

รายการคำนวณโครงสร้าง

ต่อเติมลิฟท์

โรงพยาบาล ศูนย์ฟอกไต

จ. อุตรธานี

วิศวกรโครงสร้าง

นายประสาน จีงสงวนพรสุข สย. 5499

29 พฤศจิกายน 2553

Job Title : ศูนย์ฟลอคโต อุดรธานี	Date : Nov-10	Subject : Reaction
Designed : PSJ	Date :	Sheet :
Checked :		Page :

Reaction : Frame LiftPass FS-03

Story	Point	Load	FX	FY	FZ	MX	MY	MZ
BASE	9	S2DL	0.17	-1.39	15	0.00	0.00	0.00
BASE	9	S3DWX	-0.40	0.10	2	0.00	0.00	0.00
BASE	9	S4DWY	0.11	-0.80	9	0.00	0.00	0.00
BASE	9	S5DLWX	-0.26	-0.29	5	0.00	0.00	0.00
BASE	9	S6DLWY	0.13	-0.97	10	0.00	0.00	0.00
BASE	9	SDLWX2	0.13	-1.05	11	0.00	0.00	0.00
BASE	9	SDLWY2	0.13	-1.05	11	0.00	0.00	0.00
BASE	10	S2DL	-0.17	-1.39	15	0.00	0.00	0.00
BASE	10	S3DWX	-0.62	-1.91	18	0.00	0.00	0.00
BASE	10	S4DWY	-0.11	-0.80	9	0.00	0.00	0.00
BASE	10	S5DLWX	-0.51	-1.80	17	0.00	0.00	0.00
BASE	10	S6DLWY	-0.13	-0.96	10	0.00	0.00	0.00
BASE	10	SDLWX2	-0.13	-1.04	11	0.00	0.00	0.00
BASE	10	SDLWY2	-0.13	-1.04	11	0.00	0.00	0.00
BASE	41	S2DL	0.03	0.78	25	-0.58	0.02	0.00
BASE	41	S3DWX	-2.24	1.00	9	-0.77	-1.76	-0.07
BASE	41	S4DWY	0.02	-0.23	16	0.18	0.01	0.00
BASE	41	S5DLWX	-1.67	0.96	13	-0.73	-1.31	-0.05
BASE	41	S6DLWY	0.02	0.03	18	-0.01	0.01	0.00
BASE	41	SDLWX2	0.02	0.59	19	-0.44	0.01	0.00
BASE	41	SDLWY2	0.02	0.59	19	-0.44	0.01	0.00
BASE	42	S2DL	-0.02	0.77	24	-0.57	-0.01	0.00
BASE	42	S3DWX	-2.28	0.02	24	0.01	-1.78	-0.07
BASE	42	S4DWY	-0.02	-0.23	15	0.18	-0.01	0.00
BASE	42	S5DLWX	-1.71	0.21	24	-0.14	-1.33	-0.05
BASE	42	S6DLWY	-0.02	0.02	17	0.00	0.00	0.00
BASE	42	SDLWX2	-0.02	0.58	18	-0.43	0.00	0.00
BASE	42	SDLWY2	-0.02	0.58	18	-0.43	0.00	0.00
BASE	52	S2DL	0.01	0.62	17	-0.50	0.01	0.00
BASE	52	S3DWX	-0.86	0.95	0	-0.75	-0.72	-0.07
BASE	52	S4DWY	0.01	-0.32	12	0.23	0.01	0.00
BASE	52	S5DLWX	-0.65	0.88	6	-0.69	-0.54	-0.05
BASE	52	S6DLWY	0.01	-0.07	15	0.04	0.01	0.00
BASE	52	SDLWX2	0.01	0.47	13	-0.38	0.01	0.00
BASE	52	SDLWY2	0.01	0.47	13	-0.38	0.01	0.00
BASE	53	S2DL	-0.02	0.61	15	-0.50	0.00	0.00
BASE	53	S3DWX	-0.89	-0.16	19	0.09	-0.74	-0.07
BASE	53	S4DWY	-0.01	-0.32	12	0.23	-0.01	0.00
BASE	53	S5DLWX	-0.67	0.04	18	-0.06	-0.55	-0.05
BASE	53	S6DLWY	-0.01	-0.08	13	0.04	0.00	0.00
BASE	53	SDLWX2	-0.01	0.46	11	-0.37	0.00	0.00
BASE	53	SDLWY2	-0.01	0.46	11	-0.37	0.00	0.00

Job Title : ศูนย์พักโต อุดรธานี	Date : Nov-10	Subject Column force Psaasenger Lift	
Designed : PSJ	Date :	Sheet :	Page :
Checked :			

Column Force for Design B.PL

Story	Point	Load	Loc [m]	P [t]	V2 [t]	V3 [t]	T [t.m]	M2 [t.m]	M3 [t.m]
STORY2	C1	S2DL	0.00	-7.30	0.27	0.03	0.00	0.05	0.97
STORY2	C1	S2DL	1.40	-7.23	0.27	0.03	0.00	0.00	0.60
STORY2	C1	S2DL	2.80	-7.16	0.27	0.03	0.00	-0.04	0.22
STORY2	C1	S3DWX	0.00	-0.13	-0.19	-0.96	0.00	-1.57	-0.19
STORY2	C1	S3DWX	1.40	-0.06	-0.19	-0.96	0.00	-0.24	0.07
STORY2	C1	S3DWX	2.80	0.01	-0.19	-0.96	0.00	1.10	0.34
STORY2	C1	S4DWH	0.00	-3.89	0.46	0.02	0.00	0.03	1.14
STORY2	C1	S4DWH	1.40	-3.83	0.46	0.02	0.00	0.00	0.51
STORY2	C1	S4DWH	2.80	-3.76	0.46	0.02	0.00	-0.03	-0.13
STORY2	C1	S5DLWX	0.00	-2.06	-0.09	-0.71	0.00	-1.17	0.10
STORY2	C1	S5DLWX	1.40	-2.01	-0.09	-0.71	0.00	-0.18	0.22
STORY2	C1	S5DLWX	2.80	-1.95	-0.09	-0.71	0.00	0.81	0.35
STORY2	C1	S6DLWH	0.00	-4.88	0.39	0.02	0.00	0.04	1.10
STORY2	C1	S6DLWH	1.40	-4.83	0.39	0.02	0.00	0.00	0.55
STORY2	C1	S6DLWH	2.80	-4.78	0.39	0.02	0.00	-0.03	0.00
STORY2	C1	SDLWX2	0.00	-5.47	0.20	0.02	0.00	0.04	0.73
STORY2	C1	SDLWX2	1.40	-5.42	0.20	0.02	0.00	0.00	0.45
STORY2	C1	SDLWX2	2.80	-5.37	0.20	0.02	0.00	-0.03	0.17
STORY2	C1	SDLWH2	0.00	-5.47	0.20	0.02	0.00	0.04	0.73
STORY2	C1	SDLWH2	1.40	-5.42	0.20	0.02	0.00	0.00	0.45
STORY2	C1	SDLWH2	2.80	-5.37	0.20	0.02	0.00	-0.03	0.17
STORY2	C2	S2DL	0.00	-7.23	0.26	-0.03	0.00	-0.05	0.96
STORY2	C2	S2DL	1.40	-7.16	0.26	-0.03	0.00	0.00	0.59
STORY2	C2	S2DL	2.80	-7.10	0.26	-0.03	0.00	0.04	0.22
STORY2	C2	S3DWH	0.00	-9.23	0.58	-1.00	0.00	-1.64	1.48
STORY2	C2	S3DWH	1.40	-9.16	0.58	-1.00	0.00	-0.24	0.67
STORY2	C2	S3DWH	2.80	-9.10	0.58	-1.00	0.00	1.15	-0.15
STORY2	C2	S4DWH	0.00	-3.89	0.46	-0.02	0.00	-0.03	1.14
STORY2	C2	S4DWH	1.40	-3.82	0.46	-0.02	0.00	0.00	0.51
STORY2	C2	S4DWH	2.80	-3.75	0.46	-0.02	0.00	0.03	-0.13
STORY2	C2	S5DLWX	0.00	-8.84	0.49	-0.76	0.00	-1.24	1.35
STORY2	C2	S5DLWX	1.40	-8.79	0.49	-0.76	0.00	-0.18	0.67
STORY2	C2	S5DLWX	2.80	-8.74	0.49	-0.76	0.00	0.88	-0.02
STORY2	C2	S6DLWH	0.00	-4.83	0.39	-0.02	0.00	-0.04	1.09
STORY2	C2	S6DLWH	1.40	-4.78	0.39	-0.02	0.00	0.00	0.55
STORY2	C2	S6DLWH	2.80	-4.73	0.39	-0.02	0.00	0.03	0.00
STORY2	C2	SDLWX2	0.00	-5.42	0.20	-0.02	0.00	-0.04	0.72
STORY2	C2	SDLWX2	1.40	-5.37	0.20	-0.02	0.00	0.00	0.44
STORY2	C2	SDLWX2	2.80	-5.32	0.20	-0.02	0.00	0.03	0.17
STORY2	C2	SDLWH2	0.00	-5.42	0.20	-0.02	0.00	-0.04	0.72
STORY2	C2	SDLWH2	1.40	-5.37	0.20	-0.02	0.00	0.00	0.44
STORY2	C2	SDLWH2	2.80	-5.32	0.20	-0.02	0.00	0.03	0.17
STORY2	C5	S2DL	0.00	-20.31	-0.04	0.02	0.00	0.02	-0.23
STORY2	C5	S2DL	1.40	-20.24	-0.04	0.02	0.00	-0.01	-0.17
STORY2	C5	S2DL	2.80	-20.17	-0.04	0.02	0.00	-0.03	-0.12
STORY2	C5	S3DWH	0.00	-5.16	-0.10	-1.17	0.00	-1.93	-0.23
STORY2	C5	S3DWH	1.40	-5.09	-0.10	-1.17	0.00	-0.30	-0.09
STORY2	C5	S3DWH	2.80	-5.03	-0.10	-1.17	0.00	1.34	0.05
STORY2	C5	S4DWH	0.00	-11.25	0.48	0.01	0.00	0.01	0.77
STORY2	C5	S4DWH	1.40	-11.18	0.48	0.01	0.00	0.00	0.09
STORY2	C5	S4DWH	2.80	-11.11	0.48	0.01	0.00	-0.02	-0.59
STORY2	C5	S5DLWX	0.00	-9.86	-0.06	-0.87	0.00	-1.44	-0.21
STORY2	C5	S5DLWX	1.40	-9.81	-0.06	-0.87	0.00	-0.22	-0.12
STORY2	C5	S5DLWX	2.80	-9.76	-0.06	-0.87	0.00	0.99	-0.03
STORY2	C5	S6DLWH	0.00	-14.42	0.38	0.01	0.00	0.02	0.54
STORY2	C5	S6DLWH	1.40	-14.37	0.38	0.01	0.00	0.00	0.02
STORY2	C5	S6DLWH	2.80	-14.32	0.38	0.01	0.00	-0.02	-0.51
STORY2	C5	SDLWX2	0.00	-15.23	-0.03	0.01	0.00	0.02	-0.17
STORY2	C5	SDLWX2	1.40	-15.18	-0.03	0.01	0.00	0.00	-0.13
STORY2	C5	SDLWX2	2.80	-15.13	-0.03	0.01	0.00	-0.02	-0.09
STORY2	C5	SDLWH2	0.00	-15.23	-0.03	0.01	0.00	0.02	-0.17
STORY2	C5	SDLWH2	1.40	-15.18	-0.03	0.01	0.00	0.00	-0.13
STORY2	C5	SDLWH2	2.80	-15.13	-0.03	0.01	0.00	-0.02	-0.09
STORY2	C6	S2DL	0.00	-19.33	-0.03	-0.02	0.00	-0.02	-0.22
STORY2	C6	S2DL	1.40	-19.26	-0.03	-0.02	0.00	0.01	-0.17
STORY2	C6	S2DL	2.80	-19.20	-0.03	-0.02	0.00	0.03	-0.13
STORY2	C6	S3DWH	0.00	-19.42	-0.01	-1.19	0.00	-1.96	-0.13
STORY2	C6	S3DWH	1.40	-19.35	-0.01	-1.19	0.00	-0.29	-0.12
STORY2	C6	S3DWH	2.80	-19.28	-0.01	-1.19	0.00	1.38	-0.11
STORY2	C6	S4DWH	0.00	-11.18	0.49	-0.01	0.00	-0.01	0.77
STORY2	C6	S4DWH	1.40	-11.11	0.49	-0.01	0.00	0.00	0.09
STORY2	C6	S4DWH	2.80	-11.04	0.49	-0.01	0.00	0.02	-0.59

STORY2	C6	S5DLWX	0.00	-19.87	0.01	-0.90	0.00	-1.47	-0.13
STORY2	C6	S5DLWX	1.40	-19.82	0.01	-0.90	0.00	-0.21	-0.14
STORY2	C6	S5DLWX	2.80	-19.77	0.01	-0.90	0.00	1.04	-0.15
STORY2	C6	S6DLWY	0.00	-13.69	0.38	-0.01	0.00	-0.01	0.55
STORY2	C6	S6DLWY	1.40	-13.64	0.38	-0.01	0.00	0.01	0.02
STORY2	C6	S6DLWY	2.80	-13.59	0.38	-0.01	0.00	0.02	-0.52
STORY2	C6	SDLWX2	0.00	-14.50	-0.03	-0.01	0.00	-0.01	-0.17
STORY2	C6	SDLWX2	1.40	-14.45	-0.03	-0.01	0.00	0.01	-0.13
STORY2	C6	SDLWX2	2.80	-14.40	-0.03	-0.01	0.00	0.02	-0.10
STORY2	C6	SDLWY2	0.00	-14.50	-0.03	-0.01	0.00	-0.01	-0.17
STORY2	C6	SDLWY2	1.40	-14.45	-0.03	-0.01	0.00	0.01	-0.13
STORY2	C6	SDLWY2	2.80	-14.40	-0.03	-0.01	0.00	0.02	-0.10
STORY2	C7	S2DL	0.00	-10.91	-0.23	0.01	0.00	0.01	-0.39
STORY2	C7	S2DL	1.40	-10.85	-0.23	0.01	0.00	0.00	-0.06
STORY2	C7	S2DL	2.80	-10.78	-0.23	0.01	0.00	-0.01	0.26
STORY2	C7	S3DWX	0.00	2.65	-0.16	-1.15	0.00	-1.90	-0.28
STORY2	C7	S3DWX	1.40	2.72	-0.16	-1.15	0.00	-0.29	-0.06
STORY2	C7	S3DWX	2.80	2.79	-0.16	-1.15	0.00	1.32	0.16
STORY2	C7	S4DWY	0.00	-5.93	0.30	0.01	0.00	0.01	0.61
STORY2	C7	S4DWY	1.40	-5.86	0.30	0.01	0.00	0.00	0.18
STORY2	C7	S4DWY	2.80	-5.79	0.30	0.01	0.00	-0.01	-0.24
STORY2	C7	S5DLWX	0.00	-3.15	-0.18	-0.86	0.00	-1.42	-0.31
STORY2	C7	S5DLWX	1.40	-3.09	-0.18	-0.86	0.00	-0.22	-0.06
STORY2	C7	S5DLWX	2.80	-3.04	-0.18	-0.86	0.00	0.99	0.20
STORY2	C7	S6DLWY	0.00	-9.58	0.16	0.00	0.00	0.01	0.35
STORY2	C7	S6DLWY	1.40	-9.53	0.16	0.00	0.00	0.00	0.13
STORY2	C7	S6DLWY	2.80	-9.48	0.16	0.00	0.00	-0.01	-0.10
STORY2	C7	SDLWX2	0.00	-8.19	-0.17	0.00	0.00	0.01	-0.29
STORY2	C7	SDLWX2	1.40	-8.13	-0.17	0.00	0.00	0.00	-0.05
STORY2	C7	SDLWX2	2.80	-8.08	-0.17	0.00	0.00	-0.01	0.19
STORY2	C7	SDLWY2	0.00	-8.19	-0.17	0.00	0.00	0.01	-0.29
STORY2	C7	SDLWY2	1.40	-8.13	-0.17	0.00	0.00	0.00	-0.05
STORY2	C7	SDLWY2	2.80	-8.08	-0.17	0.00	0.00	-0.01	0.19
STORY2	C8	S2DL	0.00	-8.67	-0.23	-0.01	0.00	-0.01	-0.38
STORY2	C8	S2DL	1.40	-8.60	-0.23	-0.01	0.00	0.00	-0.06
STORY2	C8	S2DL	2.80	-8.54	-0.23	-0.01	0.00	0.01	0.25
STORY2	C8	S3DWX	0.00	-10.72	-0.13	-1.16	0.00	-1.91	-0.22
STORY2	C8	S3DWX	1.40	-10.65	-0.13	-1.16	0.00	-0.29	-0.04
STORY2	C8	S3DWX	2.80	-10.58	-0.13	-1.16	0.00	1.34	0.14
STORY2	C8	S4DWY	0.00	-5.86	0.30	-0.01	0.00	-0.01	0.61
STORY2	C8	S4DWY	1.40	-5.79	0.30	-0.01	0.00	0.00	0.18
STORY2	C8	S4DWY	2.80	-5.73	0.30	-0.01	0.00	0.01	-0.24
STORY2	C8	S5DLWX	0.00	-11.54	-0.16	-0.87	0.00	-1.43	-0.26
STORY2	C8	S5DLWX	1.40	-11.49	-0.16	-0.87	0.00	-0.21	-0.04
STORY2	C8	S5DLWX	2.80	-11.44	-0.16	-0.87	0.00	1.01	0.19
STORY2	C8	S6DLWY	0.00	-7.90	0.16	-0.01	0.00	-0.01	0.36
STORY2	C8	S6DLWY	1.40	-7.85	0.16	-0.01	0.00	0.00	0.13
STORY2	C8	S6DLWY	2.80	-7.80	0.16	-0.01	0.00	0.01	-0.10
STORY2	C8	SDLWX2	0.00	-6.50	-0.17	-0.01	0.00	-0.01	-0.29
STORY2	C8	SDLWX2	1.40	-6.45	-0.17	-0.01	0.00	0.00	-0.05
STORY2	C8	SDLWX2	2.80	-6.40	-0.17	-0.01	0.00	0.01	0.19
STORY2	C8	SDLWY2	0.00	-6.50	-0.17	-0.01	0.00	-0.01	-0.29
STORY2	C8	SDLWY2	1.40	-6.45	-0.17	-0.01	0.00	0.00	-0.05
STORY2	C8	SDLWY2	2.80	-6.40	-0.17	-0.01	0.00	0.01	0.19

FP-1

Max. load on Footing = 30t
 Use Footing $2.90 \times 1.00 \times 0.50 \text{ dp}$

$$p = \frac{30}{1.0 \times 2.9} = 9.80 \text{ t/m}^2$$

$$M = \frac{1}{8} \times 10,000 \times 2.5^2$$

$$= 7810 \text{ kg.m/m}$$

$$A_{st} = 11.3 \text{ cm}^2 = \underline{7 \text{ DB16 (T\&B)}}$$

$$V = 12500 \text{ kg}$$

$$V_c = 69713 \text{ kg} - \underline{2U \text{ DB20} \times 0.20}$$

FP-2

Max load on Footing = 85t
 Use Footing $3.70 \times 3.00 \times 0.50 \text{ dp}$

$$p = \frac{85}{3.7 \times 3.0} = 7.68 \text{ t/m}^2$$

$$M^{\oplus} = \frac{1}{8} \times 10,000 \times 2.85^2$$

$$= 10153 \text{ kg.m/m}$$

$$A_{st} = 14.60 \text{ cm}^2 = \underline{1B20 \times 0.20^{\#} (T)}$$

$$M^{\ominus} = 0.5 \times 10,000 \times 0.225^2$$

$$= 253 \text{ kg.m/m}$$

$$A_{st} = 9.0 \text{ cm}^2 = \underline{1B20 \times 0.20^{\#} (B)}$$

SP-1 $USE\ t = 0.125$

$DU = 300 \text{ kg/m}^2$

$U = 300$

$\frac{600}{\quad} = 2$

$M = 0.065 \times 600 \times 2.5$

$= 240 \text{ kg-m/m}$

$A_{st} = 2.23 \text{ cm}^2/\text{m} \quad \underline{RB900.20.}$

SP-2 $USE\ t = 0.125$

$DU = 300 \text{ kg/m}^2$

$U = 300$

$\frac{600}{\quad} = 2$

$M = \frac{1}{8} \times 600 \times 1.3^2$

$= 128 \text{ kg-m/m}$

$A_{st} = 1.20 \text{ cm}^2/\text{m} \quad \underline{RB900.20.}$

SP3 $USE\ t = 0.15$

$DU = 360 \text{ kg/m}^2$

$U = 500$

$\frac{860}{\quad} = 2$

$M = \frac{1}{8} \times 860 \times 1.35^2$

$= 195 \text{ kg-m/m}$

$A_{st} = 1.52 \text{ cm}^2/\text{m} \quad \underline{RB900.20}$

SP4 $USE\ t = 0.15$

$DU = 360 \text{ kg/m}^2$

$U = 300$

$\frac{860}{\quad} = 2$

$M = 0.062 \times 860 \times 2.5$

$= 328 \text{ kg-m/m}$

$A_{st} = 2.53 \text{ cm}^2/\text{m} \quad \underline{RB900.20}$

$$B1 = 0.15 \times 0.50$$

$$DU = 180 \text{ kg/m}$$

$$S_u = 500 \text{ "}$$

$$W1 = 504 \text{ "}$$

$$\frac{1184}{2}$$

$$M = \frac{1}{2} \times 1184 \times 2.5$$

$$= 8925 \text{ kg.m}$$

$$H = 132 \text{ cm} \quad \underline{2-0812}$$

$$V = 1480 \text{ kg}$$

$$V_c = 3032 \text{ "} \quad \underline{V. 28100.20}$$

$$B2 = 0.30 \times 0.50$$

$$M = 10050$$

$$A1 = 7.20 \text{ cm}^2 \quad 30820$$

$$A2 = 14.67 \text{ "} \quad \underline{50820}$$

$$V = 9110 \text{ kg}$$

$$V_c = 5150 \text{ "}$$

$$V_c = 3710 \text{ "} \quad \underline{V. 28900.15}$$

Job Title : ศูนย์ฟลอกไต อุดรธานี	Date : Nov-10	Subject : Design of Base Plate
Designed : PSJ	Date :	Sheet :
Checked :		Page :

Base Plate : Passenger Lift

A) Properties of Materials

Fy	=	2,400	ksc
Es	=	2.10E+06	ksc
Ultimate Comp. Strength of Concrete , fc'	=	240	ksc

B) Geometry

Steel Column :	bf	=	20.00	cm
	D	=	20.00	cm
Base Plate :	B	=	30.00	cm
	N	=	30.00	cm
Distance from Edge of B.PL to cl of Bolt , N'	=	23.00	cm	
Distance from cl Column to cl of Bolt , A'=N'-N/2	=	8.00	cm	
RC. Column :	Bc	=	30.00	cm
	Nc	=	30.00	cm

C) Loading

Axial Load , P	=	19,420	kg
Moment , My-y	=	1,960	kg.m
Moment , Mx-x	=	130	kg.m

E) Determining Tension in Anchor Bolts

A1=B*N	=	900	cm ²
A2=Bc*Nc	=	900	cm ²
Allowable Bearing Stress , Fp = 0.35fc'Sqrt(A2/A1)	=	84.00	ksc
Bearing Stress ;			

$$f1 = [P/A1 + 6*My-y/BN^2 + 6*Mx-x/NB^2] = 68.02 \text{ ksc} < 0.70fc' = 168 \text{ ksc} < Fb \text{ OK.}$$

$$f2 = [P/A1 - 6*My-y/BN^2 - 6*Mx-x/NB^2] = -24.87 \text{ ksc} < 0, \text{ Tension in Base Plate}$$

$$fn = f1 * B * N / 2 = 23,468 \text{ kg}$$

$$A = fn - \text{Sqrt}[fn^2 - 4(f1*B/6)(P*A'+M)] / (f1*B/3) = 21.96 \text{ cm}$$

$$T = f1 * A * B / 2 - P = 2,990 \text{ kg}$$

F) Determining Thickness of Base Plate

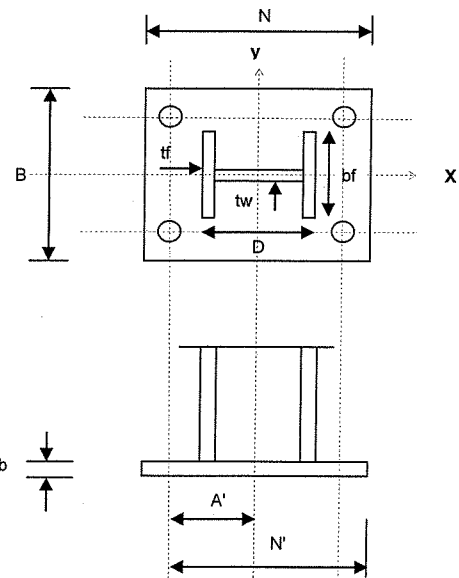
On compression side ;	m=(N-0.95D)/2	=	5.50	cm
	fm=f1*((A-m)/A)	=	50.99	ksc
	M1 = m ² /6*(fm+2*f1)	=	943	kg.cm/cm
On anchor bolt side ;	Critical width	=	15	cm (Load spreading out at 45 degrees from Anchor Bolt)
	M2 = T*(A'-D/2)/Critical width	=	(399)	kg.cm/cm
	Mm = Max(M1,M2)	=	943	kg.cm/cm
	Fb=0.75*Fy	=	1,800	Ksc
	tb(req)=Sqrt(6*Mm/Fb)	=	1.77	cm

PROVIDE Base Plate : 300 x 300 x 20 mm.

F) Determining Anchor Bolts

Provide Anchor Bolt Type	:	A307
Diameter	=	20 mm
Fut	=	3,100 ksc
Ft	=	1,380 ksc
Ab = T/Ft	=	2.17 cm ²
lh = 0.40Ab*Fu/(fc'*db)	=	5.60 cm
12db	=	24.00 cm
ld = lh+12db	=	29.60 cm

PROVIDE Anchor Bolts : 2 -Φ 20 mm (ld = 400 mm)
(As = 6.28 cm²) (Each Side)



C.R

$$DL = 10 \text{ kg/m}^2$$

$$UL = 300 \text{ "}$$

$$310 \text{ " } 2$$

$$M = \frac{1}{8} \times 310 \times 0.5$$

$$= 9.69 \text{ kgm}^2$$

$$Z = 0.68 \text{ cm}^3$$

$$t_{req} = \sqrt{\frac{6Z}{100}} = 0.20 \text{ cm}$$

$$\text{USE } t = 3.20 \text{ mm. c}$$

Joint

$$DL = 10 \text{ kg/m}^2$$

$$UL = 310 \text{ "}$$

$$320 \text{ "}$$

$$M = \frac{1}{8} \times 320 \times 0.5$$

$$= 250 \text{ kgm}^2$$

$$Z = 17.36 \text{ cm}^3$$

$$I_{req} = \frac{5 \times 2.5 \times 320 \times 250}{384 \times 2 \times 10^6 \times 1.04}$$

$$= 78.5 \text{ cm}^4$$

Provide: [100x50x20x3.20 mm @ 0.50 m-

$$\left[\begin{array}{l} Z = 213 \text{ cm}^3 \\ I = 107 \text{ cm}^4 \end{array} \right]$$

Job Title : ศูนย์ฟลอคได้อุตรธานี	Date : Nov-10	Subject Column Forced DumpWaiver	
Designer : PSJ	Date :	Sheet :	Page :
Checked :			

Column Force for Design B.PL

Story	Point	Load	Loc [m]	P [t]	V2 [t]	V3 [t]	T [t.m]	M2 [t.m]	M3 [t.m]
STORY2	C1	S2DL	0.00	-5.13	-0.02	0.01	0.00	0.02	-0.02
STORY2	C1	S2DL	1.43	-5.08	-0.02	0.01	0.00	-0.01	0.01
STORY2	C1	S2DL	2.85	-5.04	-0.02	0.01	0.00	-0.03	0.03
STORY2	C1	S3DWX	0.00	-2.01	-0.02	-0.31	0.00	-0.51	-0.01
STORY2	C1	S3DWX	1.43	-1.97	-0.02	-0.31	0.00	-0.07	0.01
STORY2	C1	S3DWX	2.85	-1.92	-0.02	-0.31	0.00	0.38	0.03
STORY2	C1	S4DWW	0.00	-1.09	0.37	0.01	0.00	0.02	0.67
STORY2	C1	S4DWW	1.43	-1.04	0.37	0.01	0.00	-0.01	0.15
STORY2	C1	S4DWW	2.85	-1.00	0.37	0.01	0.00	-0.03	-0.38
STORY2	C1	S5DLWX	0.00	-1.81	-0.01	-0.23	0.00	-0.38	-0.01
STORY2	C1	S5DLWX	1.43	-1.78	-0.01	-0.23	0.00	-0.05	0.00
STORY2	C1	S5DLWX	2.85	-1.74	-0.01	-0.23	0.00	0.28	0.02
STORY2	C1	S6DLWY	0.00	-1.12	0.28	0.01	0.00	0.01	0.50
STORY2	C1	S6DLWY	1.43	-1.08	0.28	0.01	0.00	0.00	0.11
STORY2	C1	S6DLWY	2.85	-1.05	0.28	0.01	0.00	-0.02	-0.28
STORY2	C1	SDLWX2	0.00	-3.84	-0.01	0.01	0.00	0.01	-0.01
STORY2	C1	SDLWX2	1.43	-3.81	-0.01	0.01	0.00	0.00	0.00
STORY2	C1	SDLWX2	2.85	-3.78	-0.01	0.01	0.00	-0.02	0.02
STORY2	C1	SDLWY2	0.00	-3.84	-0.01	0.01	0.00	0.01	-0.01
STORY2	C1	SDLWY2	1.43	-3.81	-0.01	0.01	0.00	0.00	0.00
STORY2	C1	SDLWY2	2.85	-3.78	-0.01	0.01	0.00	-0.02	0.02
STORY2	C2	S2DL	0.00	-5.13	-0.02	-0.01	0.00	-0.02	-0.02
STORY2	C2	S2DL	1.43	-5.08	-0.02	-0.01	0.00	0.01	0.01
STORY2	C2	S2DL	2.85	-5.04	-0.02	-0.01	0.00	0.03	0.03
STORY2	C2	S3DWX	0.00	-7.44	-0.02	-0.34	0.00	-0.54	-0.01
STORY2	C2	S3DWX	1.43	-7.40	-0.02	-0.34	0.00	-0.06	0.01
STORY2	C2	S3DWX	2.85	-7.35	-0.02	-0.34	0.00	0.43	0.03
STORY2	C2	S4DWW	0.00	-1.09	0.37	-0.01	0.00	-0.02	0.67
STORY2	C2	S4DWW	1.43	-1.04	0.37	-0.01	0.00	0.01	0.15
STORY2	C2	S4DWW	2.85	-1.00	0.37	-0.01	0.00	0.03	-0.38
STORY2	C2	S5DLWX	0.00	-5.88	-0.01	-0.26	0.00	-0.41	-0.01
STORY2	C2	S5DLWX	1.43	-5.85	-0.01	-0.26	0.00	-0.04	0.00
STORY2	C2	S5DLWX	2.85	-5.81	-0.01	-0.26	0.00	0.32	0.02
STORY2	C2	S6DLWY	0.00	-1.12	0.28	-0.01	0.00	-0.01	0.50
STORY2	C2	S6DLWY	1.43	-1.08	0.28	-0.01	0.00	0.00	0.11
STORY2	C2	S6DLWY	2.85	-1.05	0.28	-0.01	0.00	0.02	-0.28
STORY2	C2	SDLWX2	0.00	-3.84	-0.01	-0.01	0.00	-0.01	-0.01
STORY2	C2	SDLWX2	1.43	-3.81	-0.01	-0.01	0.00	0.00	0.00
STORY2	C2	SDLWX2	2.85	-3.78	-0.01	-0.01	0.00	0.02	0.02
STORY2	C2	SDLWY2	0.00	-3.84	-0.01	-0.01	0.00	-0.01	-0.01
STORY2	C2	SDLWY2	1.43	-3.81	-0.01	-0.01	0.00	0.00	0.00
STORY2	C2	SDLWY2	2.85	-3.78	-0.01	-0.01	0.00	0.02	0.02
STORY2	C3	S2DL	0.00	-5.58	0.02	0.01	0.00	0.02	0.02
STORY2	C3	S2DL	1.43	-5.54	0.02	0.01	0.00	-0.01	0.00
STORY2	C3	S2DL	2.85	-5.49	0.02	0.01	0.00	-0.03	-0.03
STORY2	C3	S3DWX	0.00	-2.47	0.02	-0.31	0.00	-0.51	0.02
STORY2	C3	S3DWX	1.43	-2.42	0.02	-0.31	0.00	-0.07	0.00
STORY2	C3	S3DWX	2.85	-2.38	0.02	-0.31	0.00	0.38	-0.03
STORY2	C3	S4DWW	0.00	-8.82	0.40	0.01	0.00	0.02	0.70
STORY2	C3	S4DWW	1.43	-8.78	0.40	0.01	0.00	-0.01	0.13
STORY2	C3	S4DWW	2.85	-8.73	0.40	0.01	0.00	-0.03	-0.43
STORY2	C3	S5DLWX	0.00	-2.15	0.01	-0.23	0.00	-0.38	0.01
STORY2	C3	S5DLWX	1.43	-2.12	0.01	-0.23	0.00	-0.05	0.00
STORY2	C3	S5DLWX	2.85	-2.09	0.01	-0.23	0.00	0.28	-0.02
STORY2	C3	S6DLWY	0.00	-6.91	0.30	0.01	0.00	0.01	0.53
STORY2	C3	S6DLWY	1.43	-6.88	0.30	0.01	0.00	0.00	0.10
STORY2	C3	S6DLWY	2.85	-6.85	0.30	0.01	0.00	-0.02	-0.33
STORY2	C3	SDLWX2	0.00	-4.19	0.01	0.01	0.00	0.01	0.01
STORY2	C3	SDLWX2	1.43	-4.15	0.01	0.01	0.00	0.00	0.00
STORY2	C3	SDLWX2	2.85	-4.12	0.01	0.01	0.00	-0.02	-0.02
STORY2	C3	SDLWY2	0.00	-4.19	0.01	0.01	0.00	0.01	0.01
STORY2	C3	SDLWY2	1.43	-4.15	0.01	0.01	0.00	0.00	0.00
STORY2	C3	SDLWY2	2.85	-4.12	0.01	0.01	0.00	-0.02	-0.02
STORY2	C4	S2DL	0.00	-5.58	0.02	-0.01	0.00	-0.02	0.02
STORY2	C4	S2DL	1.43	-5.54	0.02	-0.01	0.00	0.01	0.00
STORY2	C4	S2DL	2.85	-5.49	0.02	-0.01	0.00	0.03	-0.03
STORY2	C4	S3DWX	0.00	-7.89	0.02	-0.34	0.00	-0.54	0.02
STORY2	C4	S3DWX	1.43	-7.85	0.02	-0.34	0.00	-0.06	0.00
STORY2	C4	S3DWX	2.85	-7.81	0.02	-0.34	0.00	0.43	-0.03
STORY2	C4	S4DWW	0.00	-8.82	0.40	-0.01	0.00	-0.02	0.70
STORY2	C4	S4DWW	1.43	-8.78	0.40	-0.01	0.00	0.01	0.13
STORY2	C4	S4DWW	2.85	-8.73	0.40	-0.01	0.00	0.03	-0.43

STORY2	C4	S5DLWX	0.00	-6.22	0.01	-0.26	0.00	-0.41	0.01
STORY2	C4	S5DLWX	1.43	-6.19	0.01	-0.26	0.00	-0.04	0.00
STORY2	C4	S5DLWX	2.85	-6.16	0.01	-0.26	0.00	0.32	-0.02
STORY2	C4	S6DLWY	0.00	-6.91	0.30	-0.01	0.00	-0.01	0.53
STORY2	C4	S6DLWY	1.43	-6.88	0.30	-0.01	0.00	0.00	0.10
STORY2	C4	S6DLWY	2.85	-6.85	0.30	-0.01	0.00	0.02	-0.33
STORY2	C4	SDLWX2	0.00	-4.19	0.01	-0.01	0.00	-0.01	0.01
STORY2	C4	SDLWX2	1.43	-4.15	0.01	-0.01	0.00	0.00	0.00
STORY2	C4	SDLWX2	2.85	-4.12	0.01	-0.01	0.00	0.02	-0.02
STORY2	C4	SDLWY2	0.00	-4.19	0.01	-0.01	0.00	-0.01	0.01
STORY2	C4	SDLWY2	1.43	-4.15	0.01	-0.01	0.00	0.00	0.00
STORY2	C4	SDLWY2	2.85	-4.12	0.01	-0.01	0.00	0.02	-0.02

Job Title : ศูนย์ฟลักโต อุดรธานี	Date : Nov-10	Subject : Reaction : DumpWaiver	
Designed : PSJ	Date :	Sheet :	Page :
Checked :			

Reaction : Frame DUMP FS-01

Story	Point	Load	FX	FY	FZ	MX	MY	MZ
BASE	1	S2DL	0.01	0.01	8	0.00	0.01	0.00
BASE	1	S3DWX	-0.32	0.01	4	0.00	-0.26	0.00
BASE	1	S4DWY	0.01	-0.38	2	0.31	0.00	0.00
BASE	1	S5DLWX	-0.24	0.01	4	0.00	-0.19	0.00
BASE	1	S6DLWY	0.01	-0.28	3	0.23	0.01	0.00
BASE	1	SDLWX2	0.01	0.01	6	0.00	0.01	0.00
BASE	1	SDLWY2	0.01	0.01	6	0.00	0.01	0.00
BASE	2	S2DL	-0.01	0.01	8	0.00	-0.01	0.00
BASE	2	S3DWX	-0.34	0.01	11	0.00	-0.27	0.00
BASE	2	S4DWY	-0.01	-0.38	2	0.31	0.00	0.00
BASE	2	S5DLWX	-0.26	0.01	9	0.00	-0.20	0.00
BASE	2	S6DLWY	-0.01	-0.28	3	0.23	-0.01	0.00
BASE	2	SDLWX2	-0.01	0.01	6	0.00	-0.01	0.00
BASE	2	SDLWY2	-0.01	0.01	6	0.00	-0.01	0.00
BASE	21	S2DL	0.01	-0.01	9	0.00	0.01	0.00
BASE	21	S3DWX	-0.32	-0.01	4	0.00	-0.26	0.00
BASE	21	S4DWY	0.01	-0.39	13	0.32	0.00	0.00
BASE	21	S5DLWX	-0.24	-0.01	4	0.00	-0.19	0.00
BASE	21	S6DLWY	0.01	-0.29	10	0.24	0.01	0.00
BASE	21	SDLWX2	0.01	-0.01	7	0.00	0.01	0.00
BASE	21	SDLWY2	0.01	-0.01	7	0.00	0.01	0.00
BASE	22	S2DL	-0.01	-0.01	9	0.00	-0.01	0.00
BASE	22	S3DWX	-0.34	-0.01	11	0.00	-0.27	0.00
BASE	22	S4DWY	-0.01	-0.39	13	0.32	0.00	0.00
BASE	22	S5DLWX	-0.26	-0.01	9	0.00	-0.20	0.00
BASE	22	S6DLWY	-0.01	-0.29	10	0.24	-0.01	0.00
BASE	22	SDLWX2	-0.01	-0.01	7	0.00	-0.01	0.00
BASE	22	SDLWY2	-0.01	-0.01	7	0.00	-0.01	0.00

Dump Waiver

FD-1

Max. load on Footing = 36^t

UIE Footing Size = 2.18 x 1.60 x 0.50 dp

$$p = \frac{36}{2.18 \times 1.60} = 10.8 \text{ t/m}^2$$

$$M = \frac{1}{8} \times 10.8 \times 1.48^2$$

$$= 2738 \text{ kg.m/m}$$

$$A_{st} = 3.95 \text{ cm}^2/\text{m} \quad \left. \vphantom{A_{st}} \right\} \underline{\text{DB12 @ 0.20}^*}$$

$$d_{min} = 7.00 \text{ "}$$

△

S01 & S02

$$U_{set} = 0.15 \text{ m}$$

$$DL = 360 \text{ kg/m}^2$$

$$LL = 800 \text{ "}$$

$$\underline{1160 \text{ "}}$$

$$M = 0.06 \times 1160 \times 1.43^2$$

$$= 143 \text{ k.m/m}$$

$$A_{st} = 1.09 \text{ cm}^2/\text{m} \quad \left. \vphantom{A_{st}} \right\} \underline{RB6 @ 0.20}$$

$$A_{stmin} = 270 \text{ "}$$

△

Job Title : ศูนย์ฟลัด อุดรธานี	Date : Nov-10	Subject : Design of Base Plate
Designed : PSJ	Date :	Sheet :
Checked :		Page :

Base Plate : DumpWaiter

A) Properties of Materials

Fy	=	2,400	ksc
Es	=	2.10E+06	ksc
Ultimate Comp. Strength of Concrete, fc'	=	240	ksc

B) Geometry

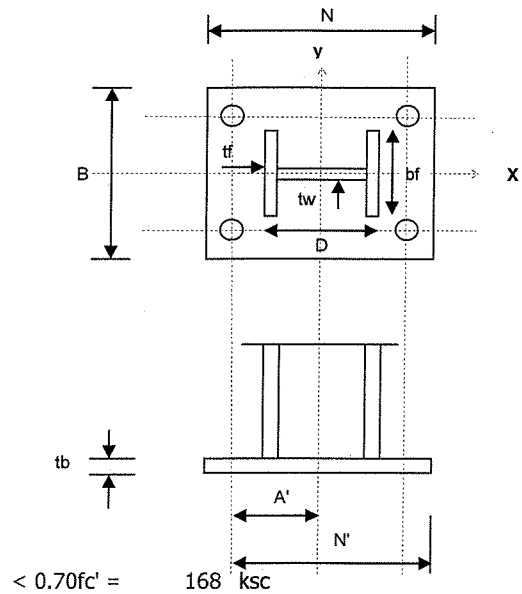
Steel Column :	bf	=	15.00	cm
	D	=	15.00	cm
Base Plate :	B	=	20.00	cm
	N	=	20.00	cm
RC. Column :	Bc	=	20.00	cm
	Nc	=	20.00	cm

C) Loading

Axial Load, P	=	8,820	kg
Moment, My-y	=	130	kg.m
Moment, Mx-x	=	-	kg.m

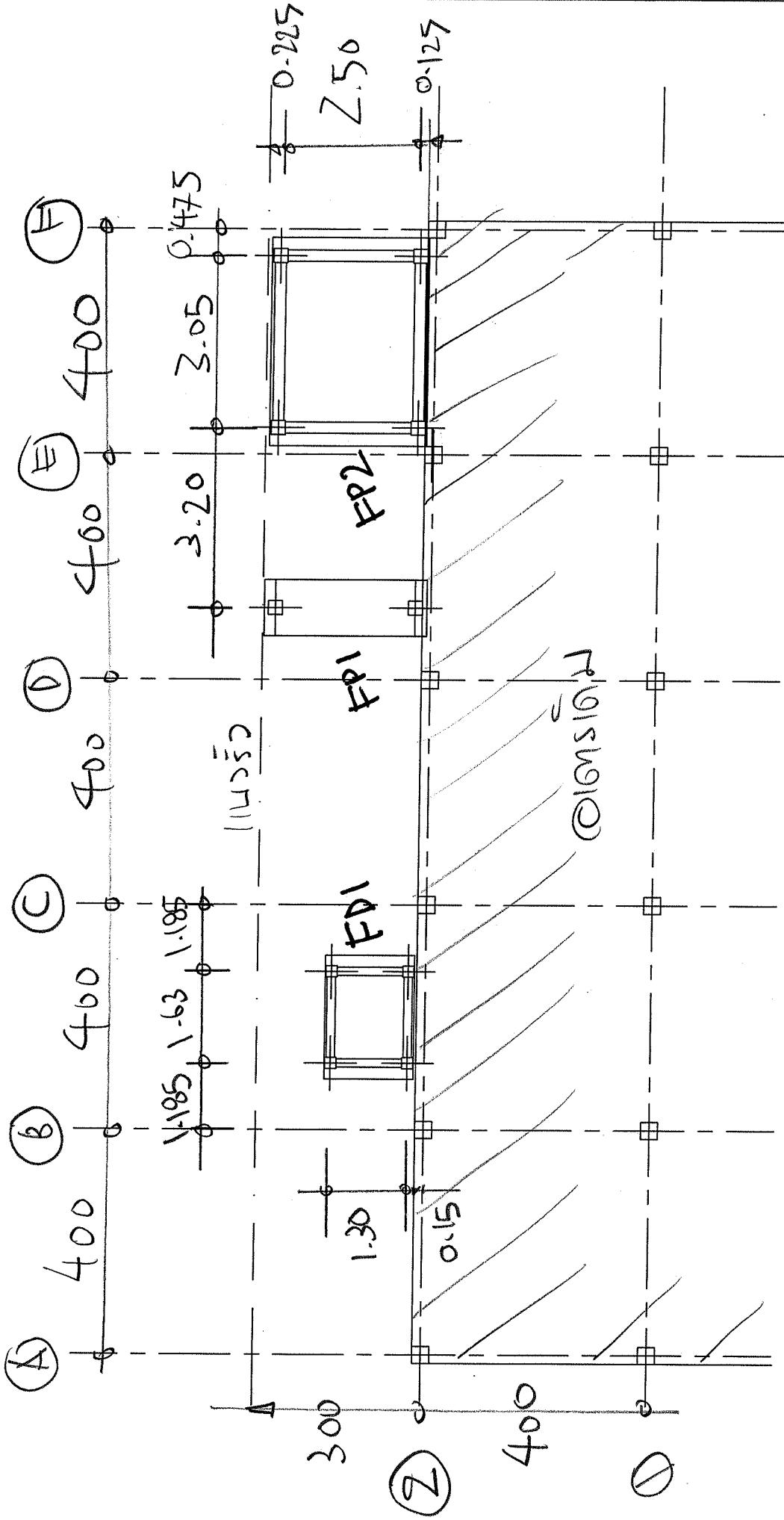
E) Determining Thickness of Base Plate

$A1 = B * N$	=	400.00	cm ²
$A2 = Bc * Nc$	=	400.00	cm ²
Allowable Bearing Stress, Fp = 0.35fc'Sqrt(A2/A1)	=	84.00	ksc
Bearing Stress ;			
$f1 = [P/A1 + 6 * My - y / BN^2 + 6 * Mx - x / NB^2]$	=	31.80	ksc
$f2 = [P/A1 - 6 * My - y / BN^2 - 6 * Mx - x / NB^2]$	=	12.30	ksc
$n = (B - 0.80bf) / 2$	=	4.00	cm
$m = (N - 0.95D) / 2$	=	2.88	cm
$L = \text{Max}(n, m)$	=	4.00	cm
$Mp = 0.50 * f1 * L^2$	=	254.40	kg.cm
$Fb = 0.75 * Fy$	=	1,800.00	Ksc
$tb(\text{req}) = \text{Sqrt}(6 * Mp / Fb)$	=	0.92	cm



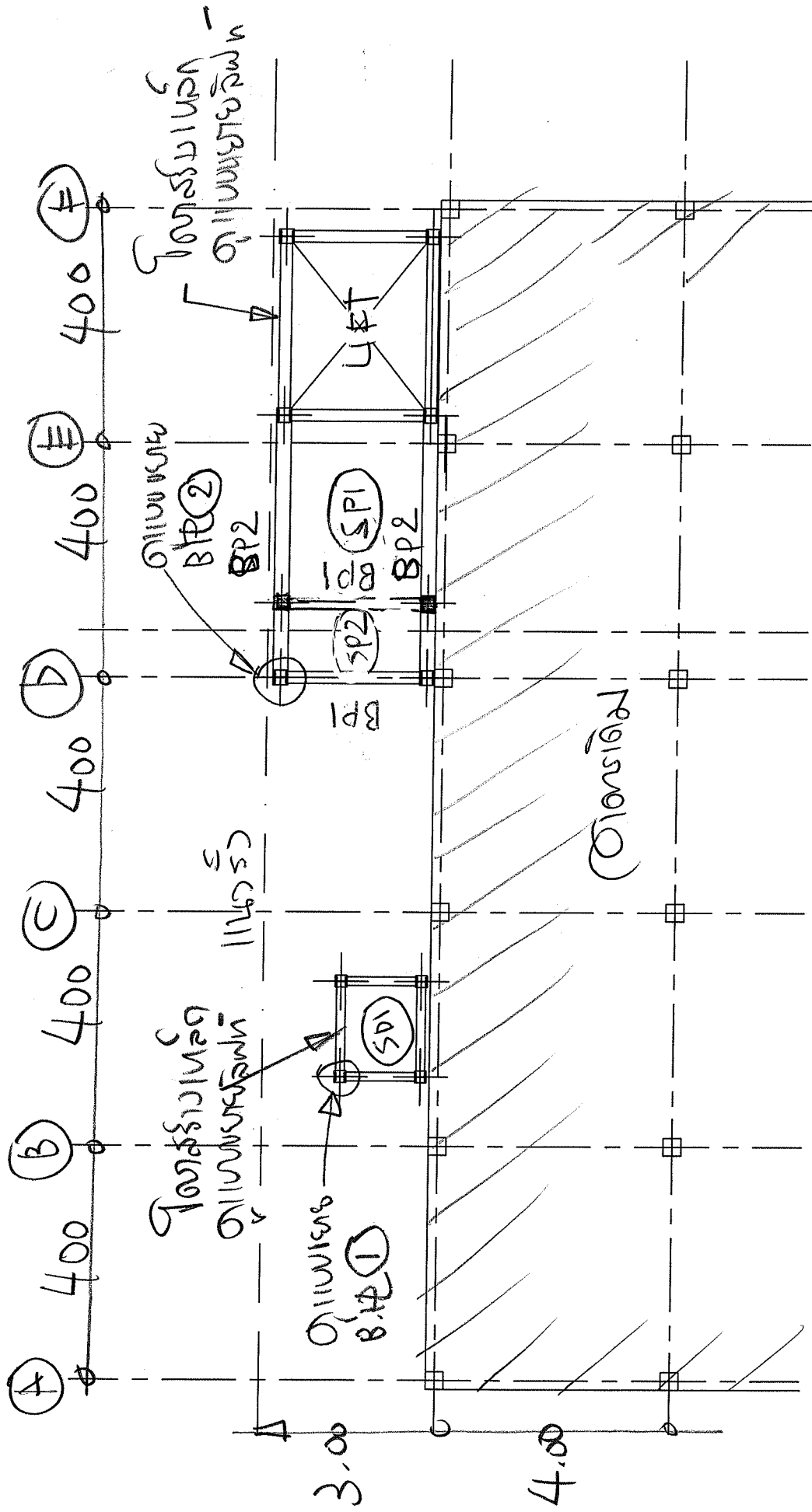
$< 0.70fc' = 168 \text{ ksc}$
 $< Fb \text{ OK.}$
 $> 0, \text{ No Tension in Base Plate}$

PROVIDE Base Plate : 200 x 200 x 16 mm.



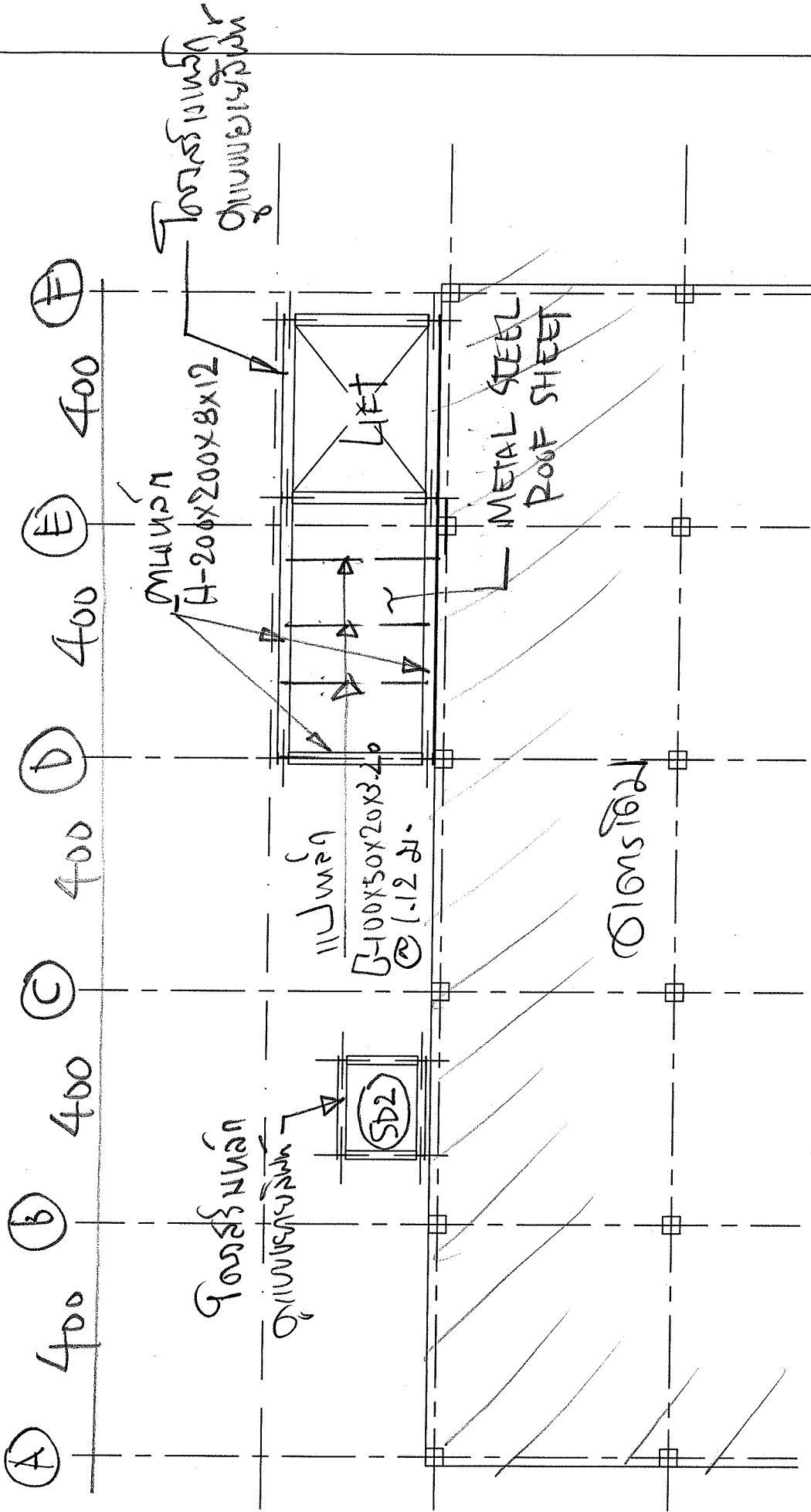
FOUNDATION PLAN

1:100



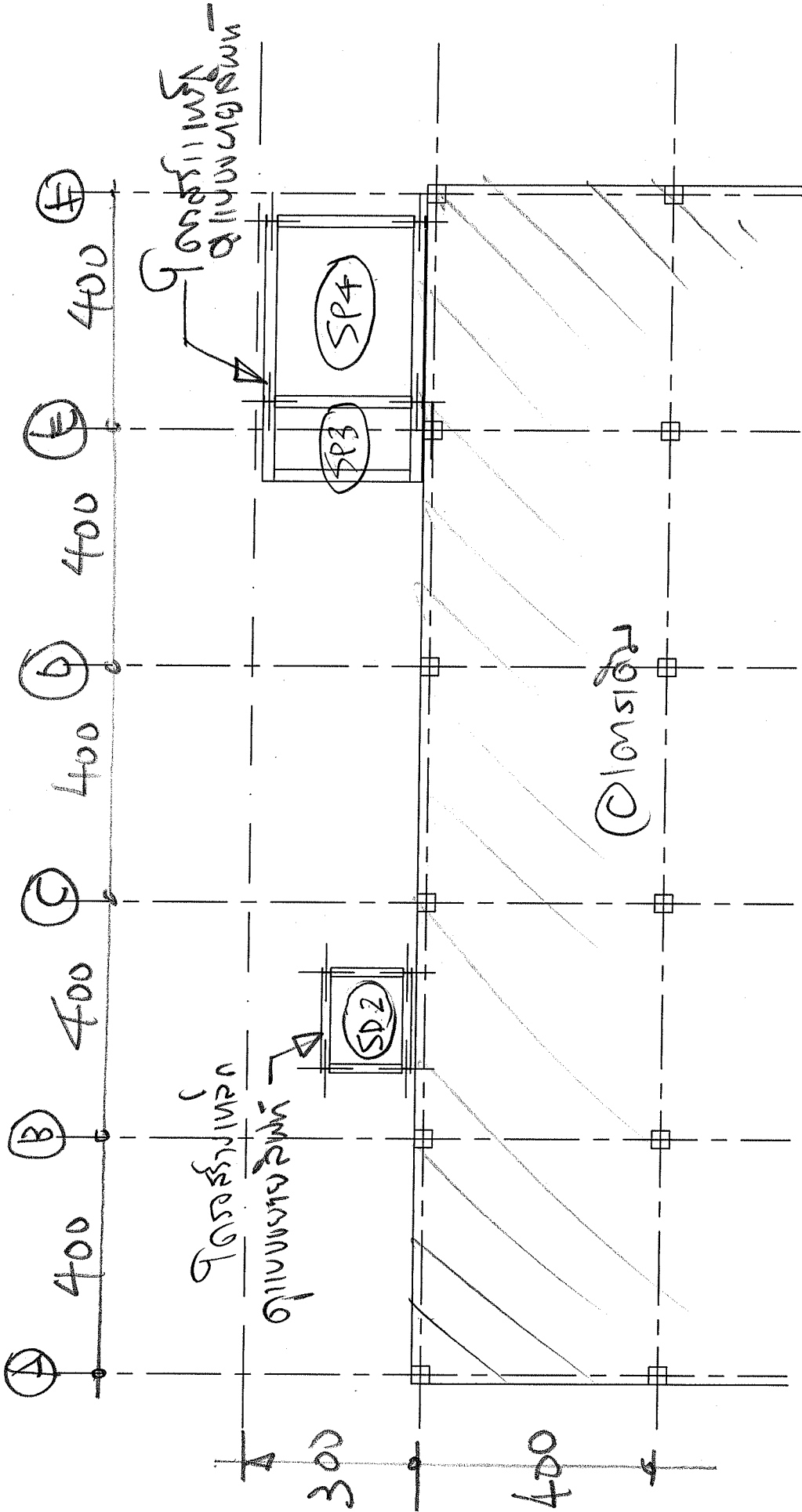
GROUND FLOOR PLAN

1:100



MECHINE ROOM PLAN ROOF PLAN

1:100



Gondokimbi
dianungsuwu

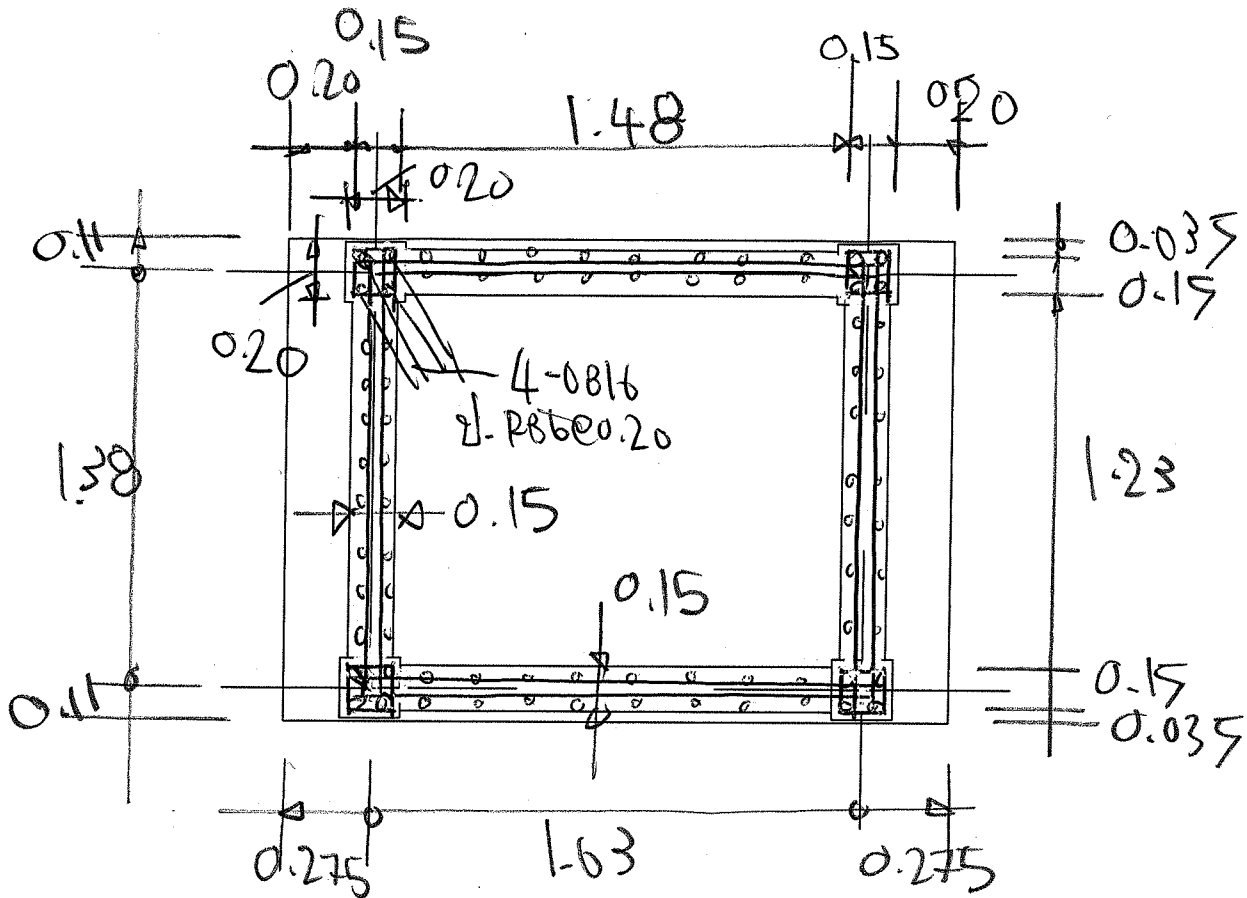
Gondokimbi
dianungsuwu

Diansida

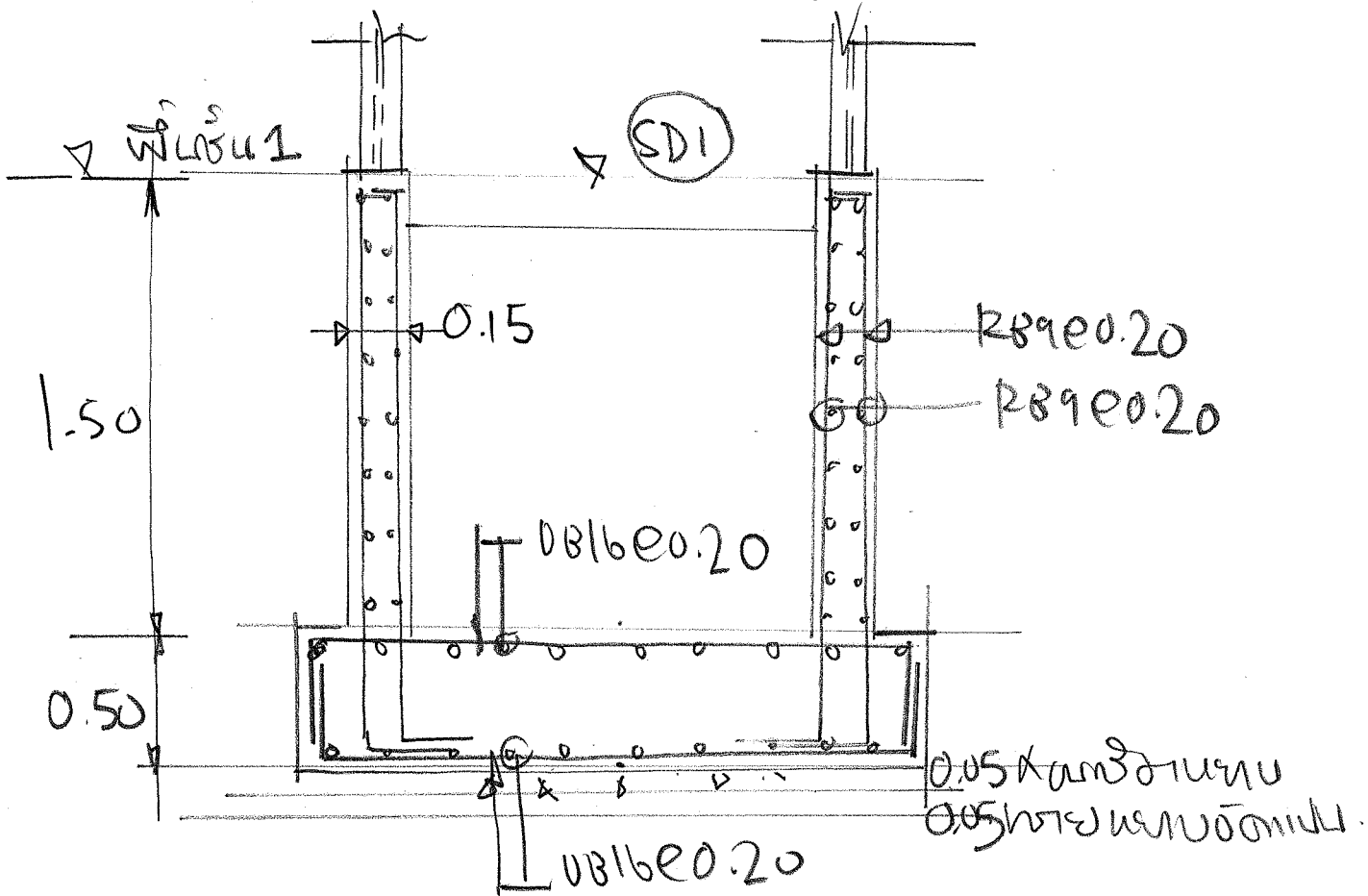
ROOF PLAN

MECHINE ROOM PLAN

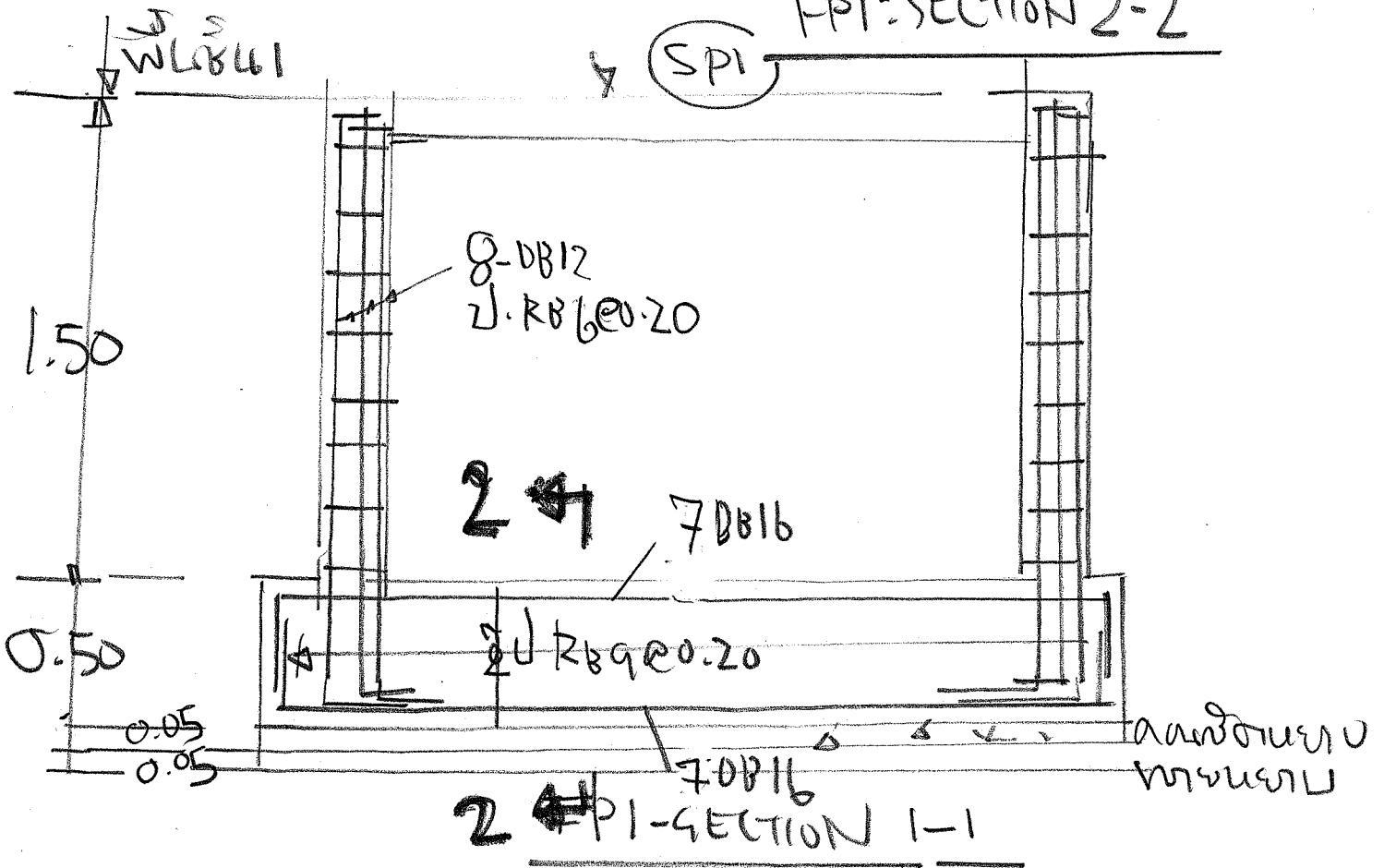
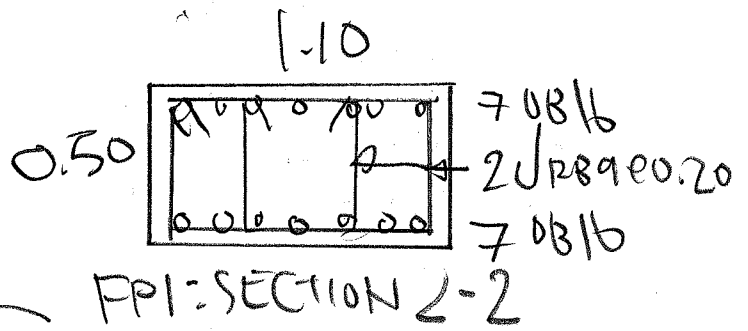
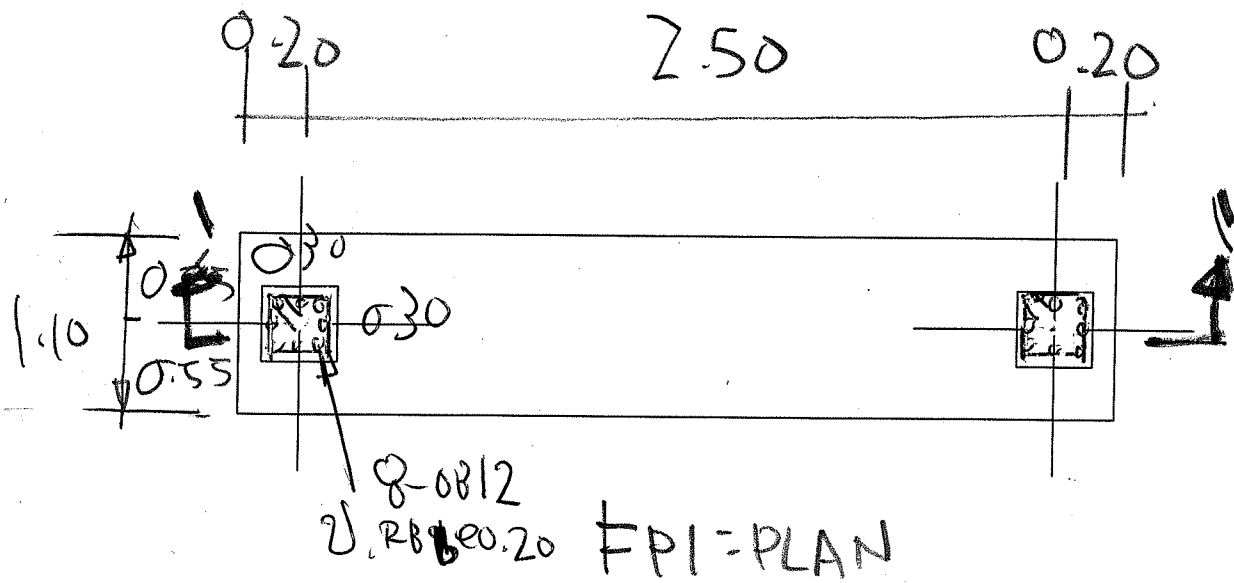
1:100

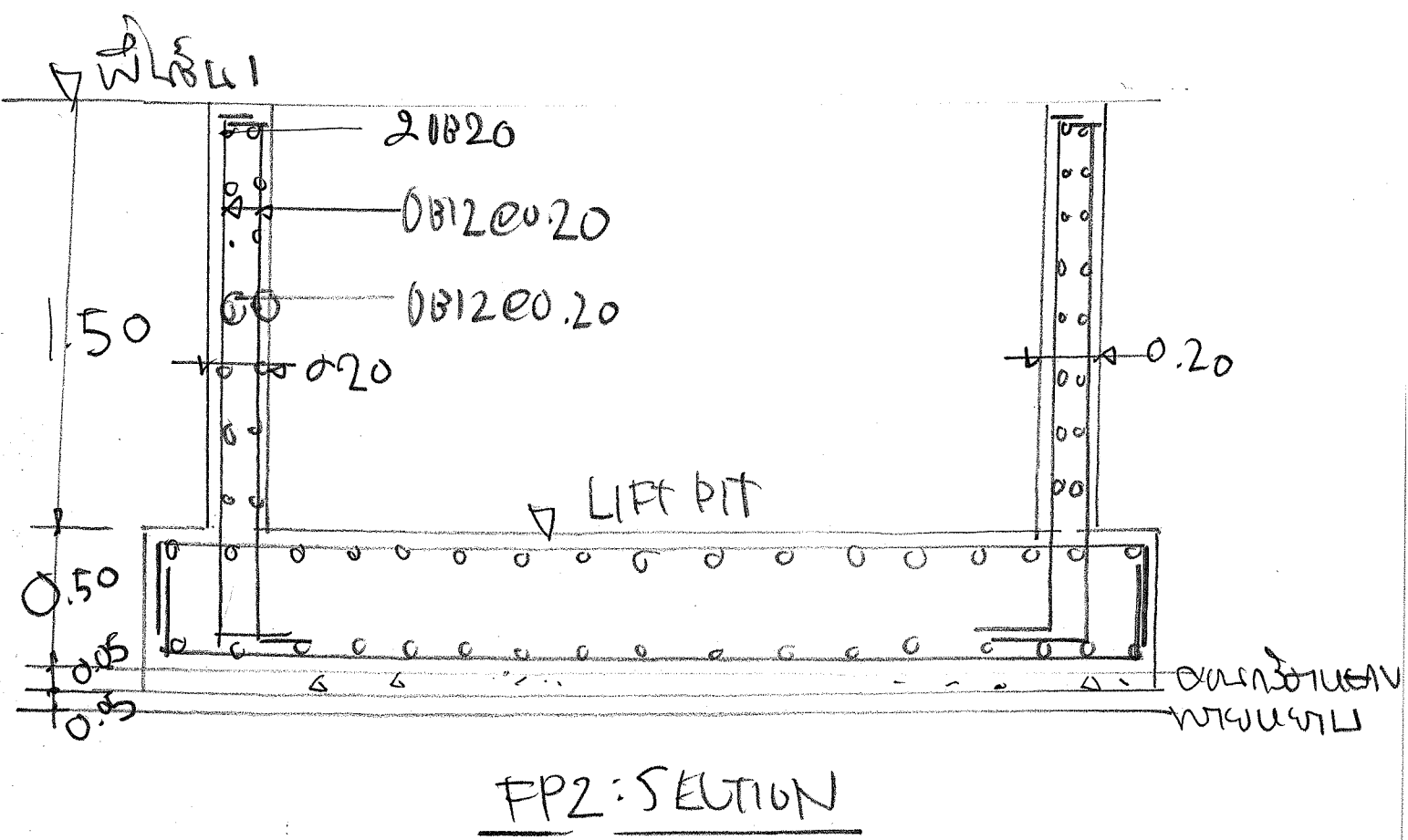
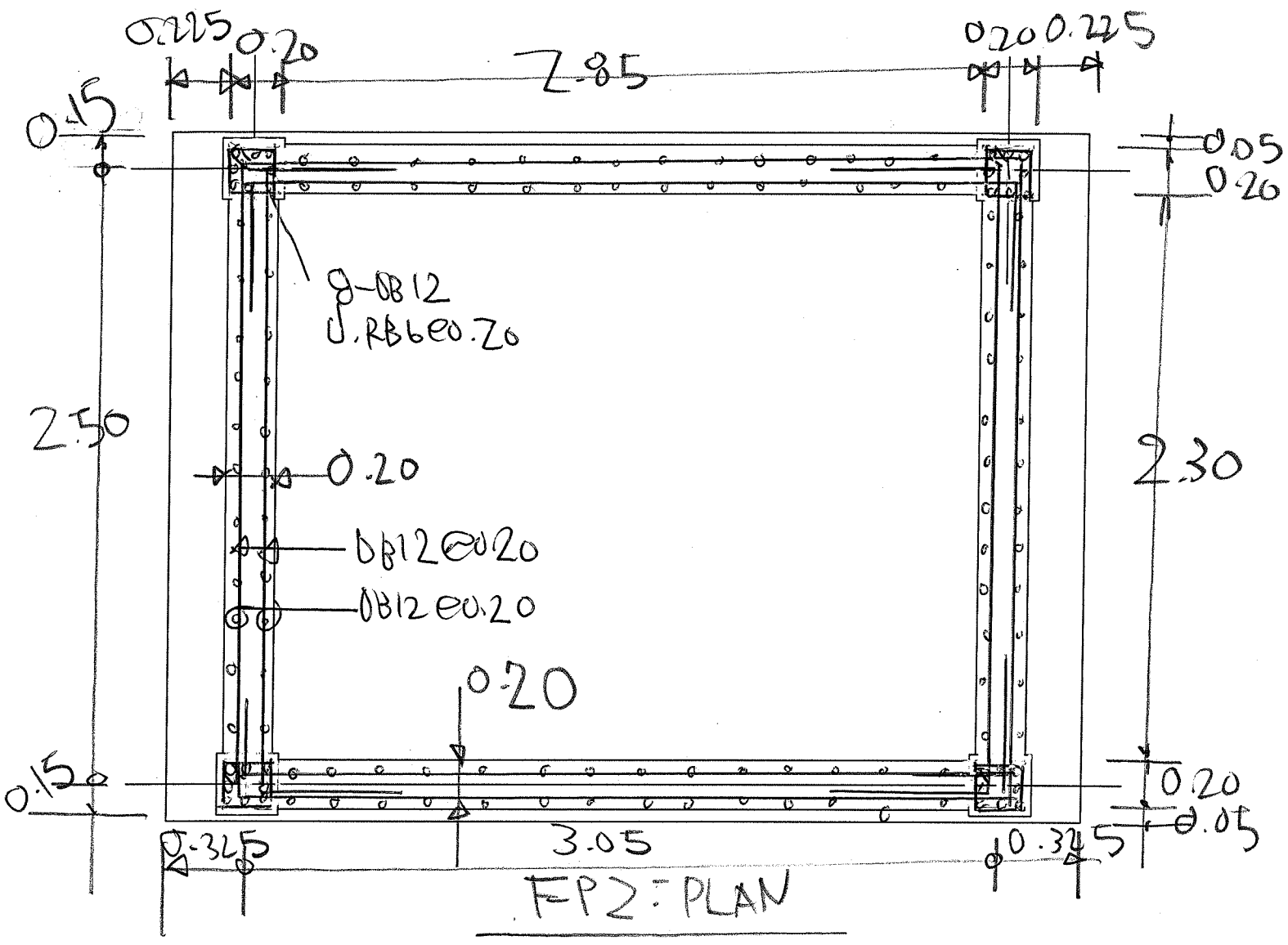


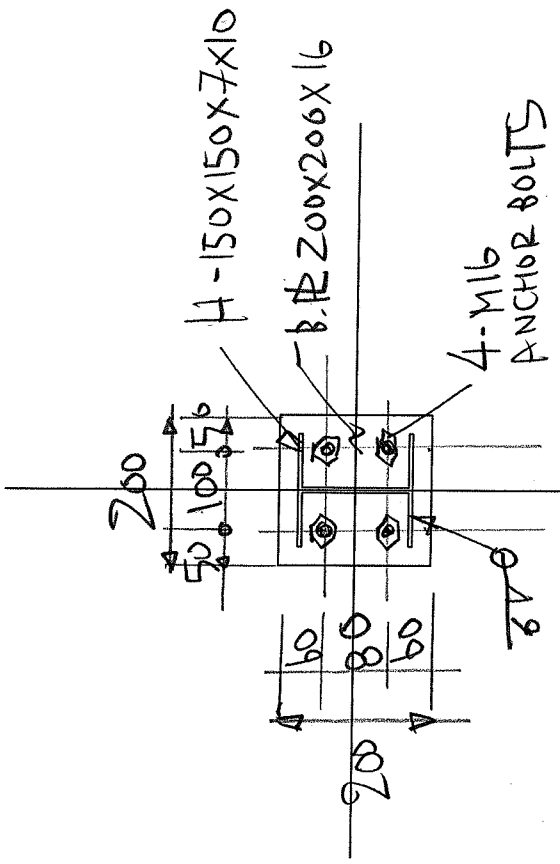
FD1 = PLAN



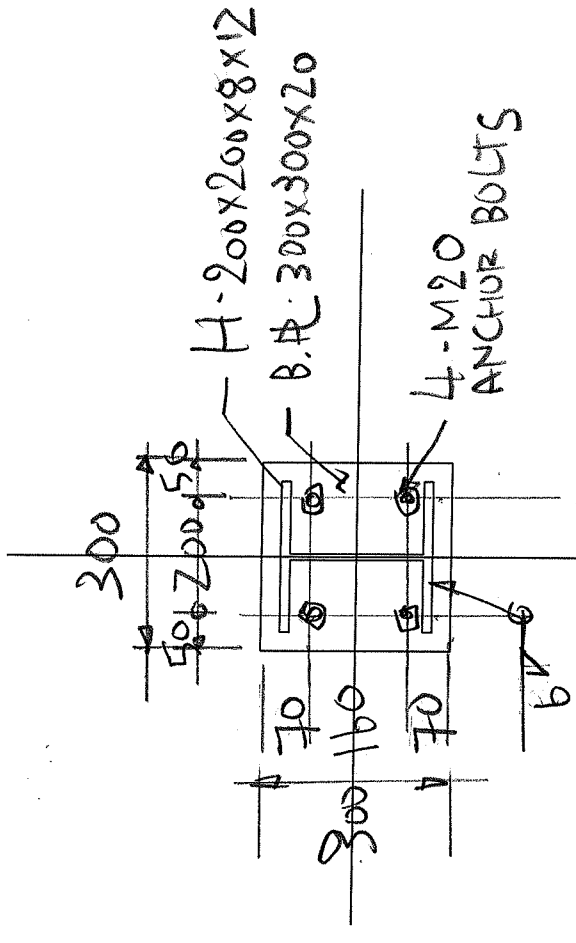
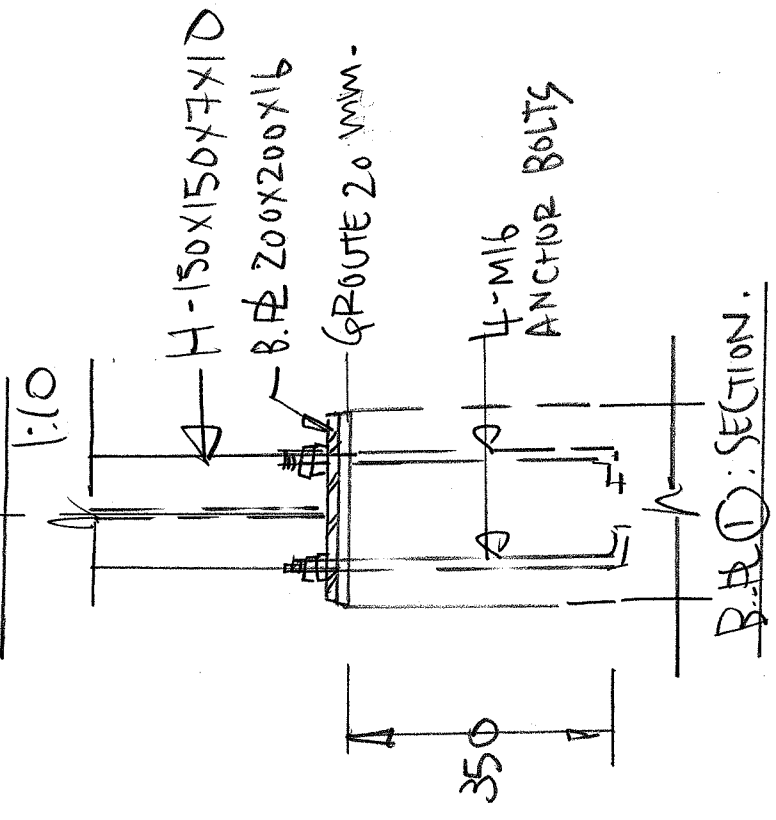
FD1 = SECTION



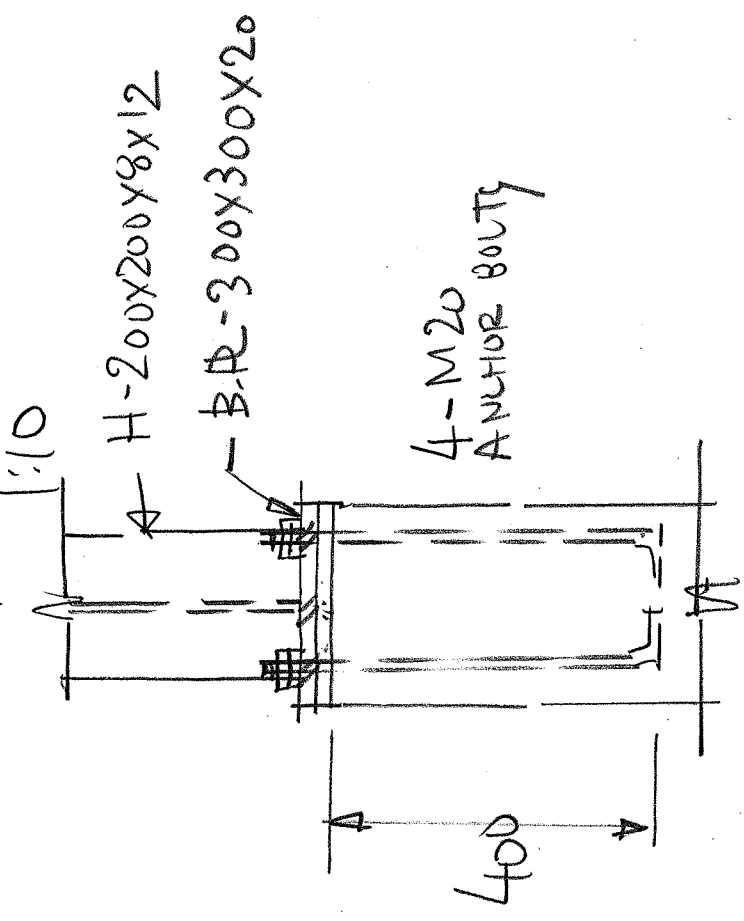


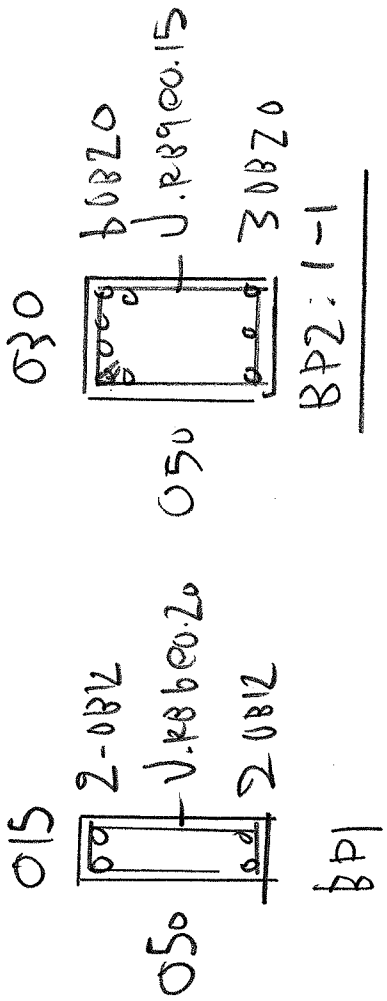


B.P. ①: PLAN

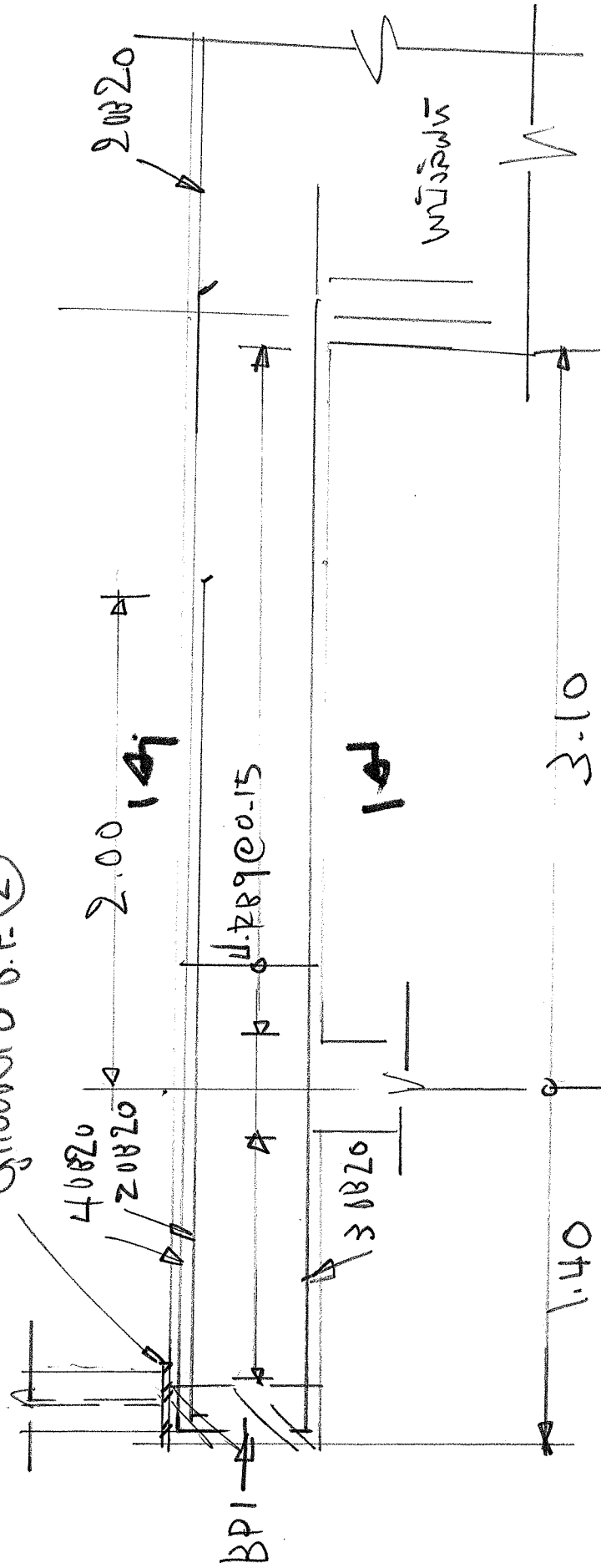


B.P. ②: PLAN

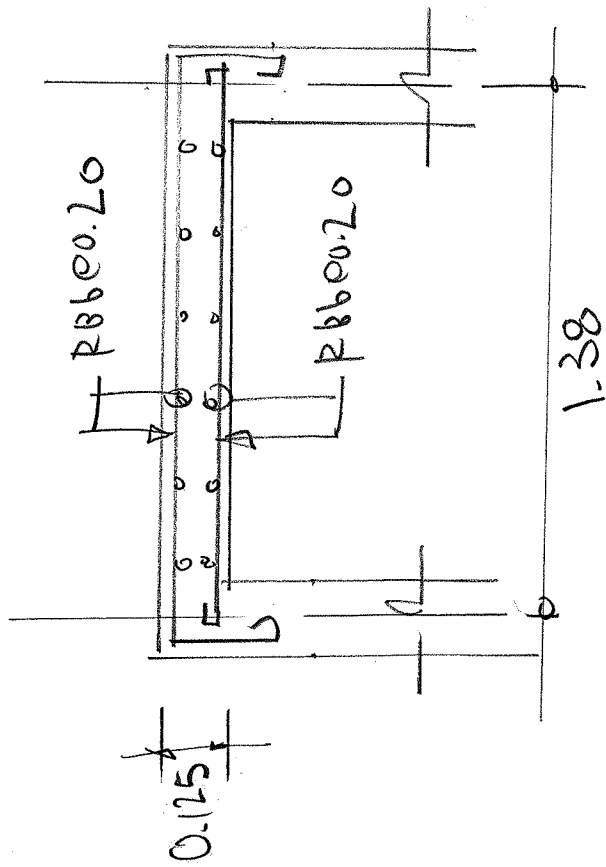




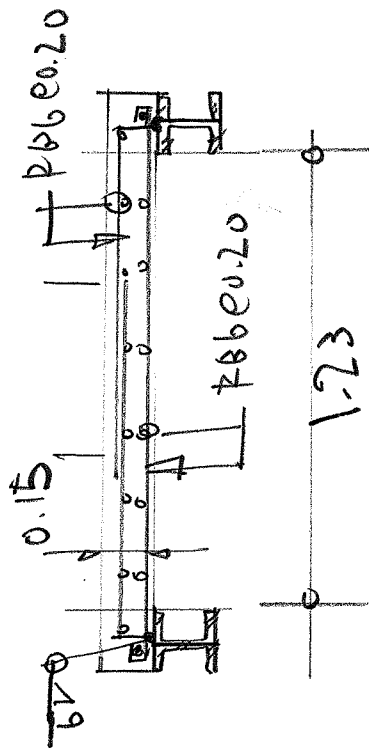
QUINQUE B.P. (2)



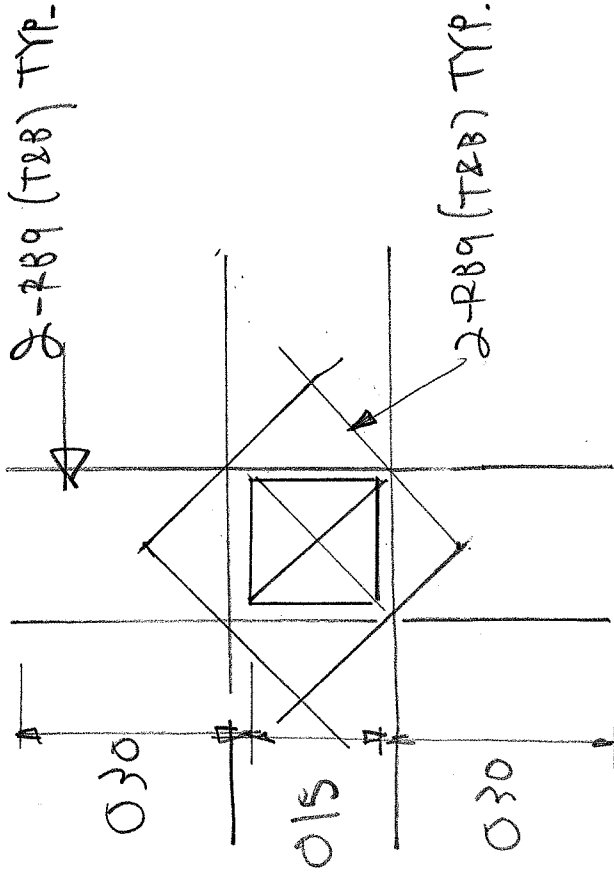
BP2: LONG SECTION



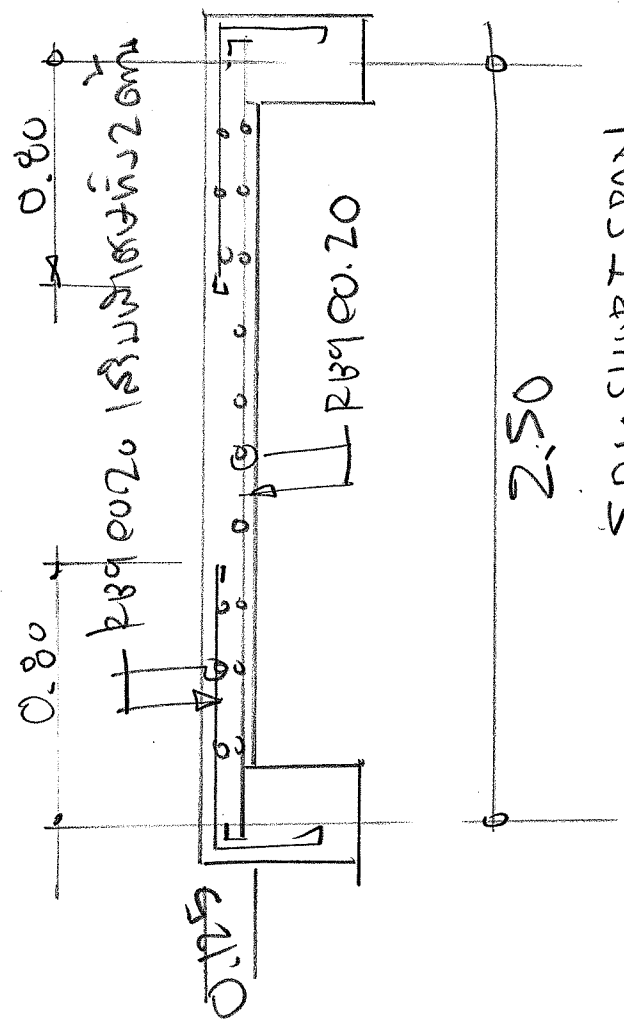
SD1: SHORT SPAN



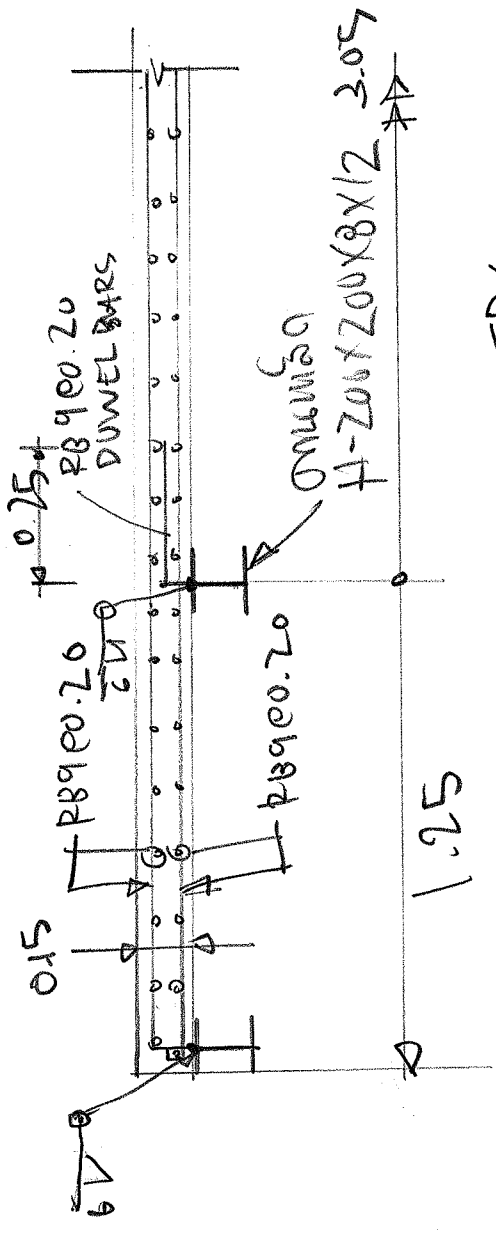
SD2: SHORT SPAN



1100x1000x150mm 150x150mm.
พื่นที่รองรับ

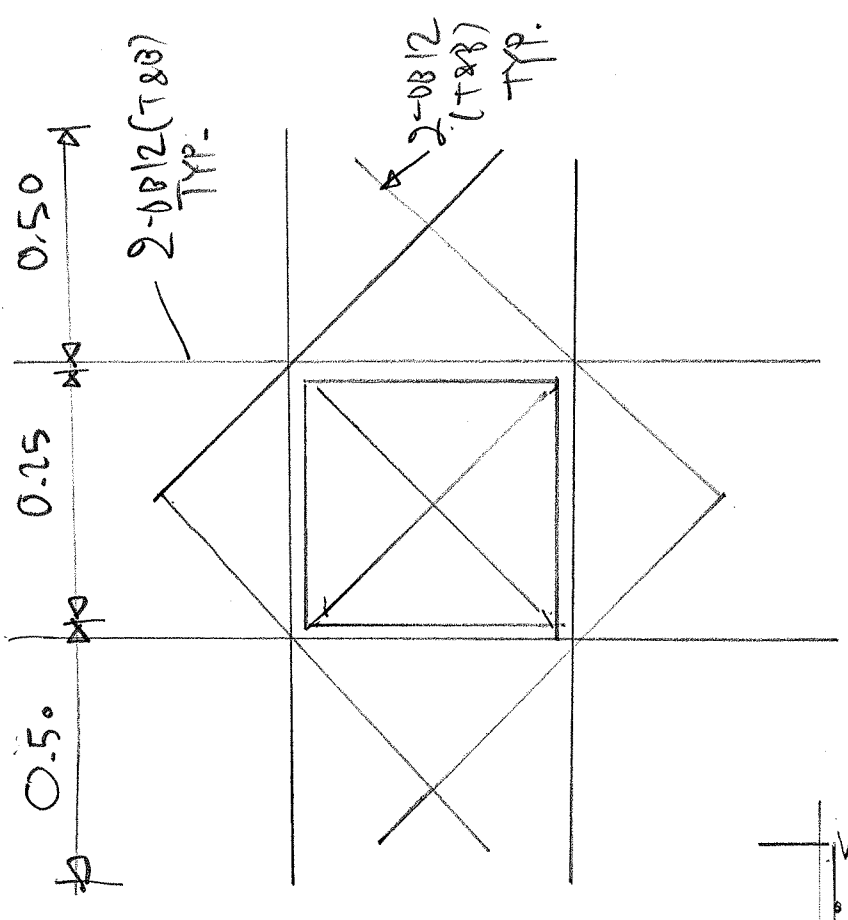


SP1: SHORT SPAN

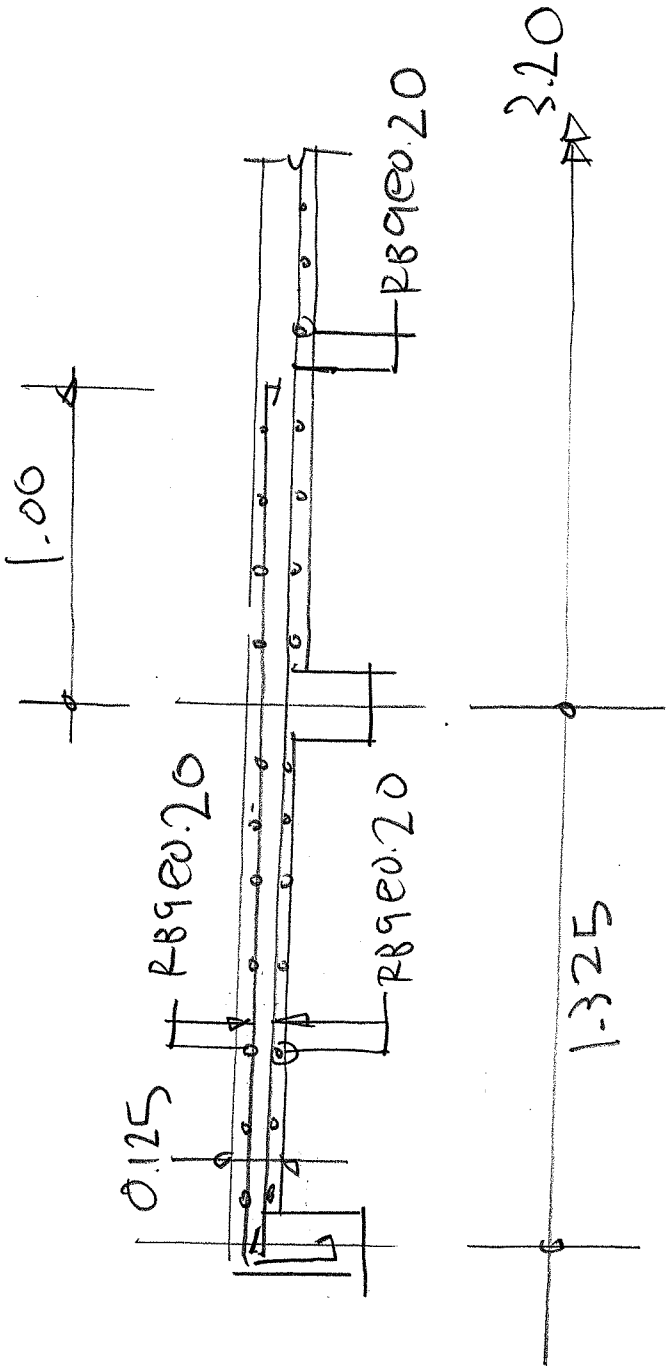


SP3

SP4



стержней 250x250 мм
в 4 стороны

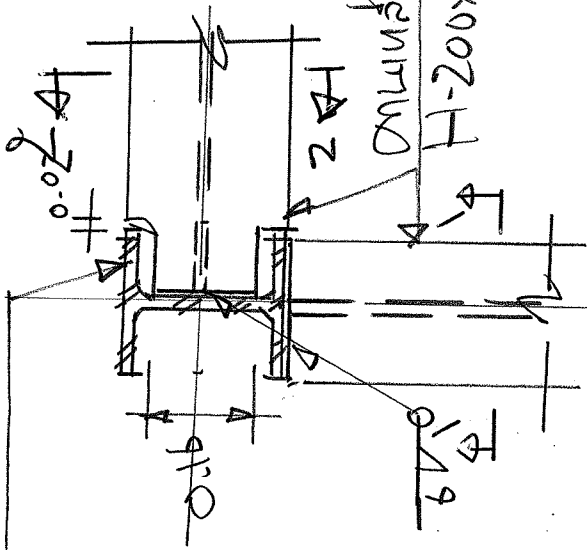


Sp2

Sp1

1. ฐาน

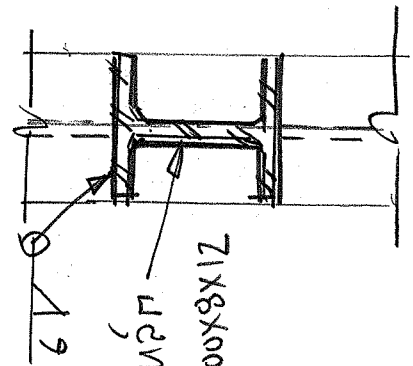
H-200x200x8x12



ฐาน

H-200x200x8x12

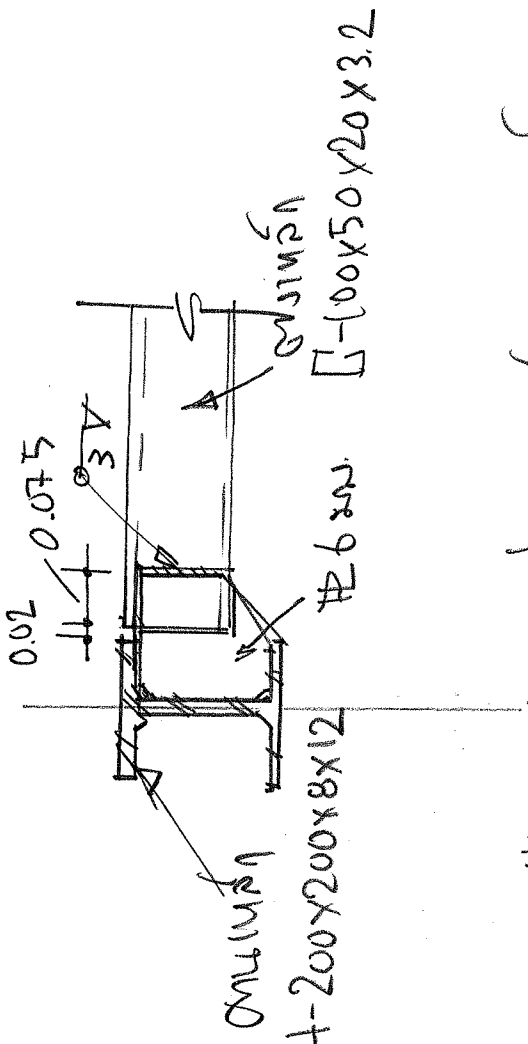
การเชื่อมต่อเสา-ฐาน



ฐาน

H 200x200x8x12

SECTION 1-1



ฐาน

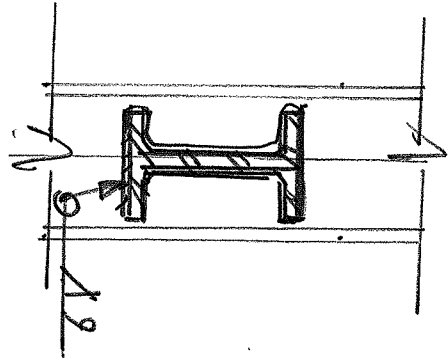
H-200x200x8x12

6 มม.

ฐาน

[-100x50x20x3.2

การเชื่อมต่อเสา-ฐาน



SECTION 2-2