15 15.19 39.49	0 12.15 12.15 15.19 39.49	0 6.08 6.08 7.59 19.75
B	12.15 18.63 24.30 15.19 70.27	48.60 48.60 24.30 30.38 151.88	48.60 48.60 24.30 30.38 151.88	48.60 48.60 24.30 30.38 151.88	48.60 48.60 24.30 30.38 151.88	48.60 48.60 24.30 30.38 151.88	48.60 48.60 24.30 30.38 139.73	48.60 48.60 24.30 30.38 159.98	0 12.15 24.30 30.38 91.13	0 12.15 24.30 30.38 103.28	0 12.15 12.15 15.19 39.49
C	12.15 18.63 24.30 15.19 70.27	24.30 30.38 54.68	24.30 30.38 54.68	24.30 30.38 54.68	24.30 30.38 54.68	24.30 30.38 54.68	24.30 30.38 54.68	24.30 30.38 54.68	0 36.45 24.30 30.38 95.18	24.30 30.38 54.68	0 12.15 12.15 15.19 39.49
D	12.15 18.63 24.30 15.19 70.27	24.30 30.38 54.68	24.30 30.38 54.68	24.30 30.38 54.68	24.30 30.38 54.68	24.30 30.38 54.68	24.30 30.38 54.68	24.30 30.38 54.68	0 30.38 30.38 103.28	24.30 30.38 54.68	0 12.15 12.15 15.19 39.49
E	12.15 18.63 24.30 15.19 70.27	48.60 48.60 24.30 30.38 151.88	48.60 48.60 24.30 30.38 151.88	48.60 48.60 24.30 30.38 151.88	48.60 48.60 24.30 30.38 151.88	48.60 48.60 24.30 30.38 151.88	48.60 48.60 24.30 30.38 139.73	48.60 48.60 24.30 30.38 159.98	0 36.45 36.45 30.38 103.28	0 48.60 24.30 30.38 103.28	0 12.15 12.15 15.19 39.49
F	6.08 3.24 15.39 7.59 32.30	12.15 0 15.39 15.19 42.73	12.15 0 15.19 39.49	12.15 0 15.19 39.49	12.15 0 15.19 39.49	12.15 0 15.19 39.49	12.15 6.08 12.15 15.19 45.57	6.08 12.15 12.15 15.19 45.57	0 12.15 12.15 15.19 39.49	0 12.15 12.15 15.19 39.49	0 6.08 6.08 7.59 19.75

28

Columns

(C1)

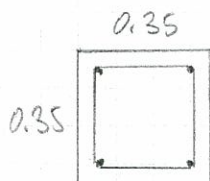


4DB 20
2. $\phi 9 @ 300$
 $\rho = 0.0103$
 $P_{u\max} = 149^T$
 $P_d = 87^T$

(Footing $\rightarrow$ Roof)

54.7

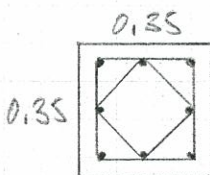
(C2)



4DB 25
2. $\phi 9 @ 300$
 $\rho = 0.0160$
 $P_{u\max} = 164^T$
 $P_d = 96^T$

(Basement $\rightarrow$ 2nd FL.)

72.9

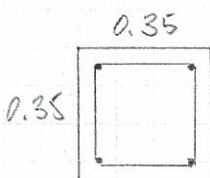


8DB 25
2. $\phi 9 @ 300$
 $\rho = 0.0321$
 $P_{u\max} = 206^T$
 $P_d = 121^T$

(Footing $\rightarrow$ Basement)

103.3

(C3)

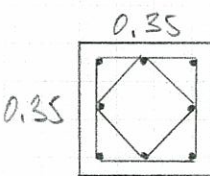


4DB 25
2. $\phi 9 @ 300$
 $\rho = 0.0160$
 $P_{u\max} = 164^T$
 $P_d = 96^T$

(2nd FL. $\rightarrow$ Roof)

48.6

(24.30)

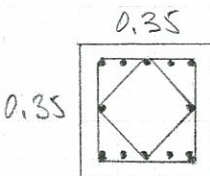


8DB 25
2. $\phi 9 @ 300$
 $\rho = 0.0321$
 $P_{u\max} = 206^T$
 $P_d = 121^T$

(Ground FL. $\rightarrow$ 2nd FL.)

~~97.2~~

105.3

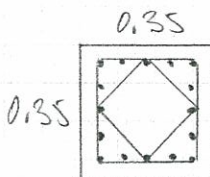


12DB 25
2. $\phi 9 @ 300$
 $\rho = 0.0481$
 $P_{u\max} = 248^T$
 $P_d = 145^T$

(Basement $\rightarrow$ Ground FL.)

~~121.5~~

129.6



16DB 25
2. $\phi 9 @ 300$
 $\rho = 0.0641$
 $P_{u\max} = 290^T$
 $P_d = 170^T$

(Footing $\rightarrow$ Basement)

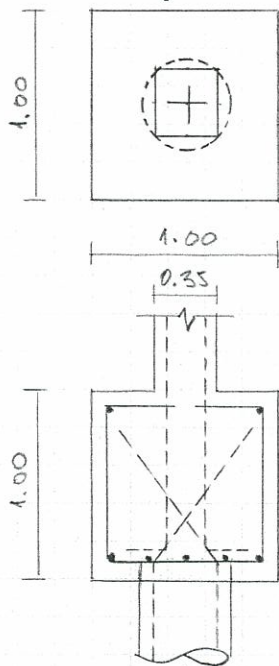
~~151.9~~

160.0

DP.

Footings

F1 :



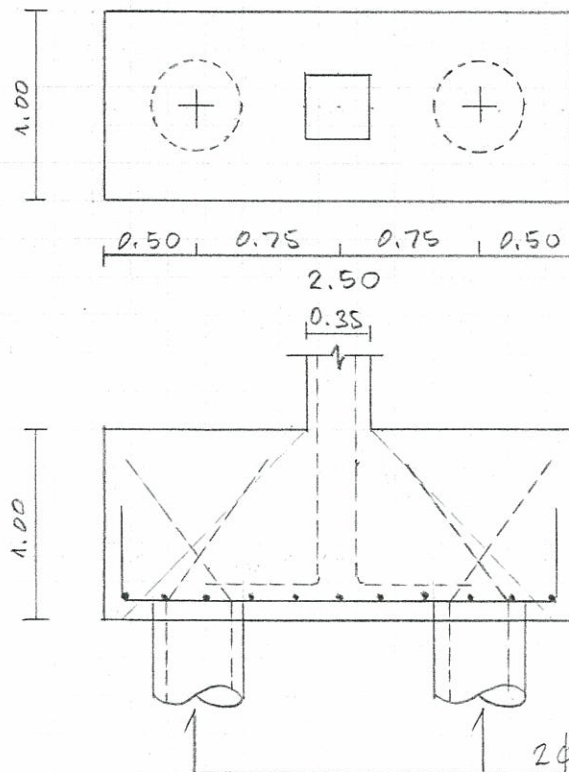
1 DB 10 5nsou

5 DB 25 #

1 ϕ 0.50, pile tip = -25.00m Concrete Bored Pile @ 65T/pile safe load

~~Void~~
~~See Revision~~

F2 :



$$M_u = 1.7(b_s \times 0.575) = 63.5 \text{ T.m}$$

$$A_{s \text{ min}} = 31.5 \text{ cm}^2, A_s = 20.2 \text{ cm}^2$$

Use 7 DB 25

$$A_{s \text{ Temp}} = 50 \text{ cm}^2$$

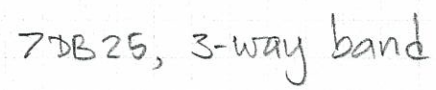
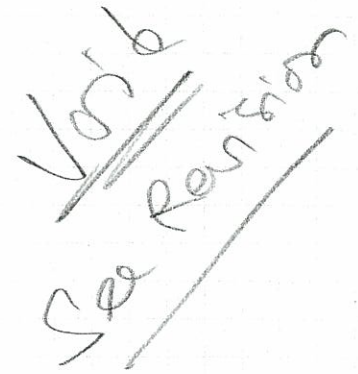
Use 11 DB 25

7 DB 25 / 11 DB 25

~~Void~~
~~See Revision~~

2 ϕ 0.50, pile tip = -25.00m Concrete Bored Piles @ 65T/pile safe load

NP.

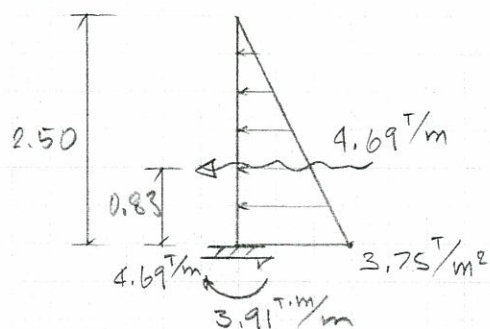


3 $\phi 0.50$, pile tip = -25.00m Concrete
Bored Pile @ 65T/pile safe load

NP.

Basement :

Wall (W1) :



$$M_u = 3.91 \text{ T}\cdot\text{m} \rightarrow A_s = 5.62 \text{ cm}^2/\text{m}$$

$$A_{s \text{ Temp}} = 5.00 \text{ cm}^2/\text{m}$$

Use $t = 0.25 \text{ m}$, $A_s = \text{DB12 @ } 200 \#$ both faces

$$(< M_u = 3.94 \text{ T}\cdot\text{m}, V_u = 13.1 \text{ T/m})$$

Slab (S1) :

$$m = 4.50/4.50 = 1.00, U = \begin{cases} +1.70 \text{ T/m}^2 \\ -2.56 \text{ T/m}^2 \end{cases}$$

$$M_{u \text{ max}} = 0.05 (2.56) (4.50)^2 = 2.59 \text{ T}\cdot\text{m}/\text{m}, V_u = 2.88 \text{ T/m}$$

Use $t = 0.25 \text{ m}$, $A_s = \text{DB12 @ } 200 \#$

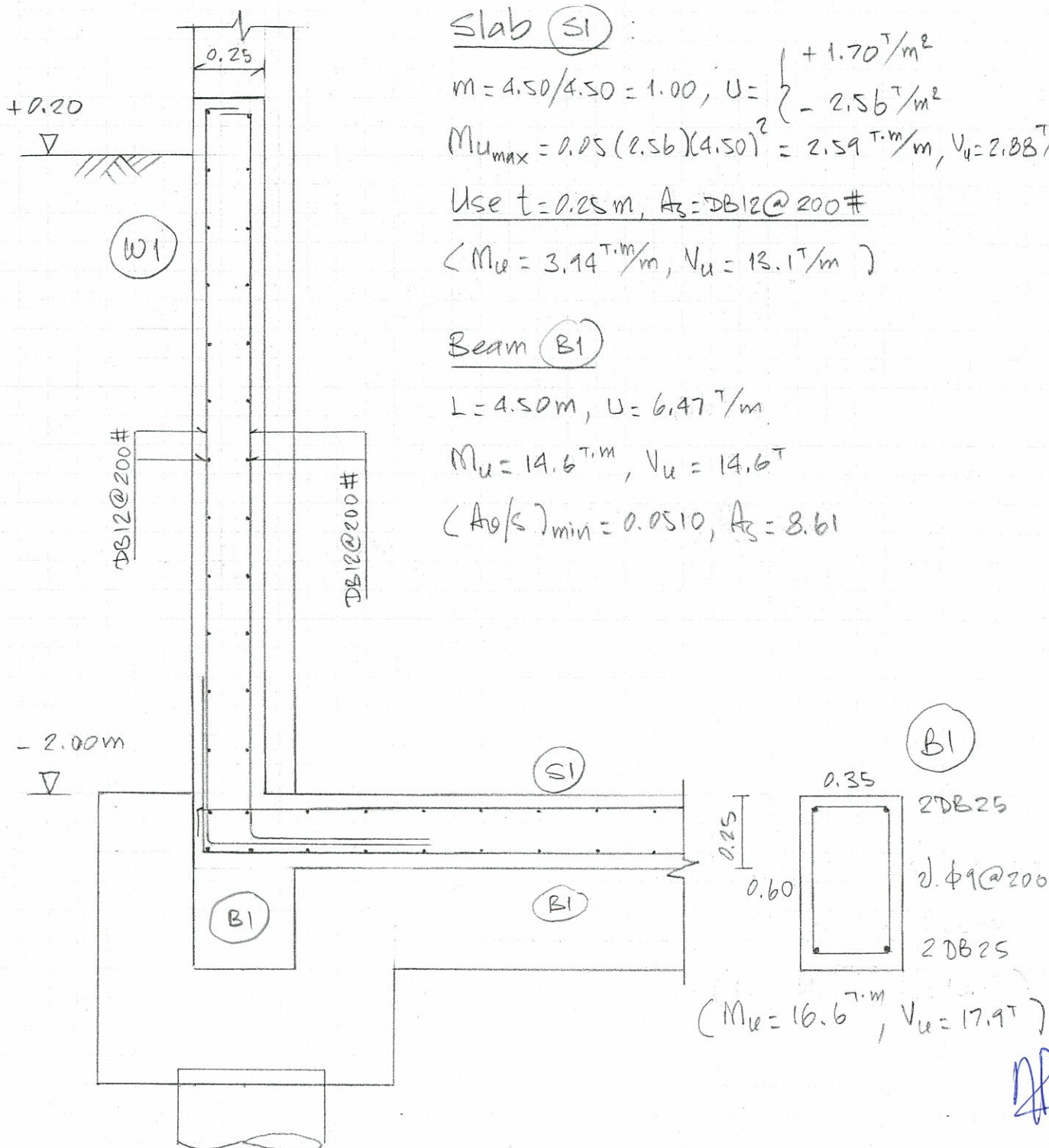
$$(< M_u = 3.14 \text{ T}\cdot\text{m}/\text{m}, V_u = 13.1 \text{ T/m})$$

Beam (B1) :

$$L = 4.50 \text{ m}, U = 6.47 \text{ T/m}$$

$$M_u = 14.6 \text{ T}\cdot\text{m}, V_u = 14.6 \text{ T}$$

$$(< A_g/s)_{\text{min}} = 0.0510, A_s = 8.61$$



$$(< M_u = 16.6 \text{ T}\cdot\text{m}, V_u = 17.9 \text{ T})$$

NP.

Roof

(S2) : $m = 4.50/4.50 = 1.00$, $U = 1.01 \text{ T/m}^2$

$M_u = 0.05(1.01)(4.50)^2 = 1.03 \text{ T}\cdot\text{m}$, $V_u = 1.14 \text{ T/m}$

$A_g = 3.26 \text{ cm}^2/\text{m}$, $A_{g \text{ Temp}} = 3.00 \text{ cm}^2/\text{m}$

Use $t = 0.15 \text{ m}$, $A_g = \text{DB10@200\#}$, $A'_g = \text{DB10@200\# @ 4.50m}$

($M_u = 1.23 \text{ T}\cdot\text{m}$, $V_u = 7.83 \text{ T/m}$)

(S3) : $L = 2.25 \text{ m}$, $U = 0.91 \text{ T/m}$, $M_u = 0.51 \text{ T}\cdot\text{m}$, $V_u = 1.03 \text{ T/m}$

$A_g = 2.17 \text{ cm}^2/\text{m}$, $A_{g \text{ Temp}} = 2.40 \text{ cm}^2/\text{m}$

Use $t = 0.12 \text{ m}$, $A_g = \text{DB10@300\#}$, $A'_g = \text{DB10@300\# @ 4.50m}$

($M_u = 0.62 \text{ T}\cdot\text{m}$, $V_u = 5.88 \text{ T/m}$)

(B2) : $L = 4.50 \text{ m}$, $U = 2.59 \text{ T}$

$M_u = 5.83 \text{ T}\cdot\text{m}$, $V_u = 5.83 \text{ T}$

(A_g/s)_{min} = 0.0292, $A_g = 4.32$

0.20
0.45
2DB12
+ 2DB12 over supports
2. #9 @ 200
4DB12
($M_u = 6.10 \text{ T}\cdot\text{m}$, $V_u = 10.4 \text{ T}$)

(B3) : $L = 4.50 \text{ m}$, $U = 1.43 \text{ T/m}$

$M_u = 3.21 \text{ T}\cdot\text{m}$, $V_u = 3.22 \text{ T}$

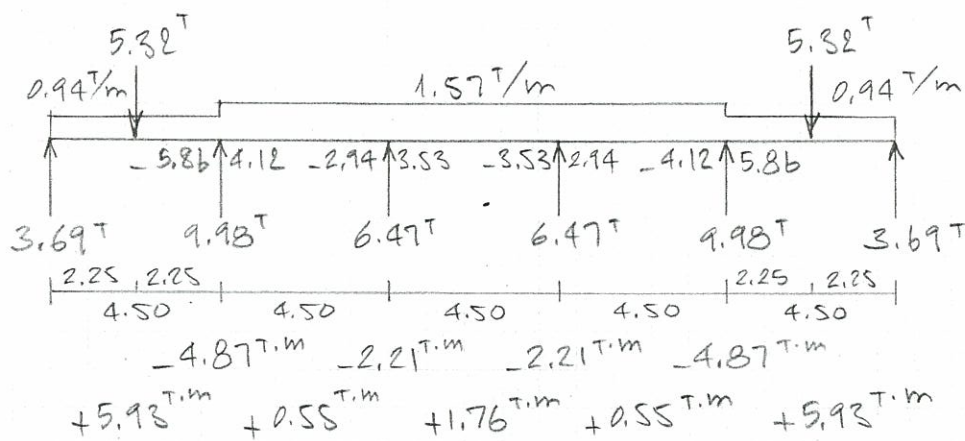
(A_g/s)_{min} = 0.0292, $A_{g \text{ min}} = 2.80$

0.20
0.45
2DB12
+ 1DB12 over supports
2. #9 @ 200
3DB12
($M_u = 4.66 \text{ T}\cdot\text{m}$, $V_u = 10.4 \text{ T}$)

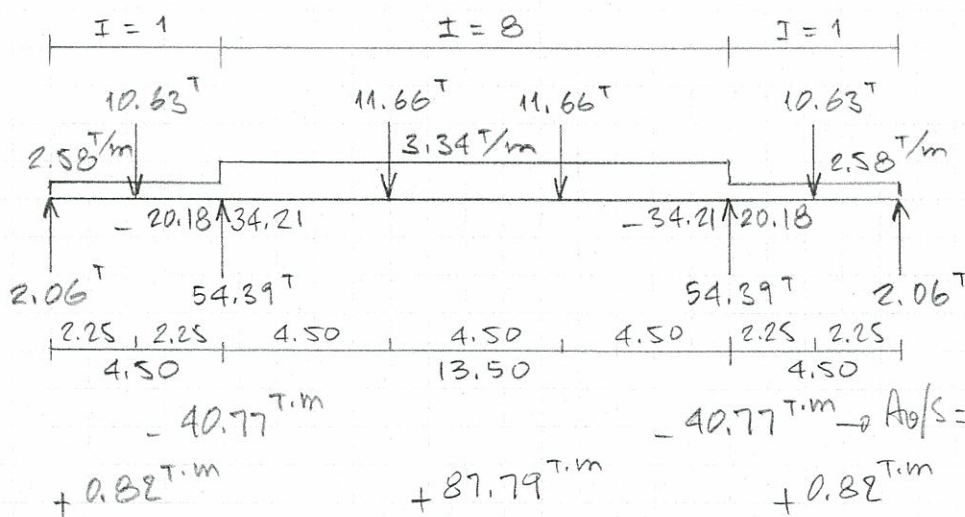
(B4) : 0.20
0.90
2DB20
2DB12
2. #9 @ 200
2DB12
2DB20

($M_u = 18.5 \text{ T}\cdot\text{m}$, $V_u = 22.1 \text{ T}$)

22.

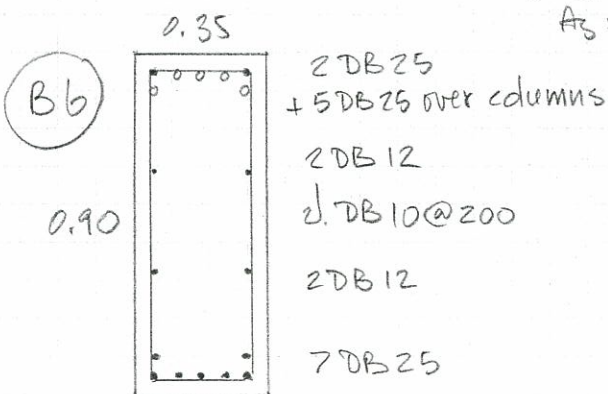


Use B2/B3/B3/B3/B2

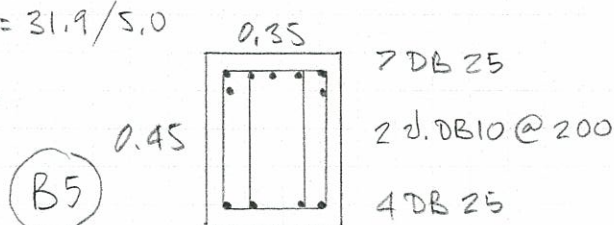


$$A_g/s = 0.1082, A'_g = 32.1/25.1$$

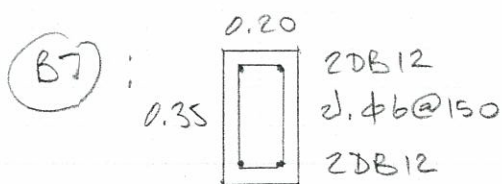
18.84



$$(M_u = 96.5^{T.m}, V_u = 36.3^T)$$

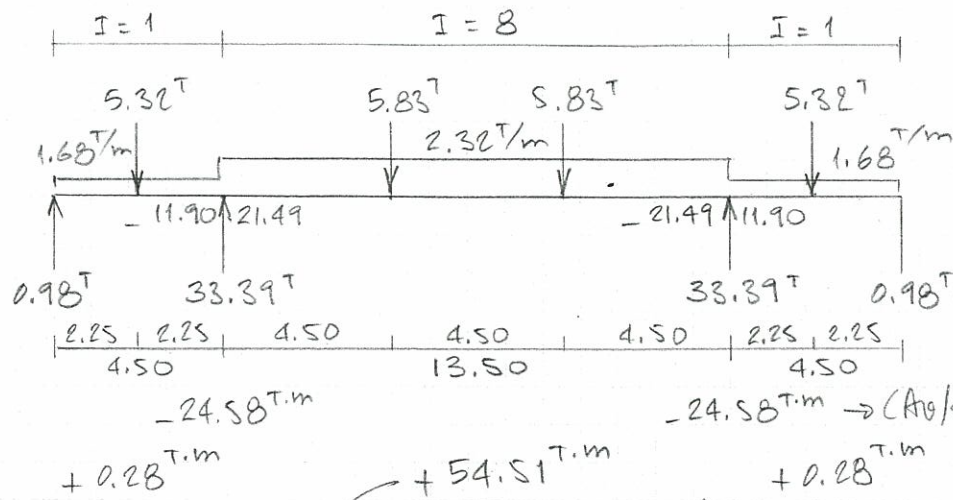


$$(-M_u = 43.1^{T.m}, +M_u = 25.4^{T.m}, V_u = 25.1^T)$$



$$(M_u = 2.40^{T.m}, V_u = 6.83^T)$$

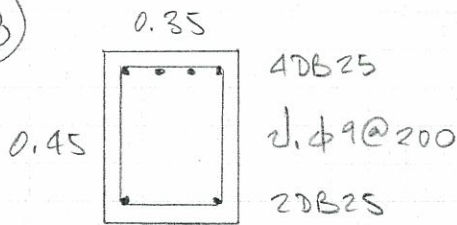
28.



$$-24.58T.m \rightarrow (A_g/s)_{\min} = 0.0510, A_g = 19.2/8.0$$

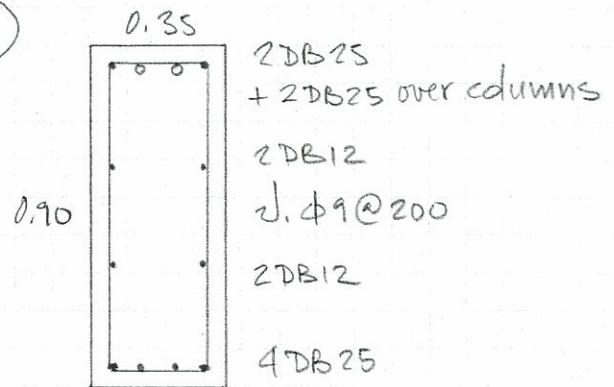
$$+0.28T.m \quad +54.51T.m \quad (A_g/s)_{\min} = 0.0510, A_g = 19.3/0$$

B8



$$(-M_u = 25.8T.m, +M_u = 13.1T.m, V_u = 14.3T)$$

B9



$$(M_u = 57.0T.m, V_u = 30.4T)$$

2nd floor

(S4) : $L = 4.50 \text{ m}$, $U = 1.63 \text{ T/m}^2$

$$M_u = 1.63(4.5)^2/9 = 3.67 \text{ T}\cdot\text{m/m}, V_u = 3.67 \text{ T/m}$$

$$A_s = 6.87 \text{ cm}^2/\text{m}, A_{s_{\text{temp}}} = 4.00 \text{ cm}^2/\text{m}$$

Use $t = 0.20 \text{ m}$, $A_s = \text{DB16@300/DB12@250}$,

$$A'_s = \text{DB16@300/DB12@250 } \text{barusou}$$

$$(M_u = 3.92 \text{ T}\cdot\text{m/m}, V_u = 11.1 \text{ T/m})$$

(S5) $L_c = 2.25 \text{ m}$, $U = 1.79 \text{ T/m}^2$, $P_u = 1.13 \text{ T/m}$

$$-M_u = 7.07 \text{ T}\cdot\text{m/m}, V_u = 5.16 \text{ T/m}$$

$$A'_s = 9.40 \text{ cm}^2/\text{m}, A_{s_{\text{temp}}} = 5.00 \text{ cm}^2/\text{m}$$

Use $t = 0.25 \text{ m}$, $A'_s = \text{DB16@200/DB12@200}$

$$(-M_u = 7.55 \text{ T}\cdot\text{m/m}, V_u = 14.4 \text{ T/m})$$

(S6) $L = 2.25 \text{ m}$, $U = 1.36 \text{ T/m}^2$

$$M_u = 1.36(2.25)^2/8 = 0.86 \text{ T}\cdot\text{m/m}, V_u = 1.52 \text{ T/m}$$

$$A_s = 3.68 \text{ cm}^2/\text{m}, A_{s_{\text{temp}}} = 2.40 \text{ cm}^2/\text{m}$$

Use $t = 0.12 \text{ m}$, $A_s = \text{DB10@200/DB10@300}$,

$$A'_s = \text{DB10@200/DB10@300 } \text{barusou}$$

$$(M_u = 0.91 \text{ T}\cdot\text{m/m}, V_u = 5.88 \text{ T/m})$$

(S7) $m = 4.5/4.5 = 1.0$, $U = 1.63 \text{ T/m}^2$

$$M_u = 0.05(1.63 \times 4.5)^2 = 1.65 \text{ T}\cdot\text{m/m}, V_u = 1.84 \text{ T/m}$$

$$A_s = 2.75 \text{ cm}^2/\text{m}, A_{s_{\text{temp}}} = 4.00 \text{ cm}^2/\text{m}$$

Use $t = 0.20 \text{ m}$, $A_s = \text{DB12@250 \#}$, $A'_s = \text{DB12@250 \# } \text{barusou}$

$$(M_u = 2.68 \text{ T}\cdot\text{m/m}, V_u = 11.1 \text{ T/m})$$

DP.

(S8) : $L = 4.00 \text{ m}$, $U = 1.52 \text{ T/m}^2$

$M_u = 3.04 \text{ T.m/m}$, $V_u = 3.04 \text{ T/m}$

$A_s = 5.16 \text{ cm}^2/\text{m}$, $A_{s \text{ temp}} = 4.00 \text{ cm}^2/\text{m}$

Use $t = 0.20 \text{ m}$, $A_s = \text{DB12@200/DB12@250}$,

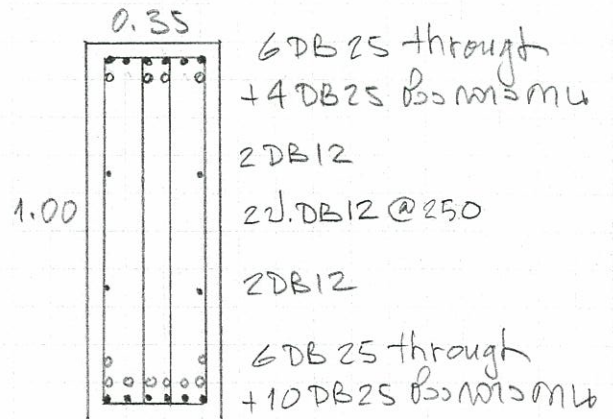
$A'_s = \text{DB12@200/DB12@250} \text{ Pansou}$

$(M_u = 3.33 \text{ T.m/m}, V_u = 11.1 \text{ T/m})$

(B10) $L = 13.50 \text{ m}$, $U = 9.65 \text{ T/m}$

$M_u = 220 \text{ T.m}$, $V_u = 65.1 \text{ T}$

$A_g/s = 0.1455$, $A_s = 76.8/6/9$
46.5



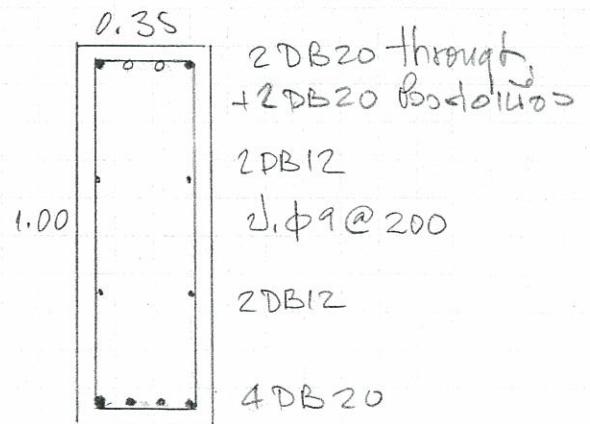
$(M_u = 225 \text{ T.m}, V_u = 75.9 \text{ T})$

(B11) $L = 4.50 \text{ m}$, $U = 9.30 \text{ T/m}$

$M_u = 20.9 \text{ T.m}$, $V_u = 20.9 \text{ T}$

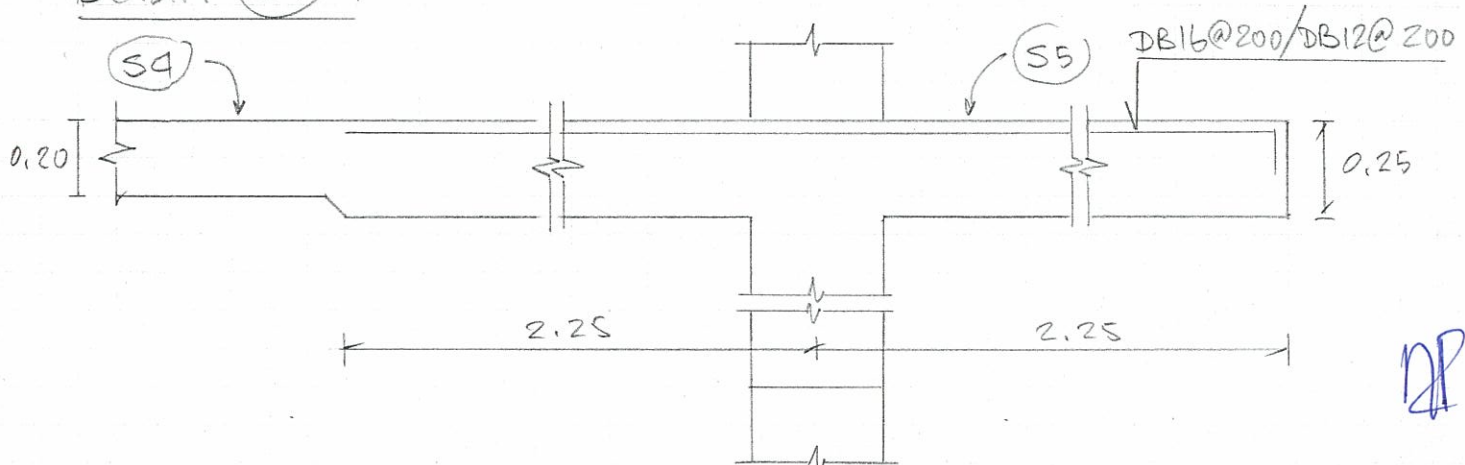
$(A_g/s)_{\min} = 0.0510$

$A_{s \min} = 11.6 \text{ cm}^2$



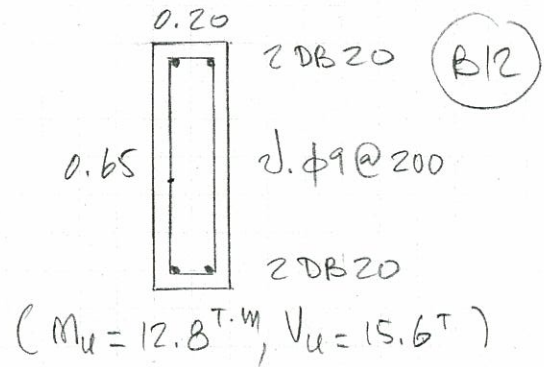
$(M_u = 41.4 \text{ T.m}, V_u = 34.0 \text{ T})$

Detail (S5) :

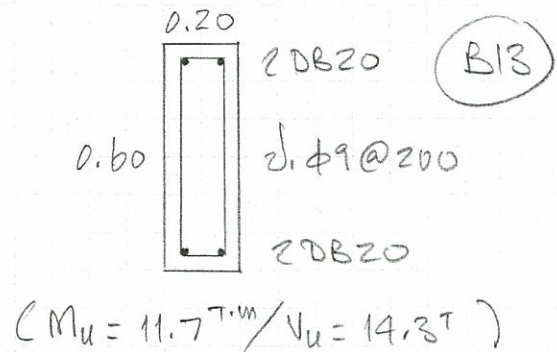


DP

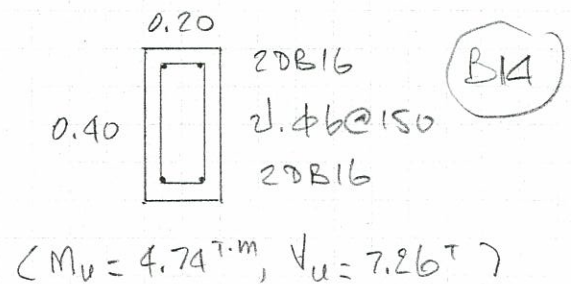
(B12) : $L = 4.50\text{ m}$, $U = 4.99\text{ T/m}$
 $M_u = 12.6\text{ T}\cdot\text{m}$, $V_u = 11.2\text{ T}$
 $(A_g/s)_{\min} = 0.0298$, $A_g = 6.21$



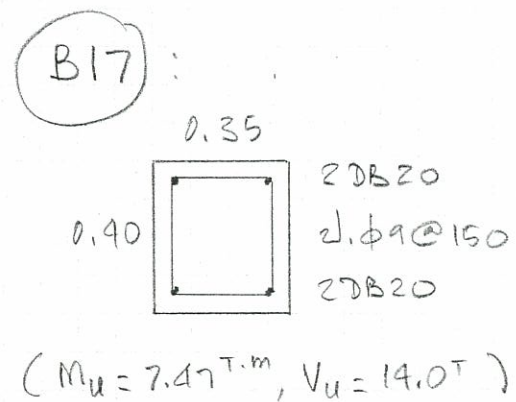
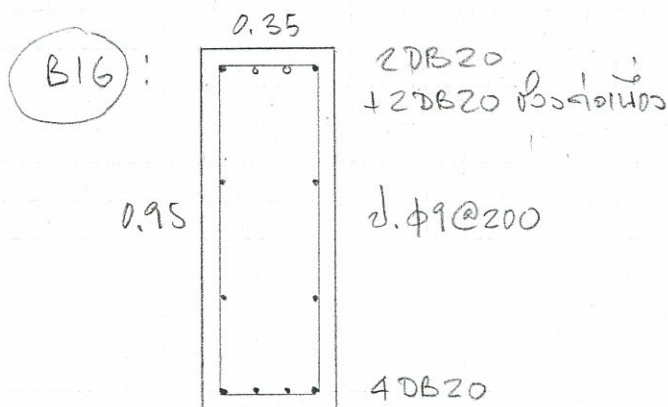
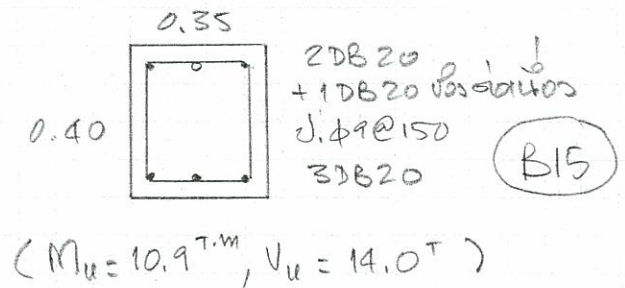
(B13) : $L = 4.50\text{ m}$, $U = 4.53\text{ T/m}$
 $M_u = 10.3\text{ T}\cdot\text{m}$, $V_u = 10.3\text{ T}$
 $(A_g/s)_{\min} = 0.0298$, $A_g = 5.53$



(B14) : $L = 4.00\text{ m}$, $U = 2.04\text{ T/m}$
 $M_u = 4.08\text{ T}\cdot\text{m}$, $V_u = 4.08\text{ T}$
 $(A_g/s)_{\min} = 0.0298$, $A_g = 3.44$



(B15) : $L = 4.50\text{ m}$, $U = 3.76\text{ T/m}$
 $M_u = 8.47\text{ T}\cdot\text{m}$, $V_u = 8.47\text{ T}$
 $(A_g/s)_{\min} = 0.0510$, $A_g = 7.22$



DP.

Stairs ST 2

main beam: $L = 10.00 \text{ m}$, $w = 1 \text{ T/m}$, $M = 12.5 \text{ T}\cdot\text{m}$

$$S \geq \frac{1,250,000}{1500} = 833 \text{ cm}^3$$

$$I \geq \frac{360(5)(10.0)(1000)^3}{384(2.1 \times 10^6)} = 22,300 \text{ cm}^4$$

Use 2 WF300x200x56.8 kg/m ($S = 1,542 \text{ cm}^3$, $I = 22,600 \text{ cm}^4$)

floor slab: $L_c = 0.55 \text{ m}$, $w = 0.42 \text{ T/m}^2$, $-M_u = 0.0635 \text{ T}\cdot\text{m}$

$$S \geq \frac{6,350}{1500} = 4.24 \text{ cm}^3, I \geq \frac{360(4.2)(55)^3}{8(2.1 \times 10^6)} = 15.0 \text{ cm}^4$$

$$\frac{100t^3}{12} = 15 \rightarrow t = 1.22 \text{ cm}$$

Use 13 mm PL ($I = 18.3 \text{ cm}^4$, $S = 28.2 \text{ cm}^3$)

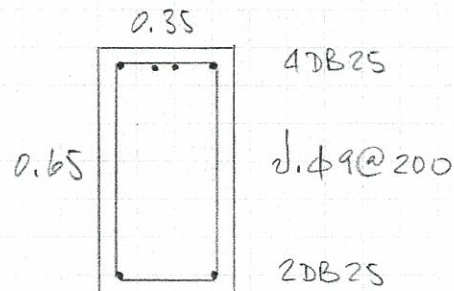
column: detail on main beam

B18C: $L_c = 2.25 \text{ m}$, $U = 1.53 \text{ T/m}$

$$P_u = 6.95 + 3.00 = 9.95 \text{ T}$$

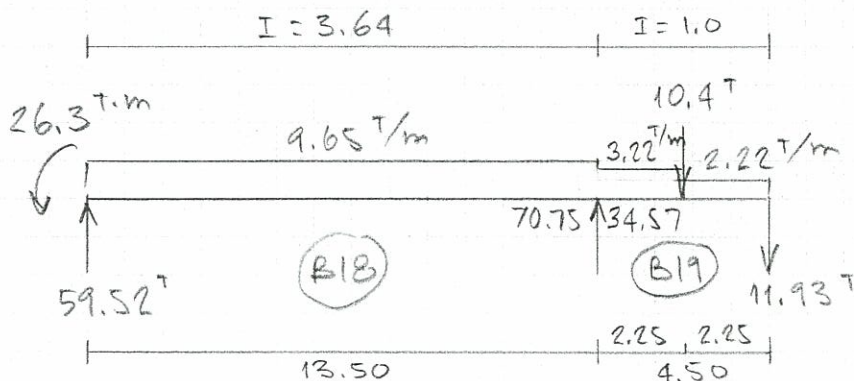
$$V_u = 13.4 + 3.00 = 16.4 \text{ T}$$

$$M_u = 26.3 \text{ T}\cdot\text{m}$$



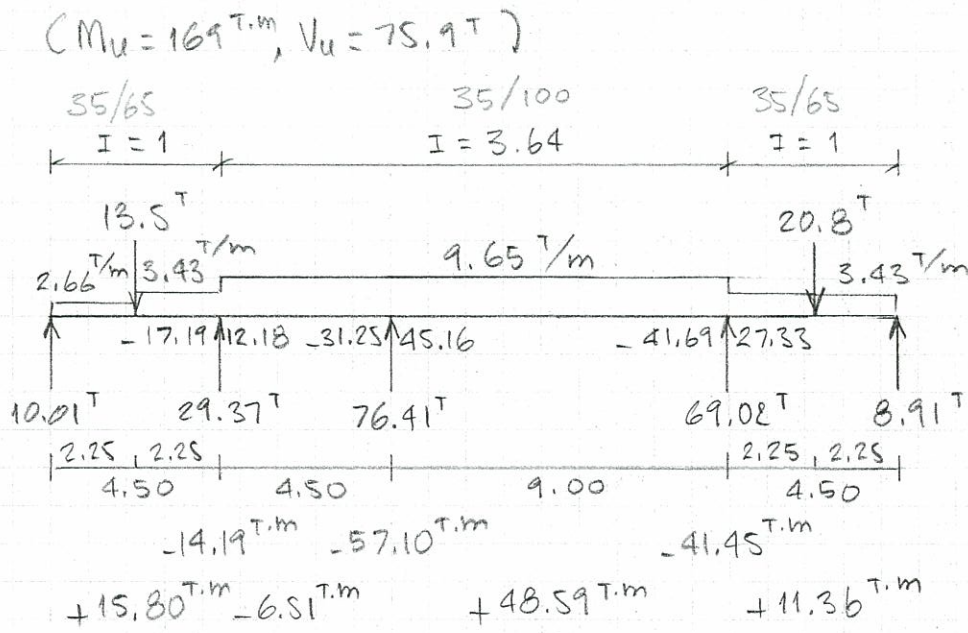
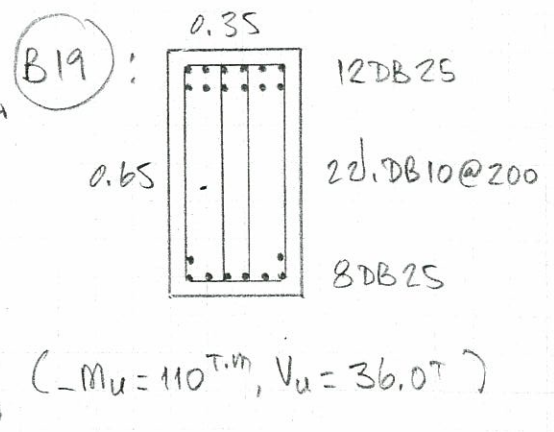
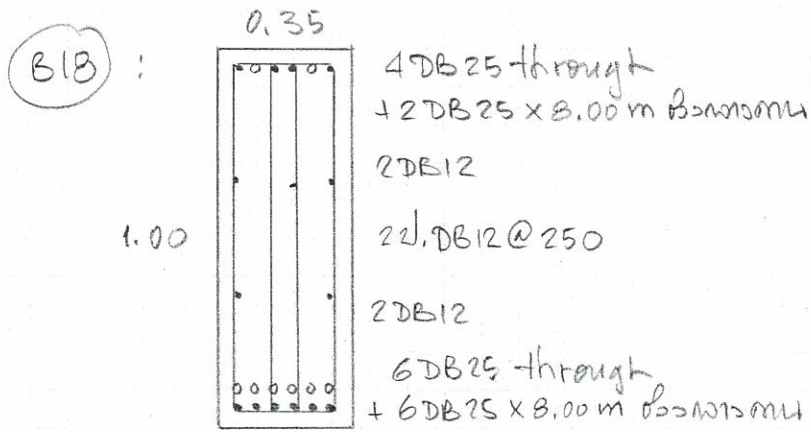
B18C

$$(A_g/s)_{\min} = 0.0510, A_g = 13.1 \quad (-M_u = 39.3 \text{ T}\cdot\text{m}, V_u = 21.5 \text{ T})$$



$$\begin{aligned} & +157 \text{ T}\cdot\text{m} \quad -102 \text{ T}\cdot\text{m} \rightarrow A_g/s = 0.1363 \rightarrow 2 \text{ DB10 @ } 200 \\ & A_g/s = 0.1640 \rightarrow 2 \text{ DB12 @ } 250 \quad A_g = 54.4/47.2 \quad (V_u = 36.0 \text{ T}) \\ & A_g = 54.3/38.8 \rightarrow 12/6 \text{ DB25} \rightarrow 12/8 \text{ DB25} \\ & 24.6 \quad (M_u = 169 \text{ T}\cdot\text{m}) \quad (-M_u = 110 \text{ T}\cdot\text{m}) \end{aligned}$$

DP.

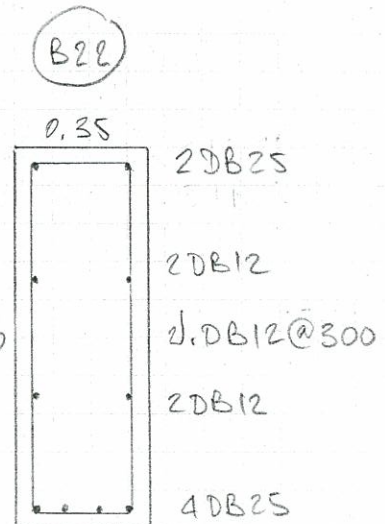
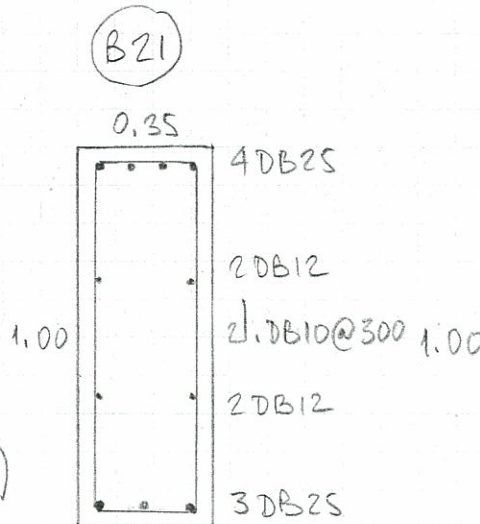
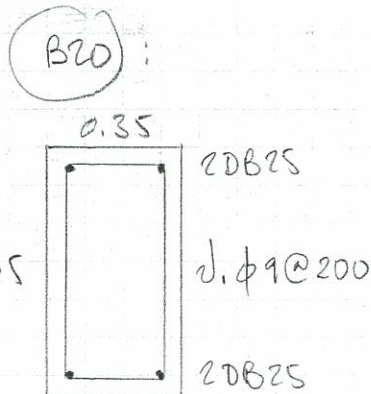


B20

B21

B22

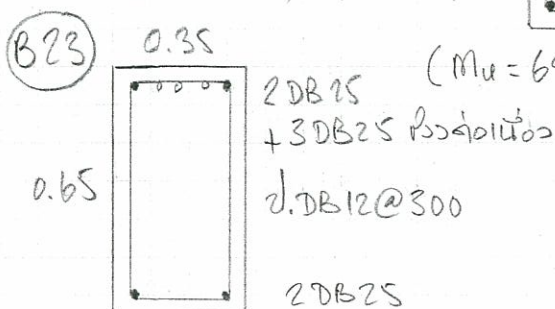
B23



($M_u = 20.1 \text{ T.m}$, $V_u = 21.5 \text{ T}$)

($M_u = 64.1 \text{ T.m}$, $V_u = 34.3 \text{ T}$)

($M_u = 64.1 \text{ T.m}$, $V_u = 46.0 \text{ T}$)

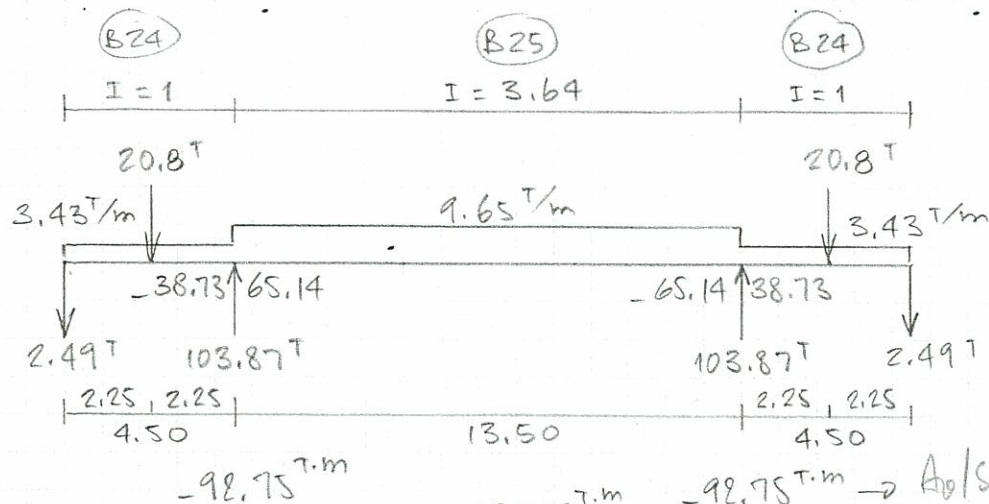


($-M_u = 48.6 \text{ T.m}$, $V_u = 29.1 \text{ T}$)

0.0408

0.0668 21.4/2.11

DP.



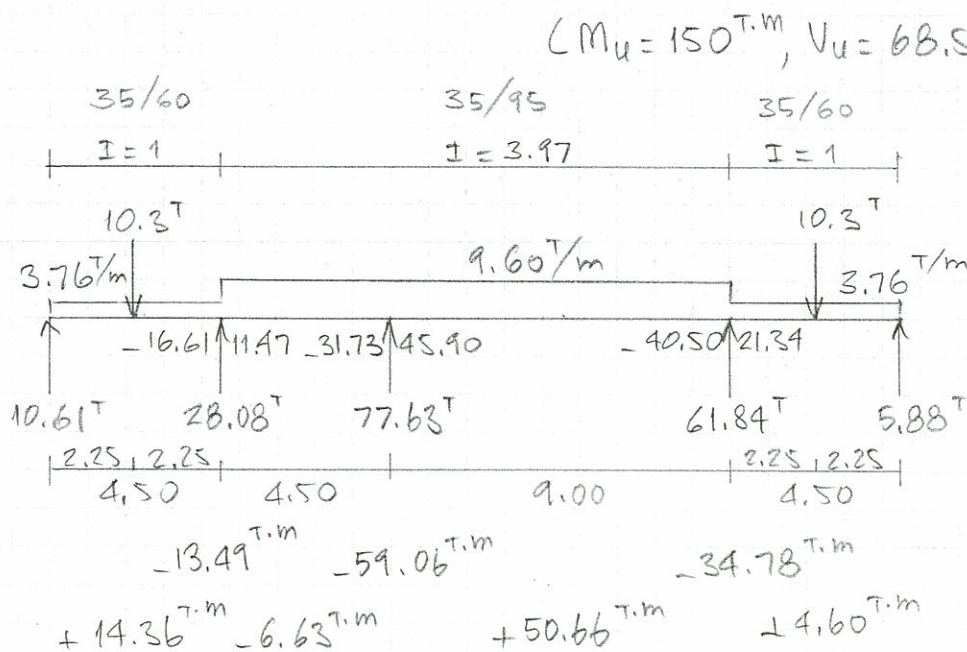
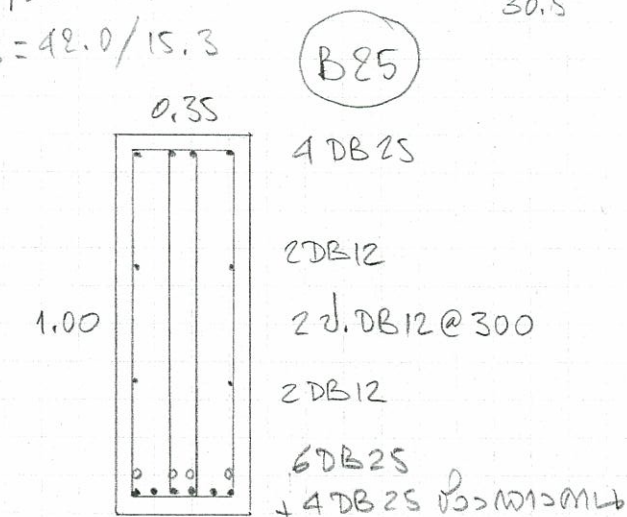
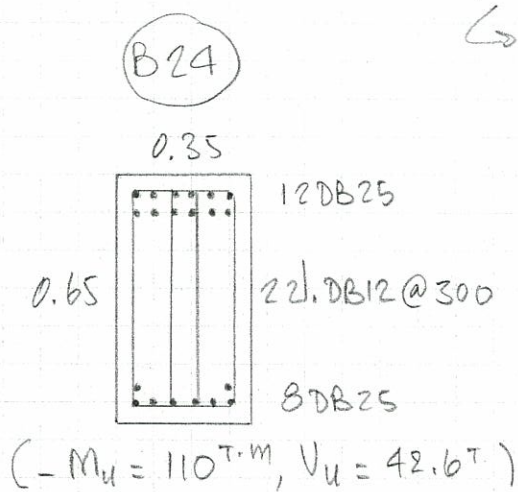
$$A_0/S = 0.1309 \rightarrow 2 \text{ DB12@300}$$

$$A'_S = 49.5/40.6 \rightarrow 12/8$$

$$30.5$$

$$A_0/S = 0.1399$$

$$A_S = 42.0/15.3$$



$$(A_0/S)_{\min} = 0.0510 \quad A_0/S = 0.0487 \quad A_0/S = 0.0828 \quad A_0/S = 0.0626$$

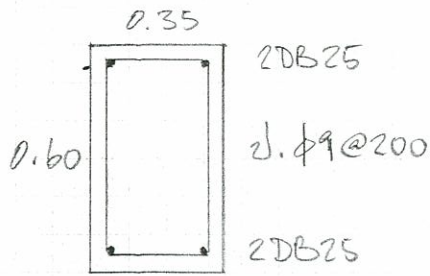
$$A_S = 7.61 \quad A'_S = 19.7/0 \quad A_S = 19.7/0 \quad A_S = 19.63/1.92$$

$$2/2 \text{ DB25} = 18.4 \text{ T.m} \quad 5/2 \text{ DB25} = 75.1 \text{ T.m} \quad 5/2 \text{ DB25} = 75.1 \text{ T.m} \quad A'_S = 5/2 \text{ DB25} = 44.1 \text{ T.m}$$

$$\phi 9 @ 200 = 19.7 \text{ T} \quad 1 \text{ DB10@250} = \quad 1 \text{ DB12@250} = 48.2 \text{ T} \quad \text{DB10@200} = 23.5 \text{ T}$$

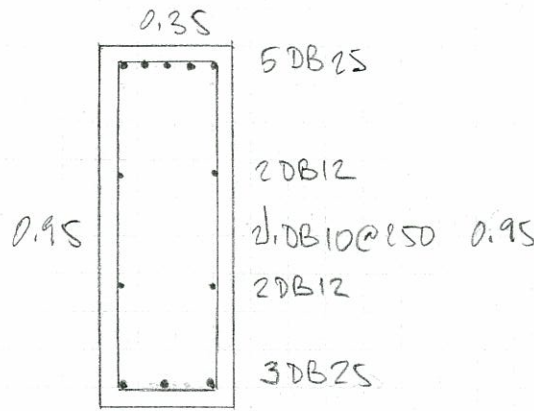
DP.

B26 :



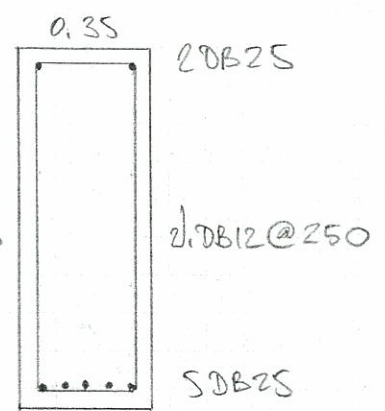
$(M_u = 18.4^{T.m}, V_u = 19.7^T)$

B27 :



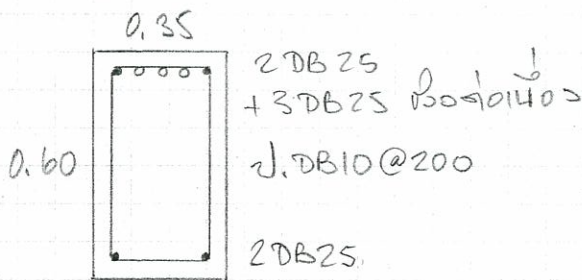
$(-M_u = 69.8^{T.m}, V_u = 33.7^T)$

B28 :

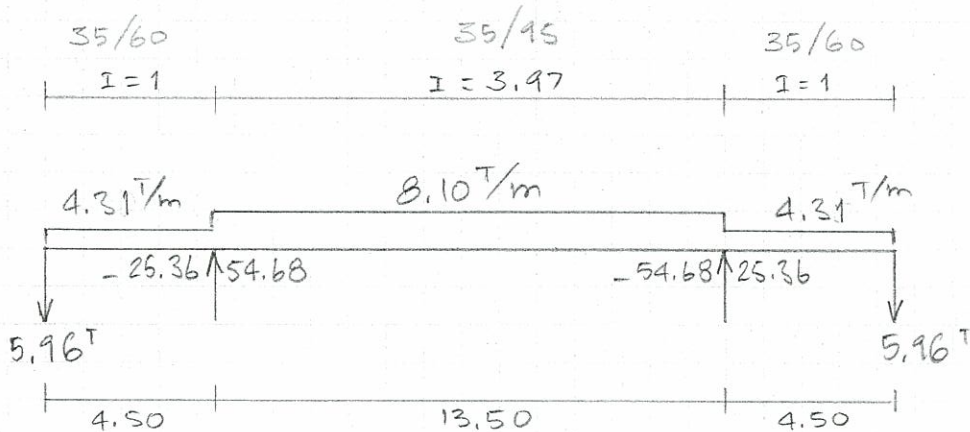


$(M_u = 69.8^{T.m}, V_u = 48.2^T)$

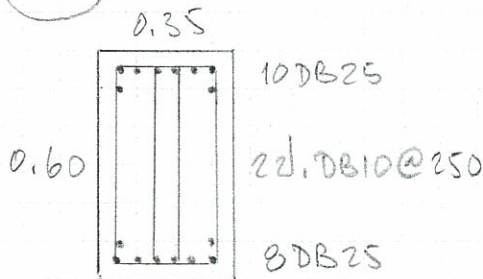
B29 :



$(-M_u = 44.1^{T.m}, V_u = 23.5^T)$

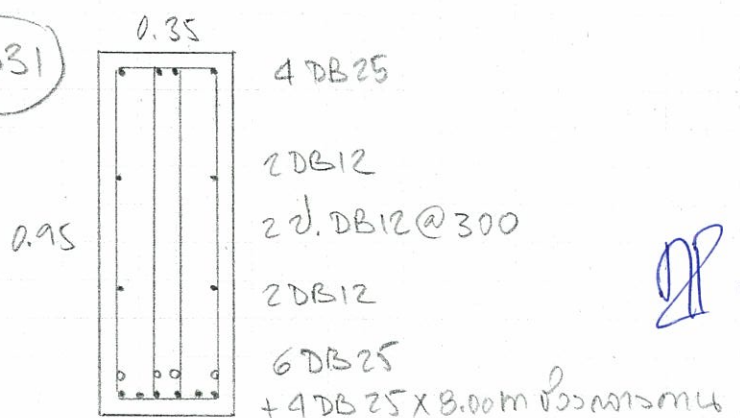


B30 :



$(-M_u = 84.0^{T.m}, V_u = 23.7^T)$

B31 :



$(M_u = 141^{T.m}, V_u = 64.8^T)$

28.

Sound Studio : (LL = 1.00 T/m²)

(S10) : L = 4.50 m, U = 2.54 T/m²,

$M_u = 6.43 \text{ T}\cdot\text{m}/\text{m}$, $V_u = 5.72 \text{ T}/\text{m}$, $A_g = 8.51 \text{ cm}^2/\text{m}$, $A_{g\text{Temp}} = 5.00 \text{ cm}^2/\text{m}$

Use $t = 0.25 \text{ m}$, $A_g = \text{DB16@200/DB12@200}$,

$A'_g = \text{DB16@200/DB12@200}$ Dan 50U

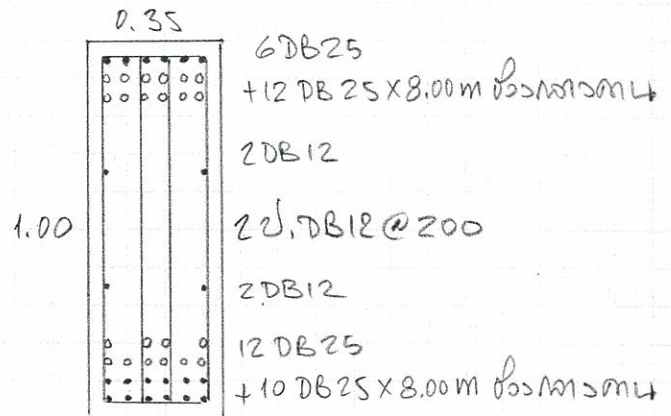
($M_u = 7.55 \text{ T}\cdot\text{m}/\text{m}$, $V_u = 14.4 \text{ T}/\text{m}$)

(B32) : L = 13.5 m, U = 12.62 T/m

$M_u = 287 \text{ T}\cdot\text{m}$, $V_u = 85.2 \text{ T}$

$A_g/s = 0.2112$, $A_g = 99.5 / 43.0$
69.7

22/18



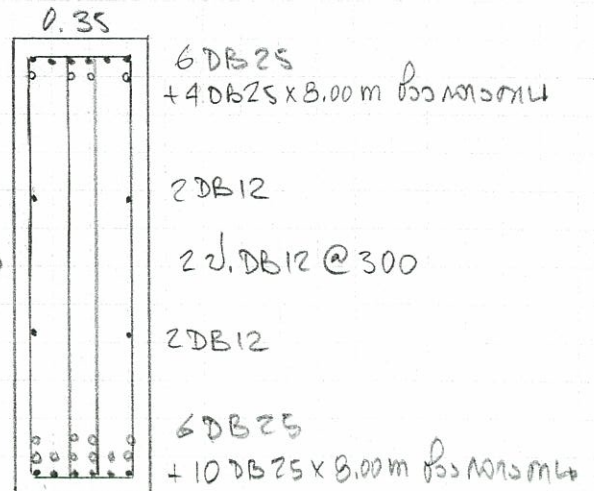
($M_u = 311 \text{ T}\cdot\text{m}$, $V_u = 89.7 \text{ T}$)

(B33) : L = 13.5 m, U = 10.80 T/m

$M_u = 246 \text{ T}\cdot\text{m}$, $V_u = 72.9 \text{ T}$

$A_g/s = 0.1277$, $A_g = 68.9 / 43.4$
32.6

1.20



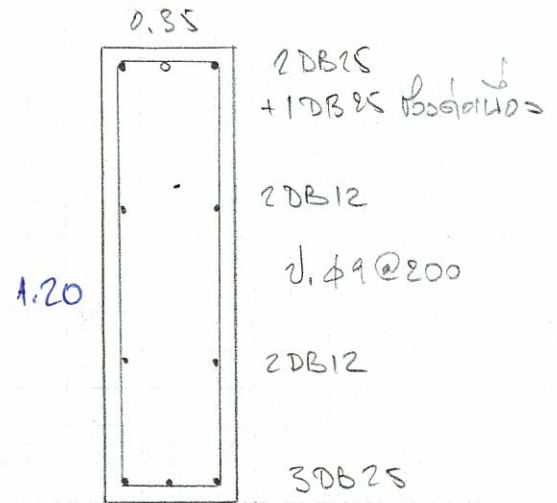
($M_u = 282 \text{ T}\cdot\text{m}$, $V_u = 81.5 \text{ T}$)

28.

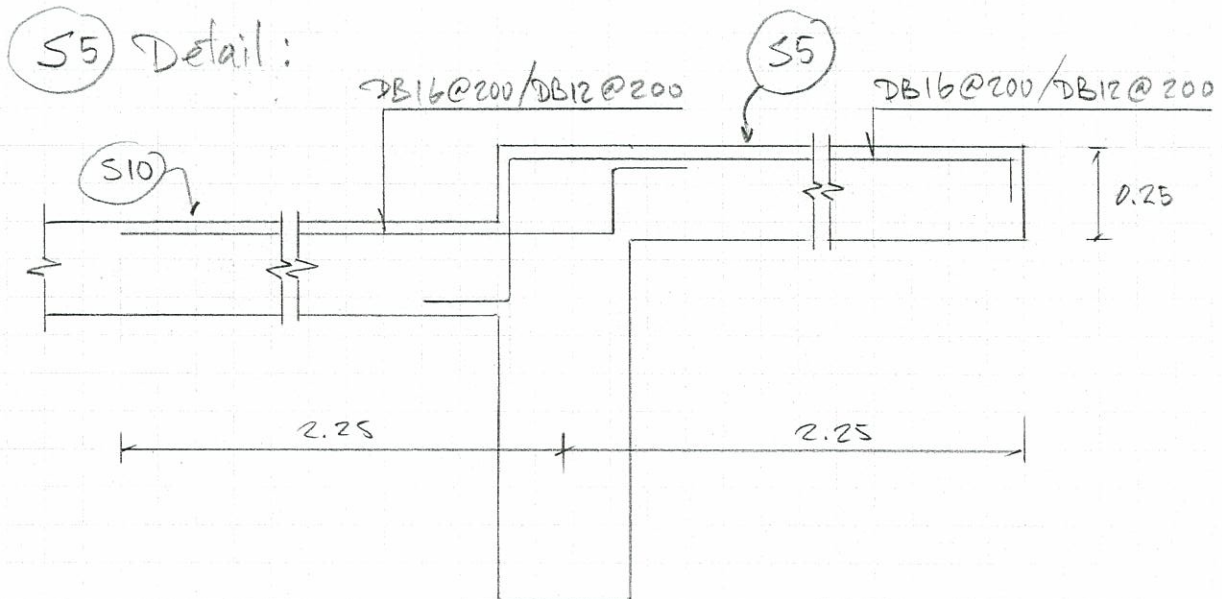
(B34): $L = 4.50 \text{ m}$, $U = 14.9 \text{ T/m}$
 $M_u = 37.6 \text{ T}\cdot\text{m}$, $V_u = 33.5 \text{ T}$
 $(A_g/s)_{\min} = 0.0510$, $A_{g\min} = 14.09$

$L = 4.50 \text{ m}$, $U = 9.40 \text{ T/m}$

Use (B34)



$(M_u = 59.0 \text{ T}\cdot\text{m}, V_u = 41.2 \text{ T})$



NP.

Unit AHU (Unit)

Slab : $L = 2.80 \text{ m}$, $U = 1.35 \text{ T/m}^2$, $M_u = 1.33 \text{ T.m/m}$

$A_s = 4.24 \text{ cm}^2/\text{m}$, $A_{s \text{ Temp}} = 3.00 \text{ cm}^2/\text{m}$

Use $t = 0.15 \text{ m}$, $A_s = 4.24 \text{ cm}^2/\text{m}$, $A_{s \text{ Temp}} = 3.00 \text{ cm}^2$

(S11) Use $t = 0.15 \text{ m}$, $A_s = \text{DB10@150/DB10@250}$,

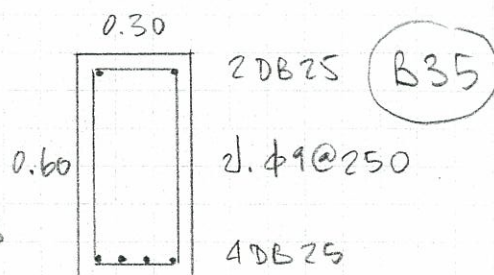
$\left\{ \begin{array}{l} \text{DB10@150/DB10@250 } \text{ ၂၀၀-၂၅၀ နီဇ် } \\ \text{DB10@250 \# } \text{ ၂၀၀၀၀၀ နီဇ် } \end{array} \right.$

($M_u = 1.62 \text{ T.m/m}$, $V_u = 7.83 \text{ T/m}$)

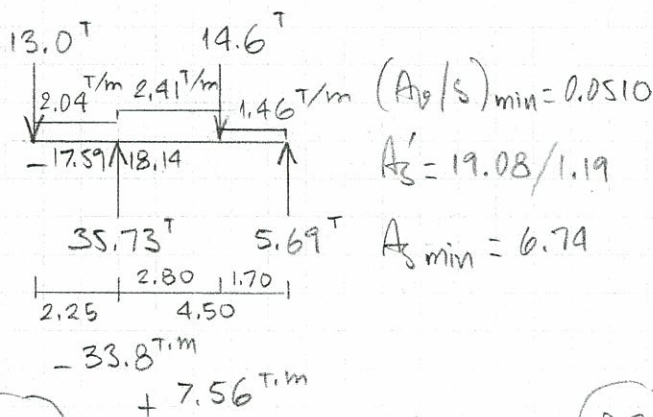
Beams : $L = 1.00 \text{ m}$, $U = 3.25 \text{ T/m}$

$M_u = 32.9 \text{ T.m}$, $V_u = 14.6 \text{ T}$

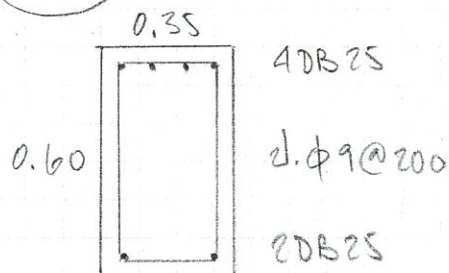
(A_g/s)_{min} = 0.0437, $A_s = 18.54/3.93$



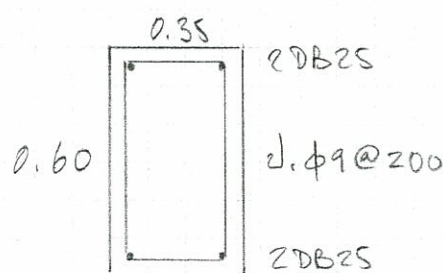
($M_u = 35.6 \text{ T.m}$, $V_u = 16.5 \text{ T}$)



(B26C)



(B26)



($-M_u = 35.8 \text{ T.m}$, $V_u = 19.7 \text{ T}$) ($M_u = 18.4 \text{ T.m}$, $V_u = 19.7 \text{ T}$)

22.

Ground Floor

TV Studio : (Flat Slab Design, $LL = 1.00 \text{ T/m}^2$, $t = 0.85 \text{ m}$)

$$L = 4.50 \text{ m}, U = 2.54 \text{ T/m}^2, M_u = 6.43 \text{ T}\cdot\text{m/m}, V_u = 5.72 \text{ T/m}, U_{pu} = 50.6 \text{ T}$$

$$t_{pu} = \frac{50,600}{0.85(4 \times 57 \times 22)} = 11.9 \text{ ksc} \checkmark \text{ o.k.}$$

$$A_{s \text{ avg.}} = 8.51 \text{ cm}^2/\text{m}, 75/25 \text{ neg.}, 60/40 \text{ pos.}$$

$$\left. \begin{array}{l} A'_s = \left\{ \begin{array}{l} 12.77 \text{ cm}^2/\text{m} \text{ col. strip} \rightarrow \text{Use 15 DB 16 (13.40 cm}^2/\text{m)} \\ 4.26 \text{ cm}^2/\text{m} \text{ mid. strip} \rightarrow \text{Use 10 DB 12 (5.02 cm}^2/\text{m)} \end{array} \right. \\ A_s = \left\{ \begin{array}{l} 8.17 \text{ cm}^2/\text{m} \text{ col. strip} \rightarrow \text{Use 10 DB 16 (8.93 cm}^2/\text{m)} \\ 6.80 \text{ cm}^2/\text{m} \text{ mid. strip} \rightarrow \text{Use 14 DB 12 (7.03 cm}^2/\text{m)} \end{array} \right. \end{array} \right\} \text{ both ways}$$

R/C Stairs as follows:

ST3

$$L = 4.00 \text{ m}, U = 1.48 \text{ T/m}^2, M_u = 2.97 \text{ T}\cdot\text{m/m}, V_u = 2.97 \text{ T/m}$$

$$A_s = 5.03 \text{ cm}^2/\text{m}, A_{s \text{ temp}} = 4.00 \text{ cm}^2/\text{m}$$

$$\text{Use } t = 0.20 \text{ m}, A_s = \text{DB 12 @ 200 / DB 12 @ 250}, A'_s = \text{DB 12 @ 200 / DB 12 @ 250 at (w)}$$

$$(M_u = 3.32 \text{ T}\cdot\text{m/m}, V_u = 11.1 \text{ T/m})$$

$$L_e = 1.20 \text{ m}, U = 1.28 \text{ T/m}^2, P_u = 1.56 \text{ T/m}$$

$$- M_u = 2.79 \text{ T}\cdot\text{m/m}, V_u = 3.10 \text{ T/m}$$

$$\text{Use } t = 0.20 \text{ m}, A'_s = \text{DB 12 @ 200 / DB 12 @ 250}$$

$$\frac{A + \frac{3}{2}A}{2} = A_{\text{avg}} \rightarrow \frac{5}{2}A = 2A_{\text{avg}} \rightarrow A = \frac{4}{5}A_{\text{avg}}, \frac{3}{2}A = \frac{6}{5}A_{\text{avg}}$$

$$\frac{A + 3A}{2} = A_{\text{avg}} \rightarrow 4A = 2A_{\text{avg}} \rightarrow A = \frac{1}{2}A_{\text{avg}}, 3A = \frac{3}{2}A_{\text{avg}}$$

DR

Ramp คิวบันโกล :

Slab : $L = 1.50 \text{ m}$, $U = 0.85 \text{ T/m}^2$, $M_u = 0.24 \text{ T}\cdot\text{m}$, $V_u = 0.64 \text{ T/m}$

$A_s = 1.30 \text{ cm}^2/\text{m}$, $A_{s_{\text{Temp}}} = 2.00 \text{ cm}^2/\text{m}$

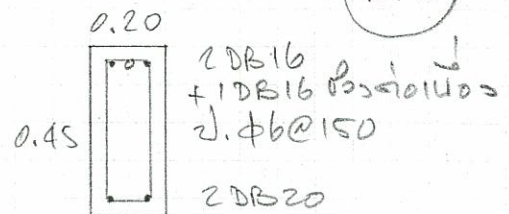
Use $t = 0.10 \text{ m}$, $A_s = \text{DB10@300\#}$, $A'_s = \text{DB10@300\# @ both ends}$

($M_u = 0.48 \text{ T}\cdot\text{m}$, $V_u = 4.57 \text{ T/m}$)

Beams : $L = 7.00 \text{ m}$, $U = 1.20 \text{ T/m}$

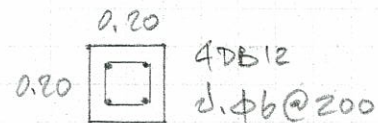
$M_u = 7.35 \text{ T}\cdot\text{m}$, $V_u = 4.20 \text{ T}$

(A_g/s)_{min} = 0.0292, $A_g = 5.55$



($M_u = 8.31 \text{ T}\cdot\text{m}$, $V_u = 8.30 \text{ T}$)

บันไดขึ้นบันได Ramp :



บันไดในรถเข็น : (ST1)

คานบันได : $L = 3.00 \text{ m}$, $w = (0.54 \text{ T/m}^2 \times 3.30 \text{ m}) = 1.78 \text{ T/m}$

$M = 2.00 \text{ T}\cdot\text{m}$, $V = 2.67 \text{ T}$

$S \geq \frac{200,000}{1500} = 133 \text{ cm}^3$

$I \geq \frac{360(17.8 \times 300)^3}{384(2.1 \times 10^6)} = 215 \text{ cm}^4$

Use Architect's Section

คานบันได : $L = 2.90 \text{ m}$, $L_c = 1.00 \text{ m}$, $w = (0.54 \text{ T/m}^2 \times 0.50 \text{ m}) = 0.27 \text{ T/m}$

$M = 0.28 \text{ T}\cdot\text{m}$, $-M = 0.14 \text{ T}\cdot\text{m}$

$S \geq \frac{28,000}{1500} = 18.7 \text{ cm}^3$, $I \geq \frac{360(5 \times 2.7 \times 290)^3}{384(2.1 \times 10^6)} = 147 \text{ cm}^4$

Use Architect's Section

(S12): $m = 3.75/4.50 = 0.83$, $U = 1.45 \text{ T/m}$

$$+M_u = \begin{cases} 0.054(1.45)(3.75)^2 = 1.10 \text{ T}\cdot\text{m} \\ 0.044(1.45)(3.75)^2 = 0.90 \text{ T}\cdot\text{m} \end{cases} \quad A_s = 3.63$$

$$-M_u = \begin{cases} 0.074(1.45)(3.75)^2 = 1.51 \text{ T}\cdot\text{m} \\ 0.058(1.45)(3.75)^2 = 1.18 \text{ T}\cdot\text{m} \\ 0.036(1.45)(3.75)^2 = 0.73 \text{ T}\cdot\text{m} \\ 0.029(1.45)(3.75)^2 = 0.59 \text{ T}\cdot\text{m} \end{cases} \quad \left. \begin{array}{l} \text{ส่วนที่ 1} \\ \text{ส่วนที่ 2} \end{array} \right\} \text{ส่วนที่ 3}$$

Use $t = 0.12 \text{ m}$, $A_s = \text{DB12@300\#}$, $A'_s = \text{DB12@300\#}$ (บวสว)

$(M_u = 1.57 \text{ T}\cdot\text{m}, V_u = 7.83 \text{ T/m})$

(S13): $m = 3.00/4.50 = 0.67$, $U = 1.52 \text{ T/m}$

(ข้อ 1)

$$+M_u = \begin{cases} 0.066(1.52)(3.00)^2 = 0.90 \text{ T}\cdot\text{m} \\ 0.044(1.52)(3.00)^2 = 0.60 \text{ T}\cdot\text{m} \end{cases} \quad A_{s \text{ temp}} = 4.00$$

$$-M_u = \begin{cases} 0.087(1.52)(3.00)^2 = 1.19 \text{ T}\cdot\text{m} \\ 0.058(1.52)(3.00)^2 = 0.79 \text{ T}\cdot\text{m} \\ 0.044(1.52)(3.00)^2 = 0.60 \text{ T}\cdot\text{m} \\ 0.029(1.52)(3.00)^2 = 0.40 \text{ T}\cdot\text{m} \end{cases} \quad \left. \begin{array}{l} \text{ส่วนที่ 1} \\ \text{ส่วนที่ 2} \end{array} \right\} \text{ส่วนที่ 3}$$

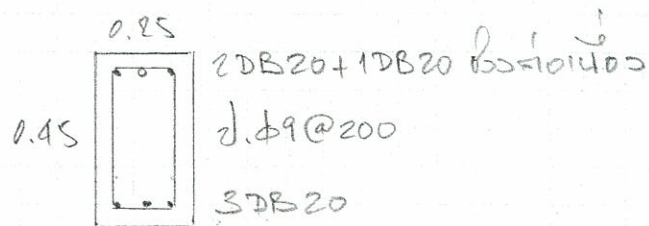
Use $t = 0.20 \text{ m}$, $A_s = \text{DB12@250\#}$, $A'_s = \text{DB12@250\#}$ (บวสว)

$(M_u = 2.68 \text{ T}\cdot\text{m}, V_u = 11.1 \text{ T/m})$

(B36): $L = 4.50 \text{ m}$, $U = 5.20 \text{ T/m}$

$M_u = 11.7 \text{ T}\cdot\text{m}$, $V_u = 11.7 \text{ T}$

$A_g/s = 0.0634$, $A_s = 9.07$



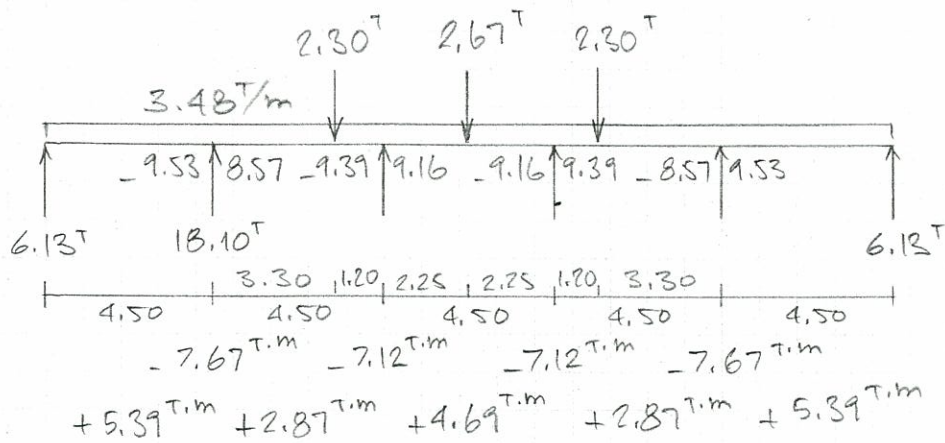
$(M_u = 12.4 \text{ T}\cdot\text{m}, V_u = 11.7 \text{ T})$

$L = 4.50 \text{ m}$, $U = 4.56 \text{ T/m}$

$M_u = 10.3 \text{ T}\cdot\text{m}$, $V_u = 10.3 \text{ T}$

Use (B36)

DP

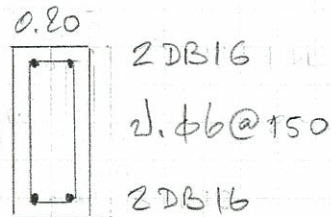


Use (B36)

(B37): $L = 4.50\text{ m}$, $U = 2.00\text{ T/m}$

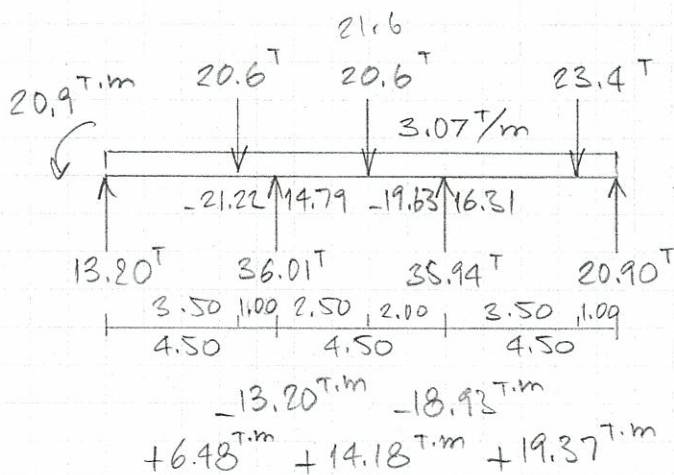
$$M_u = 5.08\text{ T.m}, V_u = 4.50\text{ T}$$

$$(A_g/s)_{\min} = 0.0292, A_g = 3.73$$



(B37)

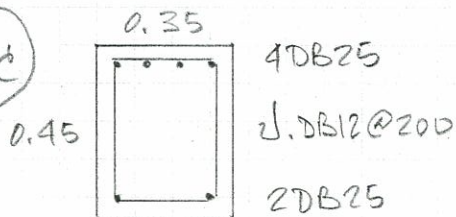
$$(M_u = 5.46\text{ T.m}, V_u = 8.30\text{ T})$$



$$A_g/s = 0.0888$$

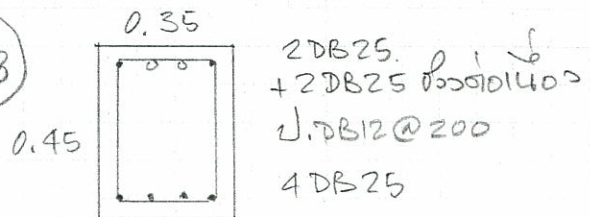
$$A_g = 16.3/4.1$$

(B38C)



$$(-M_u = 25.2\text{ T.m}, V_u = 24.5\text{ T})$$

(B38)



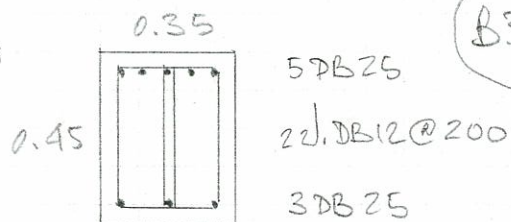
$$(M_u = 25.2\text{ T.m}, V_u = 24.5\text{ T})$$

Right end:

$$L_c = 1.00\text{ m}, U = 3.07\text{ T/m}, P_u = 28.8\text{ T}$$

$$-M_u = 30.3\text{ T.m}, V_u = 31.9\text{ T}$$

$$A_g/s = 0.1674, A_g' = 23.8/14.0$$



(B38A)

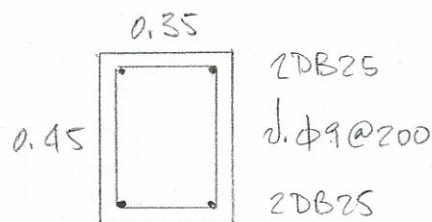
$$(-M_u = 31.3\text{ T.m}, V_u = 31.9\text{ T})$$

DP.

$$L = 4.50 \text{ m}, U = 5.33 \text{ T/m}$$

$$M_u = 12.0 \text{ T}\cdot\text{m}, V_u = 12.0 \text{ T}$$

$$(A_g/s)_{\min} = 0.0510, A_g = 9.01$$



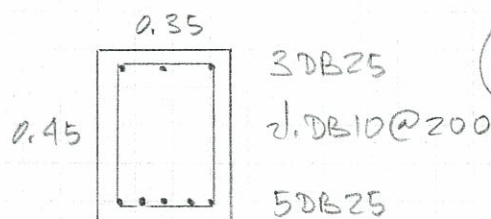
B39

$$(M_u = 13.1 \text{ T}\cdot\text{m}, V_u = 14.3 \text{ T})$$

$$L = 4.50 \text{ m}, U = 2.06 \text{ T/m}, P_u = 22.8 \text{ T}$$

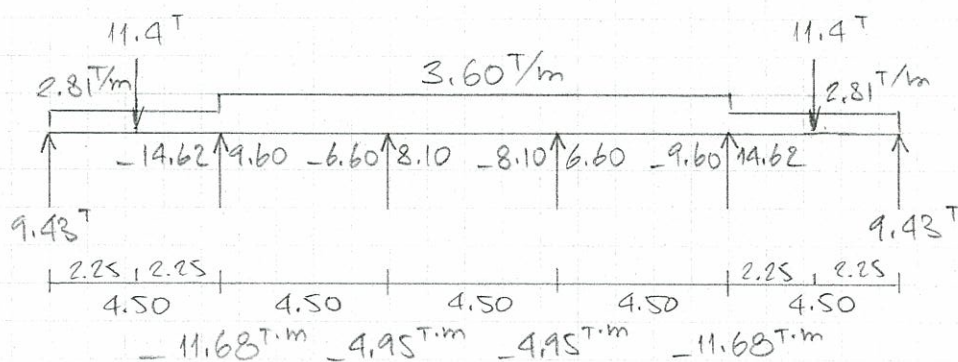
$$M_u = 30.9 \text{ T}\cdot\text{m}, V_u = 16.0 \text{ T}$$

$$A_g/s = 0.0673, A_g = 24.2/14.7$$



B40

$$(M_u = 31.3 \text{ T}\cdot\text{m}, V_u = 17.1 \text{ T})$$



$$+14.10 \text{ T}\cdot\text{m} \quad +1.11 \text{ T}\cdot\text{m} \quad +4.16 \text{ T}\cdot\text{m} \quad +1.11 \text{ T}\cdot\text{m} \quad +14.10 \text{ T}\cdot\text{m}$$

B41

B39

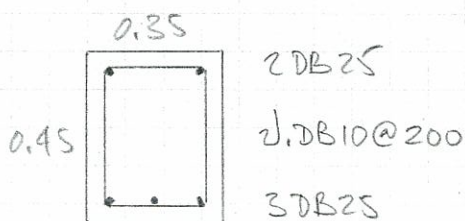
B39

B39

B41

$$A_g/s = 0.0537$$

$$A_g = 10.75/0$$



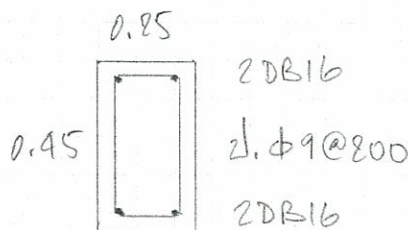
B41

$$(M_u = 19.8 \text{ T}\cdot\text{m}, V_u = 17.1 \text{ T})$$

$$L = 4.50 \text{ m}, U = 2.15 \text{ T/m}$$

$$M_u = 4.84 \text{ T}\cdot\text{m}, V_u = 4.84 \text{ T}$$

$$(A_g/s)_{\min} = 0.0365, A_g = 3.51$$



B42

$$(M_u = 5.55 \text{ T}\cdot\text{m}, V_u = 11.7 \text{ T})$$

$$U = 2.46 \text{ T/m} \rightarrow M_u = 5.54 \text{ T}\cdot\text{m}$$

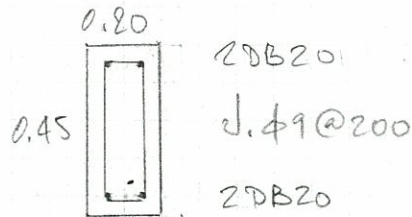
✓ 0.12.

DP.

$$L = 4.50 \text{ m}, U = 3.00 \text{ T/m}$$

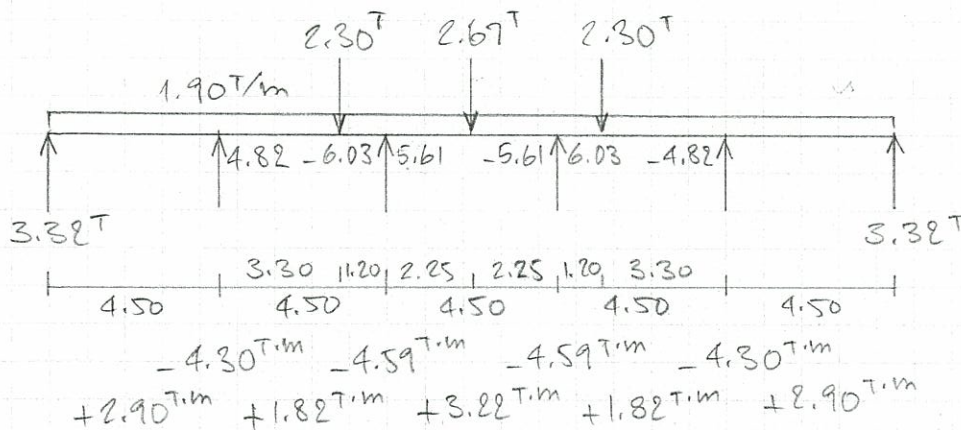
$$M_u = 6.75 \text{ T}\cdot\text{m}, V_u = 6.75 \text{ T}$$

$$(A_s/s)_{\min} = 0.0292, A_s = 5.06$$



(B43)

$$(M_u = 8.00 \text{ T}\cdot\text{m}, V_u = 10.4 \text{ T})$$



Use (B43)

Control Room: ($LL = 1.00 \text{ T/m}^2$)

$$m = 4.50/6.00 = 0.75, U = 2.37 \text{ T/m}^2$$

$$A_{s \text{ temp}} = 4.00 \text{ cm}^2/\text{m}$$

$$+M_u = \begin{cases} 0.059 (2.37)(4.50)^2 = 2.83 \text{ T}\cdot\text{m}/\text{m} \text{ (at } L/4) & A_s = 4.80 \text{ cm}^2/\text{m} \\ 0.044 (2.37)(4.50)^2 = 2.11 \text{ T}\cdot\text{m}/\text{m} \text{ (at } L/2) & A_s = 3.54 \text{ cm}^2/\text{m} \end{cases}$$

$$-M_u = \begin{cases} 0.078 (2.37)(4.50)^2 = 3.74 \text{ T}\cdot\text{m}/\text{m} \text{ (at } L/3 \text{ and } 2L/3) & A'_s = 6.40 \text{ cm}^2/\text{m} \\ 0.034 (2.37)(4.50)^2 = 1.63 \text{ T}\cdot\text{m}/\text{m} \text{ (at } L/4 \text{ and } 3L/4) & \\ 0.029 (2.37)(4.50)^2 = 1.39 \text{ T}\cdot\text{m}/\text{m} \text{ (at } L/2) & \end{cases}$$

Use $t = 0.20 \text{ m}, A_s = \text{DB12@200/DB12@250}$,

(S14)

$$A'_s = \begin{cases} \text{DB12@150/DB12@250} \text{ at } L/3 \text{ and } 2L/3, \\ \text{DB12@250} \# \text{ at } L/4 \text{ and } 3L/4 \end{cases}$$

$$\left(+M_u = 2.68 \text{ T}\cdot\text{m}/\text{m}, -M_u = \begin{cases} 4.38 \text{ T}\cdot\text{m}/\text{m} \\ 2.68 \text{ T}\cdot\text{m}/\text{m} \end{cases} \right)$$

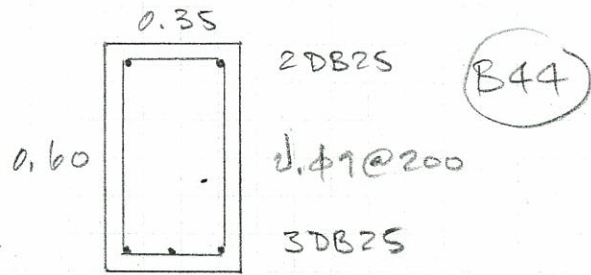
(S14A): $t = 0.20 \text{ m}, A_s = \text{DB12@250} \#, A'_s = \text{DB12@150/DB12@250}$

DP.

$$L = 6.00 \text{ m}, U = 5.86 \text{ T/m}$$

$$M_u = 26.4 \text{ T}\cdot\text{m}, V_u = 17.6 \text{ T}$$

$$(A_g/s)_{\min} = 0.0510, A_g = 14.6$$

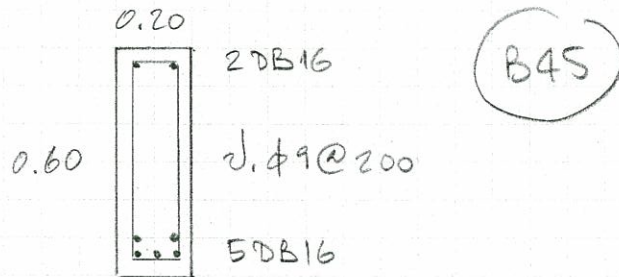


$$(M_u = 27.2 \text{ T}\cdot\text{m}, V_u = 19.7 \text{ T})$$

$$L = 6.00 \text{ m}, U = 3.66 \text{ T/m}$$

$$M_u = 16.5 \text{ T}\cdot\text{m}, V_u = 11.0 \text{ T}$$

$$A_g/s = 0.0340, A_g = 9.83$$



$$(M_u = 17.9 \text{ T}\cdot\text{m}, V_u = 14.3 \text{ T})$$

Ramp above TV studio:

Slab: $L = 2.00 \text{ m}, U = 0.85 \text{ T/m}^2, M_u = 0.485 \text{ T}\cdot\text{m/m}, V_u = 0.85 \text{ T}, A_g = 2.32$

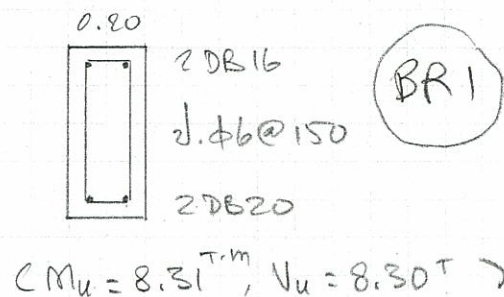
Use $t = 0.10 \text{ m}, A_g = \text{DB10@300\#}, A'_g = \text{DB10@300\# both ends}$

$$(M_u = 0.48 \text{ T}\cdot\text{m/m}, V_u = 4.57 \text{ T/m})$$

Beams: $L = 6.00 \text{ m}, U = 1.40 \text{ T/m}$

$$M_u = 6.32 \text{ T}\cdot\text{m}, V_u = 4.20 \text{ T}$$

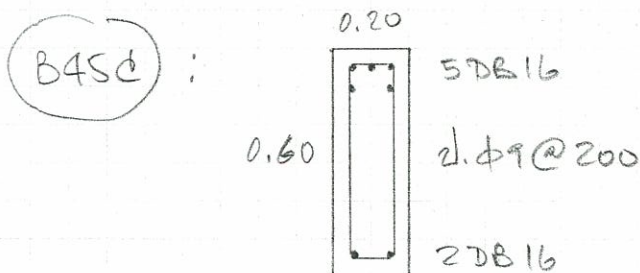
$$(A_g/s)_{\min} = 0.0298, A_g = 4.71$$

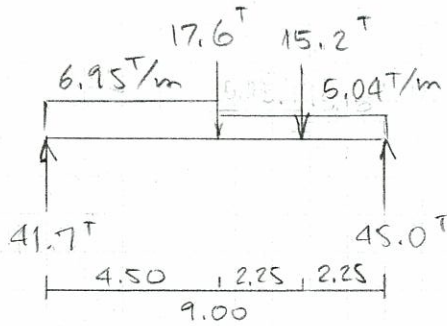


$$(M_u = 8.31 \text{ T}\cdot\text{m}, V_u = 8.30 \text{ T})$$

$$L = 4.50 \text{ m}, U = 5.93 \text{ T/m}$$

$$M_u = 15.0 \text{ T}\cdot\text{m}, V_u = 13.3 \text{ T} \sim \text{Use B45}$$





B46

0.80

3DB25
+ 5DB25 x 6.00m $\rho_{\min} = \rho_{\max}$

22. DB12 @ 200

5DB25
+ 7DB25 x 6.00m $\rho_{\min} = \rho_{\max}$

$$M_u = 117 \text{ T.m}$$

$$A_g/s = 0.1315, A_g = 53.3/44.6$$

33.5

$$(M_u = 127 \text{ T.m}, V_u = 49.6 \text{ T})$$

B46C

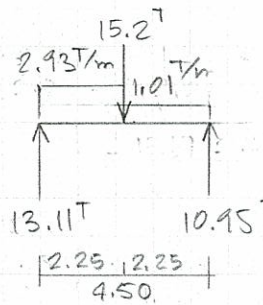
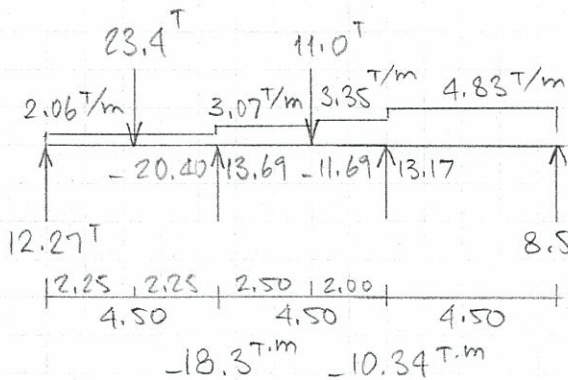
0.80



3DB25

1.49 @ 200

2DB25



$$M_u = 22.09 \text{ T.m}$$

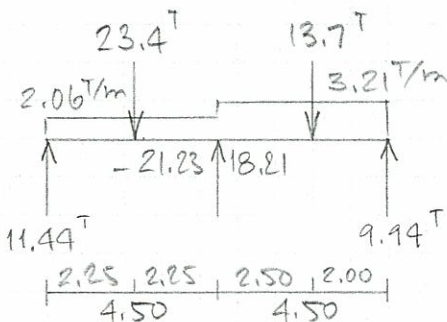
$$+22.4 \text{ T.m} + 6.33 \text{ T.m} + 7.60 \text{ T.m}$$

B38

B39

B39

Use B38

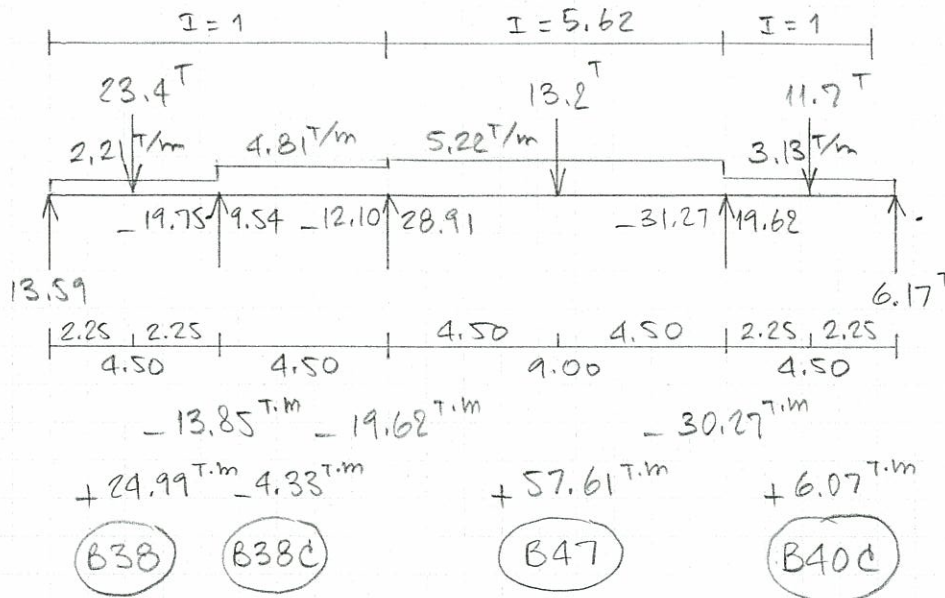


~ Use B38

$$-22.04 \text{ T.m}$$

$$+20.52 \text{ T.m} + 13.45 \text{ T.m}$$

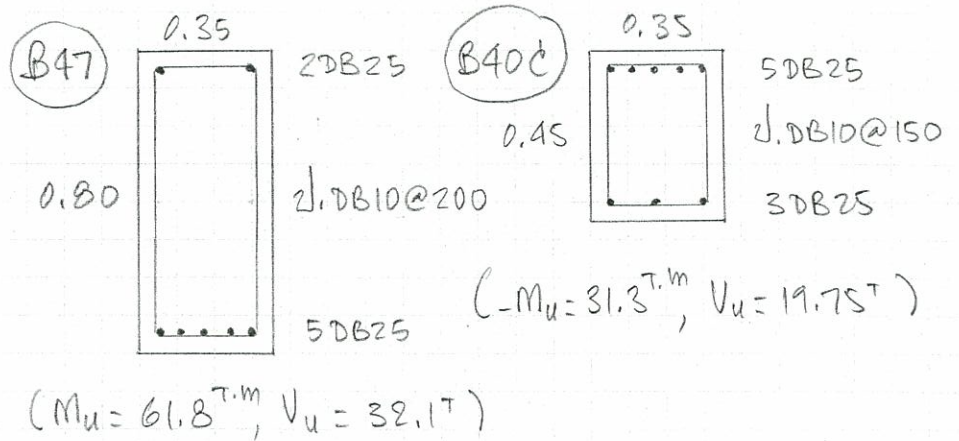
DP



$$A_g/s = 0.0739$$

$$A_g = 23.8$$

$$A_g/s = 0.1040$$



$$L_c = 2.00m, U = 1.60^T/m, P_u = 4.91^T$$

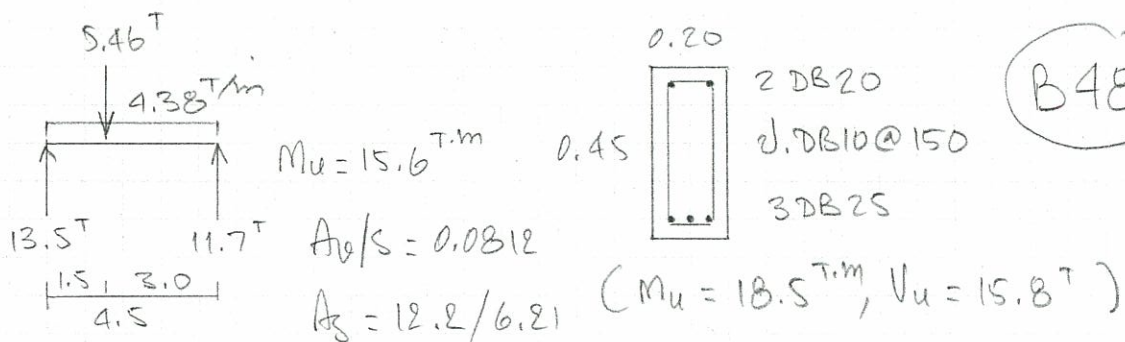
$$-M_u = 13.0^{T.m}, V_u = 8.11^T \sim \text{Use } (B39)$$

$$L_c = 2.00m, U = 2.16^T/m, P_u = 11.8^T$$

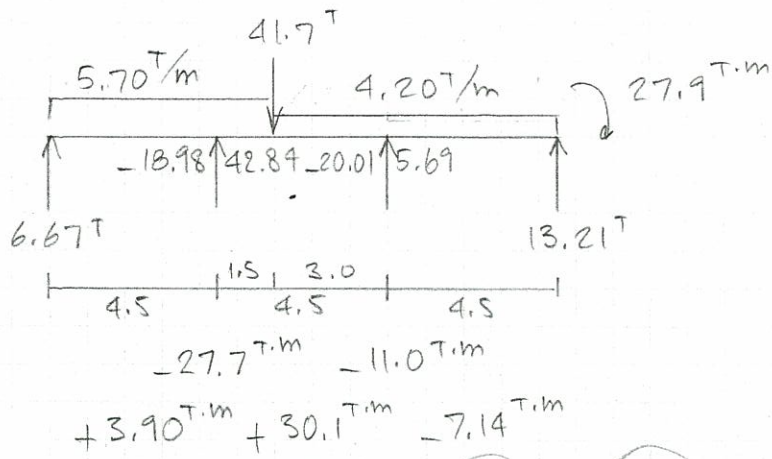
$$-M_u = 27.9^{T.m}, V_u = 16.1^T \sim \text{Use } (B40C)$$

$$L = 2.50m, U = 3.97^T/m, P_u = 1^T$$

$$M_u = 3.10^{T.m}, V_u = 5.46^T \sim \text{Use } (B37)$$



DP.

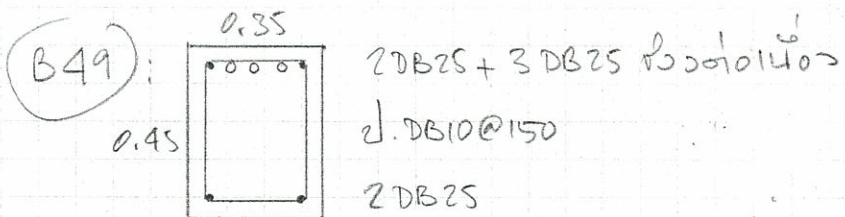


$$A_g/s = 0.2478 \rightarrow 2 \text{ DB12@150}$$

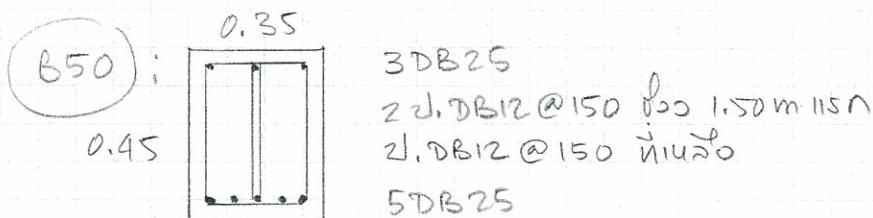
$$A_g/s = 0.0799 \rightarrow 2 \text{ DB12@200}$$

$$A_g = 23.6/13.8 \rightarrow 5/3 \text{ DB25}$$

(B49) (B50) (B39) (B40C)

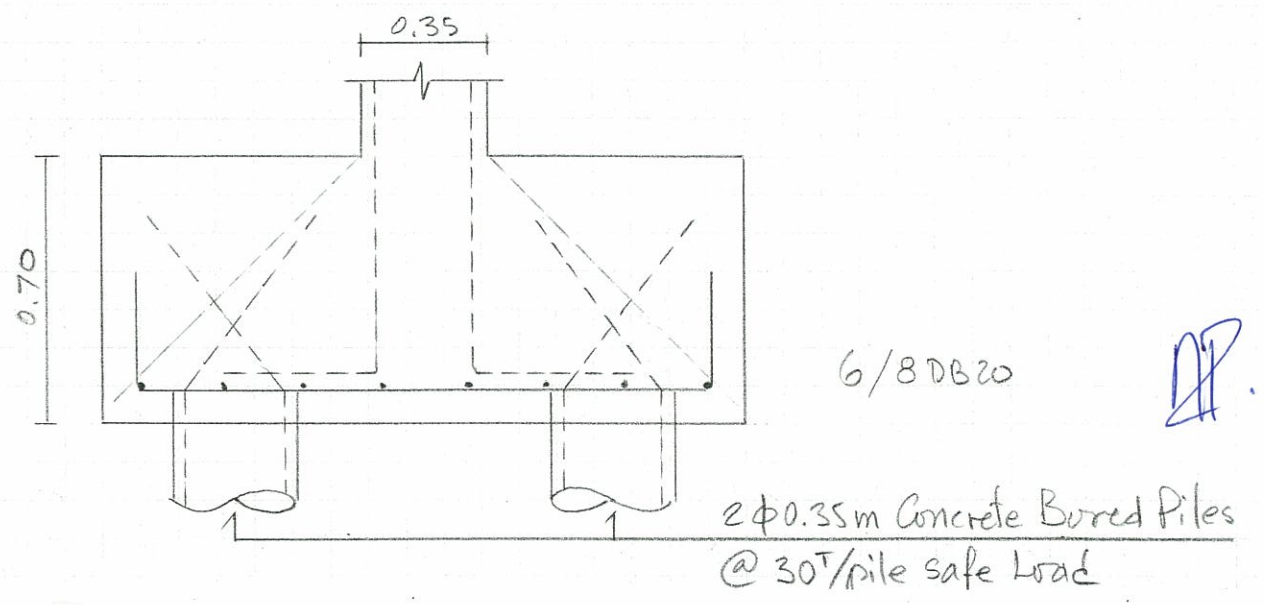
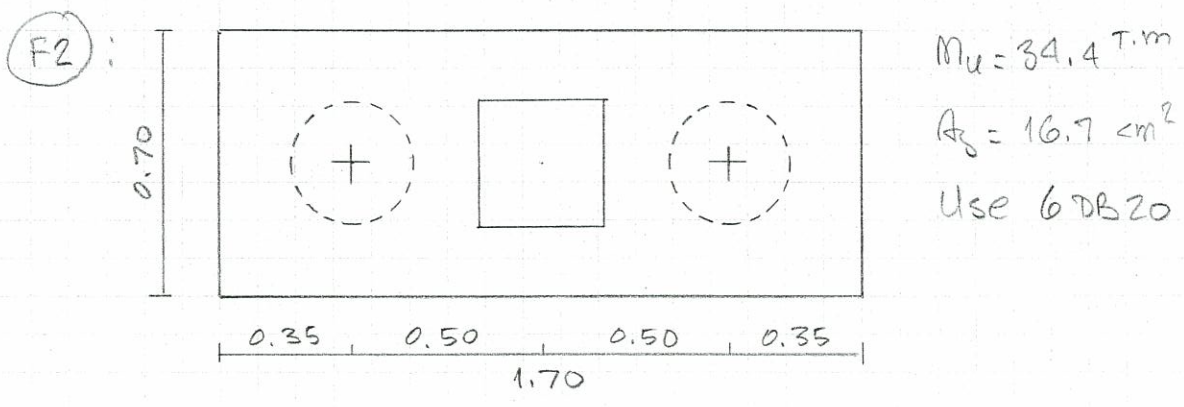
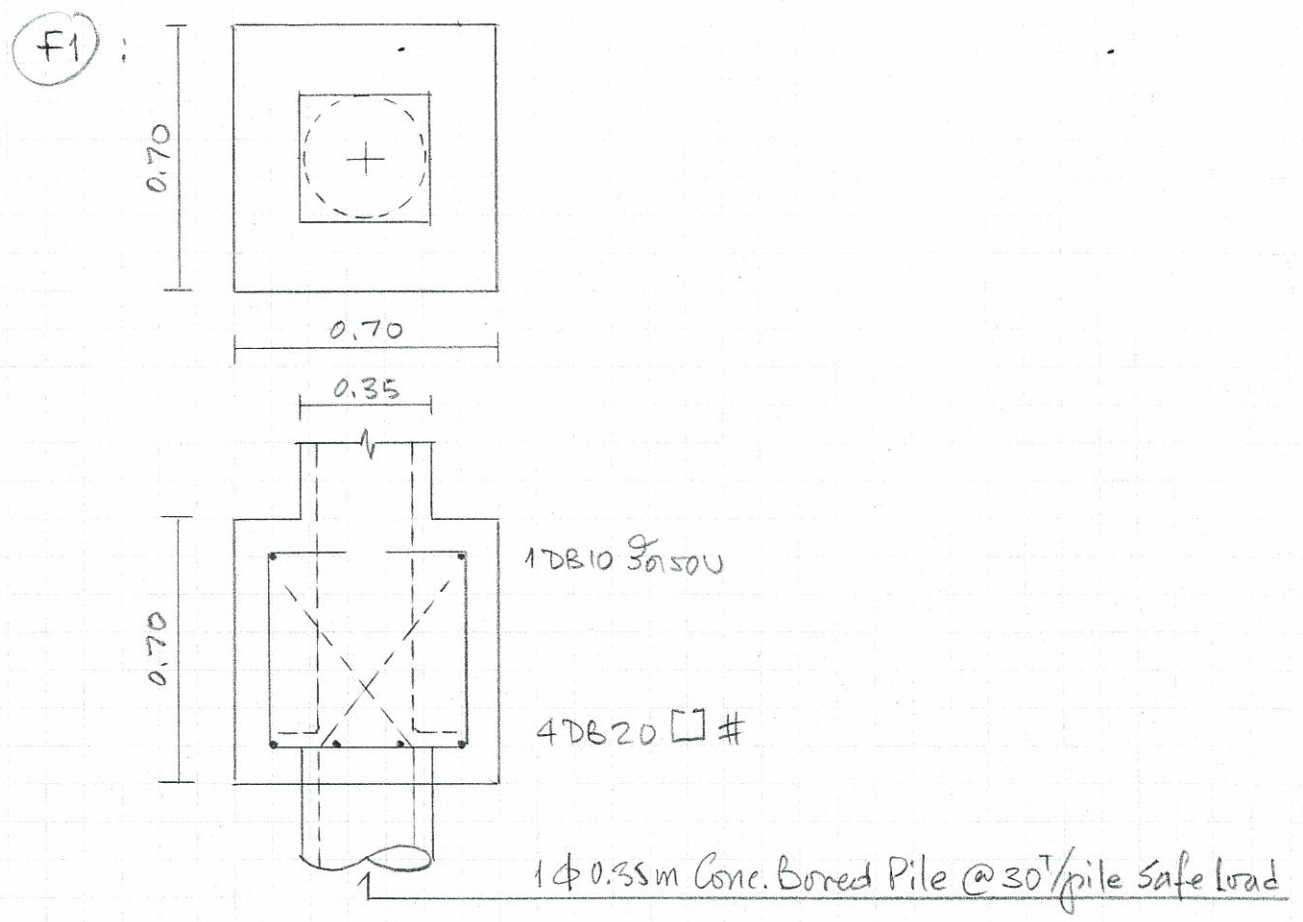


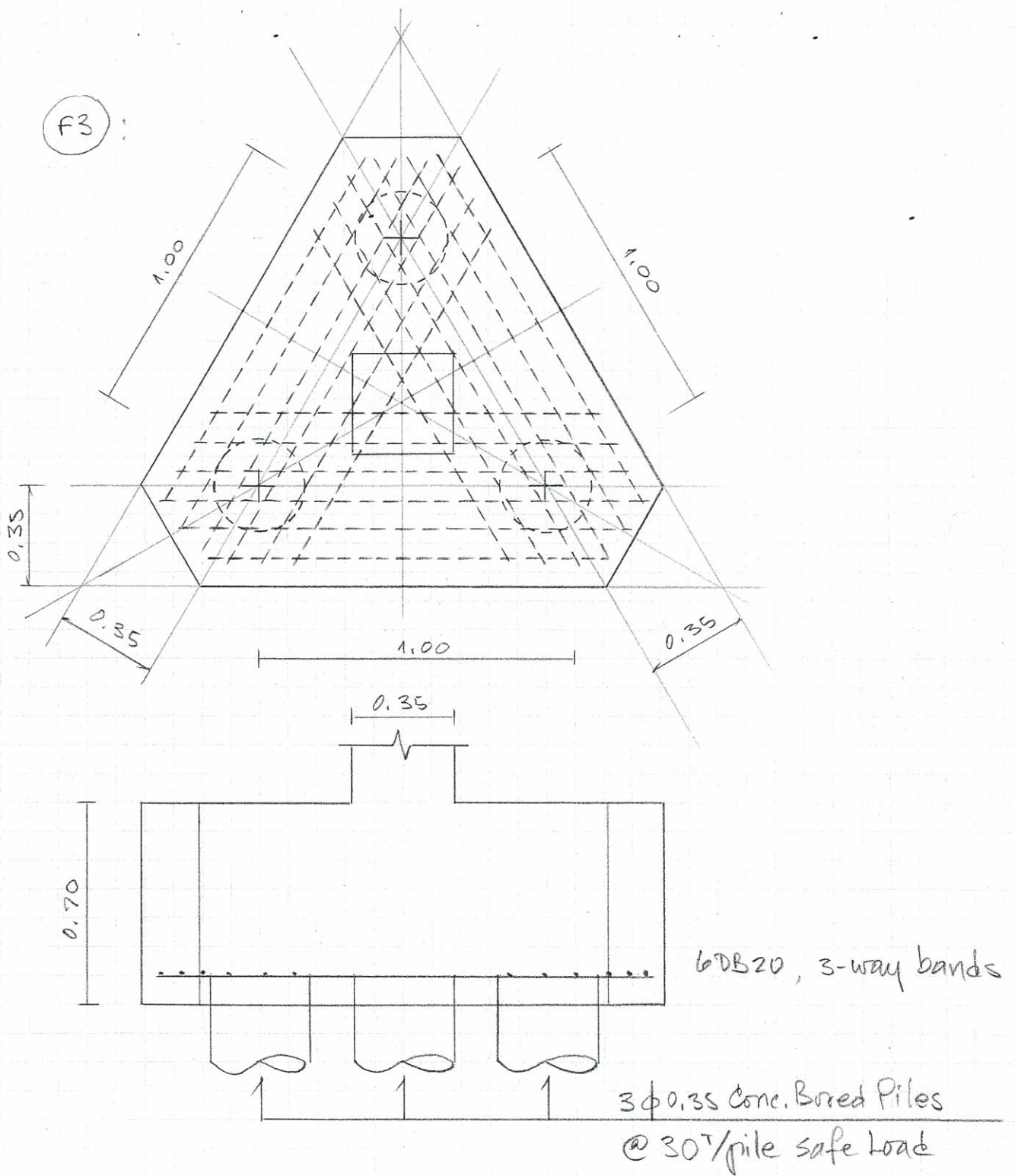
$$(M_u = 13.1 \text{ T.m}, -M_u = 30.9 \text{ T.m}, V_u = 19.75 \text{ T})$$



$$(M_u = 31.3 \text{ T.m}, V_u = 50.1 \text{ T}/24.5 \text{ T})$$

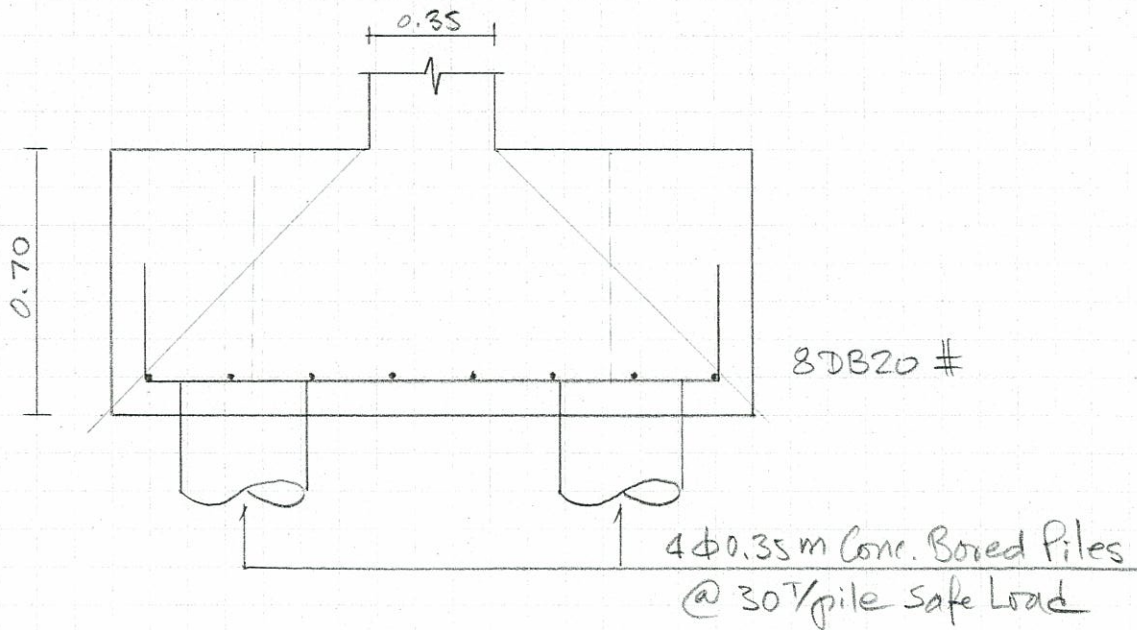
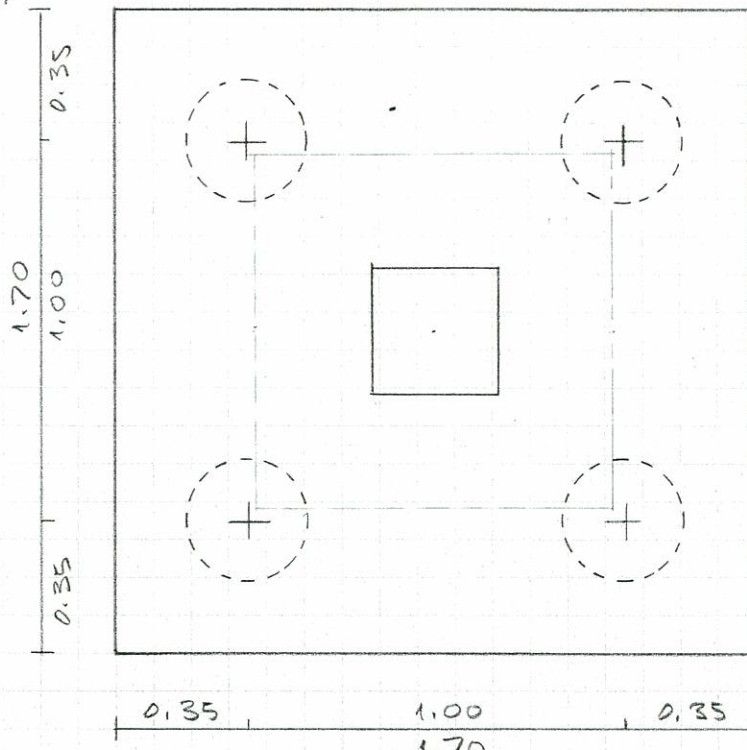
Footings (Revised)





DP.

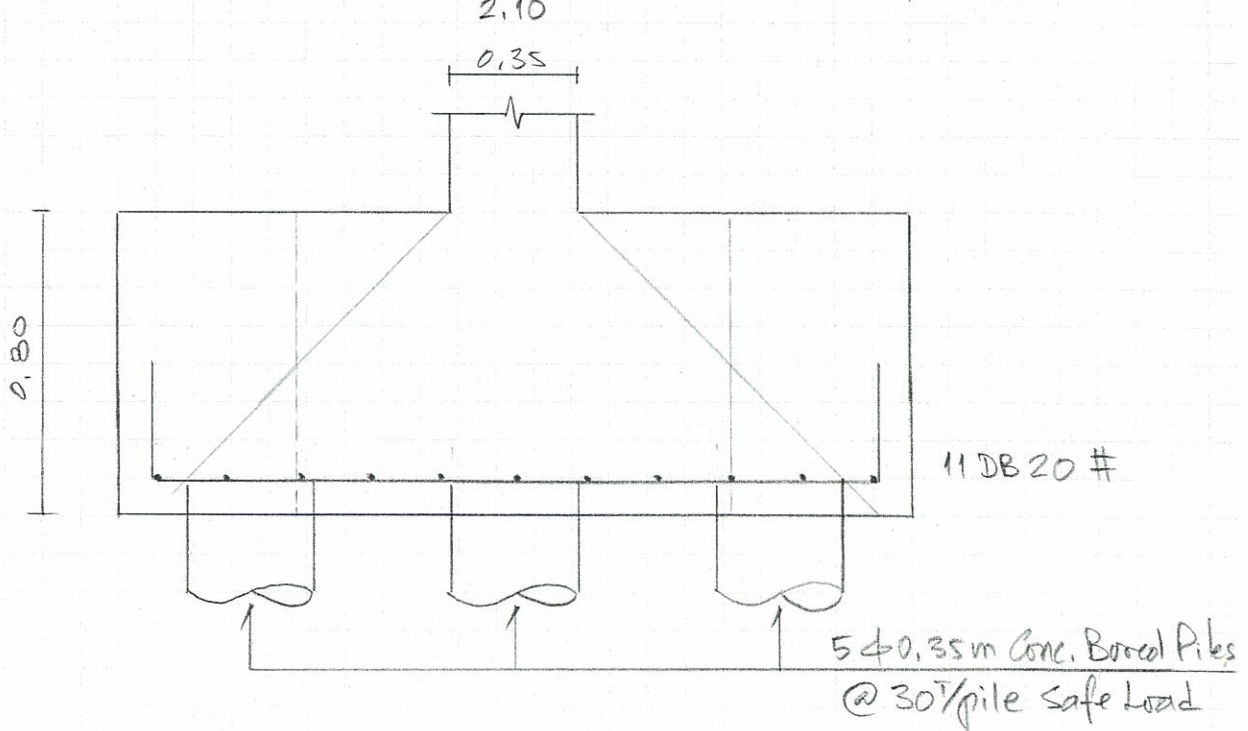
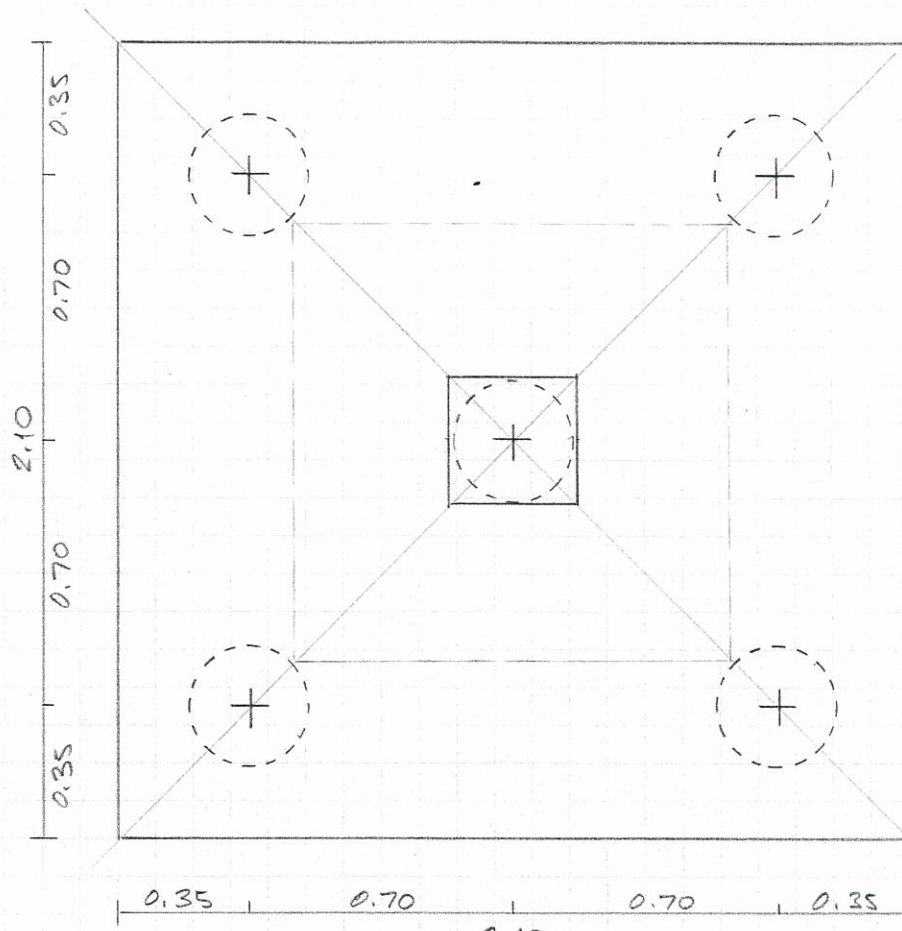
F4 :



$$M_u = 33.15 \text{ T.m} \rightarrow A_s = 15.7 \text{ cm}^2, A_{s_{\text{reqd}}} = 23.8 \text{ cm}^2$$

$$V_{pu} < \frac{204,000}{0.85(4 \times 95 \times 60)} = 10.5 \text{ ksc} \checkmark \text{ o.k.}$$

f5:

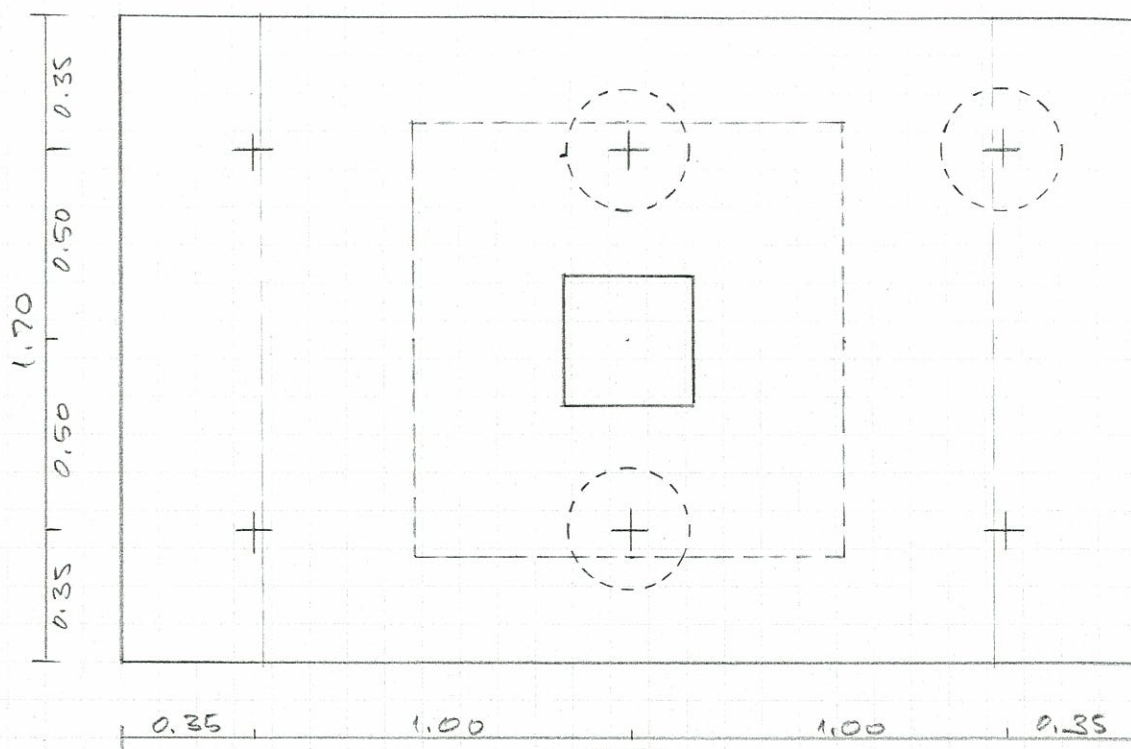


$$q_{pu} = \frac{204,000}{0.85(4 \times 70 \times 70)} = 18.24 \checkmark \text{ O.K.}$$

$$M_{ue} = 53.55 \text{ T.m} \rightarrow A_s = 21.67 \text{ cm}^2, A_{s \text{ temp}} = 33.6 \text{ cm}^2$$

MP.

f6

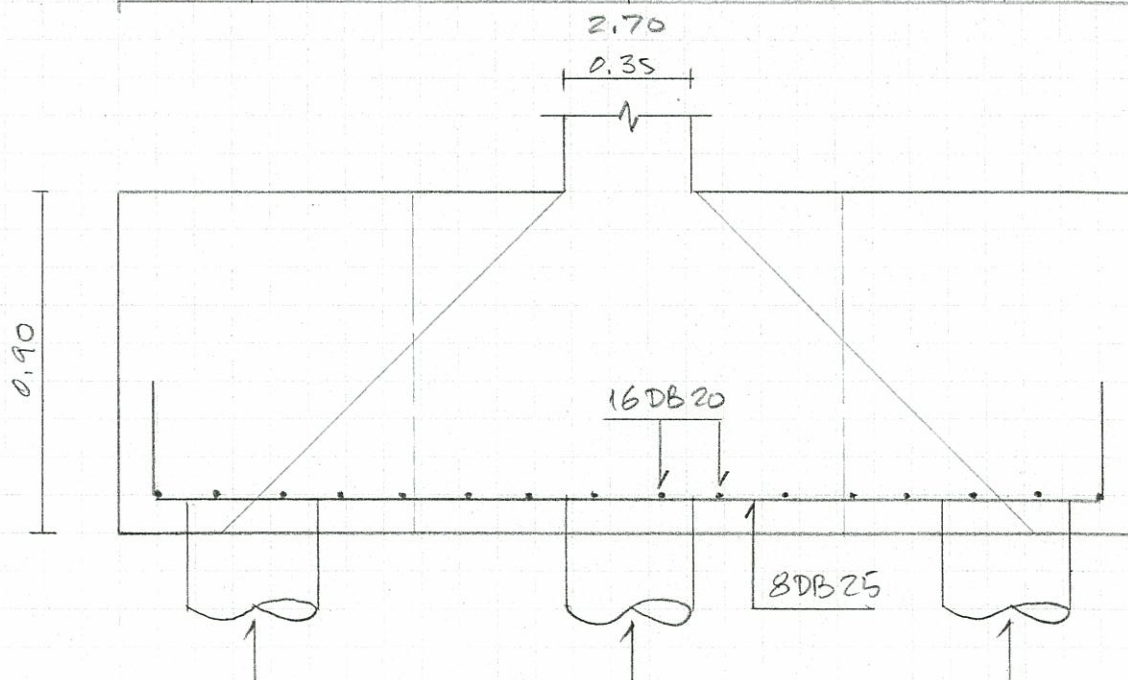


0 17 30

0 20 35

0 8.57 30

0 10 35



6 ϕ 0.35m Conc. Bored Piles @ 30°/pile Safe Load

$$V_u = \frac{58,300}{0.85(170 \times 80)} = 5.04 \text{ ksc } \checkmark \text{ o.k.}$$

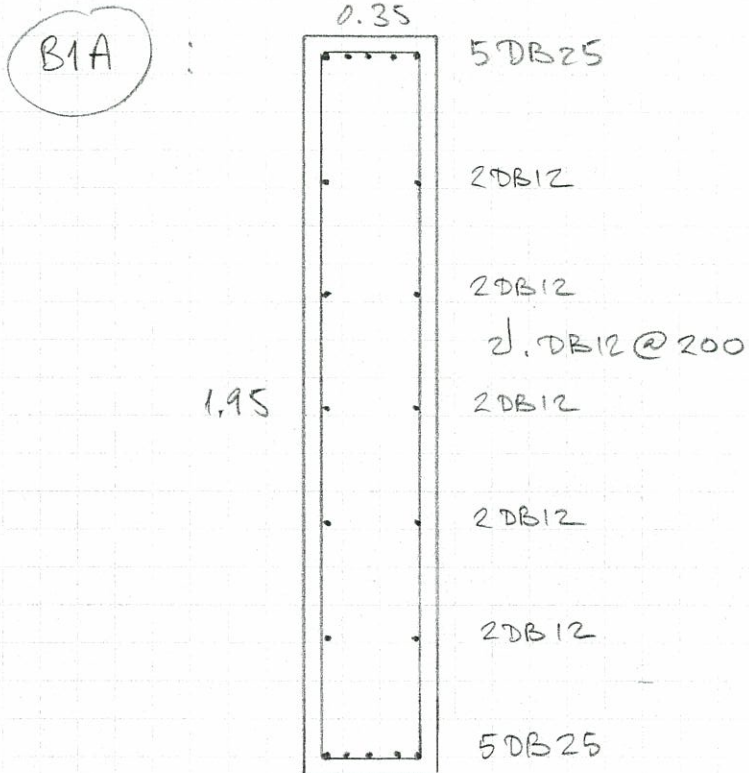
$$V_{pu} = \frac{233,000}{0.85(4 \times 115 \times 80)} = 7.45 \text{ ksc } \checkmark \text{ o.k.}$$

$$M_u = 103 \text{ T.m} \rightarrow A_s = 37.00 \text{ cm}^2, A_{s \text{ temp}} = 30.6/48.6$$

Use 8 DB 25 / 16 DB 20

Sump :

Slab : Use (S1)



Slab di Atas : Use (S6)

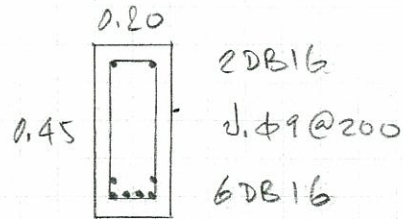
DP

มูรู Ramp :

$$L = 4.50 \text{ m}, U = 1.82 \text{ T/m}, P_u = 8.40 \text{ T}$$

$$M_u = 14.1 \text{ T}\cdot\text{m}, V_u = 8.30 \text{ T}$$

$$A_g/S = 0.0377, A_g = 11.03 / 3.47$$



BR2

$$(M_u = 15.2 \text{ T}\cdot\text{m}, V_u = 10.4 \text{ T})$$

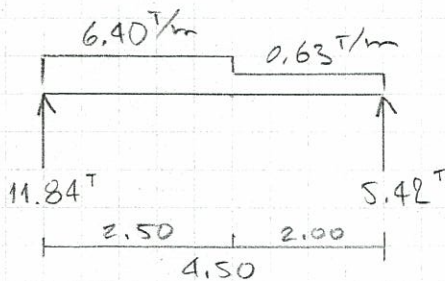
มูรู Ramp :

$$L = 4.50 \text{ m}, U = 0.63 \text{ T/m}, P_u = 8.30 \text{ T}$$

$$M_u = 10.9 \text{ T}\cdot\text{m}, V_u = 5.57 \text{ T}$$

Use BR2

มูรูบันได ลงใต้ดิน/ขึ้นดิน ground



Use BR2

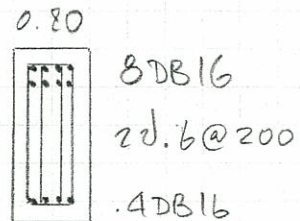
$$M_u = 10.9 \text{ T}\cdot\text{m}$$

B42C

$$L_c = 2.00 \text{ m}, U = 1.83 \text{ T/m}, P_u = 6.95 \text{ T}$$

$$-M_u = 15.97 \text{ T}\cdot\text{m}, V_u = 9.21 \text{ T}$$

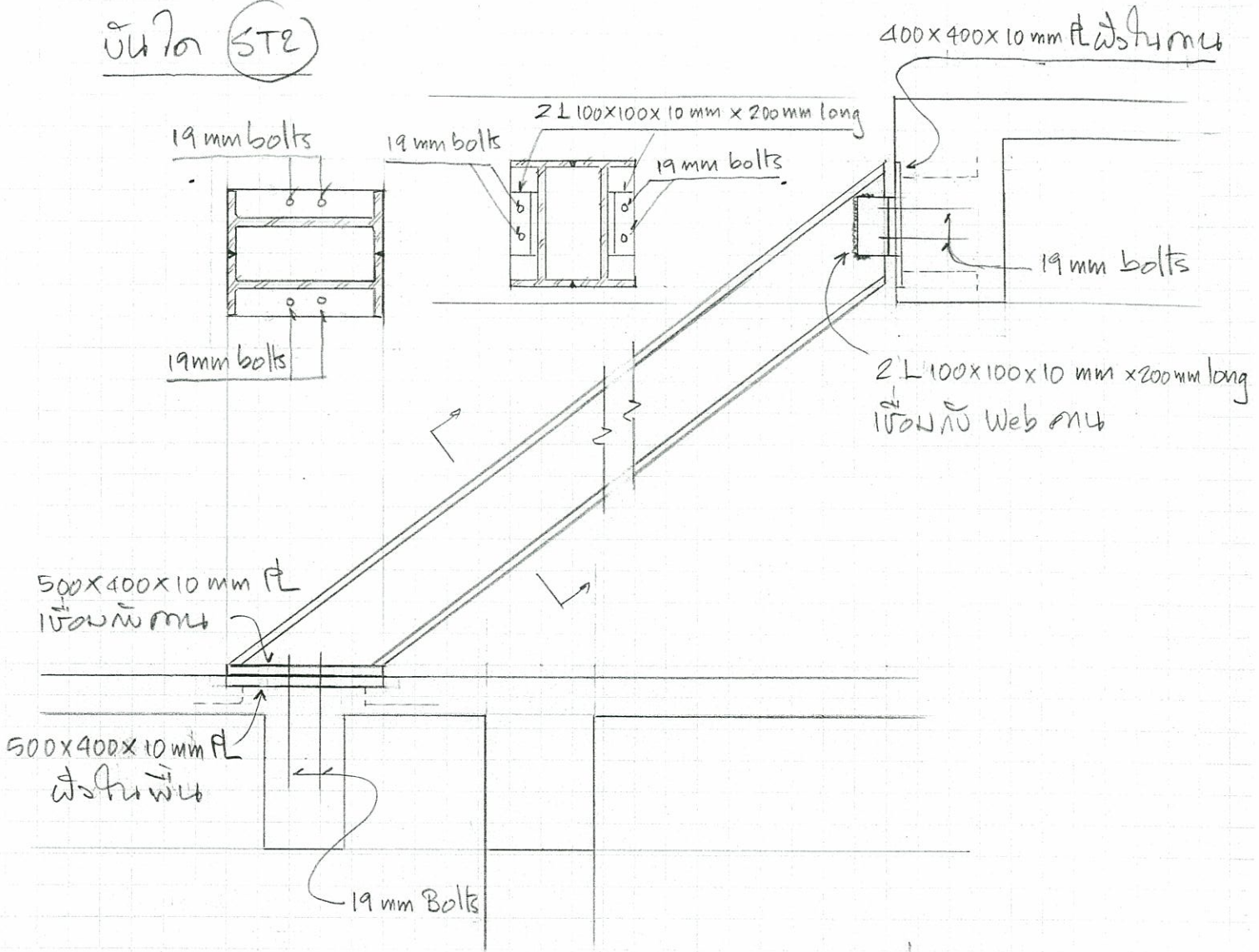
$$A_g/S = 0.0489, A_g = 12.51 / 6.60$$



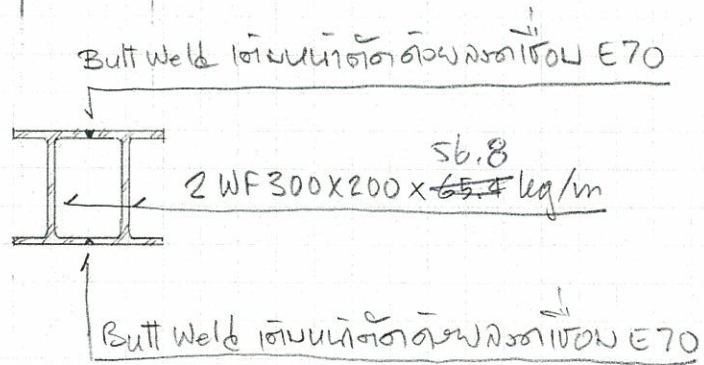
$$(-M_u = 20.2 \text{ T}\cdot\text{m}, V_u = 9.84 \text{ T})$$

27.

ប្រភេទ (ST2)



Section :



(ប្រភេទ ST2 detail ប្រភេទ ST2 ប្រភេទ ST2)

ប្រភេទ (ST1) : ប្រភេទ ST1 ប្រភេទ ST1 ប្រភេទ ST1 connections ប្រភេទ (ST2)

DP.