

รายการคำนวณฐานราก  
อาคาร Indoor Coaster  
Hanging Coaster & Viking

โครงการ : แคนเนรมิต 2  
เจ้าของ : บริษัท พาร์ค อะมิวเมนท์ จำกัด  
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DESIGN CRITERIA

(සරල P.C Pile)

1) PROPERTIES OF SOLID SQUARE P.C PILE

1.1) 0.30 x 0.30 x 21.00 m. (2 x 10.50 m.)

SAFE VERTICAL LOAD = 37 T.  
BENDING MOMENT CAPACITY (Mp) > 2.8 T-M.

1.2) 0.26 x 0.26 x 21.00 m. (2 x 10.50 m.)

SAFE VERTICAL LOAD = 31 T.  
BENDING MOMENT CAPACITY (Mp) > 2.2 T-M.

1.3) CONCRETE ,  $f_c'$  > 350 KSC.  
SHEAR STRENGTH ,  $V_c$  <  $0.29\sqrt{f_c'}$  KSC.  
TORSIONAL SHEAR STRENGTH ,  $V_t$  <  $1.32\sqrt{f_c'}$  KSC.  
COMBINED ,  $V_c + V_t$  <  $1.65\sqrt{f_c'}$  KSC.

MOMENT DUE TO LATERAL FORCE ON SINGLE PILE REFER TO BROMS'S CHART.

BIAXIAL MOMENT CAPACITY ON SINGLE PILE

$$\frac{(M_x + M_{x1})}{M_p} + \frac{(M_y + M_{y1})}{M_p} \leq 1.00$$

WHERE ,  $M_x$  ,  $M_y$  = APPLIED MOMENT TO SINGLE PILE  
 $M_{x1}$  ,  $M_{y1}$  = MOMENT ON PILE DUE TO LATERAL FORCES

2) SOIL PROPERTIES

UPPER LAYER 10 - 13 m. "VERY SOFT TO MEDIUM CLAY" IS CONSIDERED FOR ESTIMATE OF LATERAL RESISTANCE OF SINGLE PILE.

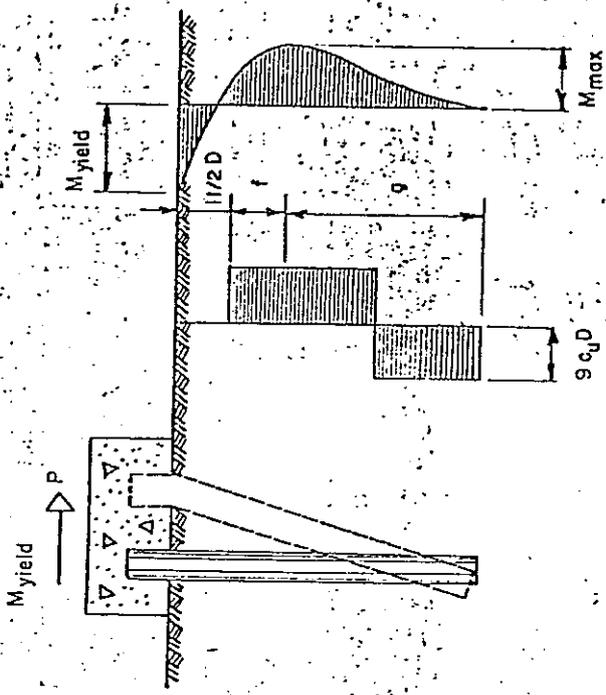
$C_u$  = UNDRAINED SHEAR STRENGTH  
= 1.0 T/m<sup>2</sup>

$$P_{ult} = 9 c_u D (L' - 1.5D) \dots (16)$$

In order for the laterally loaded pile to fail as shown, it is necessary for the maximum negative bending moment  $M_{neg}^{max}$  to be less than or equal to the yield moment resistance of the pile section. Thus

$$P_{ult} (0.5L + 0.75D) \leq M_{yield} \dots (17)$$

Intermediate Length Piles.—The failure mode of intermediate length restrained piles is illustrated in Fig. 13(a). At failure, the restraining moment



(a) DEFLECTION (b) SOIL REACTION (c) BENDING MOMENT  
 FIG. 13.—DEFLECTION, SOIL REACTION AND BENDING MOMENT DISTRIBUTION FOR A RESTRAINED PILE OF INTERMEDIATE LENGTH

at the head of the pile is, equal to the ultimate moment resistance of the pile section  $M_{yield}$ , and the pile rotates around a point located at some depth below the ground surface. The corresponding assumed distribution of lateral earth pressures and bending moments is shown in Figs. 13(b) and 13(c), respectively. The maximum positive bending moment  $M_{max}^{pos}$  occurs at a section located at a depth  $(1.5D + f)$  below the ground surface. The depth  $(1.5D + f)$  can be determined from the requirement that the total shear force at the pile section located at this depth must be equal to zero. The ultimate lateral resistance can then be calculated from Eqs. 12 and 13. The corresponding max-

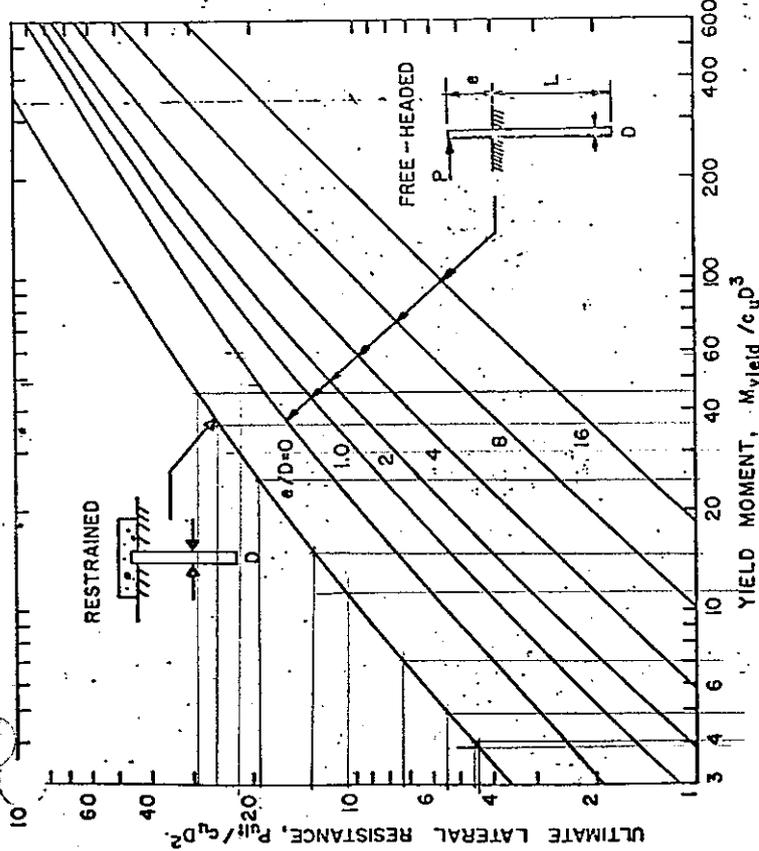
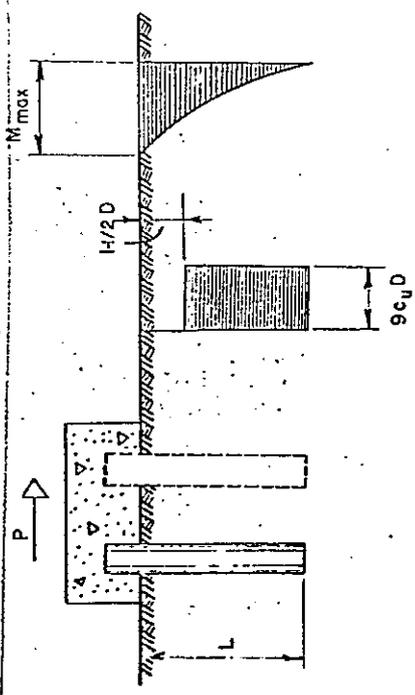


FIG. 11.—COHESIVE SOILS—ULTIMATE LATERAL RESISTANCE

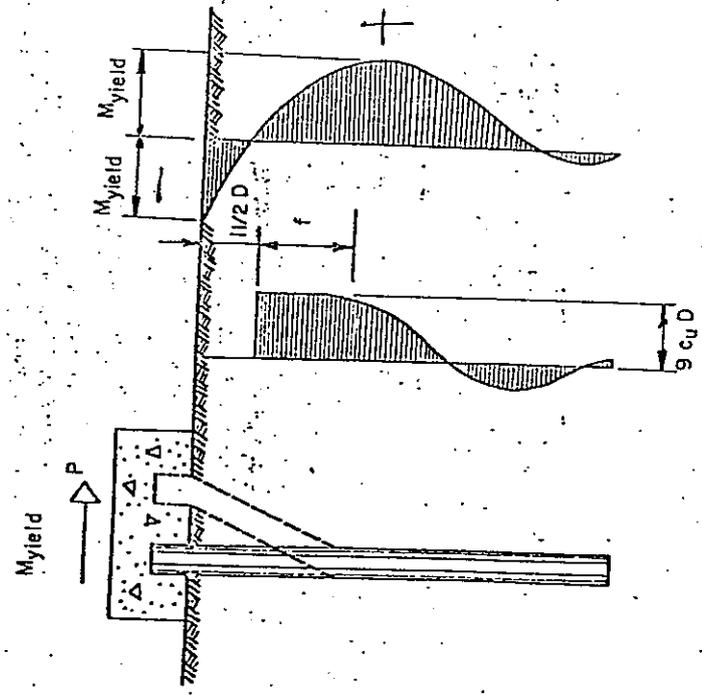


(a) DEFLECTION (b) SOIL REACTION (c) BENDING MOMENT  
 FIG. 12.—DEFLECTION, SOIL REACTION AND BENDING MOMENT DISTRIBUTION FOR A SHORT RESTRAINED PILE

positive bending moment  $M_{pos}^{max}$  determined from equilibrium requirements is equal to

$$M_{max}^{pos} = P(1.5 D + 0.5f) - M_{max}^{neg} \dots \dots \dots (18)$$

The part of the pile located below the section of maximum positive moment resists the maximum bending moment  $M_{max}^{pos}$  calculated from Eq. 14. With a



(c) DEFLECTION (b) SOIL REACTION (c) BENDING MOMENT

FIG. 14. DEFLECTION, SOIL REACTION AND BENDING MOMENT DISTRIBUTION FOR A LONG RESTRAINED PILE

knowledge of the maximum positive bending moment, the ultimate lateral resistance can finally be calculated from Eqs. 12, 14 and 18. The ultimate lateral resistance can also be determined directly from Fig. 9 in which the dimensionless quantity  $P_{ult}/cuD^2$  has been plotted as a function of the dimensionless length  $L/D$ . However, it should be noted that it is necessary for the maximum positive moment  $M_{max}^{pos}$  to be less than the yield or ultimate moment resistance of the pile section  $M_{yield}$ .

**Long Piles.**—The mode of failure of a long restrained laterally loaded pile driven into a cohesive soil is shown in Fig. 14. Failure takes place when two plastic hinges form along the pile. The first hinge is located at the section of the maximum negative moment (at the bottom of the pile cap) and the second hinge at the section of maximum positive moment at the depth  $(1.5 D + f)$  below the ground surface. The corresponding assumed distributions of the

TABLE 6.—MAXIMUM BENDING MOMENT

Test Pile (1)	Applied Lateral Load P, in kips (2)	Measured Maximum Moment $M_{test}$ in kip-feet (3)	Calculated Maximum Moment $M_{calc}$ in kip-feet (4)	Ratio $M_{test}/M_{calc}$ (5)
Parrack, 19 1952				
1	20	147 <sup>a</sup>	137 <sup>a,b</sup>	1.07
	40	336	309	1.09
	60	556	497	1.12
	80	800	707	1.13
McCammon and Ascherman, 16 1953				
1	5.0	385 <sup>a</sup>	460 <sup>a</sup>	0.84
	10.0	915	930	0.98
	15.0	1375	1405	0.98
2	12.0	400 <sup>a</sup>	410 <sup>a</sup>	0.98
	24.0	1021	1045	0.98
	36.0	1730	1780	0.97
Osterberg, 18 1958				
T1	2.91	44.4	47.6	0.93
T2	2.42	38.5	39.7	0.97
T3	1.42	22.5	23.3	0.97
T4	1.42	21.7	23.3	0.93
T5	4.90	74.5	80.7	0.92
T6	3.91	62.0	64.3	0.96
T7	2.91	45.0	47.8	0.94
T14	3.41	52.5	56.2	0.94
			Average	0.945

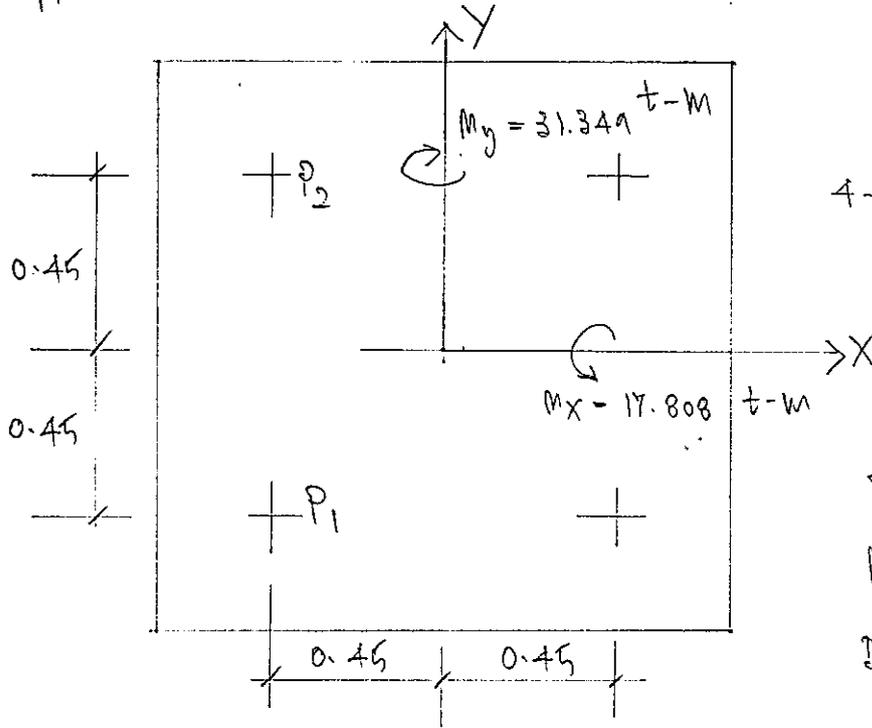
<sup>a</sup> Sum of maximum positive and negative bending moments  
<sup>b</sup> Average unconfined compressive strength taken as 0.500 tons per sq ft

soil reactions and bending moments are shown in Figs. 14(b) and 14(c), respectively. The ultimate lateral resistance can be determined from Eqs. 12 and 18 if it is noted that the maximum bending moment  $M_{max}^{pos}$  is equal to the ultimate moment resistance of the pile section  $M_{yield}$ . The resulting ultimate lateral resistance is equal to

Footing F1-2

Column C36 Loop 2 Load Case 6 (F1-2)

Max applied moment and vertical Load.



4- P.c Pile  $\square 0.30^2 \times 21.00 \text{ M.}$

$$P_2 = 4.627 \text{ t}$$

$$M_2 = 0$$

$$D.L = 2.354 \text{ t}$$

$$\begin{aligned} \text{Max. Pile load, } P_1 &= \frac{P_2 + D.L}{4} + \frac{31.349 \times 0.45}{4 \times 0.45^2} + \frac{17.808 \times 0.45}{4 \times 0.45^2} \\ &= 29.205 \text{ t} < 34 \text{ t} \text{ O.K.} \end{aligned}$$

2) Check moment & shear due to lateral forces on single pile.

2.1) Column C26, Loop 2 Load Case 8 (F1-2)

$$\text{Max } P_x = 8.258 \text{ t}, \quad P_y = 3.859 \text{ t.}$$

$$\text{Load per pile } P_{x1} = \frac{8.258}{4} = 2.065 \text{ t / pile}$$

$$P_{y1} = \frac{3.859}{4} = 0.965 \text{ t / pile}$$

From chart (Fixed Head Pile)

$$\begin{aligned} P_{x1} &= 2.065 \text{ t} & M_{y1} &= 0.810 \text{ t-m} \\ P_{y1} &= 0.965 \text{ t} & M_{x1} &= 0.324 \text{ t-m} \end{aligned}$$

No applied Moment on single pile.

$$\begin{aligned} \frac{M_{y1}}{M_p} + \frac{M_{x1}}{M_p} &\leq 1.0 \\ \frac{0.81 + 0.324}{2.80} &= 0.41 < 1.0 \text{ O.K.} \end{aligned}$$

$$\text{Shear Stress on pile, } V_c = \frac{\sqrt{2.065^2 + 0.965^2}}{30^2} = 2.53 \text{ Ksc.} < \frac{0.29 \sqrt{350}}{30^2} = 7.13 \text{ Ksc}$$

$$M_z = 0$$

$$V_t = 0 \quad \text{o.k.}$$

2.2) Column C2A, Lift, Load Case 17 (FI-1)

Max.  $P_x = 10.493 \text{ t}$        $P_y = 1.574 \text{ t}$        $M_z = 1.462 \text{ t-m}$

Load per pile       $P_{x1} = 2.623 \text{ t}$        $M_{z1} = 0.366 \text{ t-m}$

$P_{y1} = 0.394 \text{ t}$

From Chart  
(Fixed Head Pile)

$P_{x1} = 2.623 \text{ t}$        $M_{y1} = 1.215 \text{ t-m}$

$P_{y1} = 0.394 \text{ t}$        $M_{x1} = 0.105 \text{ t-m}$

$$\frac{M_{y1}}{M_p} + \frac{M_{x1}}{M_p} \leq 1.0$$

$$\frac{1.215 + 0.105}{2.8} = 0.47 < 1.0 \quad \text{o.k.}$$

$$\text{Shear stress, } V_c = \frac{\sqrt{2.623^2 + 0.394^2}}{30^2} = 2.95 \text{ Ksc} < 5.43 \text{ Ksc.} \quad \text{o.k.}$$

$$\text{Torsional shear stress } V_t = \frac{3.5 \times 366 \times 100}{30^3} = 4.74 \text{ Ksc} < 1.32 \sqrt{250} = 24.7 \text{ Ksc}$$

$$V_c + V_t = 2.95 + 4.74 = 7.69 \text{ Ksc} < 1.65 \sqrt{250} = 30.87 \text{ Ksc.} \quad \text{o.k.}$$

$$\text{Corner lebar } A_s = \frac{366 \times 100 \times 24}{2 \times 24^2 \times 1,500} = 0.51 \text{ cm}^2$$

Use 1-D16 each corner.

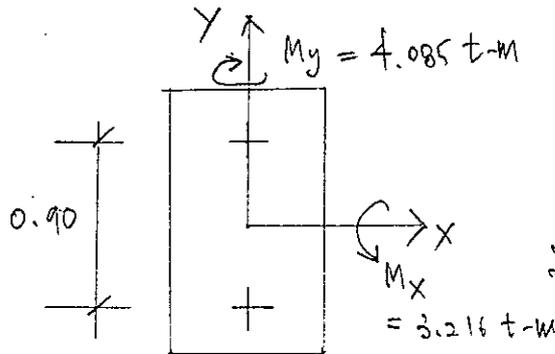
$$\text{Stirrup } \phi 6 \text{ mm. } s = \frac{2 \times 0.283 \times 24 \times 1,200}{366 \times 100} = 10.68 \text{ cm.}$$

Use  $\phi 6 @ 0.10$       o.k.

# Footing F2

4

1) Column C37  $M_x = 3.216 \text{ t-m}$   $M_y = -4.085 \text{ t-m}$   
 $P_x = -0.988 \text{ t}$   $P_y = 0.828 \text{ t}$   
 $P_z = 7.39 \text{ t}$



2 - P.C pile  $\square 0.30^2 \times 21.0 \text{ m}$

Footing WT =  $\left\{ (0.65^2 \times 0.30) + (1.50 \times 0.65 \times 0.60) \right\} \times 2.4 = 1.607 \text{ t}$

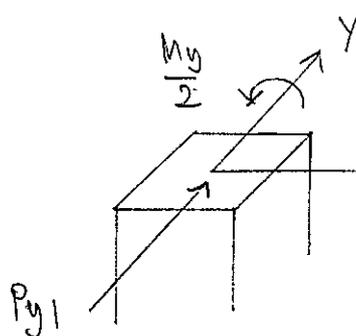
$P_1 (\text{max}) = \frac{7.39 + 1.607}{2} + \frac{3.216 \times 0.45}{2(0.45^2)} = 8.07 \text{ t} < 37 \text{ t}$   
 O.K.

2) Check Moment & shear due to lateral forces on single pile

$P_{x1} = \frac{P_x}{2} = 0.494 \text{ t}$

$P_{y1} = \frac{P_y}{2} = 0.414 \text{ t}$

$M_y = \frac{2.042}{2} \text{ t-m}$



No  $M_x$  on single pile

From chart

$P_{x1} = 0.494 \text{ t}$

$M_{y1} = 0.132 \text{ t-m}$

$P_{y1} = 0.414 \text{ t}$

$M_{x1} = 0.108 \text{ t-m}$

$\frac{M_{y1}}{M_p} + \frac{M_{x1}}{M_p} + \frac{M_y/2}{M_p} \leq 1.00$

$\frac{0.132 + 0.108 + 2.042}{2.8} = 0.815 < 1.00$  O.K.

# Footing F3

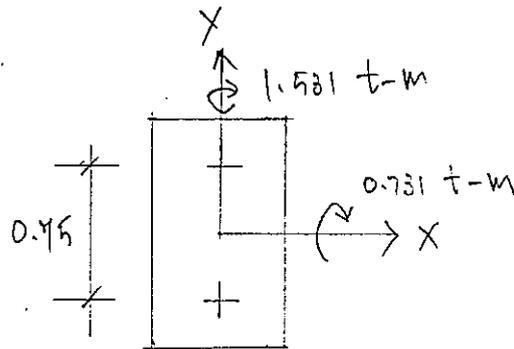
5

1) Column C13

$$M_x = -0.731 \text{ t-m} \quad M_y = -1.531 \text{ t-m}$$

$$P_x = -0.407 \text{ t} \quad P_y = 0.238 \text{ t}$$

$$P_z = 11.274 \text{ t}$$



2 - P.C Pile  $\square$  0.26 X 0.26 X 21.00

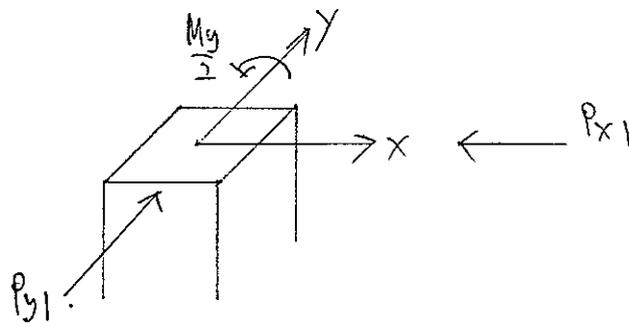
$$\text{Footing WT} = \left\{ (1.25 \times 0.75 \times 0.60) + (0.20 \times 0.75) \right\} 2.40 = 1.755 \text{ t}$$

$$P_1 (\text{max}) = \frac{11.274 + 1.755}{2} + \frac{0.731 \times 0.375}{2 \times 0.375^2} = 7.49 \text{ t} < 31 \text{ t}$$

0.K

2) Check Moment & Shear due to lateral forces on single pile

$$P_{x1} = 0.204 \text{ t} \quad P_{y1} = 0.119 \text{ t} \quad \frac{M_y}{2} = 0.757 \text{ t-m}$$



From Chart

$$P_{x1} = 0.204 \text{ t} \quad M_{y1} = 0.100 \text{ t-m}$$

$$P_{y1} = 0.119 \text{ t} \quad M_{x1} = 0.05 \text{ t-m}$$

$$\frac{M_{y1}}{M_p} + \frac{M_{x1}}{M_p} + \frac{M_y/2}{M_p} \leq 1.0$$

$$\frac{0.757 + 0.100 + 0.05}{2.2} = 0.412 \leq 1.0 \quad \text{0.K}$$

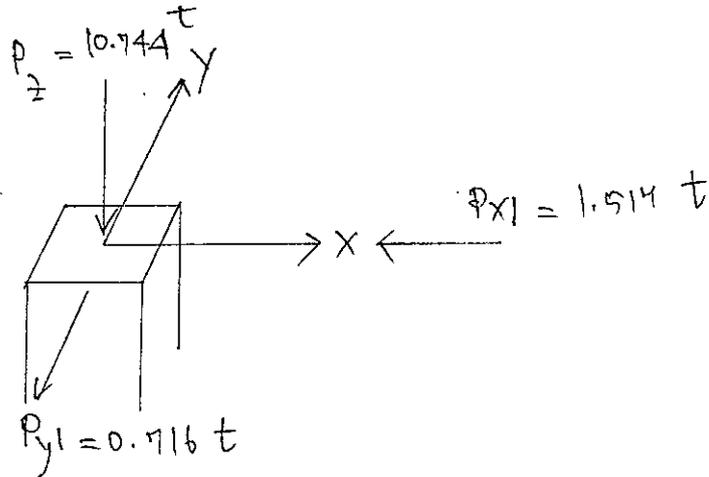
# Footing F4

6

1) Column C90A

$$P_x = -1.517 \text{ t}, \quad P_y = -0.716 \text{ t}$$

$$P_z = -10.744 \text{ t}, \quad M_x = M_y = M_z = 0$$

1 - P.C pile  $\square$  0.26x0.26x21.00 m, O.K.From chart

$$P_{x1} = 1.517 \text{ t}, \quad M_{y1} = 0.527 \text{ t-m.}$$

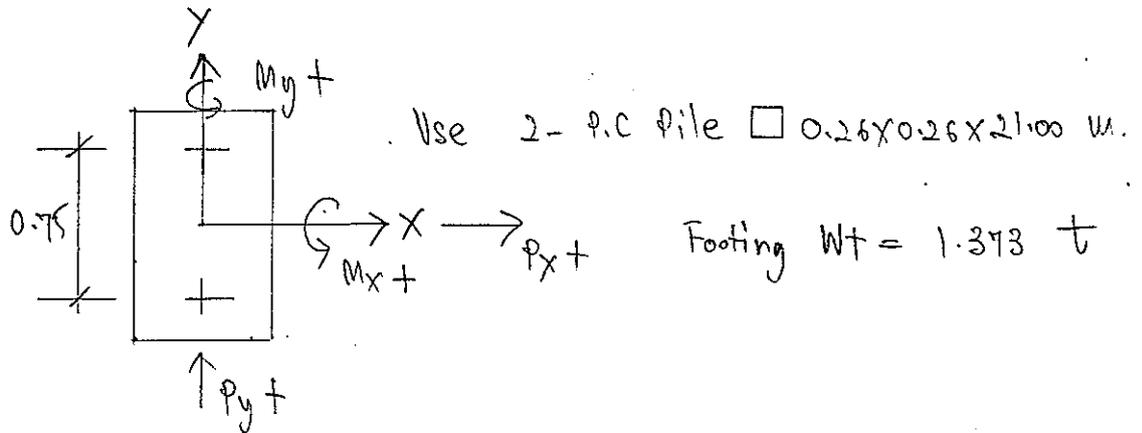
$$P_{y1} = 0.716 \text{ t}, \quad M_{x1} = 0.211 \text{ t-m.}$$

$$\frac{M_{y1}}{M_p} + \frac{M_{x1}}{M_p} \leq 1.0$$

$$\frac{0.527 + 0.211}{2.2} = 0.335 < 1.0 \quad \underline{\text{O.K.}}$$

$$V_c = \frac{\sqrt{1.517^2 + 0.716^2}}{26.2} = 2.48 \text{ ksc.} < 5.43 \text{ ksc.} \quad \underline{\text{O.K.}}$$

Footing F1-t & F1-6 (Indoor Coaster, Ride Footing) 7



1) Col. 84 Max  $M_x = 2.33$  t-m.  $P_2 = 2.652$  t

$$P_1 (\text{max.}) = \frac{2.652 + 1.373}{2} + \frac{2.33 \times 0.375}{2 \times 0.375^2} = 5.12 \text{ t} \quad \text{O.K.}$$

2) Col. 85 Max  $M_y = -1.513$  t-m  $P_x = -0.987$  t

Check moment on single pile  $P_y = 0.256$  t

From chart  $P_{x1} = 0.493$  t,  $M_{y1} = 0.123$  t-m.

$P_{y1} = 0.128$  t,  $M_{x1} = 0.04$  t-m.

$\frac{M_y}{2} = 0.757$  t-m, No  $M_x$  on single pile

$$\frac{M_{y1}}{M_p} + \frac{M_{x1}}{M_p} + \frac{M_y/2}{M_p} \leq 1.00$$

$$\frac{0.123 + 0.757 + 0.04}{2.2} = 0.42 < 1.0 \quad \text{O.K.}$$

3) Col 82 Max  $P_x = -2.609$  t,  $M_x = -1.554$  t-m  $M_y = 1.057$  t-m

Max  $P_y = -2.744$  t.

From Chart  $P_{x1} = 1.305$  t  $M_{y1} = 0.439$  t-m

$P_{y1} = 1.372$  t  $M_{x1} = 0.527$  t-m.

$\frac{M_{y1}}{M_p} + \frac{M_{x1}}{M_p} + \frac{M_y/2}{M_p} \leq 1.00$   $M_y/2 = 0.529$  t-m.

$$\frac{0.439 + 0.527 + 0.529}{2.2} = 0.68 < 1.00 \quad \text{O.K.}$$

Footing FF1

( Portal Frame Footing )

8

$$\text{Column Load} = 120 \text{ t}$$

$$\text{Footing WT} = \left\{ (1.50^2 \times 0.40) + (0.49^2 \times 0.20) \right\} \times 2.4 = 4.08 \text{ t}$$

$$\sum W = 124 \text{ t}$$

Use 4-  $\square$  0.30 x 0.30 x 21.00 m

$$\text{pile Load} = \frac{124}{4} = 31 \text{ t} < 37 \text{ t} \quad \underline{\text{O.K}}$$

Footing FF2

$$\text{Column Load} = 45 \text{ t}$$

$$\text{Footing WT} = \left\{ (1.50 \times 0.60 \times 0.40) + (0.33 \times 0.38) \right\} \times 2.4 = 1.57 \text{ t}$$

$$\sum W = 49 \text{ t}$$

Use 2  $\square$  0.30 x 0.30 x 21.00 m.

$$\text{pile Load} = \frac{49}{2} = 24.5 \text{ t} \quad \underline{\text{O.K.}}$$

Footing FF3

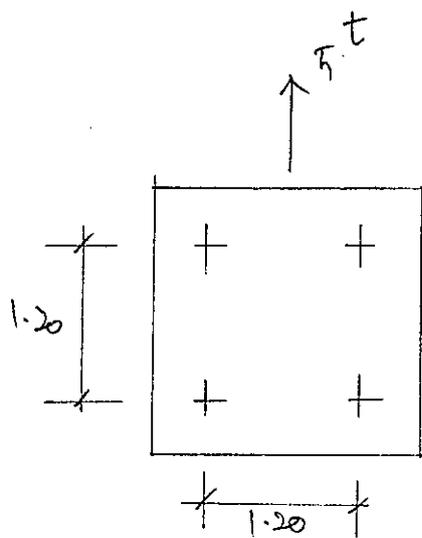
$$\text{Column Load} = 32 \text{ t}$$

$$\text{Footing WT} = \left\{ 0.60^3 + (0.28^2 \times 0.20) \right\} \times 2.4 = 0.56 \text{ t}$$

$$\sum W = 33 \text{ t}$$

Use 1  $\square$  0.30 x 0.30 x 0.30 x 21.00 m. O.K

# F1 (Viking)



$$\begin{aligned} P_x &= 10 \text{ t.} \\ P_y &= 5 \text{ t.} \\ P_z &= 12 \text{ t.} \end{aligned}$$

Use  $\square 0.30 \times 0.30 \times 21.00 \text{ W.}$

Check moment on single pile, due to lateral forces.

From Chart

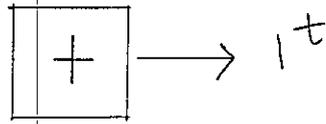
$$\begin{aligned} P_{x1} &= 2.5 \text{ t} & M_{y1} &= 0.942 \text{ t-m} \\ P_{y1} &= 1.25 \text{ t} & M_{x1} &= 0.432 \text{ t-m} \end{aligned}$$

No applied moment on single pile

$$\frac{M_{y1}}{M_p} + \frac{M_{x1}}{M_p} \leq 1.0$$
$$\frac{0.942 + 0.432}{2.8} = 0.50 < 1.0 \quad \underline{0.1}$$

## F2 (Viking)

b



$$P_x = 1.0 \text{ t.}$$

$$P_y = 0$$

$$P_z = 4 \text{ t.}$$

Use 1-  $\square$  0.30 x 0.30 x 21.00 m.  
O.K.

## F3 (Viking)

$$\text{Floor load (D.L + L.L)} = 1.0 \text{ t/m}^2$$

$$\text{Load to footing} = 1.0 \times 5.00 \times 5.00 = 25 \text{ t}$$

Use 1-  $\square$  0.30 x 0.30 x 21.00 m. O.K.

# Design of Anchor Bolts

14

Base Pl Type 1

Use 8 -  $\phi 30$  mm. Anchor Bolt

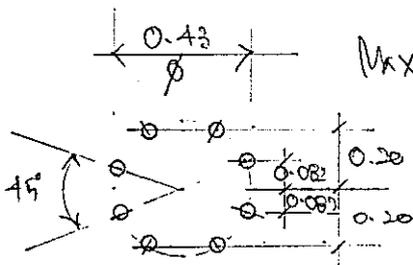
Embedded Length = 700 mm.

Max Shear  $P_x = -10.493 \text{ t}$        $P_y = +1.574 \text{ t}$        $P_z = +2.71 \text{ t}$   
 $M_z = -1.462 \text{ t-m}$        $M_x = +0.53 \text{ t-m}$  ,  $M_y = -1.334 \text{ t-m}$

Combine Shear Force per one bolt

$$F_v = \frac{\sqrt{10.493^2 + 1.574^2}}{8} + \frac{1.462 \times 2}{0.43 \times 8}$$

$$= 1.324 + 0.85 = 2.176 \text{ t}$$



Max Tension in one Bolt due to  $M_x, M_y$

$$\text{Max } P = \frac{2.71}{8} + \frac{0.53 \times 0.082}{4(0.20^2) + 4(0.082^2)}$$

$$+ \frac{1.334 \times 0.20}{4(0.20^2) + 4(0.082^2)}$$

$$= 0.339 + 0.233 + 1.428$$

$$= 2.000 \text{ t}$$

From AISC. Specification Combined shear + tensile stress.

Allowable tension in bolt  $f_t = 0.43 F_t - 1.4 F_v \leq 0.33 F_t$

Where  $F_t =$  tensile strength =  $\dagger, 100$  ksc.

$F_v =$  Actual shear stress =  $\frac{2,176}{\pi \times 3.0^2 / 4} = 308$  ksc.

$f_t = 0.43 \times \dagger, 100 - 1.4 \times 308 = 1,332$  ksc.

$0.33 F_t = 1,353$  ksc.

$\therefore$  Use  $f_t = 1,332$  ksc

Actual tension =  $\frac{2,000}{\pi \times 3.0^2 / 4} = 282$  ksc  $< f_t$  O.K.

Allowable Bond Stress = 8 ksc.

Actual Bond stress =  $\frac{2,000}{\pi \times 3.0 \times 700} = 2.03$  ksc O.K.

Moment & shear on footing.

15.

$$\text{pile load } P_1 = 21.813 \text{ t}$$

$$P_2 = \frac{P_2 + D.L}{4} + \frac{21.349 \times 0.45}{4 \times 0.45^2} - \frac{17.808 \times 0.45}{4 \times 0.45^2}$$

$$= 9.519 \text{ t}$$

Moment at edge of Base  $M = 0$

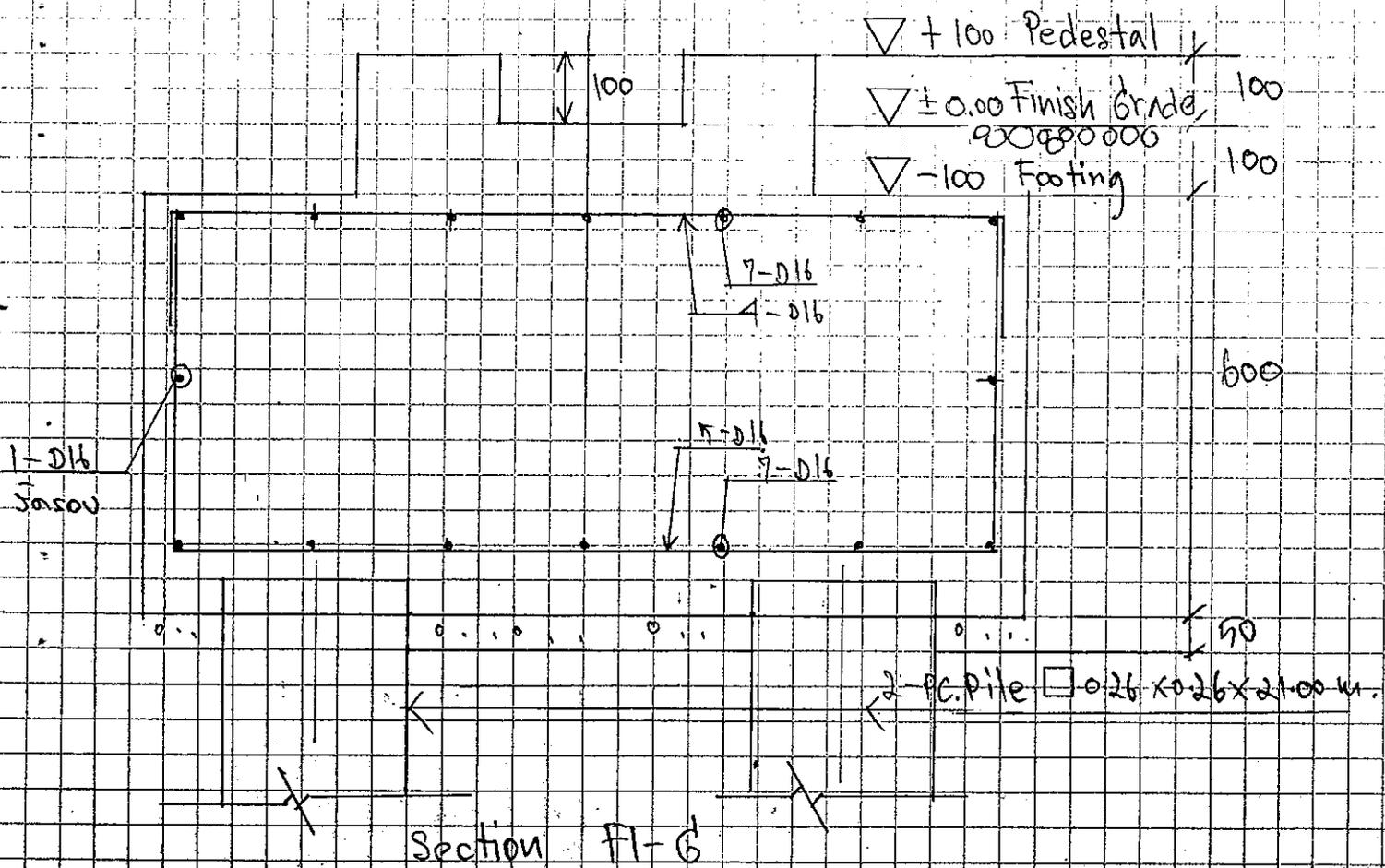
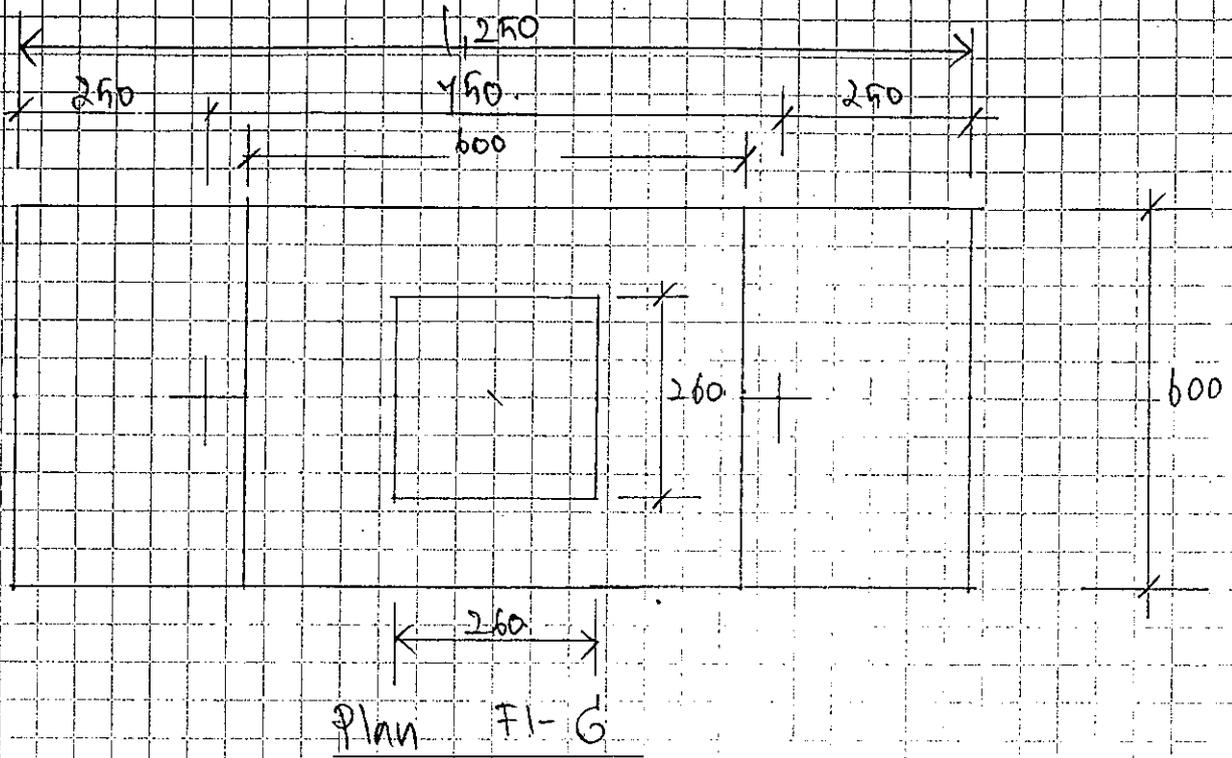
$$e_0 = \frac{(21.813 + 9.519) 1,000}{23.4 \times 0.9 \times 40} = 15.06 \text{ cm}$$

Use 10 - D20 #

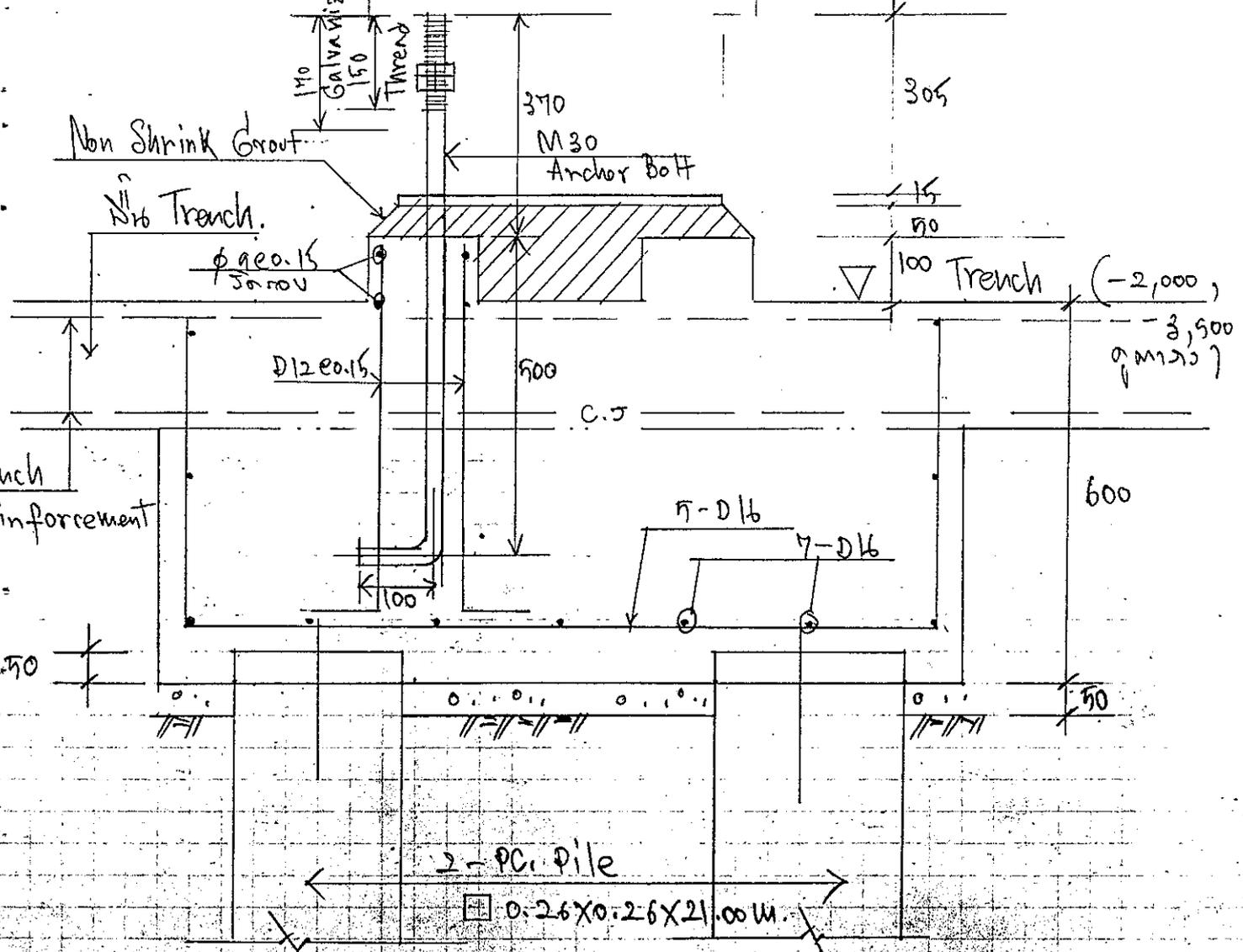
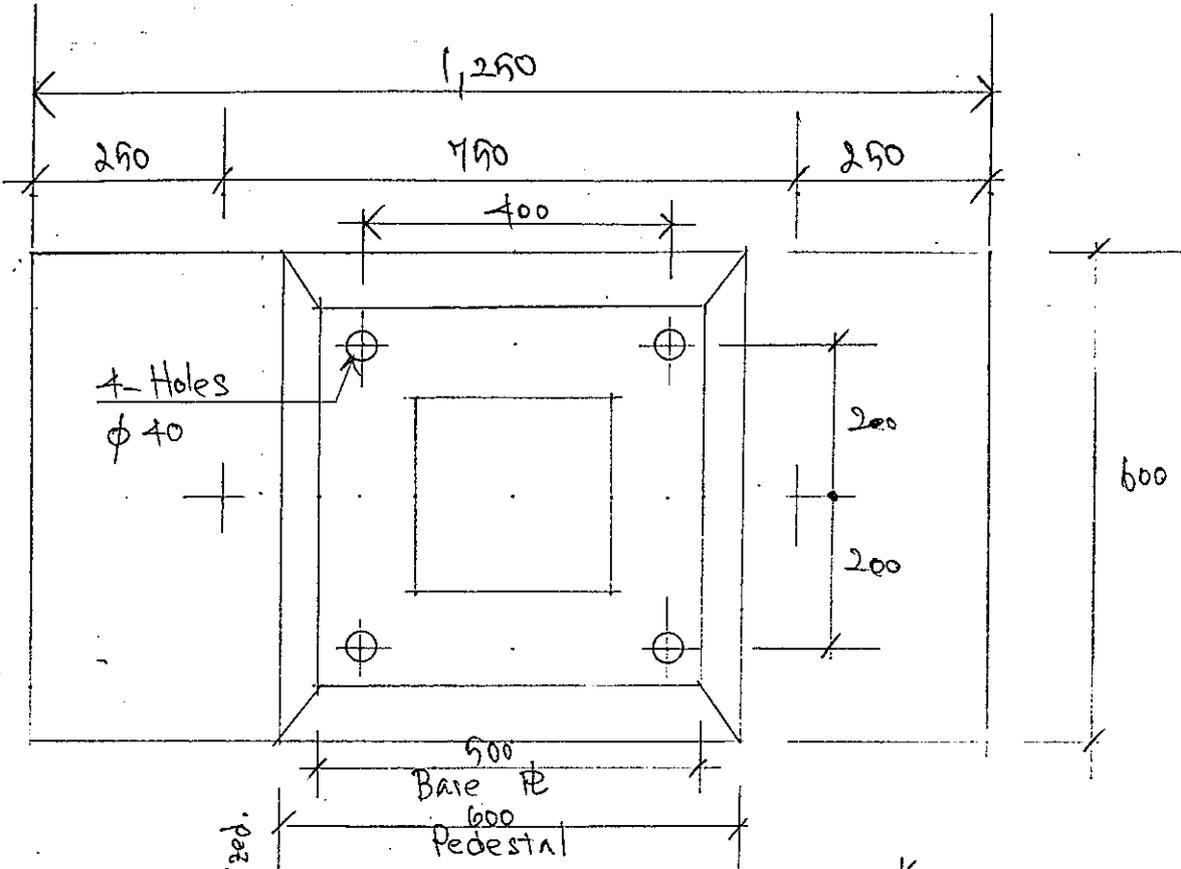
Critical Punching shear section at  $d/2$  from edge of Base  $M$  fall outside footing, No punching shear.

# Footing F1-G, Ride Footing (Indoor Coaster)

16



# Footings Fl-T, Ride Footing (Indoor Coaster)

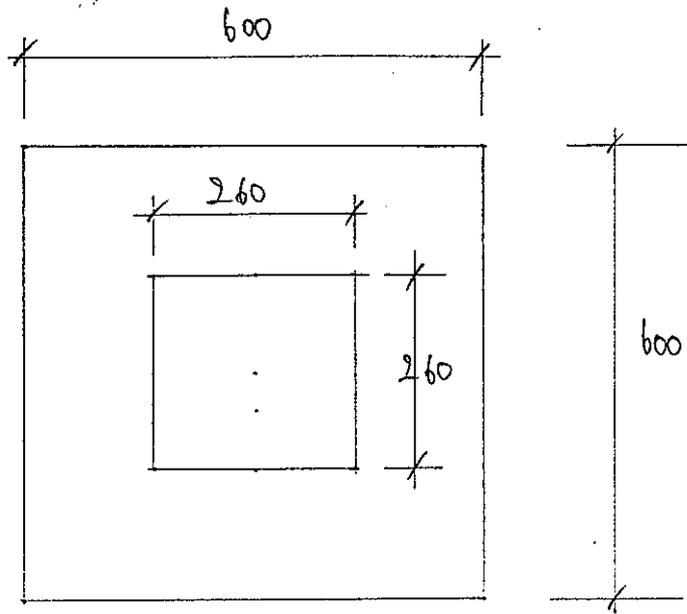


Section Fl-T

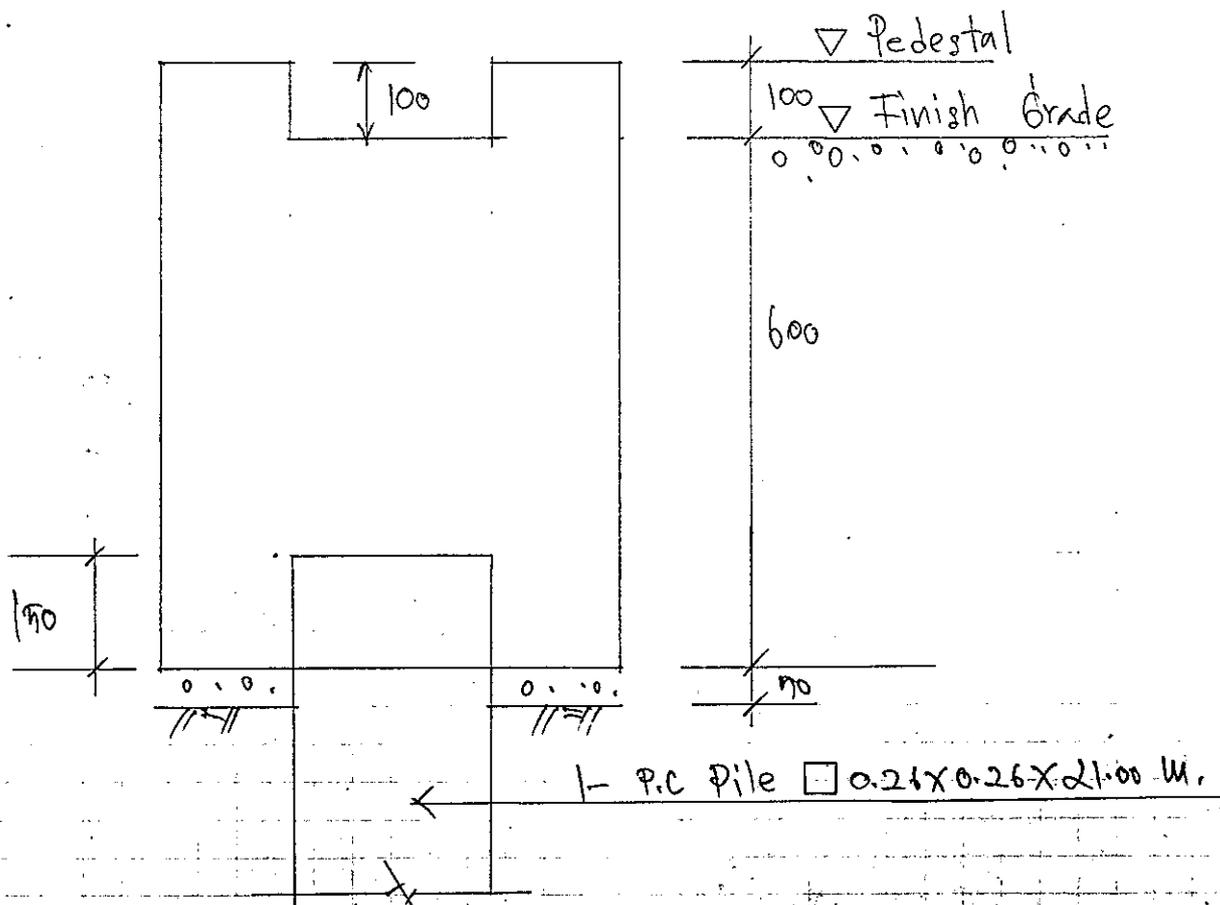
Footing F2-6

Ride Footing

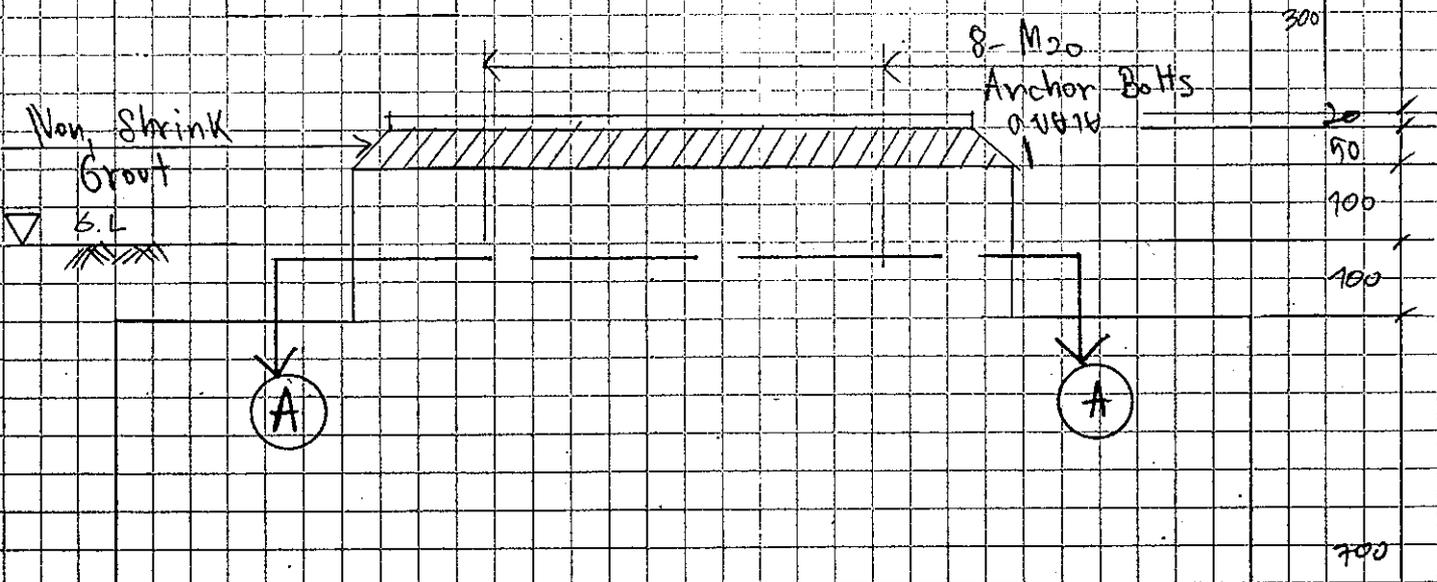
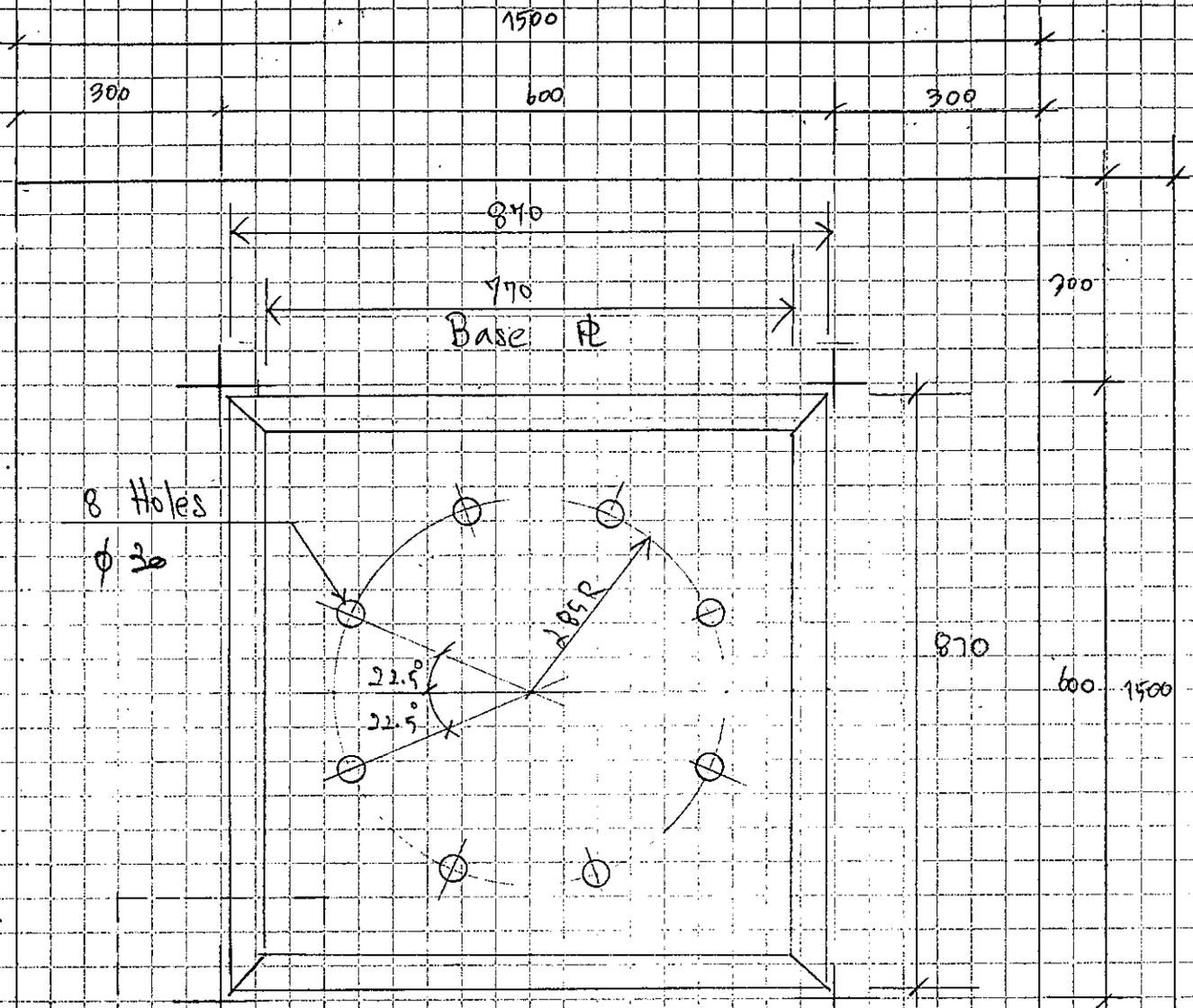
(Indoor Coaster) 18



Plan F2-6



Section F2-6

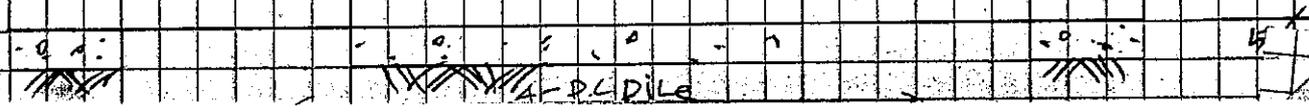
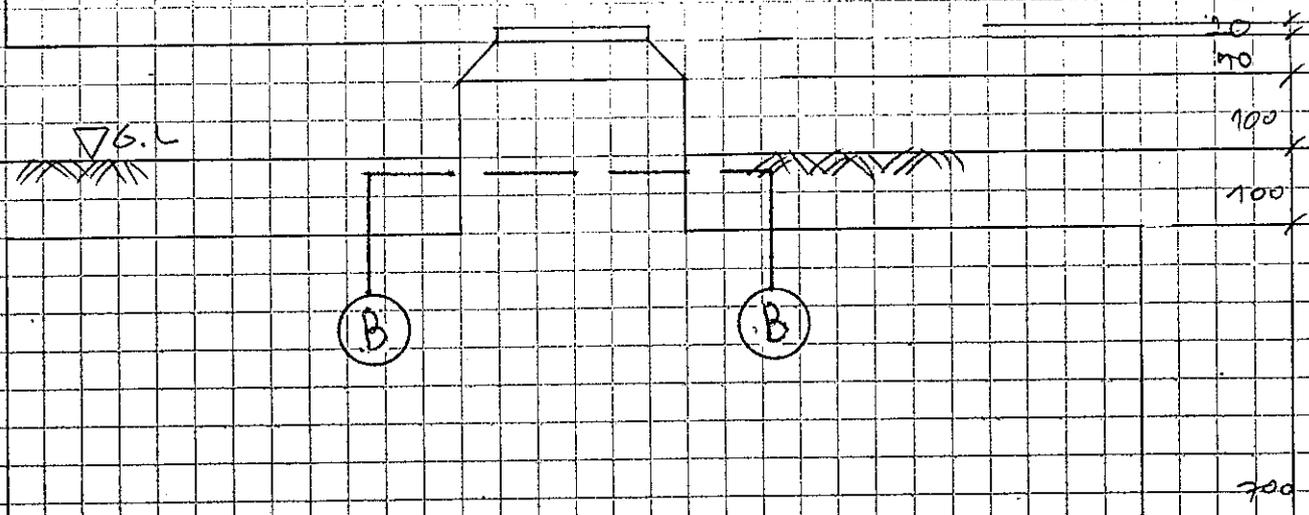
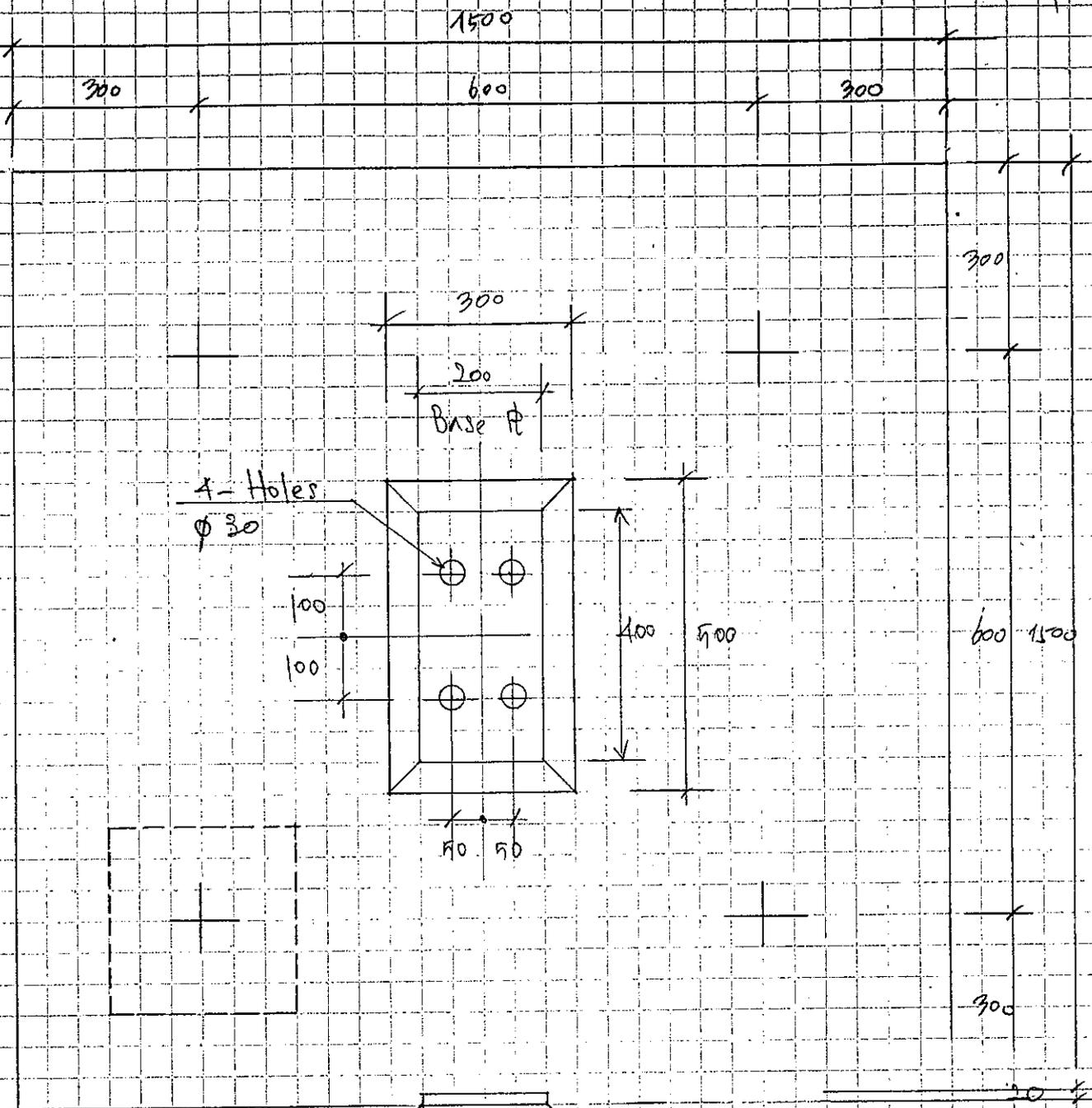


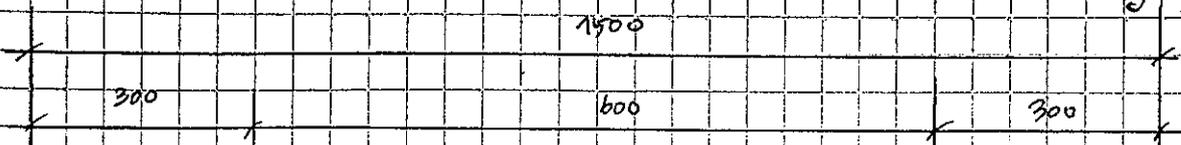
2 - P.C PILE  
 $\square 0.30 \times 0.30 \times 21.00 \text{ m}$

PILE CUT OFF  
50









1400

1700

600 1500

700

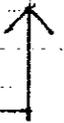
16

50

100

100

700



4 Holes

φ 30

31°

300

300

BASE R

45

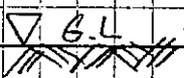
45

50

50

340

440



PILE CUT OFF  
50

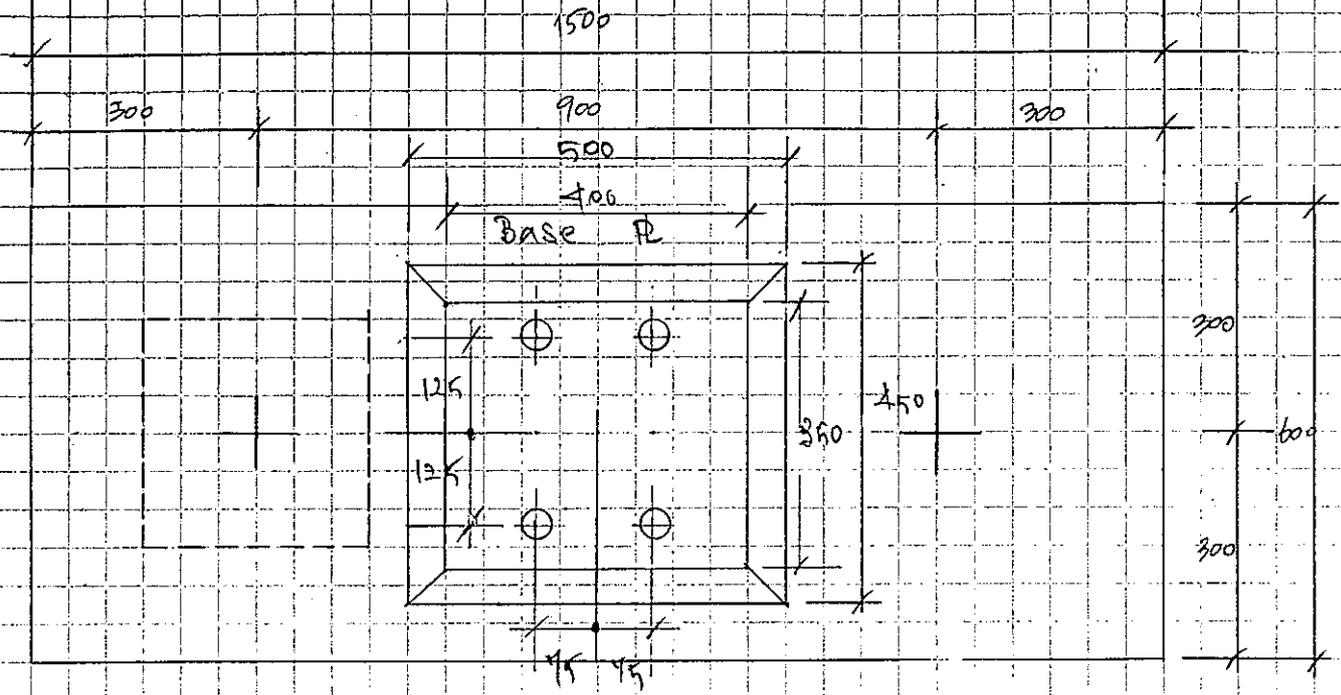


4-PC PILE

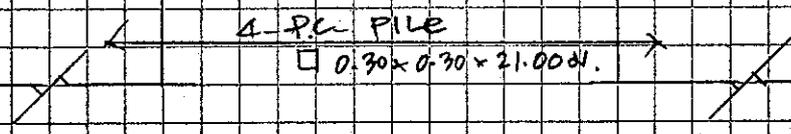
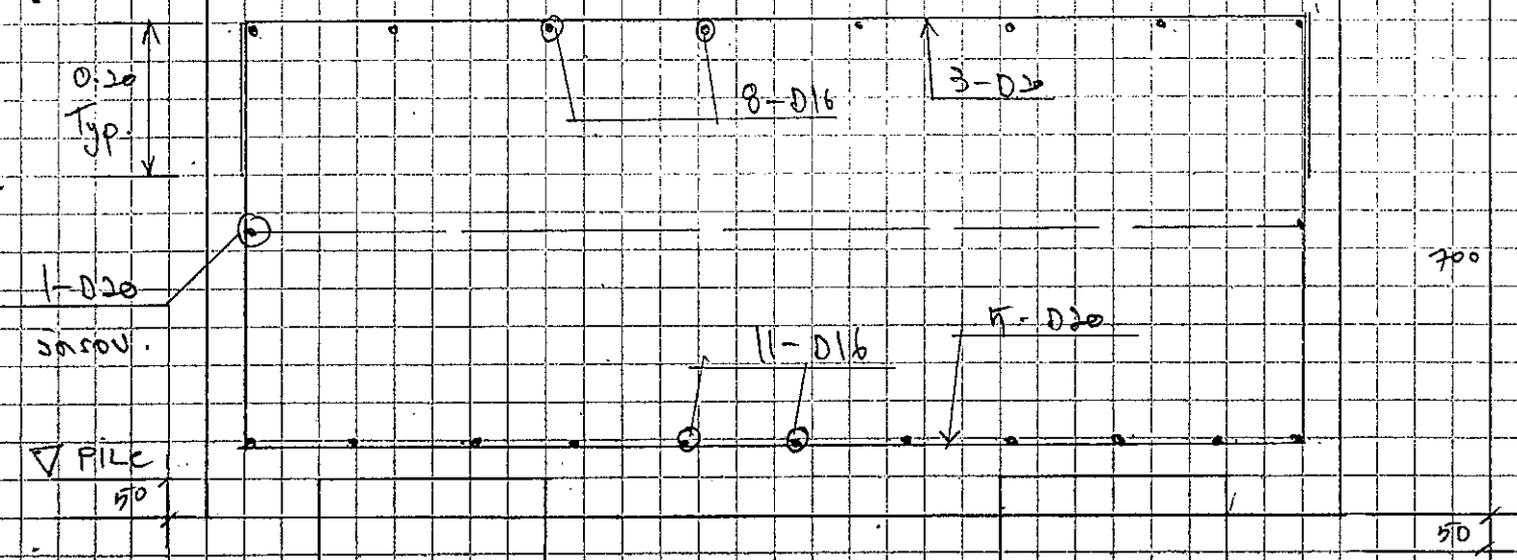
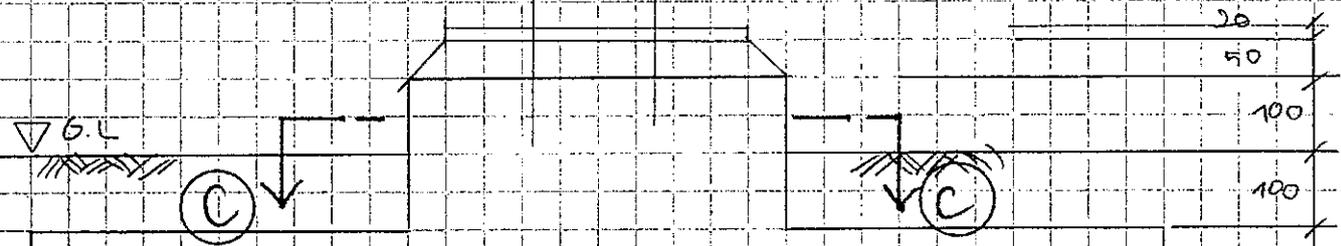


50

PLAN FF2-1 (Frame Footing)



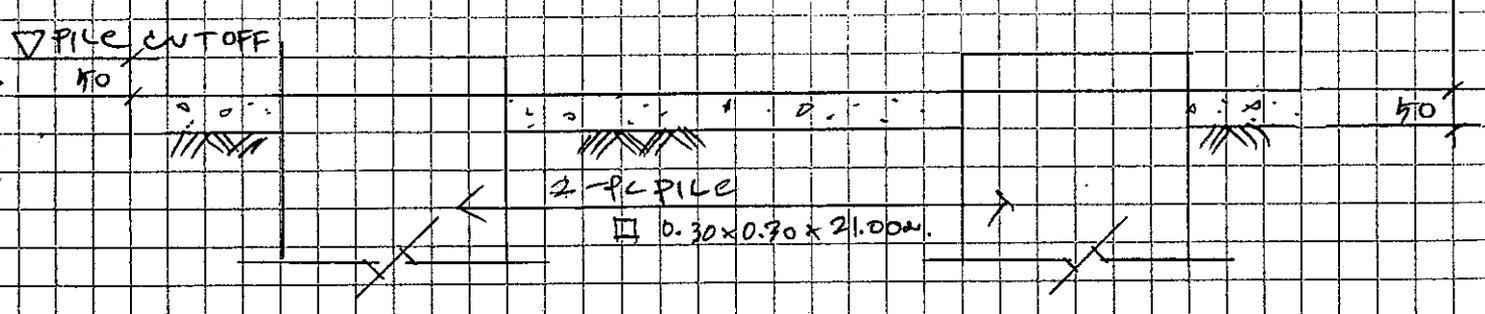
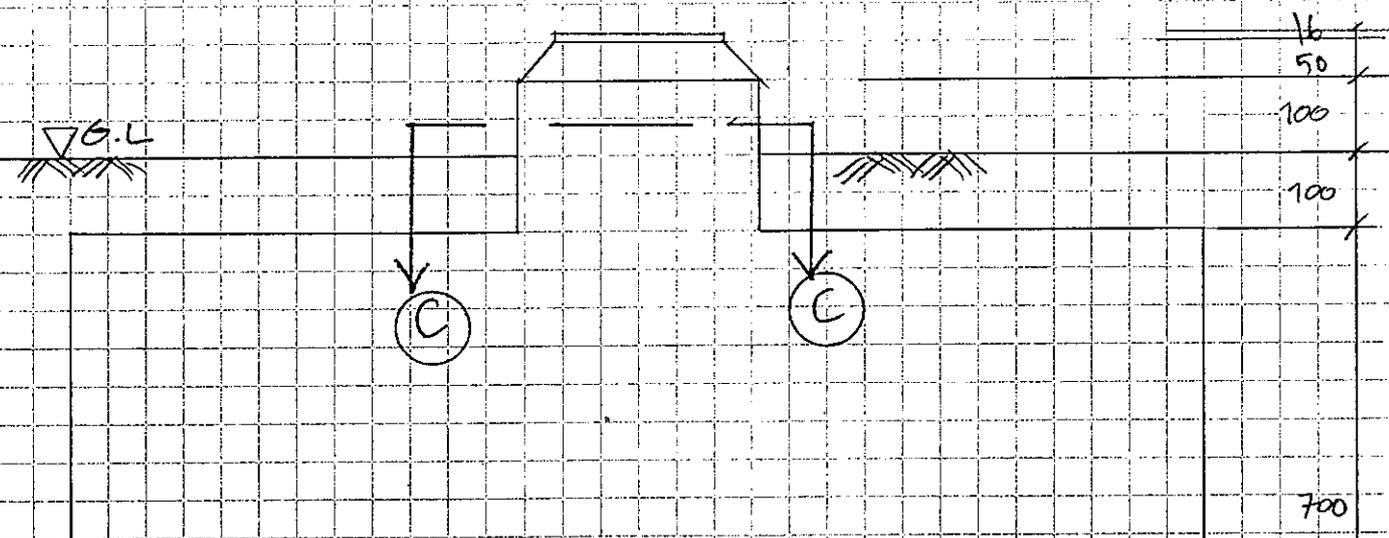
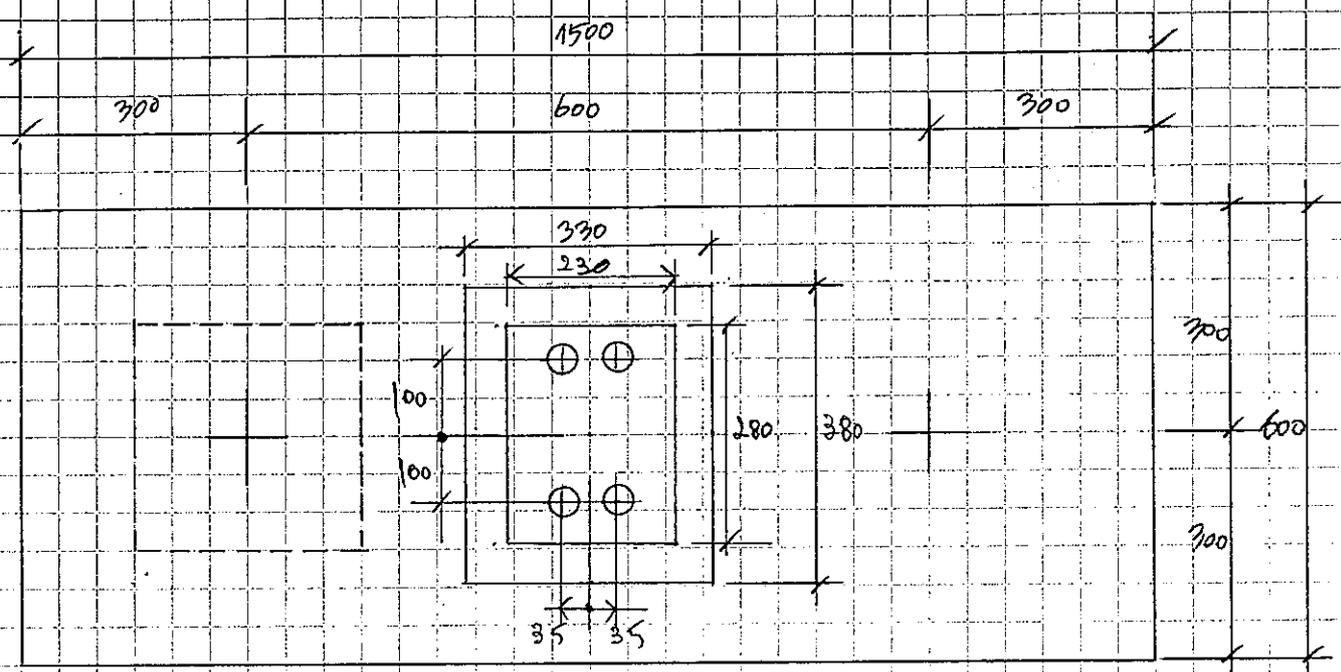
M20 Anchor Bolts



PLAN FF 2-2

(Frame Footing)

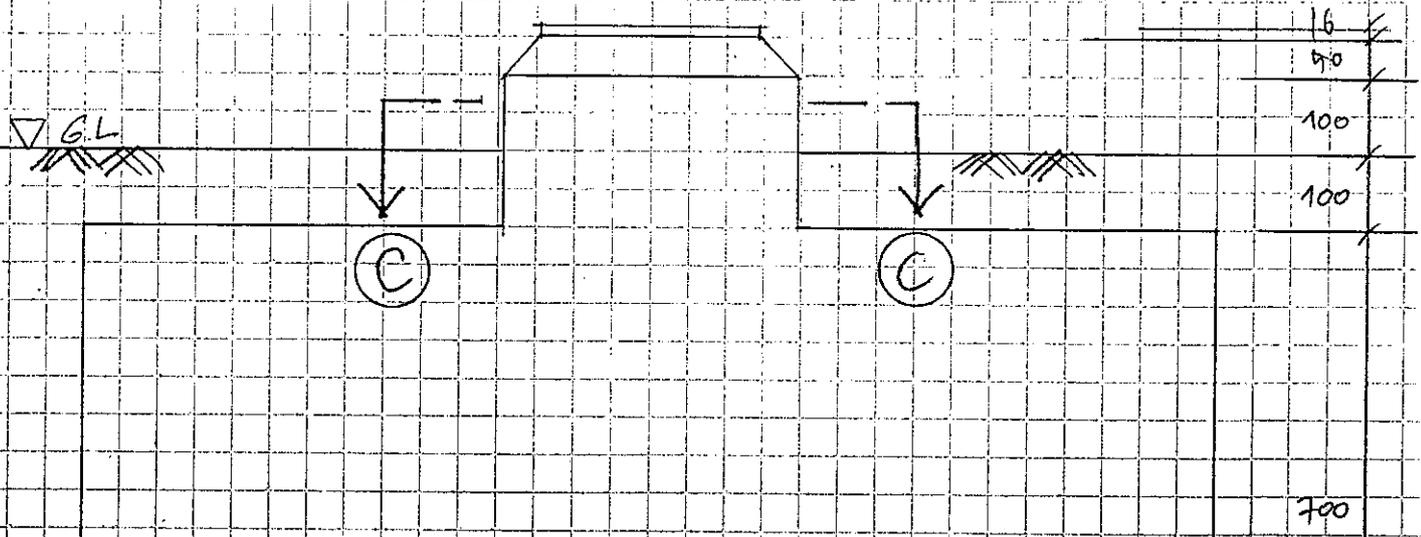
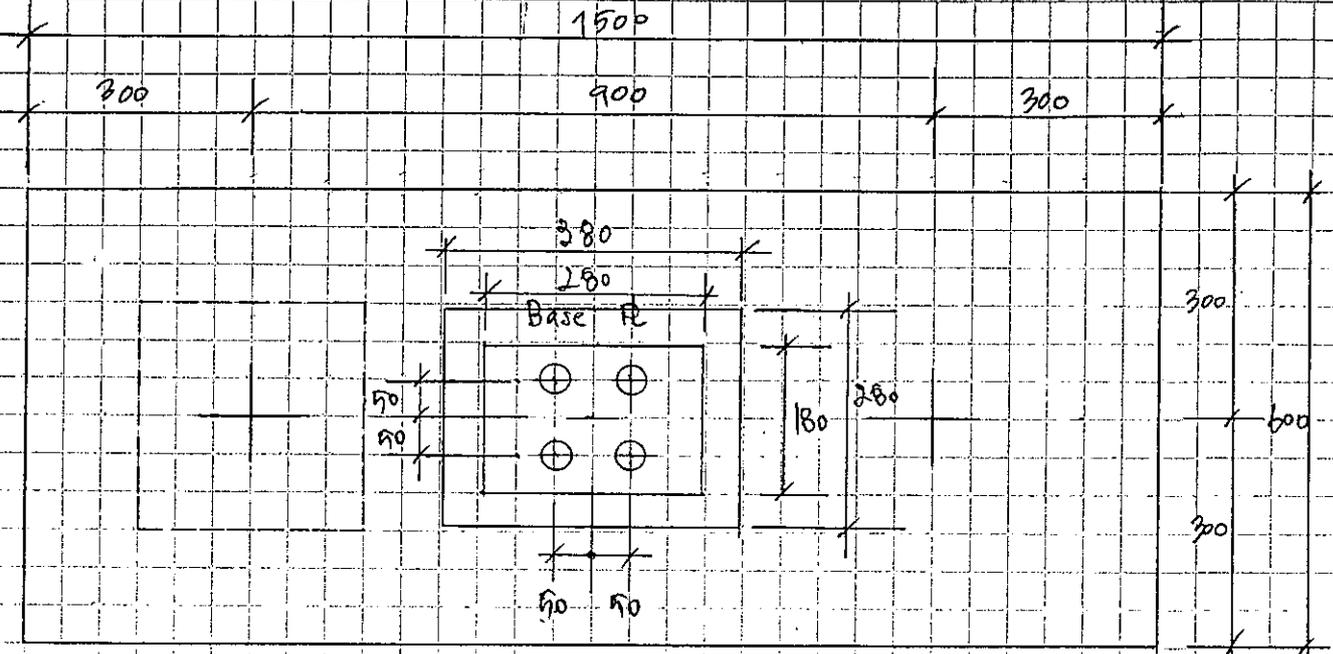
24



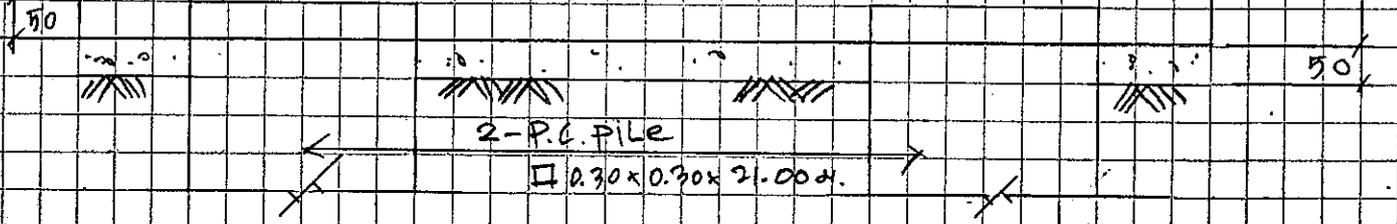
PLAN FF2-3

(Frame Footing)

25



PILE CUT OFF

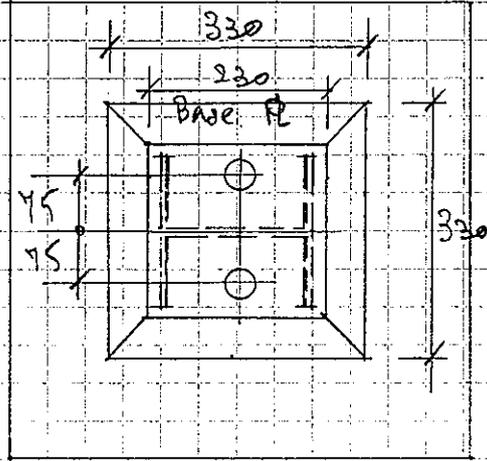


Plan

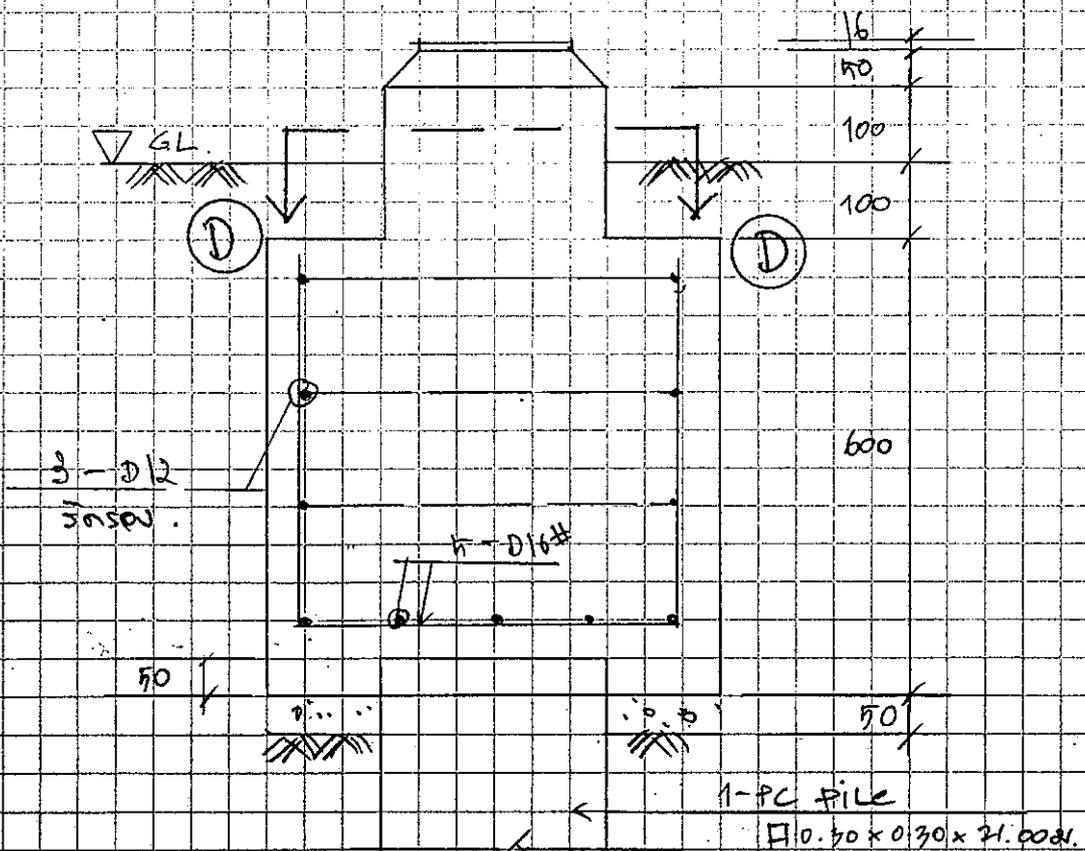
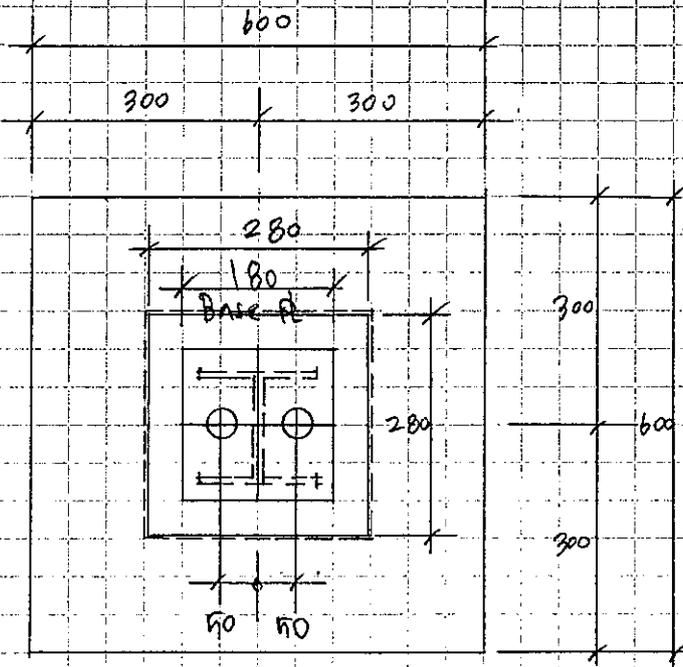
FF3-1

(Frame Footing)

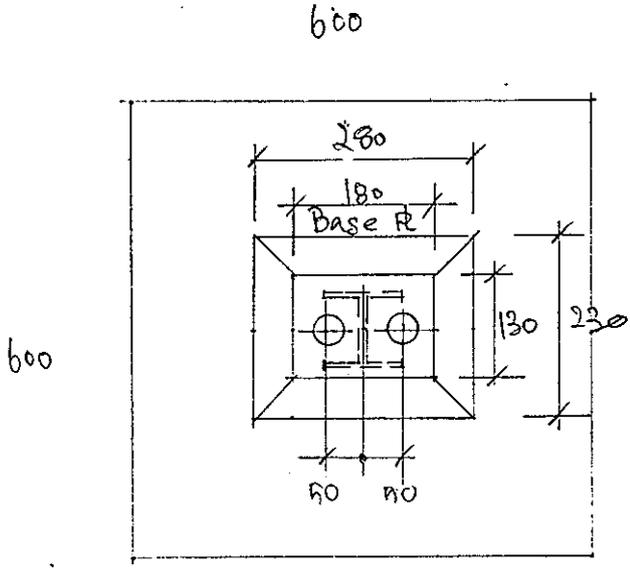
26



PLAN FF3-1a (Frame Footing)

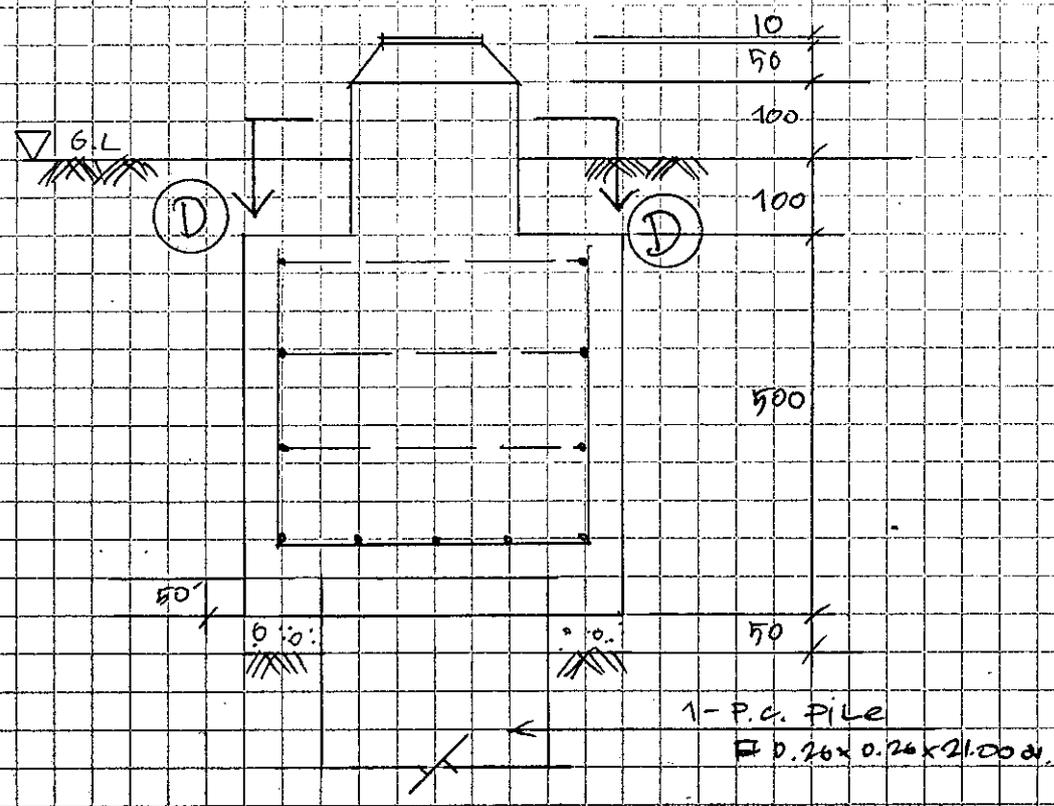
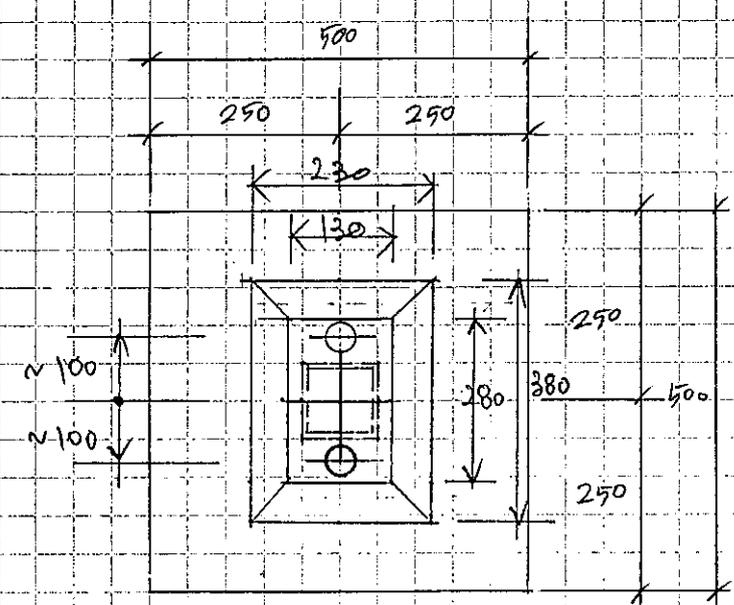


Plan FF3-1b (Frame Footing)

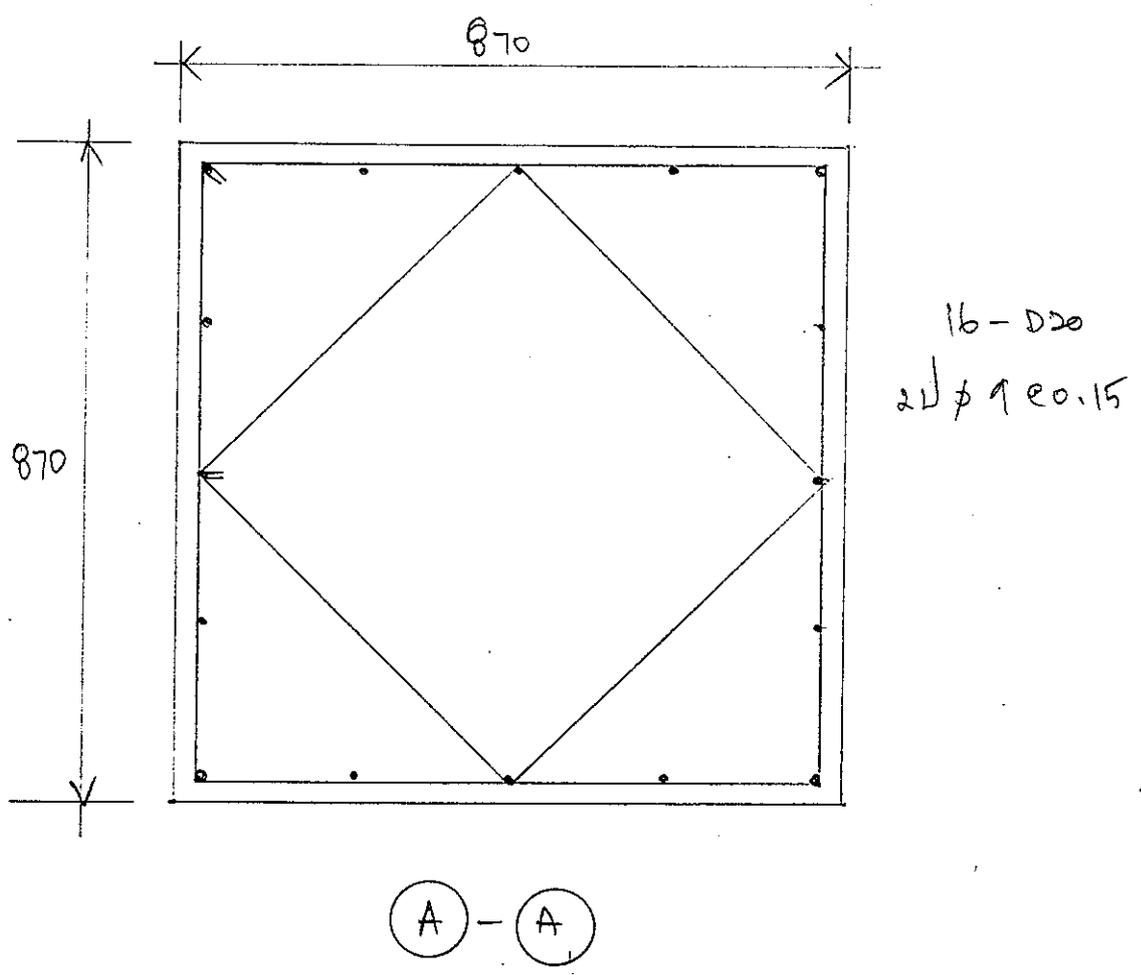
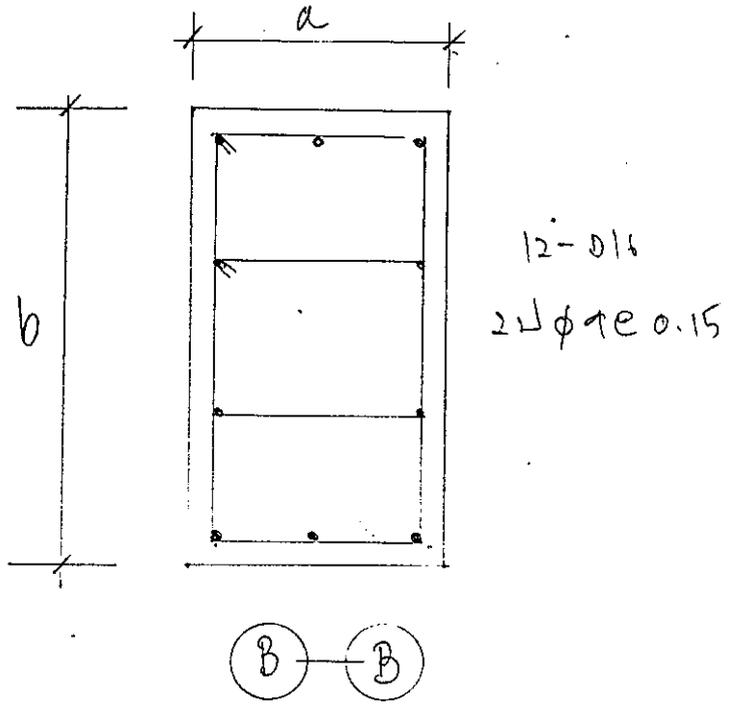


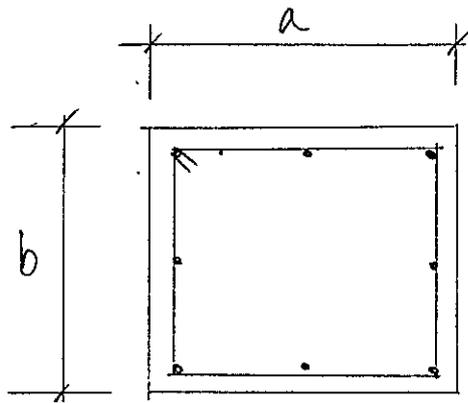
Section 1'-0" x 1'-0" FF3-1b

# PLAN FF 4-1 (Frame Footing)

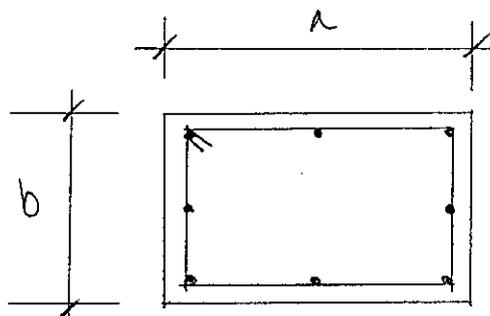
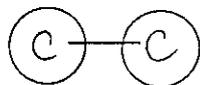


1-P.C. PILE  
0.26 x 0.26 x 21.00

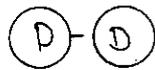




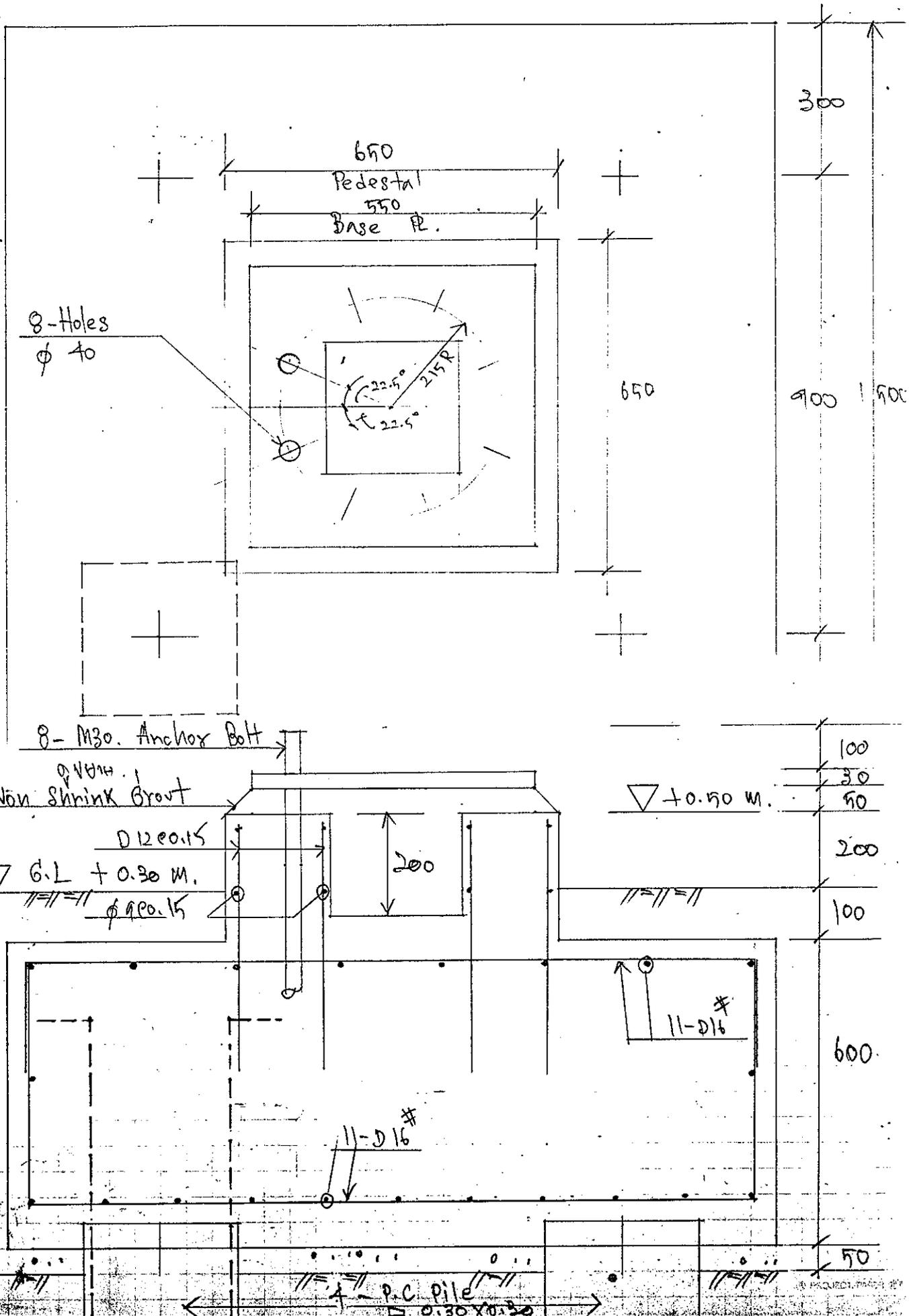
8-D11  
Uφ 9 eo.15



8-D12  
Uφ 9 eo.15

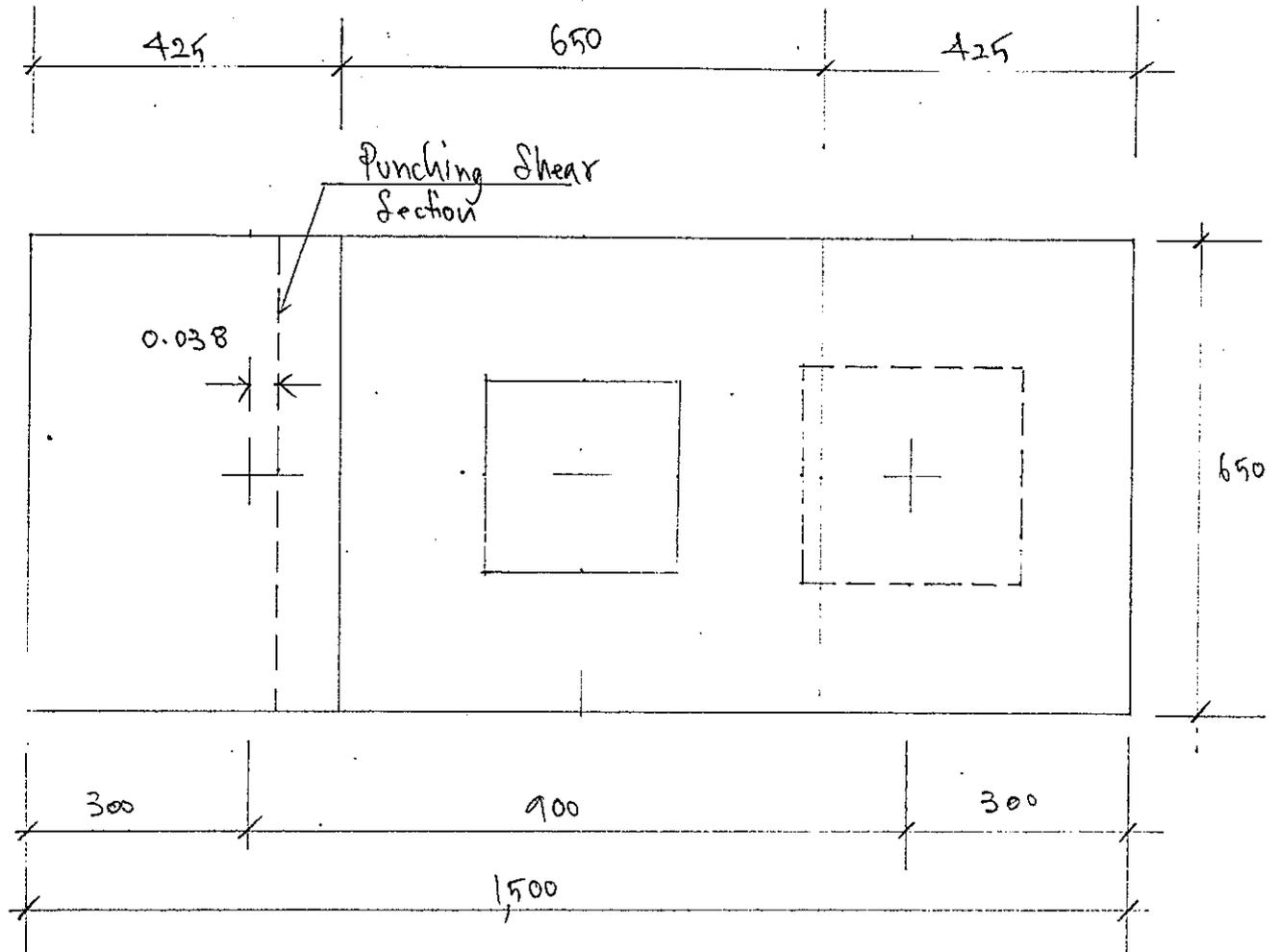


Plan F1-1

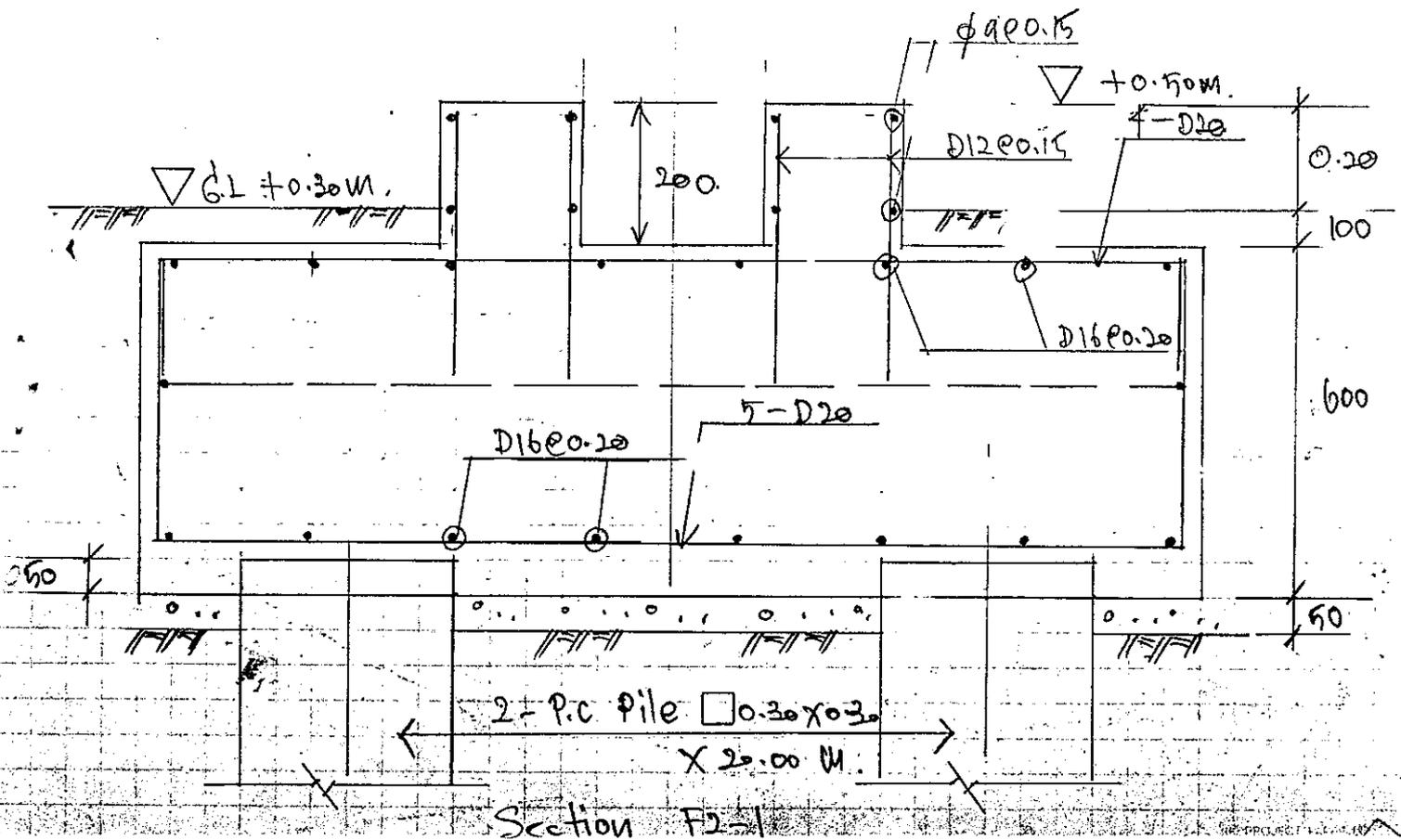




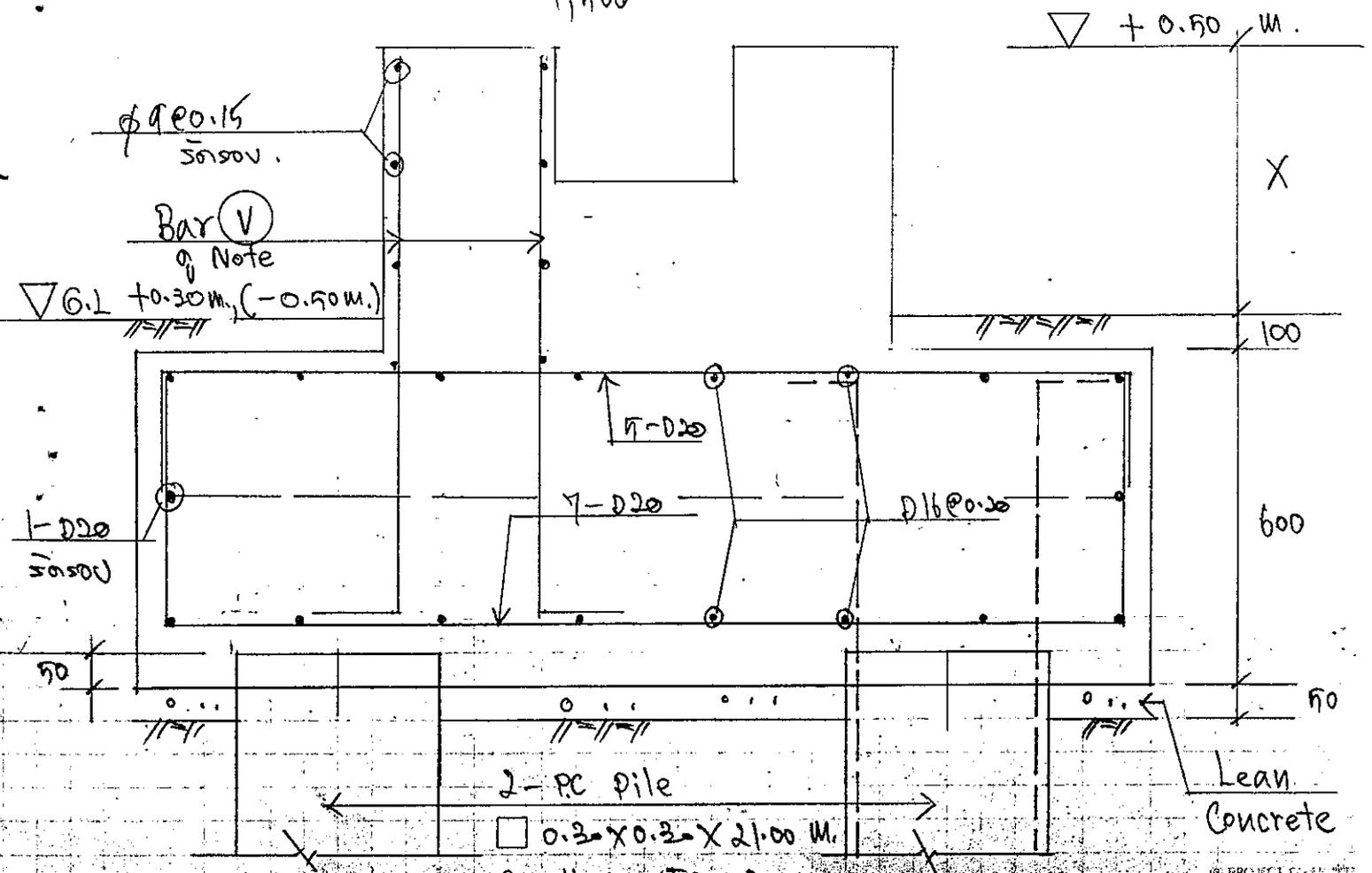
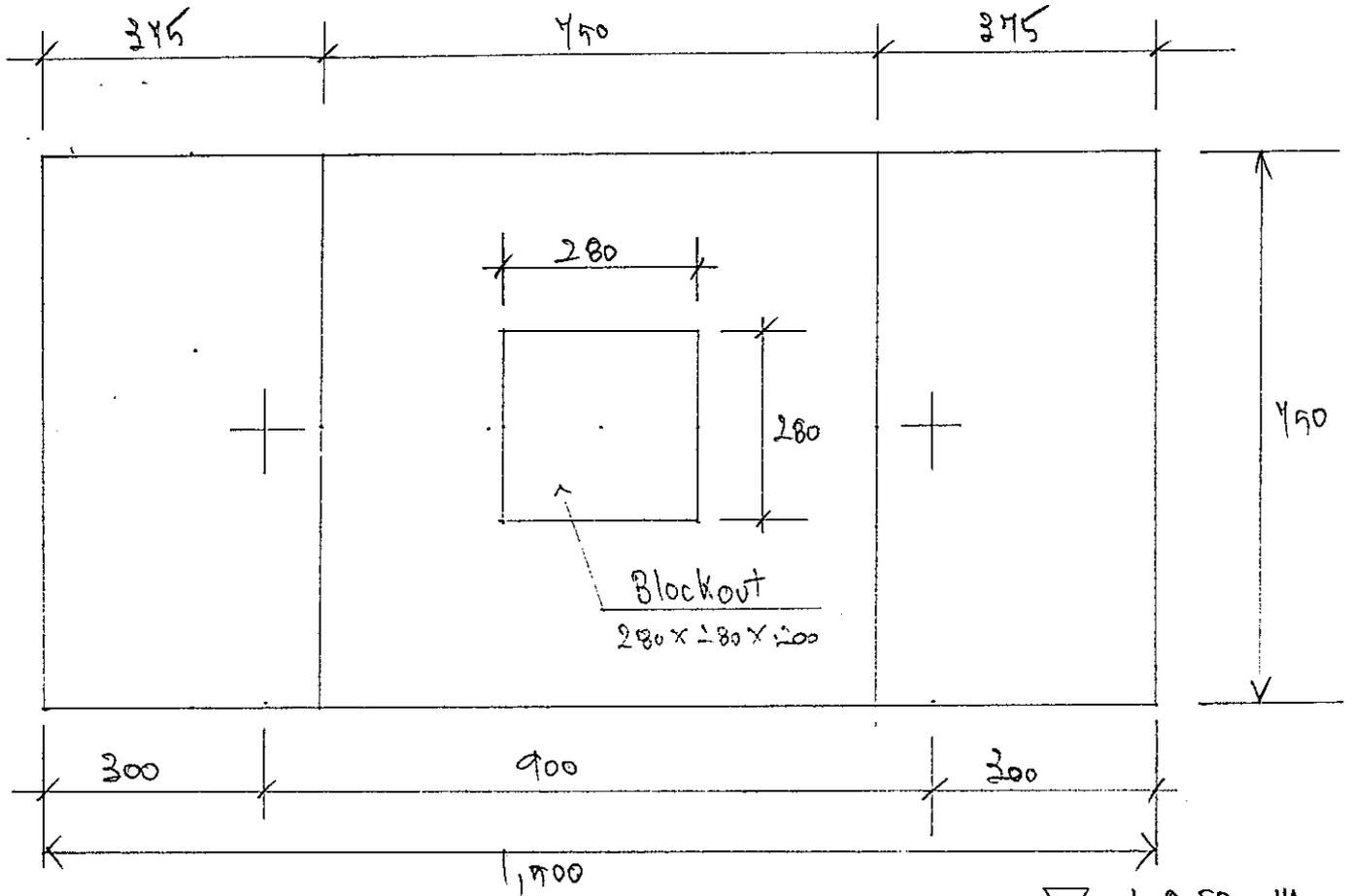
Footing F2, Base @ Type 1'

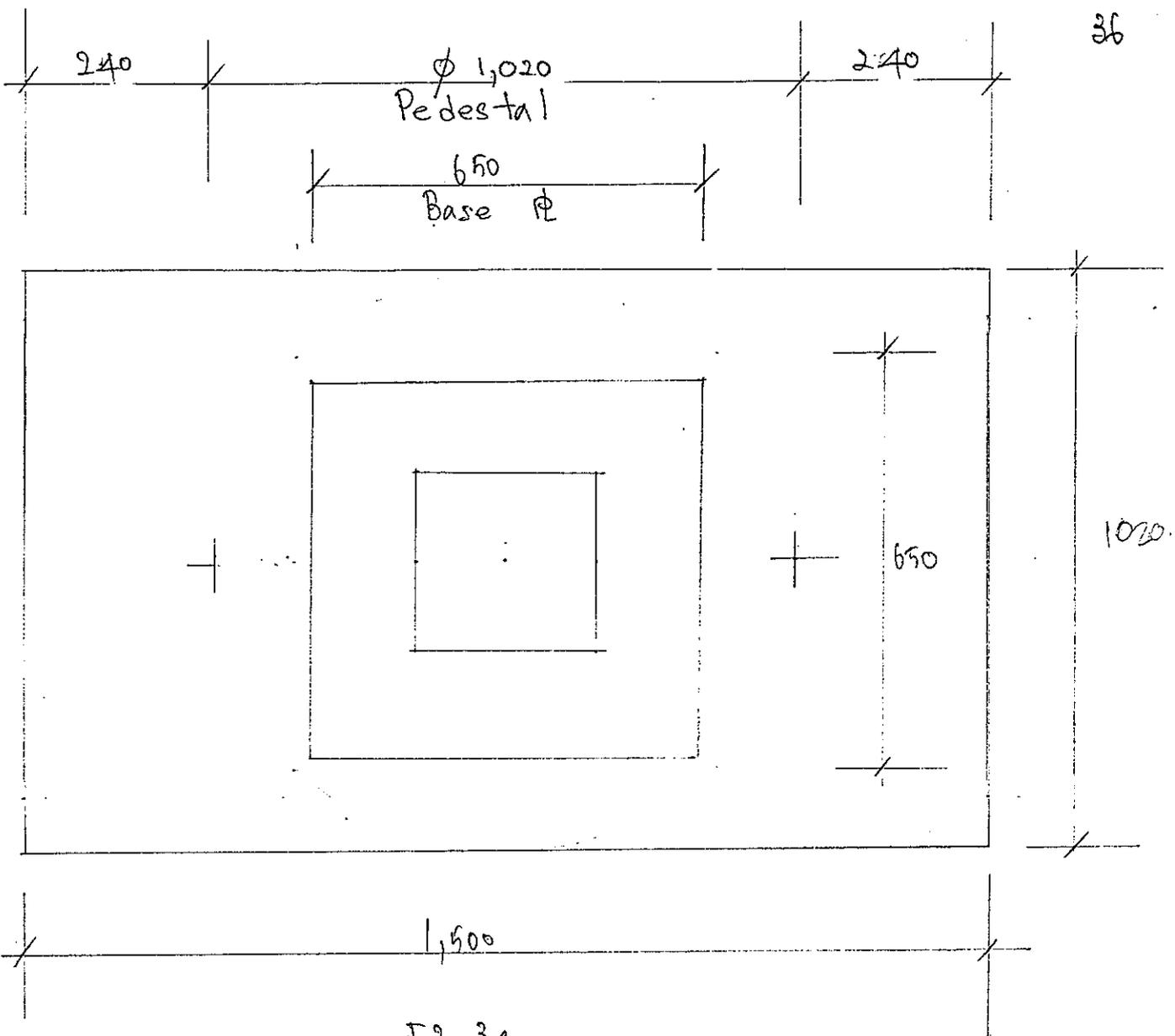


Plan F2-1



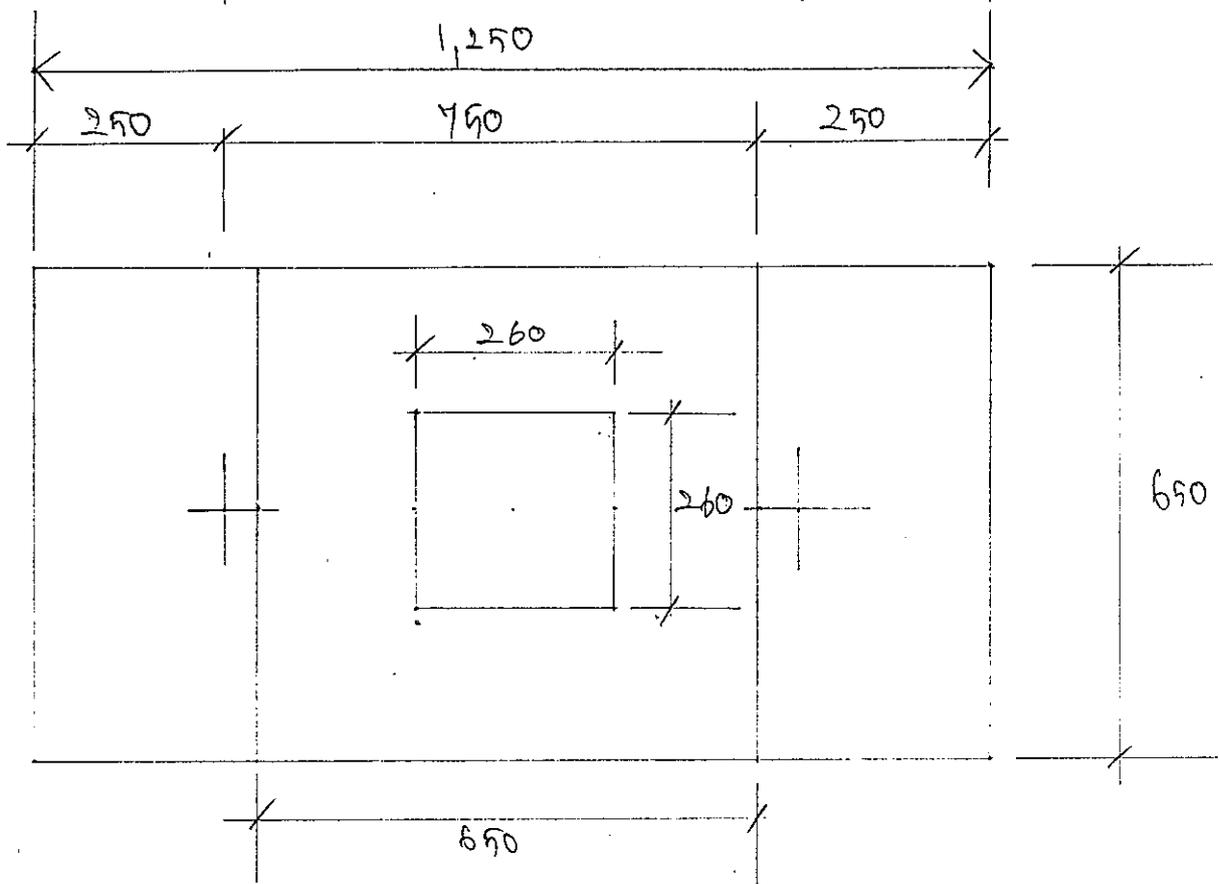
Footing F2 , Base @ Type 3 (F2-3)



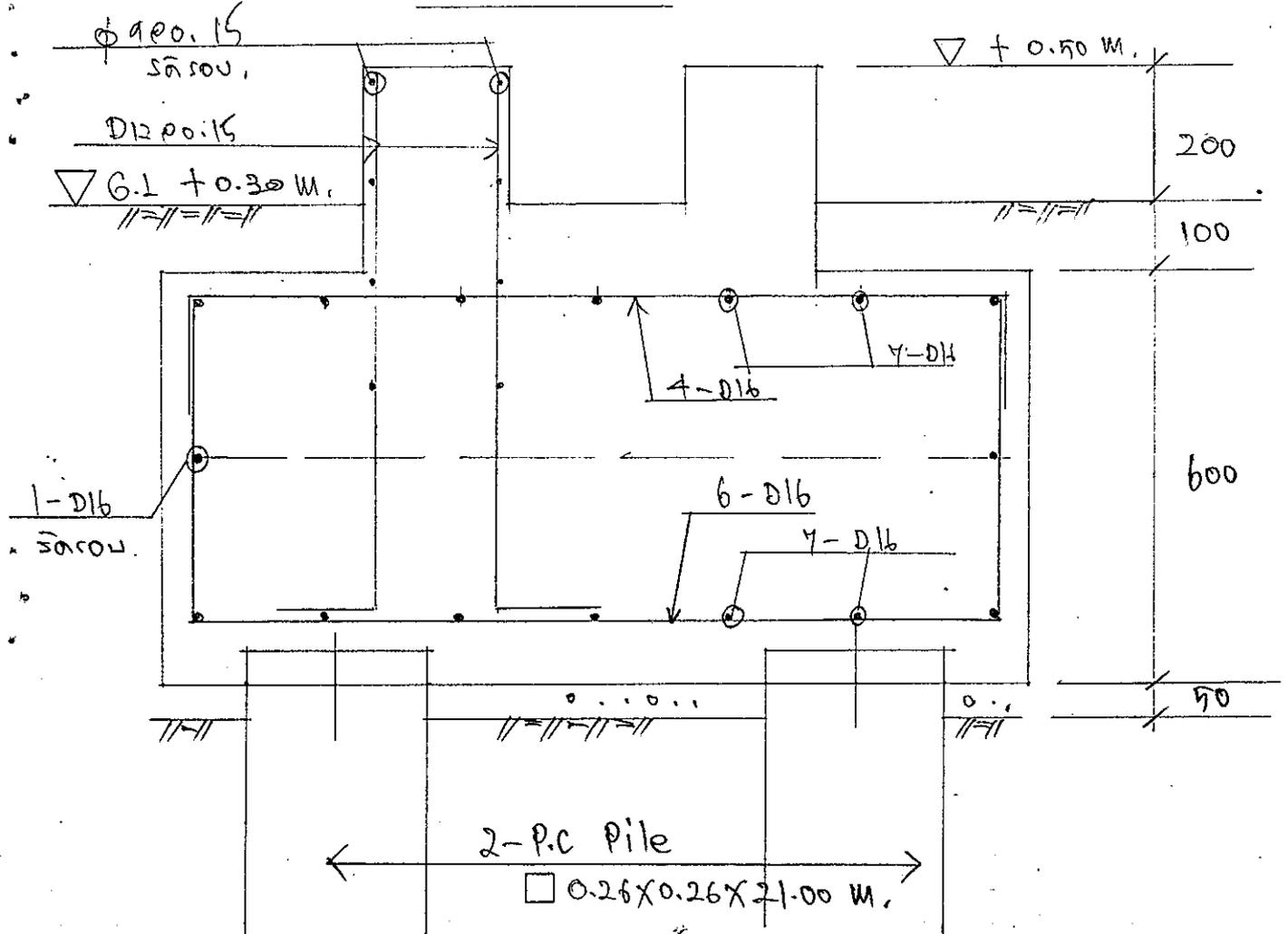


F2-3a

Footing F3, Base @ Type 1

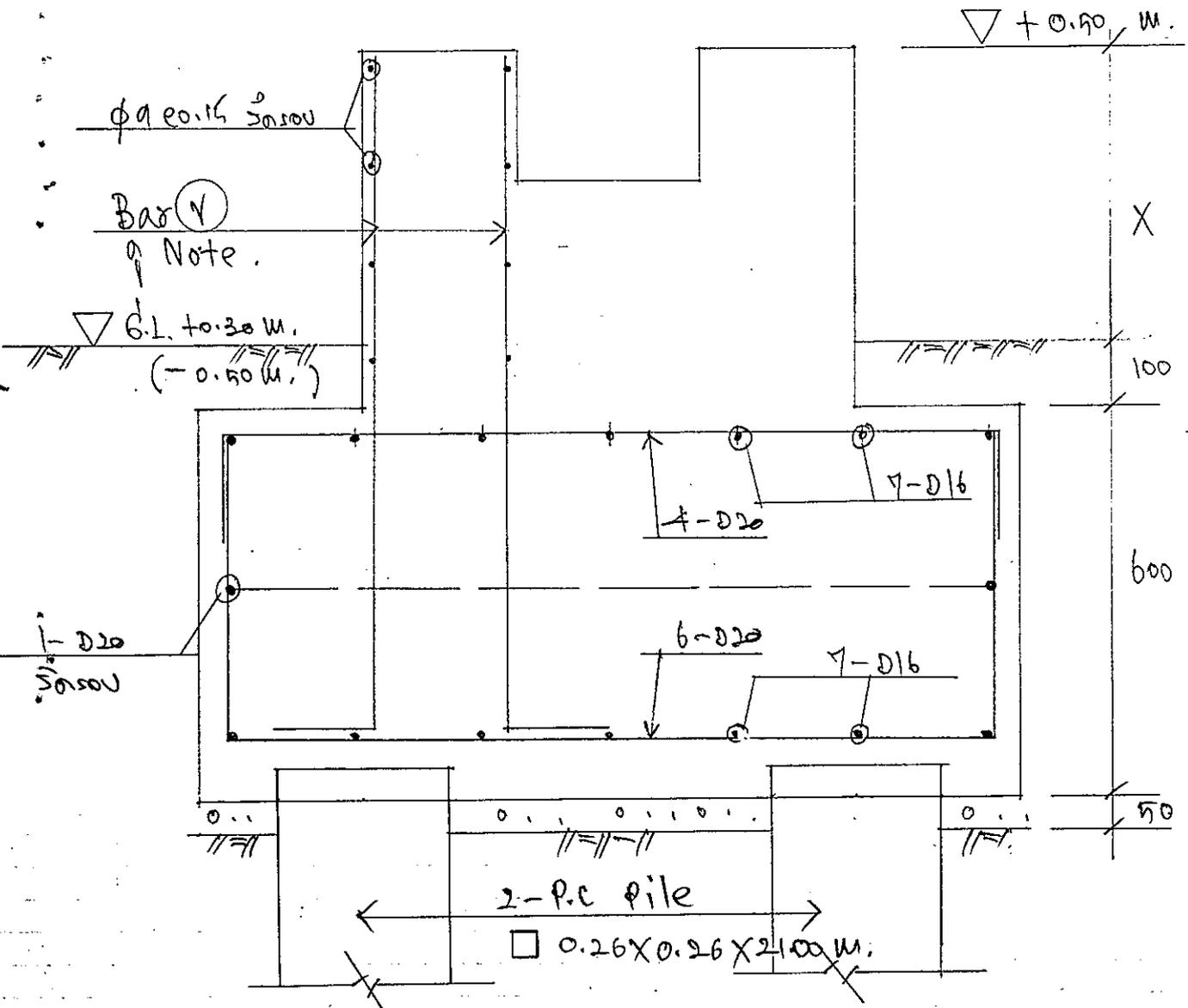
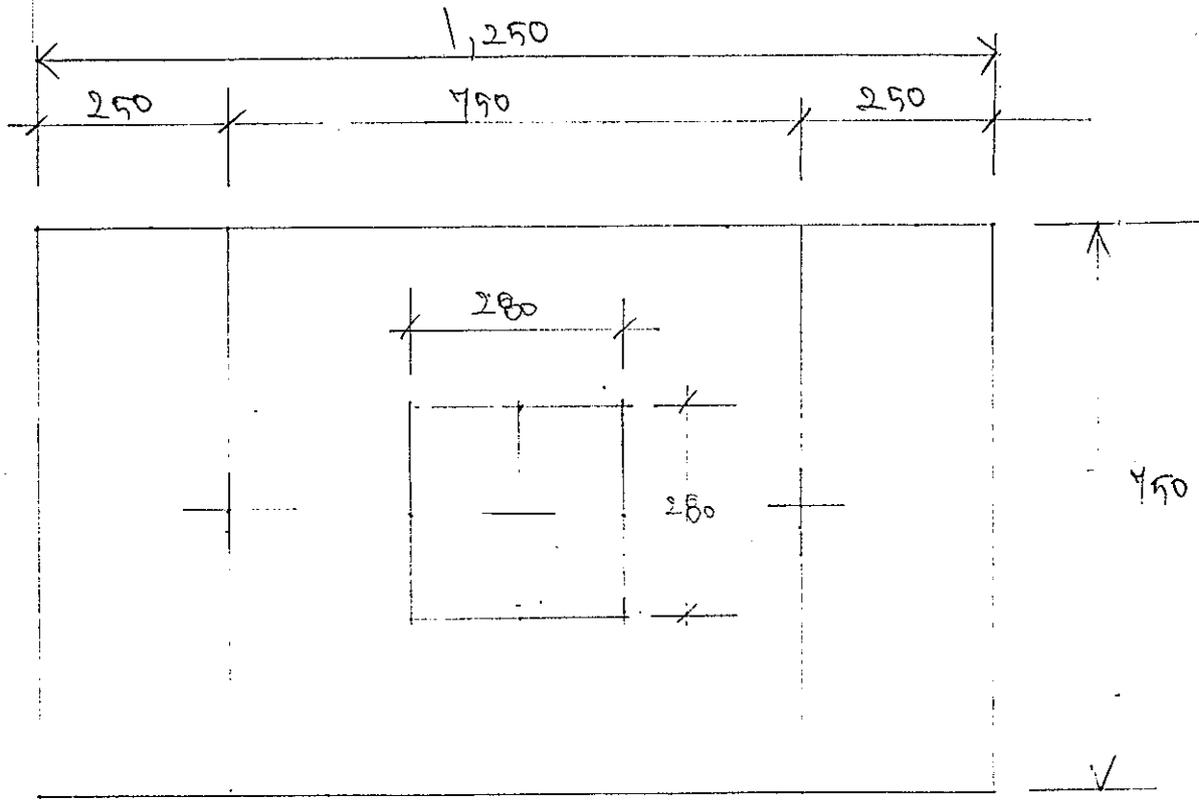


Plan F3-1



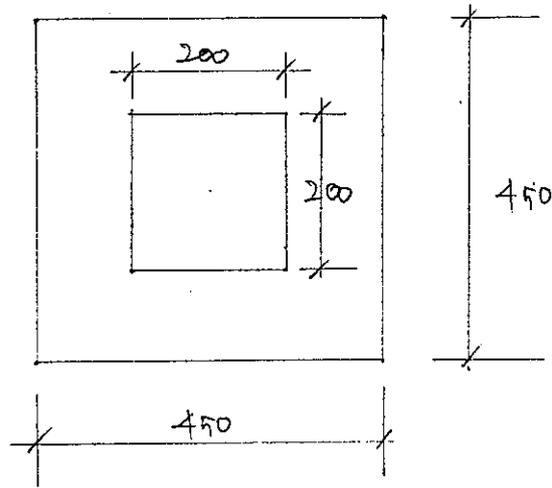
Section F3-1

Footing F3, Base R Type 3

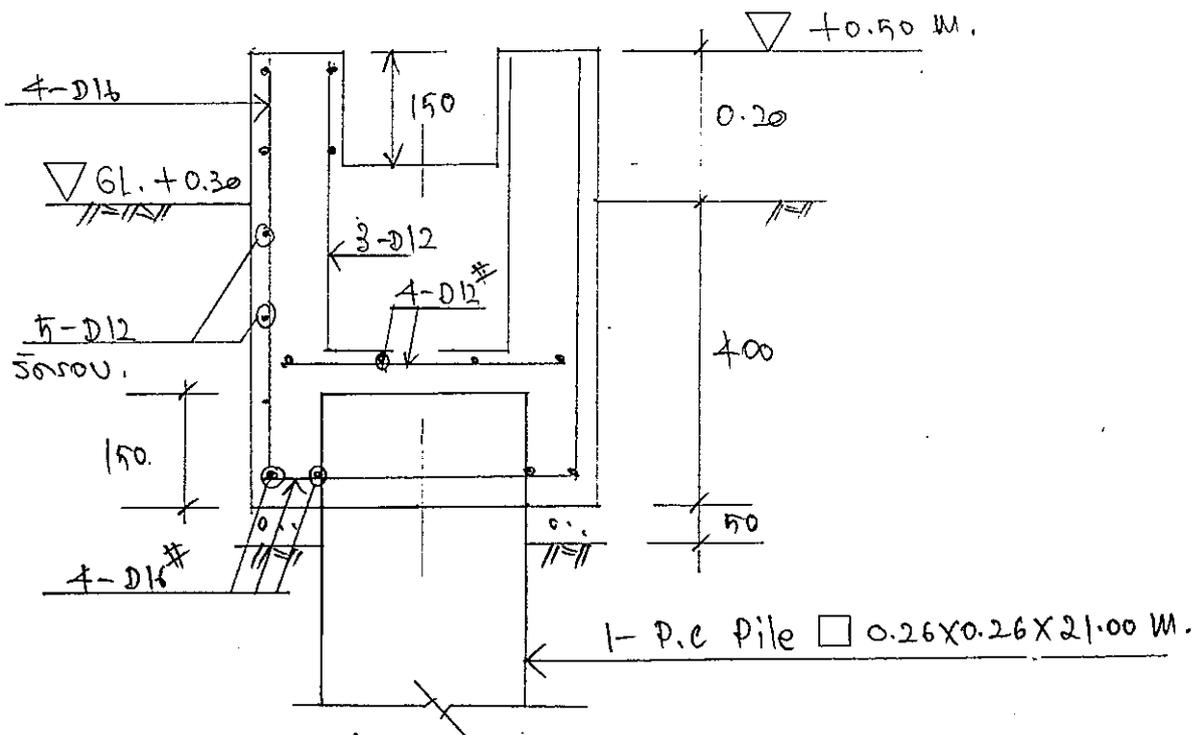


Section F3-3

Footing F4, Base R Type 4

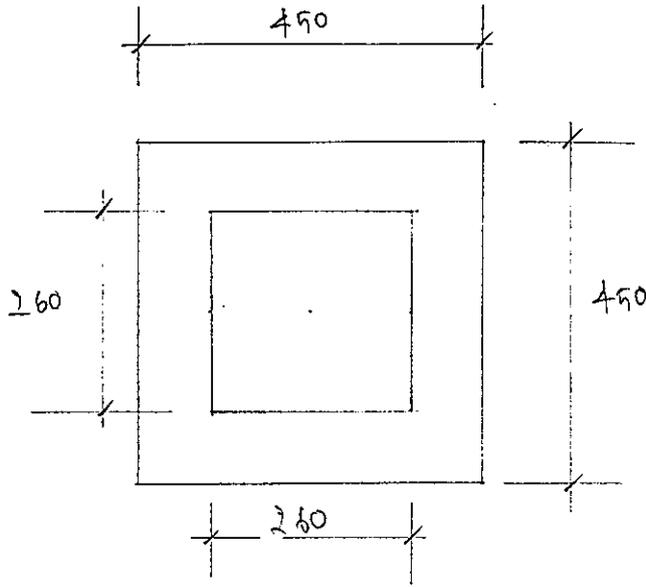


Plan F4-4

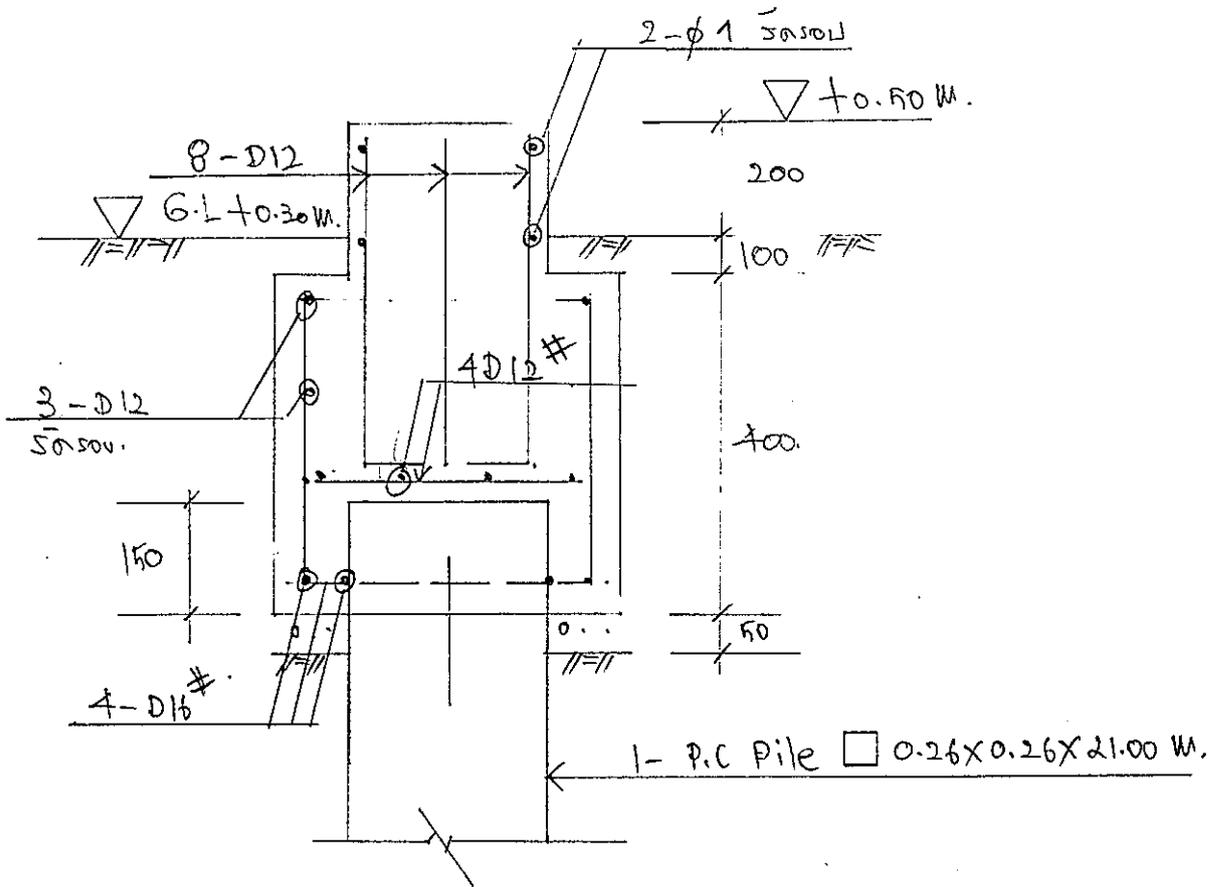


Section F4-4

Footing F4, Base # Type 5

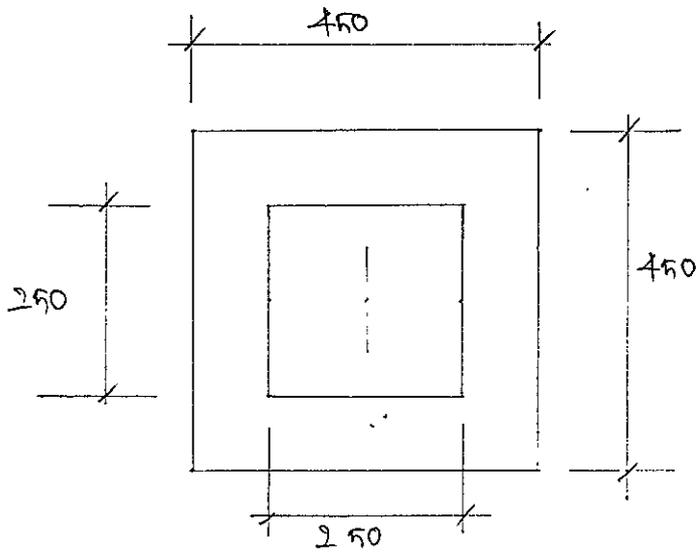


Plan F4-5

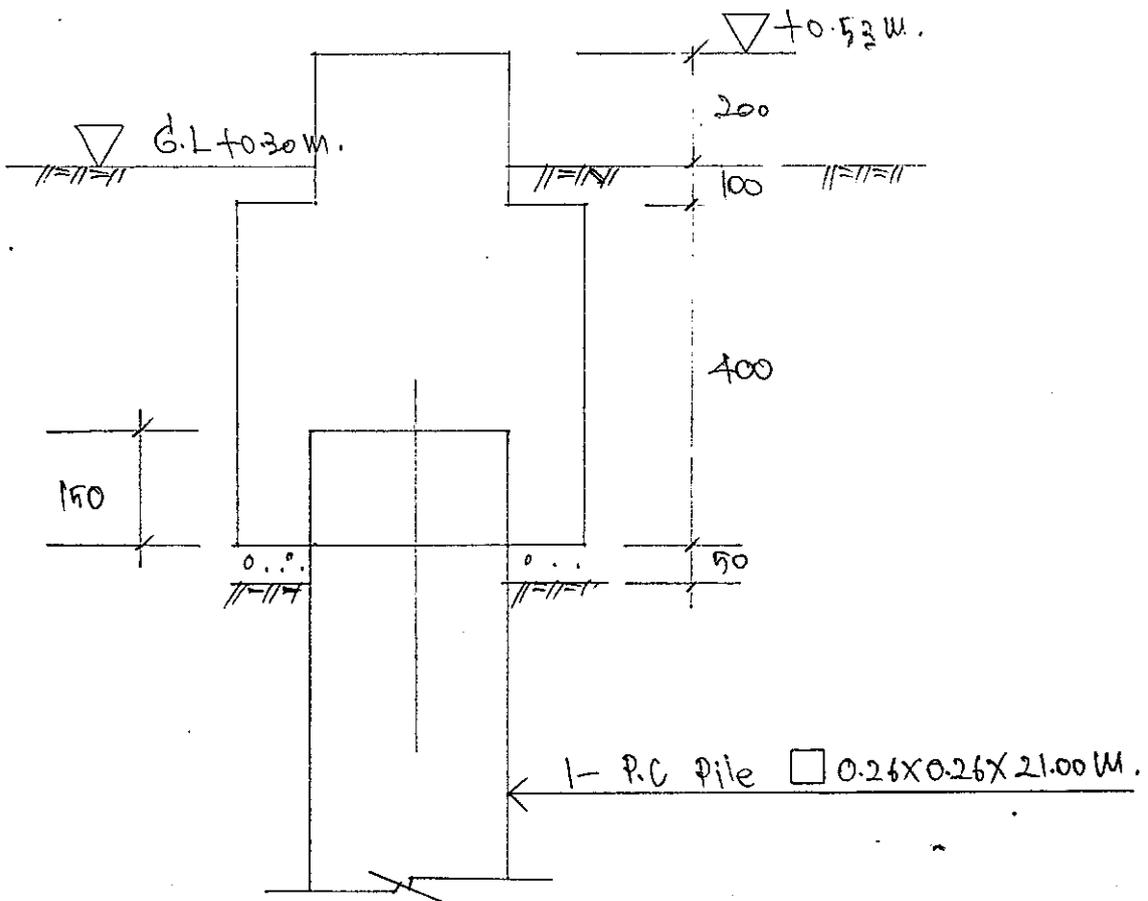


Section F4-5

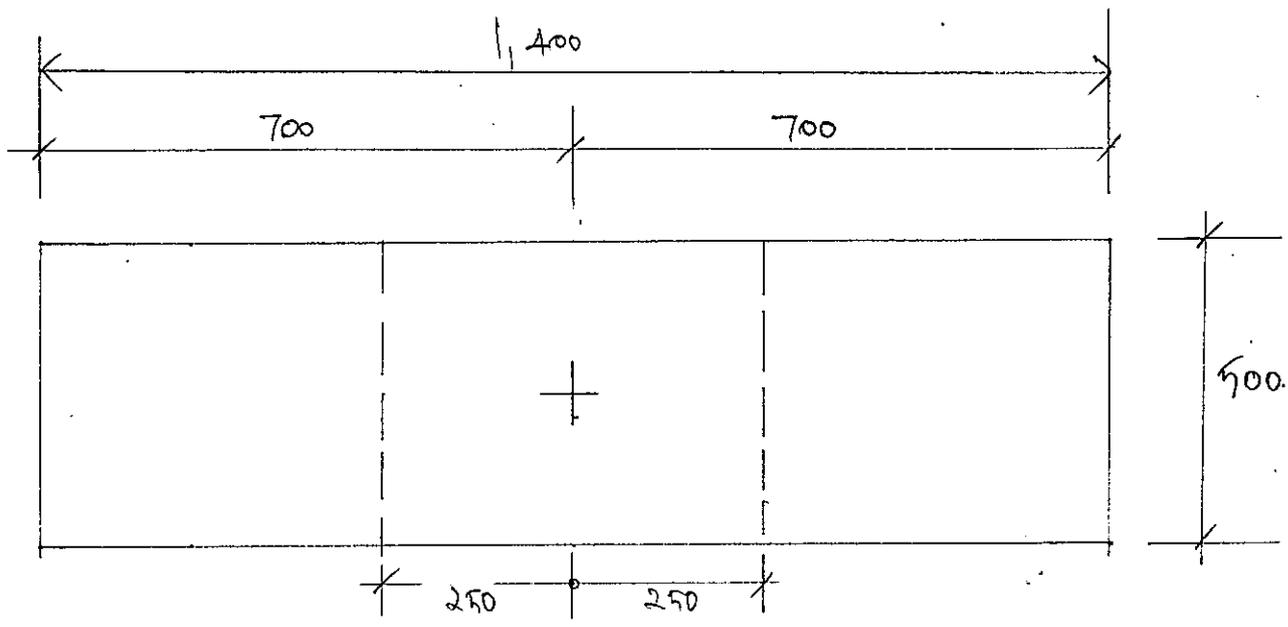
Footing F4, Base @ Type 6



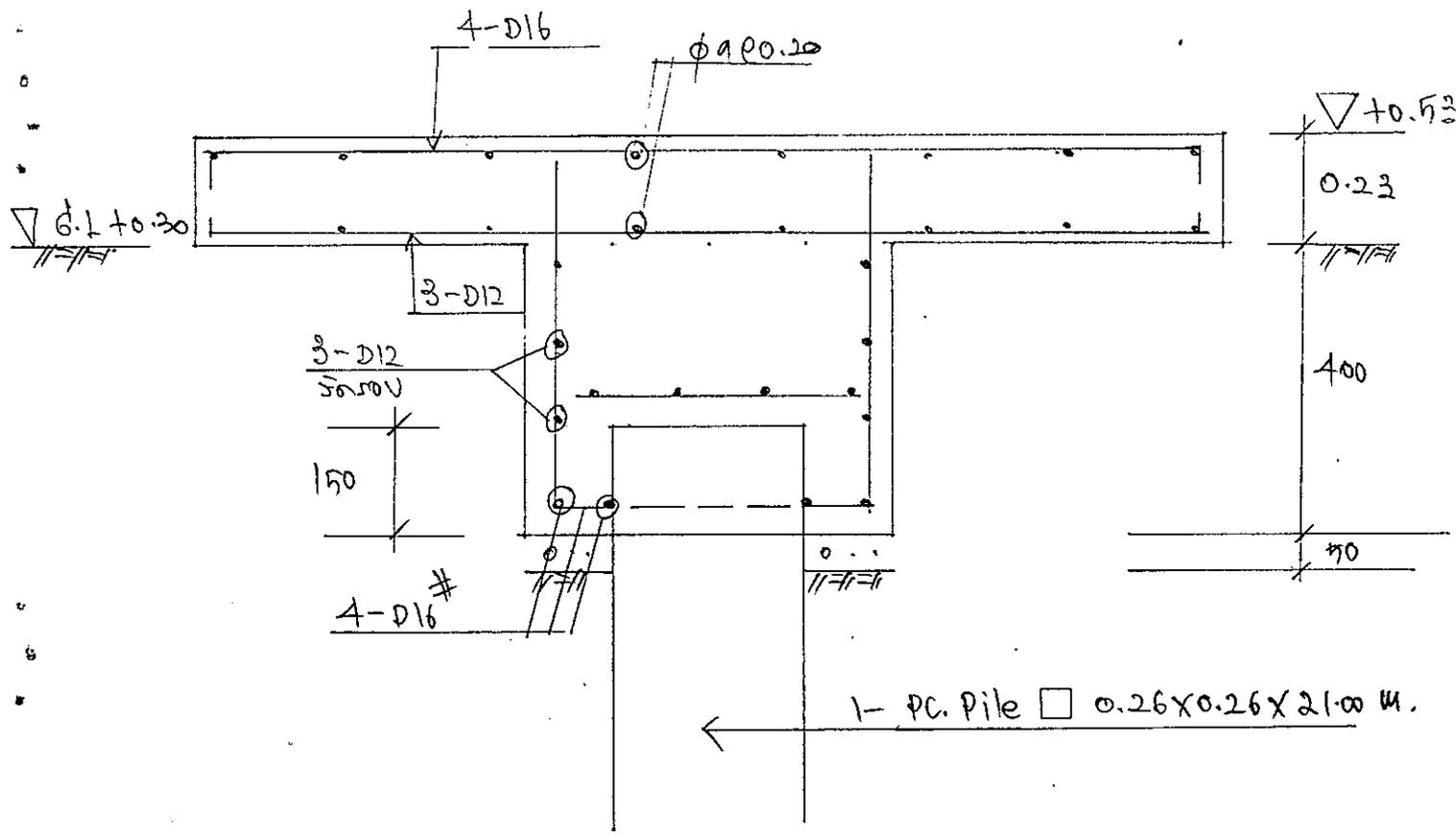
Plan F4-6



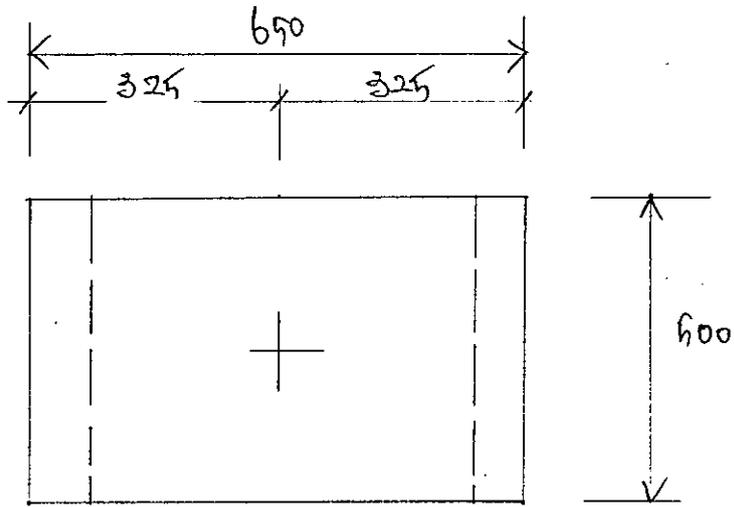
Section F4-6



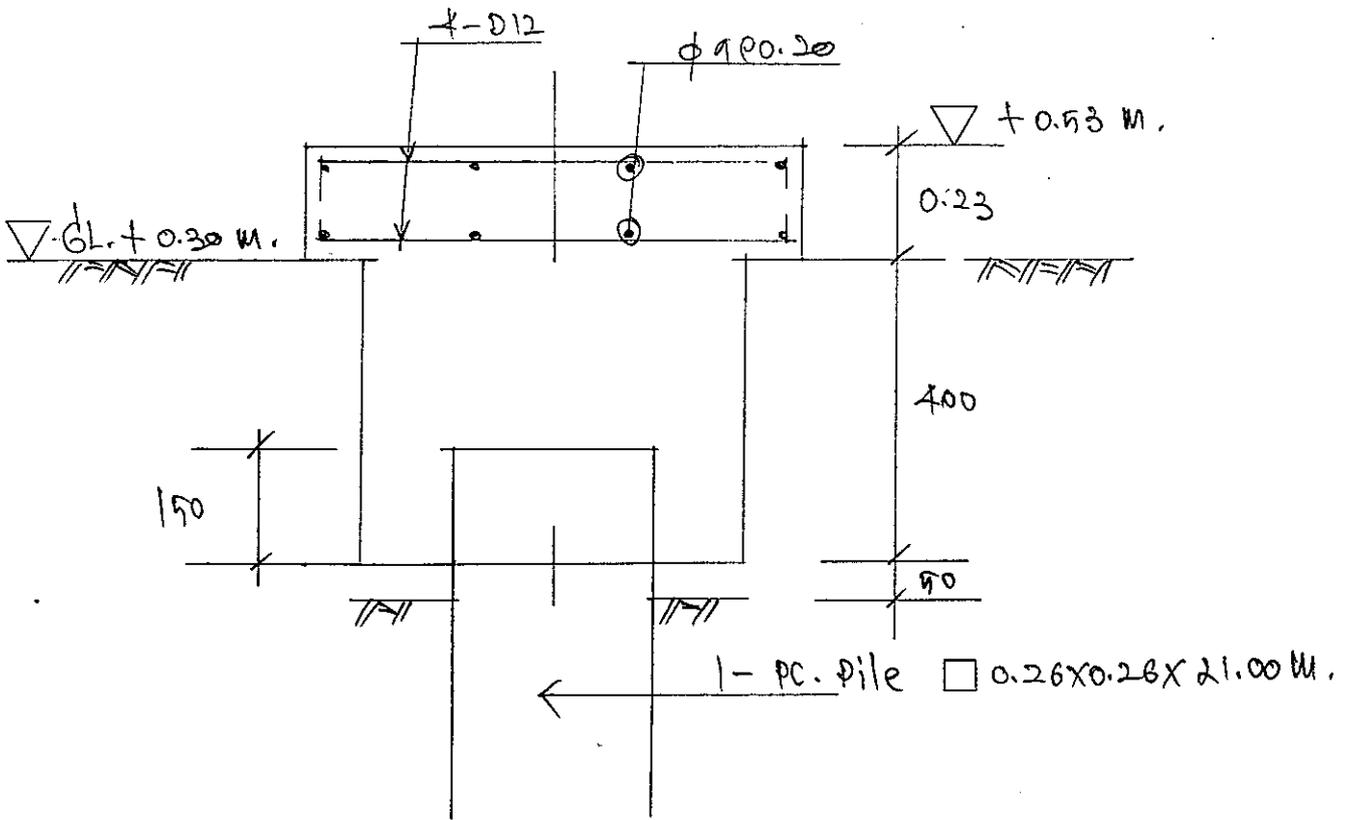
Plan F-ST1



Section F-ST1



Plan F-ST2

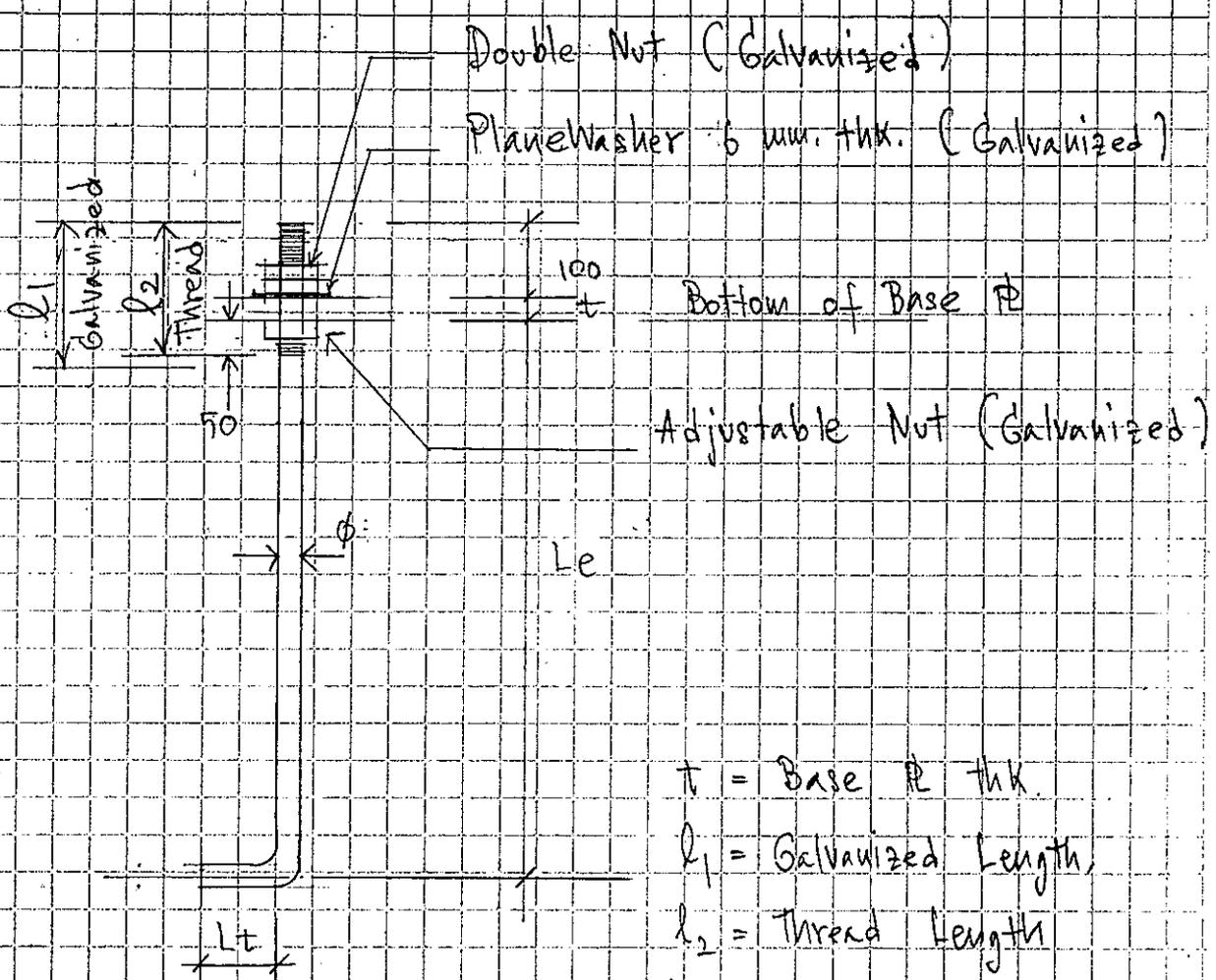


Section F-ST2

SWINGING TURNS  
FOOTING

LIFT	LIFT+WIND	LOOP 4	LOOP 3	LOOP 2	LOOP 1	STATION
C1	C1	C10A	C17	C26	C35	C49A
F3-1	F3-1	C10B	C20	C33	C38	F4-4
C54	C54	C11A	C21	C32	C39	C49B
F3-1	F3-1	C11B	C22	C31	C44	F4-5
C2A	C2A	C12	C26	C35	C45	F4-4
F1-1	F1-1	C13	F2-3	C37	C46	F4-4
C2B	C2B	C14	F2-3	C38	C47A	F4-4
C3A	C3A	C15	F2-3	C39	C55	F4-4
F2-1	F2-1	C16	F2-3	C44	C56	F4-4
C3B	C3B	C17	F1-2	C45	C57	F4-4
C4A	C4A	C18	F2-3	C46	C58	F4-4
F3-1	F3-1	C19	F2-3	C47A	C59	F4-5
C4B	C4B	C20	F2-3	C47B	C60	F4-4
F3-1	F3-1	C21	F2-3	C40	C61	F4-4
C5A	C5A	C22	F2-3	C41	C47B	F4-5
F3-1	F3-1	C23	F2-3	C42	C40	C49A
C5B	C5B	C24	F2-3	C43	C53A	F4-4
F3-1	F3-1	C25	F2-3	C36	C53B	F4-4
C6A	C6A	C26	F1-2		C52A	F4-6
F3-1	F3-1	C34			C52B	F4-6
C6B	C6B				C54	
C48B	C48B				C2B	
C48A	C48A				C2A	
F2-1	F2-1				C1	
C7A	C7A					
F2-1	F2-1					
C7B	C7B					
F2-1	F2-1					
C7C	C7C					
F2-1	F2-1					
C8A	C8A					
F2-1	F2-1					
C8B	C8B					
F2-1	F2-1					
C9A	C9A					
F2-1	F2-1					
C9B	C9B					
F2-1	F2-1					
C10A	C10A					
F2-1	F2-1					
C10B	C10B					
F2-1	F2-1					
C11A	C11A					
F2-1	F2-1					
C11B	C11B					
F2-1	F2-1					
C12	C12					
F1-2	F1-2					
C13	C13					
F3-3	F3-3					
C14	C14					
F3-3	F3-3					

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Detail of Anchor Bolt

1:10

- $t$  = Base P thk.
- $l_1$  = Galvanized Length
- $l_2$  = Thread Length
- $l_e$  = Embedded Length
- $L_t$  = End Turn Length

Bolt	$\phi$	$t$	$l_1$	$l_2$	$l_e$	$L_t$	Total L
M20	20	20	190	170	450	100	670
M20	20	25	200	145	445	100	670
M30	30	30	200	180	450	100	980
M36	36	40	210	190	440	100	980
M45	45	50	220	200	450	100	1000

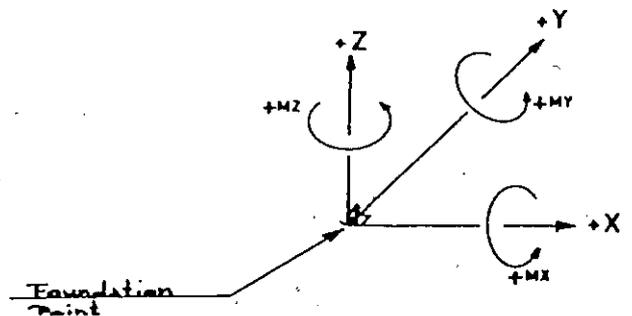
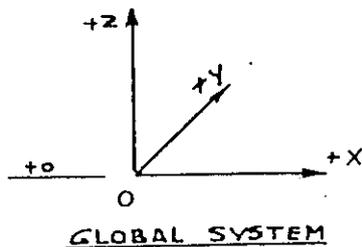
GENERAL CONTENTS

	letter	pages
A: <u>Velocities and loads</u>	VL	800 thru. 848
B: <u>General structural analysis:</u>		
S 311 C: lift	GS	1001 thru. 1315
S 311 D: lift and wind	GS	1501 thru. 1671
S 312 C: Horz. loop 4	GS	2001 thru. 2198
S 313 C: Horz. loop 3	GS	3001 thru. 3148
S 314 C: horz. loop 2	GS	4001 thru. 4115
S 315 C: horz. loop 1	GS	5001 thru. 5105
S 316 : -station	GS	6000 thru. 6118
C. <u>Structural analysis:</u>		
S 311 : lift	SA	1 thru. 19
column B762' x 9,5/12,7	SB	2106 thru. 2125 3073 thru. 3098 4059 thru. 4103 5053 thru. 5060
column B406,4 x 9,5	SC	2123 thru. 2141 3088 thru. 3105 4068 thru. 4080 5056 thru. 5070
strut K.450 x 250 x 12,5	SD	2139 thru. 2176 3105 thru. 3133 4080 thru. 4102 5070 thru. 5085
saddle K.300 x 300 x 10	SE	2078 thru. 2097 3060 thru. 3073 4048 thru. 4059 5044 thru. 5053
D: <u>Foundation loads</u>		
Arrangement sheets	FL	1299 thru. 1303
S 311 C: lift	FL	1304 thru. 1315
S 311 D: lift and wind	FL	1660 thru. 1671
S 312 C: horz. loop 4	FL	2192 thru. 2198
S 313 C: horz. loop 3	FL	3144 thru. 3148
S 314 C: horz. loop 2	FL	4112 thru. 4115
S 315 C: horz. loop 1	FL	5101 thru. 5105
S 316 : station	FL	6093 thru. 6097



Ref. : SWINGING TURNS  
 Subject: Foundation Loads

- The positive directions of the forces and moments are according to the global system (see scheme)
- +x works from left to right
- x works from right to left
- +y works from near to far
- y works from far to near
- +z works aloft (gives tensile forces)
- z works downwards (gives compression forces)



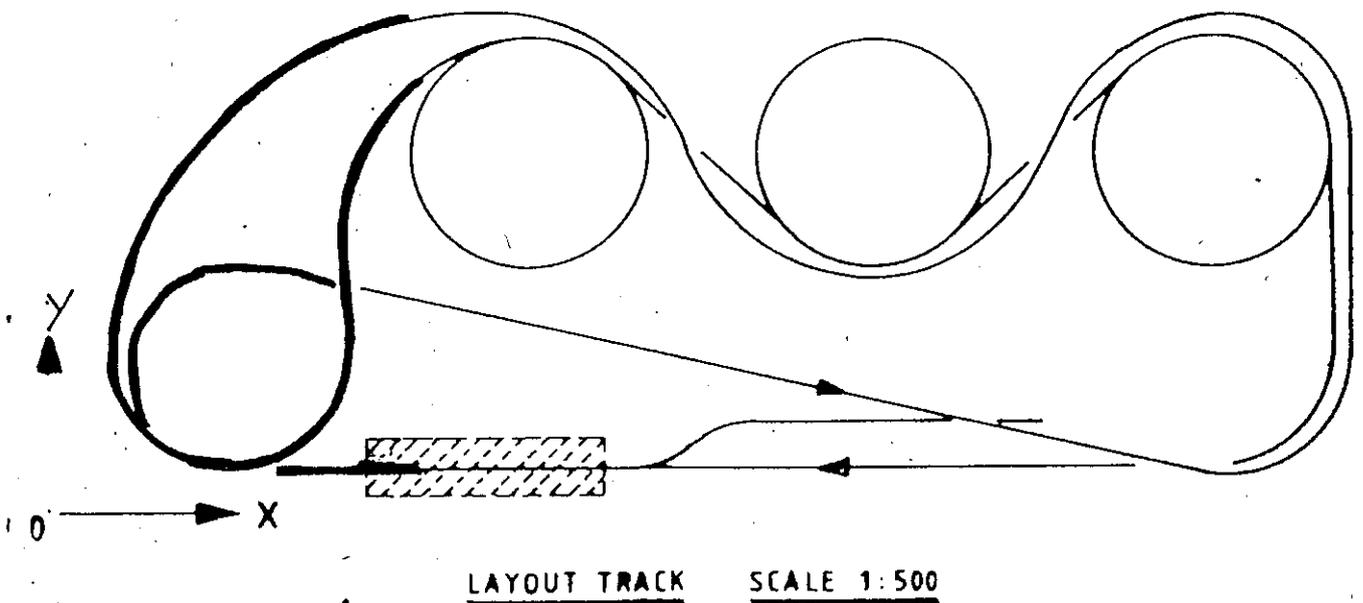
- All forces and moments are according to the righthand rule.
- Force are in KN; moments in kNm
- x and y are shear-forces = 0.102 ton.
- z are tensile-or compression forces
- $M_x$  and  $M_y$  are bending moments
- $M_z$  are torsional moments
- The given loads are related to the underside of the baseplate.
- The loadcases are inclusive of the dead load of the construction. ('DL-ride' or 'DL-ride' + 'Dynamic load from a train in a position').

# Foundation Loads

HORZ. LOOP 1

code S 315

DRAWING 86760-1-15



COMBINATIONS

COMBINATION	L.CASE	DESCRIPTION	FACTOR
1	1	TRAIN IN C46/C47A	-1.200
1	8	DEAD LOAD	-1.000
2	2	TRAIN IN C56/C57	-1.200
2	8	DEAD LOAD	-1.000
3	3	TRAIN IN C58/C59	-1.200
3	8	DEAD LOAD	-1.000
4	4	TRAIN IN C60/C61	-1.200
4	8	DEAD LOAD	-1.000
5	5	TRAIN IN C47B/C44	-1.200
5	8	DEAD LOAD	-1.000
6	6	TRAIN IN C59/C58	-1.200
6	8	DEAD LOAD	-1.000
7	7	TRAIN IN C57/C56	-1.200
7	8	DEAD LOAD	-1.000
8	8	DEAD LOAD	-1.000

REACTIONS

NODE	L.C.	- X --	- Y --	- Z --	- MX --	- MY --	- MZ --
1	1	-20.06	2.97	6.16	-15.33	-126.87	0.00
1	2	-9.73	-1.63	-17.73	7.55	-65.88	0.00
1	3	-3.94	-6.84	-34.70	34.65	-32.59	0.00
1	4	3.17	-3.92	-41.97	15.70	11.80	0.00
1	5	-26.61	6.58	24.28	-33.07	-167.48	0.00
1	6	0.20	-0.88	-32.44	-0.40	-5.17	0.00
1	7	0.70	-0.75	-33.09	-1.36	-2.06	0.00
1	8	0.82	-0.31	-32.58	-3.87	-1.17	0.00
2	1	-0.25	0.36	-56.69	-1.81	-4.87	-1.74
2	2	-1.36	-0.27	-55.17	1.07	-11.17	1.89
2	3	-2.94	-1.06	-51.13	4.72	-19.52	4.97
2	4	-1.14	-0.43	-59.42	1.75	-7.65	2.67
2	5	-1.23	0.86	-55.60	-4.06	-11.29	-0.98
2	6	-0.05	0.03	-62.10	-0.43	-1.57	0.53
2	7	0.17	0.07	-62.69	-0.58	0.00	0.11
2	8	0.25	0.14	-63.29	-0.95	0.38	0.06
3	1	-2.10	2.16	-120.26	-9.17	-11.72	-1.64
3	2	-1.83	0.08	-106.88	2.10	-11.62	1.80
3	3	-2.03	-1.79	-96.44	12.41	-13.87	4.63
3	4	-0.66	-1.20	-91.09	7.13	-4.81	2.54
3	5	-3.48	2.51	-142.67	-9.65	-19.53	-0.69

REACTIONS

NODE	L.C.	- X --	- Y --	- Z --	- MX --	-MY --	-MZ --
3	6	-0.42	-0.04	-97.13	0.53	-2.64	0.58
3	7	-0.27	0.04	-96.62	-0.24	-1.54	0.19
3	8	-0.24	0.11	-96.95	-0.64	-1.35	0.16
4	1	-4.63	3.26	95.03	-20.95	-26.13	0.00
4	2	-2.15	-1.76	-6.07	11.99	-12.88	0.00
4	3	-1.38	-3.32	-21.13	22.50	-8.41	0.00
4	4	-0.38	-1.29	-9.32	8.92	-2.12	0.00
4	5	-4.56	0.91	9.10	-5.56	-27.33	0.00
4	6	-0.87	-0.07	1.04	0.62	-4.85	0.00
4	7	-0.83	0.31	3.84	-1.99	-4.55	0.00
4	8	-0.79	0.28	3.40	-1.79	-4.34	0.00
5	1	-0.09	0.61	-114.00	-9.47	-7.42	1.36
5	2	-1.09	-2.65	-42.48	15.83	-9.66	2.67
5	3	-1.04	-4.21	-33.02	26.31	-8.89	3.86
5	4	-0.26	-2.11	-40.82	12.46	-2.49	1.75
5	5	-1.61	-0.22	-55.13	-0.59	-14.67	0.24
5	6	-0.17	-0.89	-48.42	4.19	-2.09	0.56
5	7	-0.05	-0.50	-50.22	1.57	-1.20	0.08
5	8	-0.06	-0.52	-50.07	1.74	-1.26	0.19
6	1	-0.56	0.15	-165.97	-8.31	-9.95	0.40
6	2	-1.11	-1.98	-41.16	14.82	-9.42	3.50
6	3	-0.24	-3.35	-38.30	25.19	-4.75	4.83
6	4	0.62	-1.67	-43.13	11.50	1.52	2.17
6	5	-3.30	0.54	-62.76	-3.90	-22.32	0.37
6	6	0.13	-0.64	-46.18	3.33	-0.99	0.82
6	7	0.17	-0.31	-47.51	0.65	-0.56	0.25
6	8	0.19	-0.34	-47.08	0.90	-0.44	0.36
7	1	3.19	-0.32	-120.13	-4.54	6.99	0.24
7	2	-0.85	-1.58	-54.73	11.88	-12.23	1.82
7	3	0.24	-3.62	-33.58	27.48	-2.78	2.95
7	4	3.41	-2.39	-28.67	17.85	17.01	2.32
7	5	-0.15	-0.32	-26.71	0.75	-7.23	1.70
7	6	1.22	-0.80	-37.00	4.54	3.94	0.87
7	7	1.16	-0.39	-37.54	1.23	3.66	0.36
7	8	1.37	-0.50	-37.24	2.09	5.03	0.63
8	1	-5.54	-0.92	32.29	-15.82	-29.73	0.00
8	2	-18.57	-11.02	115.52	34.32	-116.06	-0.00
8	3	-6.86	-17.98	103.87	98.00	-49.98	-0.00
8	4	12.95	-13.54	-7.82	73.05	81.73	-0.00
8	5	-3.75	-4.74	24.61	11.31	-17.00	-0.00
8	6	-27.37	-31.25	44.18	81.59	-75.77	-0.00
8	7	-41.48	7.94	41.31	-20.04	-113.02	-0.00
8	8	-3.99	-3.74	6.23	10.14	-13.70	-0.00
9	1	-1.37	2.76	-123.19	-8.15	-3.62	-0.83
9	2	-1.00	5.42	-124.83	-8.92	-10.84	-2.62
9	3	2.68	-2.83	-39.20	14.11	-1.20	-0.75
9	4	5.02	-9.12	-6.74	25.38	12.55	2.64
9	5	1.04	0.01	-66.75	0.53	-0.01	0.03
9	6	-0.20	-1.71	-58.03	4.89	-2.58	-0.47
9	7	0.69	2.15	-103.08	-8.58	-2.41	-1.64
9	8	0.70	-0.49	-61.55	0.83	0.50	-0.17

C44

C45

C46

C47A

C48

C56

3

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3

3

3

3

REACTIONS

NODE	L.C.	- X --	- Y --	- Z --	- MX --	-MY --	-MZ --	
10	1	-0.46	1.24	-85.64	-5.38	-3.65	-0.67	
10	2	-7.02	3.86	-162.83	-7.08	-22.81	-2.23	
10	3	-0.59	-0.43	-109.26	10.76	-6.64	-0.40	
CS4	10	4	10.72	-5.10	-29.31	21.74	24.17	2.57
10	5	1.63	0.16	-76.10	1.20	0.65	0.24	
10	6	1.31	-1.57	-96.08	7.52	-3.14	0.05	
10	7	2.53	1.51	-125.27	-3.86	-3.63	-1.17	
10	8	1.72	-0.22	-72.25	1.10	1.45	0.01	
11	1	1.37	2.37	-69.48	-6.84	-1.48	-0.26	
11	2	-6.95	-1.68	-133.05	2.61	-25.69	-1.72	
11	3	-4.76	-4.18	-167.23	16.79	-13.13	-0.18	
CS8	11	4	7.23	0.23	-66.02	11.69	23.93	2.63
11	5	1.56	1.39	-77.27	-0.76	1.45	0.54	
11	6	3.84	3.12	-134.71	-0.07	0.80	0.34	
11	7	0.28	4.38	-106.02	-10.19	-8.70	-1.23	
11	8	1.83	1.31	-74.90	-1.08	2.01	0.24	
12	1	-0.31	6.38	-63.34	-12.71	-2.37	0.31	
12	2	-3.38	2.35	-80.69	-1.30	-20.00	-0.87	
12	3	-0.79	-4.94	-171.40	18.07	-6.37	0.46	
CS9	12	4	4.66	-2.27	-127.97	11.25	22.25	3.07
12	5	0.31	3.70	-75.60	-5.33	1.55	1.10	
12	6	-0.08	3.04	-138.40	-9.61	-0.50	1.57	
12	7	-2.14	5.08	-71.54	-9.18	-7.37	-0.14	
12	8	0.53	3.57	-76.19	-5.06	1.74	0.78	
13	1	-1.25	1.19	-41.38	-8.59	-8.16	0.16	
13	2	-3.43	0.78	-34.68	-2.66	-27.16	-0.08	
13	3	-1.27	-0.62	-74.64	11.00	-10.62	0.82	
CS6	13	4	1.65	-1.28	-118.76	12.23	16.10	1.51
13	5	-0.65	0.62	-41.37	-4.14	-3.58	1.60	
13	6	-0.73	0.25	-45.85	-0.60	-4.56	0.39	
13	7	-1.01	0.54	-44.03	-2.97	-6.70	0.10	
13	8	-0.60	0.37	-45.62	-1.87	-3.35	0.38	
14	1	-1.70	0.35	-49.77	-4.46	-10.39	0.52	
14	2	-5.28	-0.78	-27.65	4.85	-36.03	-0.05	
14	3	-3.34	-1.95	-30.34	16.70	-21.28	0.89	
CS7	14	4	0.01	-1.53	-122.48	13.38	7.19	1.69
14	5	-2.43	-0.66	-80.19	1.44	-13.41	2.06	
14	6	-1.44	-0.25	-47.68	1.64	-8.28	0.52	
14	7	-1.61	-0.08	-47.16	-0.05	-9.63	0.24	
14	8	-1.17	-0.08	-48.63	0.16	-6.36	0.51	
15	1	-4.41	1.60	-9.33	-11.27	-25.90	-1.39	
15	2	-3.81	0.23	-28.91	1.05	-24.29	0.99	
15	3	-1.85	-1.32	-34.87	14.42	-11.39	0.81	
15	4	-0.87	-0.14	-55.73	6.63	-1.77	0.52	
CS47B	15	5	-5.53	1.85	-78.13	-10.10	-30.85	0.67
15	6	-1.51	0.34	-33.75	-1.07	-7.88	0.02	
15	7	-1.60	0.53	-33.48	-2.88	-8.42	-0.29	
15	8	-1.43	0.50	-33.75	-2.64	-7.20	-0.07	
16	1	-3.59	0.47	-73.74	-3.90	-18.39	-1.24	
16	2	-1.90	-0.31	-61.22	3.44	-9.90	1.43	
16	3	-1.00	-1.37	-55.16	12.57	-5.39	4.09	

VEKOMA BV VLODROP

PROJECT : S315C SWINGING TURNS HORZ.LOOP 1

REACTIONS

NODE	L.C.	- X --	- Y --	- Z --	- MX --	-MY --	-MZ --
16	4	0.25	-0.60	-46.11	5.98	0.99	2.26
16	5	-4.95	1.02	-110.20	-6.94	-24.85	-1.24
(C40) 16	6 (3)	-0.21	0.00	-49.17	0.24	-1.30	0.42
16	7	-0.12	0.10	-48.60	-0.67	-0.85	0.08
16	8	-0.09	0.14	-48.33	-1.01	-0.71	0.04
17	1	0.00	-1.52	-11.07	0.00	0.00	0.00
17	2	-0.00	-1.59	-11.16	0.00	0.00	0.00
17	3	0.00	-1.74	-11.61	0.00	0.00	0.00
(C53A) 17	4 (4)	0.00	-1.70	-11.68	0.00	0.00	0.00
17	5	0.00	-1.57	-11.24	0.00	0.00	0.00
17	6	0.00	-3.02	-16.76	0.00	0.00	0.00
17	7	-0.00	-1.60	-11.27	0.00	0.00	0.00
17	8	0.00	-1.57	-11.23	0.00	0.00	0.00
18	1	0.00	1.86	-14.56	0.00	0.00	0.00
18	2	-0.00	1.68	-13.91	0.00	0.00	0.00
18	3	-0.00	1.70	-14.21	0.00	0.00	0.00
(C53B) 18	4 (4)	0.00	1.94	-15.11	0.00	0.00	0.00
18	5	0.00	1.87	-14.65	0.00	0.00	0.00
18	6	0.00	3.33	-22.35	0.00	0.00	0.00
18	7	0.00	1.81	-14.50	0.00	0.00	0.00
18	8	0.00	1.86	-14.62	0.00	0.00	0.00
19	1	0.00	-0.80	-8.38	0.00	0.00	0.00
19	2	-0.00	-0.81	-8.41	0.00	0.00	0.00
19	3	0.00	-0.76	-8.28	0.00	0.00	0.00
(C52A) 19	4 (4)	0.00	-0.72	-8.18	0.00	0.00	0.00
19	5	0.00	-0.78	-8.33	0.00	0.00	0.00
19	6	0.00	-0.74	-8.13	0.00	0.00	0.00
19	7	0.00	-0.82	-8.41	0.00	0.00	0.00
19	8	0.00	-0.78	-8.34	0.00	0.00	0.00
20	1	0.00	0.71	-8.99	0.00	0.00	0.00
20	2	-0.00	0.71	-9.03	0.00	0.00	0.00
20	3	0.00	0.72	-8.95	0.00	0.00	0.00
(C52B) 20	4 (4)	0.00	0.74	-8.88	0.00	0.00	0.00
20	5	0.00	0.72	-8.97	0.00	0.00	0.00
20	6	0.00	0.42	-7.33	0.00	0.00	0.00
20	7	0.00	0.69	-8.94	0.00	0.00	0.00
20	8	0.00	0.72	-8.97	0.00	0.00	0.00
21	1	-0.06	0.66	-17.97	-2.24	0.00	-0.28
21	2	-0.56	-2.34	-19.32	4.43	-1.49	-0.13
21	3	-0.56	-7.72	-10.80	16.09	-1.94	-0.18
(C54) 21	4 (1)	-0.05	-6.43	-6.35	13.21	-0.54	-0.18
21	5	-0.17	-1.39	-15.76	2.29	-0.44	-0.11
21	6	-0.29	-4.19	-15.14	8.51	-1.03	-0.41
21	7	0.02	-1.86	-32.09	1.79	-0.10	-0.52
21	8	-0.09	-1.46	-14.89	2.40	-0.24	-0.30
22	1	-1.89	-0.41	-7.35	1.04	-0.07	0.37
22	2	-8.37	0.38	-2.90	2.11	-0.99	1.20
22	3	-1.00	-1.44	-8.92	3.05	-0.33	0.54
(C2B) 22	4 (1)	8.67	-2.96	-15.95	2.20	0.87	-0.46
22	5	-1.15	-0.73	-8.13	1.46	-0.08	0.45
22	6	-0.35	-1.25	-9.02	2.33	-0.13	0.20

REACTIONS

NODE	L.C.	- X --	- Y --	- Z --	- MX --	-MY --	-MZ -
22	7	-3.40	-0.47	-6.84	1.80	-0.18	0.34
22	8	0.47	-1.04	-9.33	1.44	0.11	0.17
23	1	-0.19	1.07	-9.62	-1.41	0.66	-0.41
23	2	-6.63	2.03	-5.57	-0.58	-0.32	-1.52
23	3	-3.00	0.90	-7.62	0.38	0.02	-0.83
23	4	4.57	-0.35	-12.34	-0.24	1.14	0.50
23	5	-1.05	1.10	-9.05	-1.06	0.50	-0.52
23	6	-0.25	0.57	-9.33	-0.16	0.44	-0.40
23	7	0.36	0.84	-10.30	-0.96	0.83	-0.51
23	8	0.79	0.71	-10.16	-1.01	0.73	-0.22
130	1	-0.13	2.80	-14.87	-5.27	-0.01	0.13
130	2	-0.72	0.51	-16.87	0.37	-1.64	-0.99
130	3	-0.91	-3.08	-10.77	9.48	-2.54	-0.14
130	4	-0.38	-2.03	-6.69	6.92	-1.22	1.25
130	5	-0.33	1.32	-13.94	-1.56	-0.66	0.03
130	6	-0.48	-0.71	-11.33	3.56	-1.29	0.25
130	7	-0.19	5.17	-27.28	-8.22	-0.22	0.27
130	8	-0.23	1.33	-12.71	-1.57	-0.43	0.38

C2A

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C1

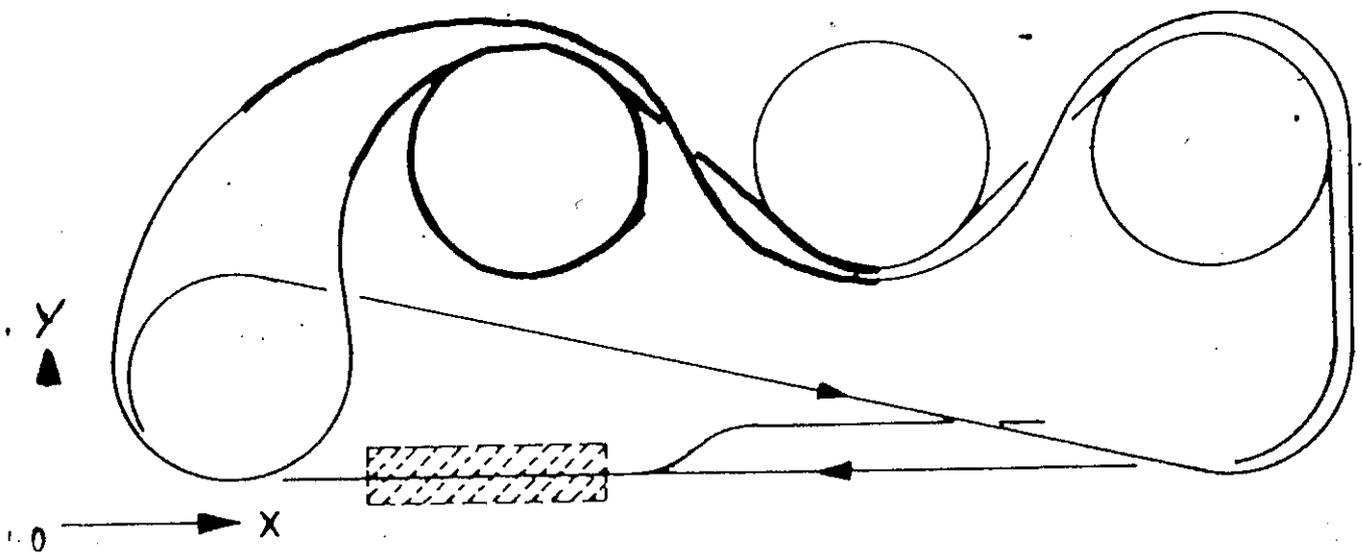
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# Foundation Loads

HORZ. LOOP 2

code S 314

DRAWING 86760-1-14



LAYOUT TRACK

SCALE 1:500

COMBINATIONS

COMBINATION	L.CASE	DESCRIPTION	FACTOR
1	1	TRAIN IN C37/C38	-1.200
1	9	DEAD LOAD	-1.000
2	2	TRAIN IN C39/C45	-1.200
2	9	DEAD LOAD	-1.000
3	3	TRAIN IN C39/C38	-1.200
3	9	DEAD LOAD	-1.000
4	4	TRAIN IN C37/C36	-1.200
4	9	DEAD LOAD	-1.000
5	5	TRAIN IN C43/C42	-1.200
5	9	DEAD LOAD	-1.000
6	6	TRAIN IN C41/C40	-1.200
6	9	DEAD LOAD	-1.000
7	7	TRAIN IN C39/C38	-1.200
7	9	DEAD LOAD	-1.000
8	8	TRAIN IN C37/C36	-1.200
8	9	DEAD LOAD	-1.000
9	9	DEAD LOAD	-1.000

REACTIONS

NODE	L.C.	- X --	- Y --	- Z --	- MX --	- MY --	- MZ --
1	1	11.58	0.53	-60.02	3.70	35.78	-0.00
1	2	5.70	-2.15	-35.48	13.84	7.41	0.00
1	3	-3.38	2.71	-35.28	-12.83	-34.74	-0.00
1	4	26.19	0.49	-91.93	9.93	104.33	0.00
1	5	16.87	-1.94	-59.43	17.92	59.97	0.00
1	6	-17.67	1.27	4.64	-10.80	-101.67	-0.00
1	7	-10.53	4.20	-25.38	-21.01	-66.40	-0.00
1	8	35.72	0.32	-36.92	0.60	99.36	-0.00
1	9	4.59	0.44	-42.70	1.41	2.49	-0.00
2	1	0.27	-0.34	-53.34	1.16	-0.29	-1.07
2	2	1.04	-0.81	-56.11	2.59	5.38	1.53
2	3	-0.95	0.64	-38.04	-2.07	-10.46	-2.53
2	4	0.15	-0.81	-63.56	2.71	1.13	-2.11
2	5	1.85	-1.13	-65.82	3.69	12.93	2.72
2	6	-0.31	0.66	-38.00	-2.18	-4.71	1.28
2	7	-2.79	1.11	-36.80	-3.53	-20.13	-4.14
2	8	-1.72	-0.15	-49.68	0.40	-11.18	-4.06
2	9	0.34	-0.16	-50.57	0.55	0.40	0.10

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VEKOMA BV VLODRUP

PROJECT : S3140 SWINGING TURNS HORZ.LOOP 2

REACTIONS

NODE	L.C.	- X --	- Y --	- Z --	- MX --	-MY --	-Mz -		
3	1	0.42	0.39	-79.27	-2.03	0.49	-1.12		
3	2	0.42	-1.24	-91.75	6.15	3.05	1.66		
3	3	-1.92	0.26	-95.92	-5.98	-11.52	-2.92		
3	4	1.77	1.85	-64.97	-5.82	5.98	-2.00		
C32	3	5	③	2.25	-0.90	-78.51	8.34	12.42	3.13
3	6	-2.61	-2.12	-113.46	5.15	-10.66	1.10		
3	7	-3.78	0.96	-101.11	-10.88	-20.05	-4.64		
3	8	0.25	3.10	-94.12	-13.62	-3.90	-4.13		
3	9	-0.11	-0.44	-89.65	1.28	-0.78	0.08		
4	1	1.72	0.26	-85.35	-2.60	5.13	-1.31		
4	2	0.73	-1.25	-89.70	8.55	1.19	2.20		
4	3	-0.87	2.05	-103.84	-13.29	-4.86	-3.78		
4	4	4.17	0.34	-55.83	-3.50	14.66	-2.00		
C31	4	5	③	2.63	-2.45	-71.19	15.33	8.56	4.02
4	6	-3.23	0.41	-125.85	-0.35	-14.11	0.87		
4	7	-2.04	3.89	-110.95	-22.15	-9.26	-5.77		
4	8	5.12	2.41	-154.05	-12.97	14.20	-3.82		
4	9	0.51	-0.08	-90.98	0.54	0.43	0.07		
5	1	7.23	22.50	39.70	-125.00	36.32	-0.00		
5	2	-0.10	21.59	8.65	-118.33	-3.13	-0.00		
5	3	-10.89	53.53	28.05	-285.00	-66.87	0.00		
C35	5	4	③	47.10	30.87	-7.48	-160.46	241.29	-0.00
5	5	20.18	-68.22	-78.14	338.83	110.23	-0.00		
5	6	-63.47	-38.22	-46.27	178.08	-313.49	0.00		
5	7	-23.56	78.01	3.19	-381.01	-155.85	0.00		
5	8	12.36	33.75	-20.25	-161.65	48.04	0.00		
5	9	-2.62	-0.46	-41.74	-3.33	-14.85	0.00		
6	1	1.23	1.89	-177.34	-11.89	5.62	-0.66		
6	2	2.02	-0.45	-116.66	-0.22	10.47	-4.90		
6	3	-0.39	5.51	-143.87	-30.54	-5.21	0.05		
6	4	5.96	5.64	-172.15	-26.37	26.20	1.06		
C37	6	5	③	-0.48	-8.66	-80.01	38.96	3.37	-0.53
6	6	-9.89	-8.28	-73.90	32.16	-40.85	-0.70		
6	7	-4.11	8.32	-132.96	-42.01	-19.98	1.84		
6	8	-3.11	2.04	-189.64	-15.72	-8.65	2.29		
6	9	-0.94	-1.26	-98.93	3.07	-3.14	-0.58		
7	1	1.10	2.76	-187.10	-14.68	5.33	-0.49		
7	2	3.06	2.71	-142.14	-14.11	15.40	-4.39		
7	3	-1.04	7.78	-186.88	-36.91	-6.94	0.02		
7	4	3.46	3.87	-145.53	-19.15	18.62	1.34		
C38	7	5	③	1.55	-10.82	-64.75	46.81	8.82	0.65
7	6	-5.68	-5.82	-83.63	24.29	-28.83	0.06		
7	7	-3.70	9.73	-171.42	-45.52	-19.15	0.95		
7	8	-1.32	3.56	-123.70	-17.52	-6.05	2.24		
7	9	0.14	-0.52	-101.09	0.95	-0.15	-0.23		
8	1	0.55	2.21	-140.24	-13.13	3.35	-0.46		
8	2	1.29	3.93	-178.86	-22.21	7.97	-4.21		
8	3	-2.40	6.73	-187.49	-33.71	-11.34	-0.28		
C39	8	4	③	4.27	0.95	-110.76	-7.97	21.43	1.41
8	5	3.94	-9.35	-82.58	43.64	16.62	1.28		
8	6	-5.62	-2.96	-126.72	15.07	-29.79	-0.33		

VEKOMA BV VLODROP

PROJECT : S314C SWINGING TURNS HORZ.LOOP 2

$M_x > M_y$

REACTIONS

NODE	L.C.	- X --	- Y --	- Z --	- MX --	- MY --	- MZ --		
8	7	-4.67	8.35	-169.41	-40.69	-22.44	-0.09		
8	8	-0.90	1.70	-116.00	-9.12	-4.26	2.05		
8	9	0.19	0.04	-109.02	-0.76	-0.10	-0.15		
9	1	0.06	1.66	10.06	-11.20	1.24	0.00		
9	2	-1.13	7.93	104.66	-52.16	-5.50	0.00		
9	3	-1.96	2.49	19.49	-16.43	-11.19	0.00		
9	4	2.31	0.79	-2.71	-5.85	15.47	0.00		
C44	9	5	3	0.92	-1.93	-17.62	12.82	6.24	0.00
9	6	-3.83	-0.32	9.62	3.06	-23.72	0.00	0.00	
9	7	-2.50	2.19	23.11	-14.28	-14.90	0.00	0.00	
9	8	-0.39	0.32	2.76	-2.17	-1.71	0.00	0.00	
9	9	-0.77	0.38	4.29	-2.43	-4.19	0.00	0.00	
10	1	0.66	0.98	-54.33	-8.18	4.39	-1.05	-1.05	
10	2	1.56	4.74	-166.23	-38.19	8.33	-5.52	-5.52	
10	3	-0.38	1.55	-62.95	-12.36	-4.41	0.12	0.12	
10	4	1.37	0.34	-56.35	-3.84	11.32	0.29	0.29	
C45	10	5	3	0.56	-2.58	-40.39	15.68	4.75	-0.08
10	6	-1.42	-1.54	-43.05	8.29	-13.27	-0.11	-0.11	
10	7	-0.68	1.18	-58.31	-9.28	-7.22	0.52	0.52	
10	8	0.02	-0.45	-52.01	1.24	-0.45	1.12	1.12	
10	9	0.00	-0.44	-50.55	1.16	-0.75	-0.08	-0.08	
11	1	0.98	0.67	-48.15	-7.77	5.12	-1.09	-1.09	
11	2	0.11	3.92	-107.08	-39.49	0.71	-6.40	-6.40	
11	3	-1.09	1.30	-57.67	-11.60	-7.76	0.16	0.16	
11	4	3.23	-0.36	-32.76	-0.93	19.44	0.42	0.42	
C46	11	5	3	2.18	-2.05	-33.34	13.40	11.26	0.21
11	6	-2.83	-0.44	-63.03	3.53	-19.71	0.14	0.14	
11	7	-1.72	1.07	-62.06	-9.44	-11.89	0.63	0.63	
11	8	0.59	-0.53	-45.44	2.03	1.96	1.40	1.40	
11	9	0.23	-0.26	-48.35	0.20	-0.15	0.06	0.06	
12	1	0.74	0.62	-27.57	-8.18	3.92	-0.88	-0.88	
12	2	-1.19	5.20	-28.25	-45.26	-6.95	-7.85	-7.85	
12	3	-0.07	0.47	-29.06	-7.07	-1.31	1.20	1.20	
12	4	2.46	-0.19	-24.75	-2.13	15.06	-0.31	-0.31	
C47A	12	5	3	1.24	-1.49	-27.67	10.16	6.02	-1.10
12	6	-1.81	-0.90	-32.69	6.08	-13.96	0.46	0.46	
12	7	-0.58	0.19	-29.80	-4.67	-4.93	1.60	1.60	
12	8	0.79	-0.85	-27.89	4.01	3.63	1.03	1.03	
12	9	0.28	-0.40	-28.72	0.71	0.36	-0.01	-0.01	
13	1	-0.41	0.77	-24.88	-7.75	-1.32	-0.69	-0.69	
13	2	-1.93	2.44	-16.72	-23.95	-11.88	-5.46	-5.46	
13	3	-0.76	1.30	-21.72	-12.11	-3.96	1.24	1.24	
13	4	0.90	0.33	-27.97	-4.11	8.08	-0.42	-0.42	
C47B	13	5	3	-0.34	-1.22	-27.94	11.07	-1.38	-2.14
13	6	-2.52	-0.29	-22.85	3.68	-17.00	-0.41	-0.41	
13	7	-1.26	1.21	-23.04	-11.02	-7.43	1.56	1.56	
13	8	-0.37	0.11	-26.12	-1.16	-1.27	0.43	0.43	
13	9	-0.84	0.12	-25.30	-1.22	-4.60	-0.41	-0.41	
14	1	1.27	2.11	-51.66	-12.75	5.57	-0.05	-0.05	
14	2	0.36	4.51	-62.56	-25.23	0.83	-4.06	-4.06	
14	3	-1.44	3.94	-80.63	-24.98	-8.10	-0.02	-0.02	

REACTIONS

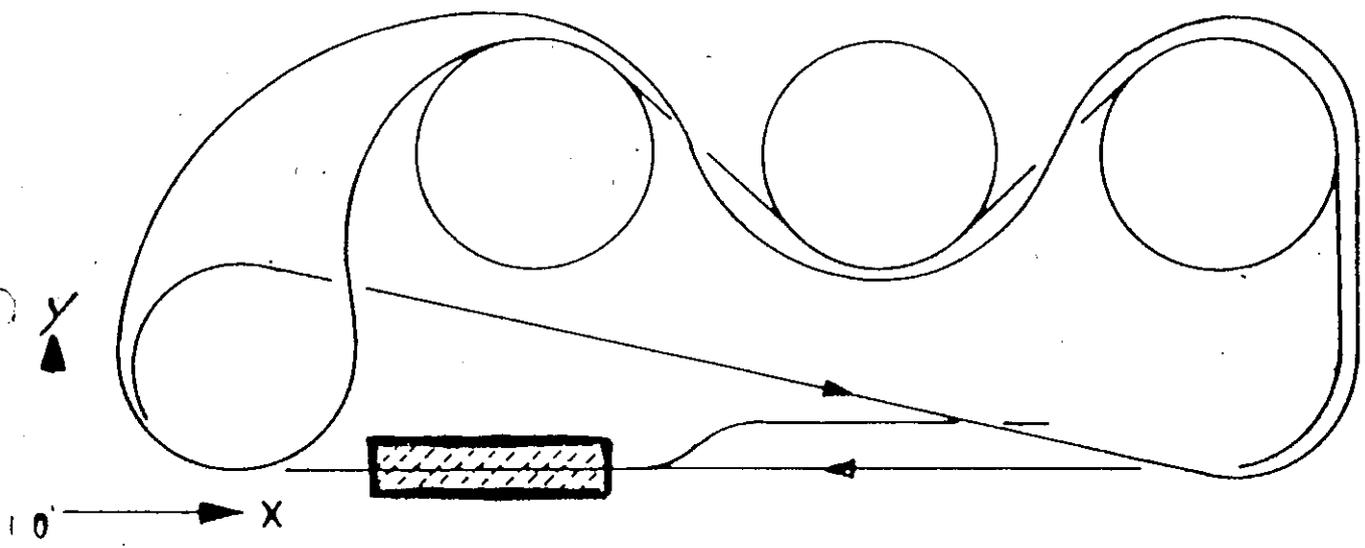
NODE	L.C.	- X --	- Y --	- Z --	- MX --	- MY --	- MZ --
		6.87	1.21	-48.66	-7.61	32.08	1.92
		3.68	-6.02	-54.22	33.44	16.70	1.43
(C40)		-6.53	-1.94	-109.02	10.82	-33.51	-0.53
	(3)	-3.32	6.17	-85.56	-34.53	-17.46	0.13
		1.19	0.89	-62.50	-5.54	4.86	1.98
		0.15	0.26	-61.91	-1.48	-0.25	-0.04
		2.13	3.43	-23.23	-16.92	8.69	0.10
		-0.10	3.97	-25.44	-22.14	-4.29	-3.41
		1.00	5.49	-22.90	-29.74	0.66	0.26
(C41)		6.64	4.24	-16.21	-18.41	34.08	2.27
	(3)	1.26	-4.05	-62.12	27.82	10.22	0.54
		-5.11	-2.45	-90.70	13.44	-29.82	-1.26
		-0.19	5.84	-27.44	-32.75	-6.36	-0.08
		2.33	2.32	-27.15	-11.17	11.09	2.03
		0.31	0.68	-33.04	-2.76	0.35	0.00
		0.53	4.09	-22.39	-19.67	3.62	0.34
		-1.55	3.51	-21.80	-17.27	-10.28	-3.12
		-0.59	7.47	-14.60	-37.47	-3.99	0.78
(C42)		3.79	4.48	-21.12	-21.92	25.23	2.56
	(3)	1.59	-4.85	-91.28	29.02	10.55	0.75
		-3.39	-1.75	-59.69	11.79	-25.04	-0.74
		-1.47	7.88	-18.82	-40.41	-10.03	0.54
		1.23	3.59	-25.68	-17.91	8.33	2.14
		-0.15	1.08	-31.99	-4.26	-1.02	0.10
		-0.55	2.72	-27.04	-15.37	-0.40	0.38
		-1.99	1.51	-24.71	-7.22	-10.54	-3.00
		-2.90	5.82	-17.84	-32.95	-12.57	1.05
(C43)		2.12	2.85	-56.41	-19.00	18.94	1.90
	(3)	1.94	-3.79	-88.46	24.48	11.83	0.11
		-4.31	-0.69	-29.41	8.38	-26.43	-1.21
		-3.85	6.30	-20.65	-35.81	-18.64	0.93
		-0.08	3.09	-28.67	-18.37	2.59	2.15
		-0.75	0.86	-31.96	-3.80	-3.13	0.16
		0.34	1.18	-73.88	-9.95	2.61	0.10
		-0.00	0.41	-57.06	-1.95	-0.19	-3.36
		-1.69	3.58	-53.27	-24.89	-9.19	1.08
(C36)		3.25	2.89	-104.97	-19.03	20.34	1.95
	(3)	1.58	-3.33	-80.61	22.94	9.86	0.04
		-5.12	-2.26	-60.13	13.94	-28.68	-0.90
		-2.95	4.03	-57.93	-27.59	-16.22	1.21
		0.22	2.59	-57.42	-17.15	1.57	1.99
		-0.51	0.17	-59.60	-1.50	-2.49	0.08

# Foundation Loads

STATION

Code S316

DRAWING 86760-1-16



LAYOUT TRACK      SCALE 1:500

COMBINATIONS

COMBINATION	L. CASE	DESCRIPTION	FACTOR
1	1	DEAD LOAD	-1.000
2	1	DEAD LOAD	-1.000
2	6	TRAIN IN STATION WITH BRAKES	-1.200
3	1	DEAD LOAD	-1.000
3	3	LIVE LOAD PLATFORM	-1.000
3	4	10% HORZ.LOAD Y-DIR.	-1.000
3	6	TRAIN IN STATION WITH BRAKES	-1.200
4	1	DEAD LOAD	-1.000
4	3	LIVE LOAD PLATFORM	-1.000
4	5	10% HORZ.LOAD X-DIR.	-1.000
4	6	TRAIN IN STATION WITH BRAKES	-1.200
5	1	DEAD LOAD	-1.000
5	3	LIVE LOAD PLATFORM	-1.000
5	4	10% HORZ.LOAD Y-DIR.	-1.000
5	6	TRAIN IN STATION WITH BRAKES	-1.200
5	7	WIND IN -Y-DIR.	-0.600
6	1	DEAD LOAD	-1.000
6	3	LIVE LOAD PLATFORM	-1.000
6	5	10% HORZ.LOAD X-DIR.	-1.000
6	6	TRAIN IN STATION WITH BRAKES	-1.200
6	7	WIND IN -Y-DIR.	-0.600
7	1	DEAD LOAD	-1.000
7	3	LIVE LOAD PLATFORM	-1.000
7	4	10% HORZ.LOAD Y-DIR.	-1.000
7	6	TRAIN IN STATION WITH BRAKES	-1.200
7	8	WIND IN -X-DIR.	-0.600
8	1	DEAD LOAD	-1.000
8	3	LIVE LOAD PLATFORM	-1.000
8	5	10% HORZ.LOAD X-DIR.	-1.000
8	6	TRAIN IN STATION WITH BRAKES	-1.200
8	8	WIND IN -X-DIR.	-0.600
9	1	DEAD LOAD	-1.000
9	2	SNOW	-1.000
10	1	DEAD LOAD	-1.000
10	2	SNOW	-1.000
10	7	WIND IN -Y-DIR.	-1.200
11	1	DEAD LOAD	-1.000
11	2	SNOW	-1.000
11	8	WIND IN -X-DIR.	-1.200

REACTIONS

NODE	L.C.	- X --	- Y --	- Z --	- MX --	-MY --	-MZ --
1	1	0.54	-0.16	-16.29	0.00	0.00	0.00
1	2	-7.61	-0.71	-4.91	0.00	0.00	0.00
1	3	-7.64	-5.35	-25.00	0.00	0.00	0.00
1	4	-12.67	-1.95	-15.70	0.00	0.00	0.00
1	5	-7.66	-7.71	-30.03	0.00	0.00	0.00
1	6	-12.69	-4.31	-20.73	0.00	0.00	0.00
1	7	-9.55	-5.35	-21.58	0.00	0.00	0.00
1	8	-14.58	-1.96	-12.27	0.00	0.00	0.00
1	9	0.55	-0.09	-21.32	0.00	0.00	0.00
1	10	0.51	-4.81	-31.38	0.00	0.00	0.00
1	11	-3.26	-0.10	-14.46	0.00	0.00	0.00
2	1	0.55	0.19	-17.64	0.00	0.00	0.00
2	2	-8.35	-0.65	-4.08	0.00	0.00	0.00
2	3	-8.37	-2.42	-15.08	0.00	0.00	0.00
2	4	-13.54	0.90	-13.35	0.00	0.00	0.00
2	5	-8.34	-4.74	-13.85	0.00	0.00	0.00
2	6	-13.52	-1.41	-12.12	0.00	0.00	0.00
2	7	-10.79	-2.42	-11.59	0.00	0.00	0.00
2	8	-15.47	0.89	-9.86	0.00	0.00	0.00
2	9	0.56	0.10	-24.67	0.00	0.00	0.00
2	10	0.61	-4.53	-22.21	0.00	0.00	0.00
2	11	-3.28	0.09	-17.70	0.00	0.00	0.00
3	1	0.00	0.00	-6.42	0.00	0.00	0.00
3	2	0.00	-0.00	-6.33	0.00	0.00	0.00
3	3	0.00	-0.00	-29.22	0.00	0.00	0.00
3	4	0.00	-0.00	-29.19	0.00	0.00	0.00
3	5	0.00	-0.00	-29.26	0.00	0.00	0.00
3	6	0.00	-0.00	-29.22	0.00	0.00	0.00
3	7	0.00	-0.00	-29.22	0.00	0.00	0.00
3	8	0.00	-0.00	-29.18	0.00	0.00	0.00
3	9	0.00	0.00	-6.39	0.00	0.00	0.00
3	10	-0.00	-0.00	-6.46	0.00	0.00	0.00
3	11	0.00	0.00	-6.39	0.00	0.00	0.00
4	1	-0.55	-0.38	-24.97	0.00	0.00	0.00
4	2	-9.69	-1.26	-61.44	0.00	0.00	0.00
4	3	-9.73	-9.39	-98.94	0.00	0.00	0.00
4	4	-15.14	-4.49	-101.39	0.00	0.00	0.00
4	5	-9.81	-12.05	-105.00	0.00	0.00	0.00
4	6	-15.17	-7.16	-107.44	0.00	0.00	0.00
4	7	-11.85	-9.39	-102.36	0.00	0.00	0.00
4	8	-17.21	-4.49	-104.80	0.00	0.00	0.00
4	9	-0.56	-0.21	-34.70	0.00	0.00	0.00
4	10	-0.62	-5.55	-46.82	0.00	0.00	0.00
4	11	-4.69	-0.21	-41.54	0.00	0.00	0.00
5	1	-0.55	0.36	-27.87	0.00	0.00	0.00
5	2	-11.20	-1.48	-69.46	0.00	0.00	0.00
5	3	-11.15	-3.32	-94.21	0.00	0.00	0.00
5	4	-16.15	1.50	-102.99	0.00	0.00	0.00
5	5	-11.13	-6.00	-95.62	0.00	0.00	0.00
5	6	-16.12	-1.16	-104.40	0.00	0.00	0.00
5	7	-13.23	-3.32	-97.65	0.00	0.00	0.00

C49A

(4)

C49B

(4)

C49C

(5)

C50A

(4)

C50B

(4)

REACTIONS

NODE	L.C.	- X --	- Y --	- Z --	- MX --	- MY --	- MZ --
5	8	-18.23	1.50	-106.43	0.00	0.00	0.00
5	9	-0.56	0.20	-41.62	0.00	0.00	0.00
5	10	-0.51	-5.14	-44.43	0.00	0.00	0.00
5	11	-4.72	0.20	-48.50	0.00	0.00	0.00
6	1	-0.00	0.00	-10.88	0.00	0.00	0.00
6	2	0.00	-0.00	-10.58	0.00	0.00	0.00
6	3	0.00	-0.00	-56.34	0.00	0.00	0.00
6	4	0.00	-0.00	-56.32	0.00	0.00	0.00
6	5	0.00	-0.00	-56.37	0.00	0.00	0.00
6	6	0.00	-0.00	-56.34	0.00	0.00	0.00
6	7	0.00	-0.00	-56.34	0.00	0.00	0.00
6	8	0.00	-0.00	-56.32	0.00	0.00	0.00
6	9	-0.00	0.00	-10.82	0.00	0.00	0.00
6	10	0.00	-0.00	-10.88	0.00	0.00	0.00
6	11	0.00	0.00	-10.82	0.00	0.00	0.00
7	1	0.00	-0.43	-24.42	0.00	0.00	0.00
7	2	8.82	-1.30	-40.30	0.00	0.00	0.00
7	3	8.88	-9.94	-77.69	0.00	0.00	0.00
7	4	8.78	-4.87	-74.11	0.00	0.00	0.00
7	5	8.91	-12.73	-84.01	0.00	0.00	0.00
7	6	8.80	-7.66	-80.42	0.00	0.00	0.00
7	7	9.93	-9.94	-77.64	0.00	0.00	0.00
7	8	9.83	-4.87	-74.05	0.00	0.00	0.00
7	9	0.00	-0.24	-34.31	0.00	0.00	0.00
7	10	0.05	-5.82	-46.94	0.00	0.00	0.00
7	11	2.10	-0.24	-34.20	0.00	0.00	0.00
8	1	-0.00	0.41	-27.28	0.00	0.00	0.00
8	2	10.07	-1.46	-45.18	0.00	0.00	0.00
8	3	10.01	-3.07	-69.99	0.00	0.00	0.00
8	4	10.05	1.91	-73.25	0.00	0.00	0.00
8	5	9.99	-5.86	-71.23	0.00	0.00	0.00
8	6	10.03	-0.87	-74.49	0.00	0.00	0.00
8	7	11.06	-3.07	-69.94	0.00	0.00	0.00
8	8	11.10	1.91	-73.20	0.00	0.00	0.00
8	9	-0.00	0.24	-41.27	0.00	0.00	0.00
8	10	-0.04	-5.34	-43.75	0.00	0.00	0.00
8	11	2.09	0.24	-41.17	0.00	0.00	0.00
9	1	-0.00	0.00	-10.85	0.00	0.00	0.00
9	2	0.00	-0.00	-10.57	0.00	0.00	0.00
9	3	0.00	-0.00	-56.34	0.00	0.00	0.00
9	4	0.00	-0.00	-56.31	0.00	0.00	0.00
9	5	0.00	-0.00	-56.37	0.00	0.00	0.00
9	6	0.00	-0.00	-56.34	0.00	0.00	0.00
9	7	0.00	-0.00	-56.34	0.00	0.00	0.00
9	8	0.00	-0.00	-56.31	0.00	0.00	0.00
9	9	-0.00	0.00	-10.79	0.00	0.00	0.00
9	10	-0.00	-0.00	-10.85	0.00	0.00	0.00
9	11	0.00	0.00	-10.79	0.00	0.00	0.00
10	1	0.64	-0.50	-24.93	0.00	0.00	0.00
10	2	-8.97	-1.20	-23.19	0.00	0.00	0.00
10	3	-9.01	-10.26	-60.09	0.00	0.00	0.00

CS0x

5

CS1A

4

CS1B

4

CS1C

5

REACTIONS

NODE	L.C.	- X --	- Y --	- Z --	- MX --	-MY --	-MZ -
10	4	-14.81	-5.23	-51.80	0.00	0.00	0.00
10	5	-9.02	-12.95	-65.96	0.00	0.00	0.00
10	6	-14.82	-7.92	-57.67	0.00	0.00	0.00
C52A 10	7	-10.89	-10.26	-57.34	0.00	0.00	0.00
10	8	-16.69	-5.23	-49.06	0.00	0.00	0.00
10	9	0.65	-0.30	-34.63	0.00	0.00	0.00
10	10	0.61	-5.69	-46.36	0.00	0.00	0.00
10	11	-3.11	-0.30	-29.14	0.00	0.00	0.00
11	1	0.65	0.47	-27.71	0.00	0.00	0.00
11	2	-10.54	-1.24	-26.84	0.00	0.00	0.00
11	3	-10.46	-2.41	-52.22	0.00	0.00	0.00
11	4	-15.84	2.54	-50.04	0.00	0.00	0.00
11	5	-10.43	-5.10	-53.80	0.00	0.00	0.00
52B 11	6	-15.81	-0.14	-51.62	0.00	0.00	0.00
11	7	-12.36	-2.41	-49.47	0.00	0.00	0.00
11	8	-17.74	2.54	-47.28	0.00	0.00	0.00
11	9	0.66	0.29	-41.42	0.00	0.00	0.00
11	10	0.71	-5.09	-44.59	0.00	0.00	0.00
11	11	-3.13	0.29	-35.91	0.00	0.00	0.00
12	1	-0.00	0.00	-10.82	0.00	0.00	0.00
12	2	0.00	-0.00	-10.58	0.00	0.00	0.00
12	3	0.00	-0.00	-56.34	0.00	0.00	0.00
12	4	0.00	-0.00	-56.31	0.00	0.00	0.00
12	5	0.00	-0.00	-56.36	0.00	0.00	0.00
C52C 12	6	0.00	-0.00	-56.34	0.00	0.00	0.00
12	7	0.00	-0.00	-56.34	0.00	0.00	0.00
12	8	0.00	-0.00	-56.31	0.00	0.00	0.00
12	9	-0.00	0.00	-10.76	0.00	0.00	0.00
12	10	-0.00	-0.00	-10.82	0.00	0.00	0.00
12	11	0.00	0.00	-10.76	0.00	0.00	0.00
13	1	-0.64	-0.25	-16.50	0.00	0.00	0.00
13	2	-11.35	-2.11	-43.88	0.00	0.00	0.00
13	3	-11.45	-7.54	-63.69	0.00	0.00	0.00
13	4	-17.63	-4.12	-66.06	0.00	0.00	0.00
13	5	-11.48	-9.93	-68.74	0.00	0.00	0.00
C53A 13	6	-17.66	-6.51	-71.11	0.00	0.00	0.00
13	7	-13.51	-7.53	-66.50	0.00	0.00	0.00
13	8	-19.70	-4.11	-68.87	0.00	0.00	0.00
13	9	-0.65	-0.15	-21.55	0.00	0.00	0.00
13	10	-0.72	-4.93	-31.66	0.00	0.00	0.00
13	11	-4.78	-0.14	-27.18	0.00	0.00	0.00
14	1	-0.64	0.28	-18.09	0.00	0.00	0.00
14	2	-13.08	-1.94	-43.01	0.00	0.00	0.00
14	3	-13.02	-2.91	-54.29	0.00	0.00	0.00
14	4	-18.78	0.40	-62.67	0.00	0.00	0.00
14	5	-13.00	-5.23	-53.05	0.00	0.00	0.00
C53B 14	6	-18.75	-1.91	-61.43	0.00	0.00	0.00
14	7	-15.11	-2.91	-57.15	0.00	0.00	0.00
14	8	-20.86	0.41	-65.53	0.00	0.00	0.00
14	9	-0.65	0.16	-25.13	0.00	0.00	0.00
14	10	-0.60	24.47	-22.64	0.00	0.00	0.00

REACTIONS

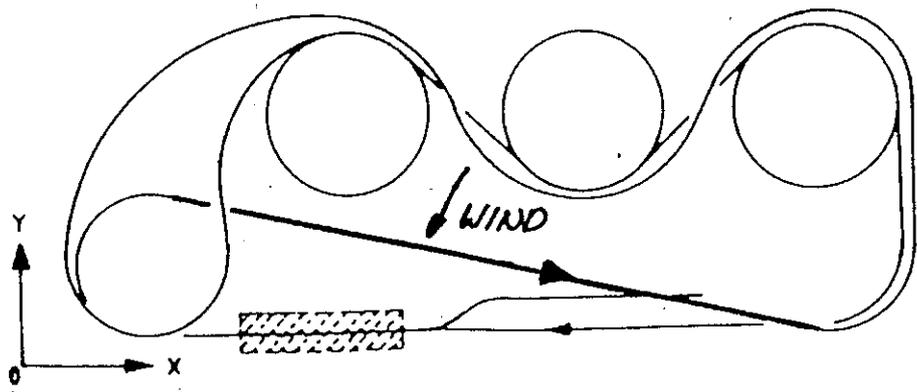
NODE	L.C.	- X --	- Y --	- Z --	- MX --	-MY --	-MZ --
14	11	-4.82	0.17	-30.84	0.00	0.00	0.00
15	1	-0.00	0.00	-6.26	0.00	0.00	0.00
15	2	0.00	-0.00	-6.19	0.00	0.00	0.00
15	3	0.00	-0.00	-29.07	0.00	0.00	0.00
15	4	0.00	-0.00	-29.04	0.00	0.00	0.00
15	5	0.00	-0.00	-29.11	0.00	0.00	0.00
15	6	0.00	-0.00	-29.08	0.00	0.00	0.00
15	7	0.00	-0.00	-29.07	0.00	0.00	0.00
15	8	0.00	-0.00	-29.04	0.00	0.00	0.00
15	9	-0.00	0.00	-6.23	0.00	0.00	0.00
15	10	-0.00	-0.00	-6.30	0.00	0.00	0.00
15	11	0.00	0.00	-6.23	0.00	0.00	0.00

(530

(5)

COMBINATIONS

COMBINATION	L.CASE	DESCRIPTION	FACTOR
1	1	DEAD LOAD	-1.000
1	11	WIND ON FRAME + DRIVE	2.400
2	1	DEAD LOAD	-1.000
2	3	CHAIN LOAD	-1.000
2	4	TRAIN IN C3/C4	-1.000
2	11	WIND ON FRAME + DRIVE	1.200
2	12	WIND ON TRAIN IN C3/C4	1.200
3	1	DEAD LOAD	-1.000
3	3	CHAIN LOAD	-1.000
3	5	TRAIN IN C4/C5	-1.000
3	11	WIND ON FRAME + DRIVE	1.200
3	13	WIND ON TRAIN IN C4/C5	1.200
4	1	DEAD LOAD	-1.000
4	3	CHAIN LOAD	-1.000
4	6	TRAIN IN C5/C6	-1.000
4	11	WIND ON FRAME + DRIVE	1.200
4	14	WIND ON TRAIN IN C5/C6	1.200
5	1	DEAD LOAD	-1.000
5	3	CHAIN LOAD	-1.000
5	7	TRAIN IN C6/C7	-1.000
5	11	WIND ON FRAME + DRIVE	1.200
5	15	WIND ON TRAIN IN C6/C7	1.200
6	1	DEAD LOAD	-1.000
6	3	CHAIN LOAD	-1.000
6	8	TRAIN IN C7/C8	-1.000
6	11	WIND ON FRAME + DRIVE	1.200
6	16	WIND ON TRAIN IN C7/C8	1.200
7	1	DEAD LOAD	-1.000
7	3	CHAIN LOAD	-1.000
7	9	TRAIN IN C8/C9	-1.000
7	11	WIND ON FRAME + DRIVE	1.200
7	17	WIND ON TRAIN IN C8/C9	1.200
8	1	DEAD LOAD	-1.000
8	3	CHAIN LOAD	-1.000
8	10	TRAIN IN C9/C10	-1.000
8	11	WIND ON FRAME + DRIVE	1.200
8	18	WIND ON TRAIN IN C9/C10	1.200



LAYOUT TRACK SCALE 1:1000

REACTIONS

NODE	L.C.	- X --	- Y --	- Z --	- MX --	-MY --	-MZ -
1	1	-1.10	-1.53	-11.96	1.74	-1.76	0.26
1	2	-1.25	-0.80	-13.61	0.52	-2.08	-0.79
1	3	-0.97	-1.04	-11.47	0.71	-1.46	0.60
1	4	-0.89	-1.05	-10.74	0.79	-1.31	0.59
C1	1	-0.91	-1.06	-10.85	0.79	-1.33	0.60
1	6	-0.91	-1.05	-10.85	0.78	-1.34	0.58
1	7	-1.09	-1.00	-12.57	0.68	-1.73	0.23
1	8	-1.69	-0.82	-18.06	0.37	-2.97	-0.88
2	1	-0.87	0.29	-13.99	1.47	-1.42	-0.07
2	2	-1.00	0.56	-15.71	0.31	-1.67	0.59
2	3	-0.72	0.69	-13.07	0.45	-1.06	-0.34
2	4	-0.67	0.63	-12.41	0.54	-0.96	-0.34
C54	2	-0.68	0.64	-12.55	0.54	-0.98	-0.34
2	6	-0.68	0.64	-12.59	0.53	-0.99	-0.33
2	7	-0.82	0.66	-13.95	0.43	-1.26	-0.07
2	8	-1.25	0.72	-18.29	0.12	-2.14	0.74
3	1	-0.10	-0.75	-13.29	1.79	-0.27	0.09
3	2	0.15	-0.28	-12.97	0.60	0.64	0.15
3	3	-0.19	-0.36	-12.92	0.85	-0.56	0.03
3	4	-0.18	-0.39	-12.96	0.93	-0.53	0.03
C55	3	-0.18	-0.39	-12.96	0.93	-0.53	0.03
3	6	-0.18	-0.39	-12.96	0.92	-0.53	0.03
3	7	-0.10	-0.34	-12.93	0.80	-0.22	0.07
3	8	0.17	-0.20	-12.85	0.41	0.75	0.19
4	1	-0.28	-4.78	-16.75	6.85	-1.27	-0.90
4	2	-6.01	-4.90	-24.16	5.89	-2.69	-1.07
4	3	1.16	-3.43	-17.35	3.47	-0.20	-0.77
4	4	1.74	-3.78	-19.62	3.41	-0.35	-0.54
C2A	4	1.65	-3.81	-19.14	3.63	-0.36	-0.58
4	6	1.62	-3.85	-19.17	3.71	-0.39	-0.58
4	7	-1.31	-3.34	-17.60	3.73	-0.77	-0.97
4	8	-10.73	-1.70	-12.64	3.74	-1.98	-2.19
5	1	-1.08	-0.60	-14.74	6.53	-1.42	0.79
5	2	-4.43	2.20	-18.51	5.42	-2.33	1.02
5	3	0.86	0.35	-14.13	3.16	-0.37	0.66
5	4	1.39	0.53	-15.51	3.08	-0.47	0.43
C2B	5	1.24	0.42	-15.30	3.30	-0.49	0.48
5	6	1.18	0.40	-15.34	3.38	-0.52	0.48
5	7	-0.66	0.81	-14.18	3.42	-0.76	0.83
5	8	-6.54	2.14	-10.51	3.50	-1.51	1.91
6	1	-1.04	-5.61	-10.55	12.06	-1.97	-0.82
6	2	-2.34	-9.01	-39.52	13.44	-4.04	-0.85
6	3	-1.45	-6.14	-22.55	10.76	-0.67	-1.07
6	4	-0.47	-3.49	-11.12	6.73	-0.71	-0.59
C3A	6	-0.68	-3.40	-13.39	6.11	-0.91	-0.41
6	6	-0.68	-3.42	-12.99	6.22	-1.01	-0.38
6	7	-0.92	-3.59	-14.18	6.31	-1.73	-0.42
6	8	-1.66	-3.96	-18.03	6.16	-3.99	-0.52
7	1	-1.32	-2.85	-15.64	10.48	-4.59	-0.43
7	2	-0.96	0.80	-33.67	9.25	-5.61	-0.25
7	3	-1.09	-0.53	-22.07	8.02	-3.40	-0.51

REACTIONS

NODE	L.C.	- X --	- Y --	- Z --	- MX --	-MY --	-MZ -
C3B	7 4	-0.66	-1.04	-12.75	5.38	-2.78	-0.37
	7 5	-0.50	-0.58	-13.46	4.77	-2.09	-0.22
	7 6	-0.49	-0.68	-13.37	4.93	-2.10	-0.20
	7 7	-0.63	-0.54	-14.23	4.92	-2.68	-0.13
	7 8	-1.01	0.00	-16.63	4.49	-4.46	0.09
C4A	8 1	-0.68	-5.04	-9.05	17.99	-1.98	-1.87
	8 2	-1.32	-6.14	-39.38	17.90	-3.65	-1.23
	8 3	-0.86	-6.53	-37.37	19.60	-1.83	-1.66
	8 4	-0.97	-4.91	-21.48	16.00	-1.50	-2.06
	8 5	-0.28	-3.28	-10.61	11.29	-0.70	-1.49
	8 6	-0.39	-2.94	-13.28	9.76	-0.95	-1.08
	8 7	-0.47	-2.85	-13.25	9.41	-1.40	-0.95
	8 8	-0.71	-2.86	-13.94	9.24	-2.60	-0.95
C4B	9 1	-1.35	-3.61	-21.49	15.76	-6.37	-1.51
	9 2	-0.91	-1.52	-39.01	12.71	-5.48	-0.89
	9 3	-0.82	-1.97	-39.04	14.23	-5.19	-1.41
	9 4	-1.30	-2.19	-27.71	12.44	-5.60	-1.56
	9 5	-0.83	-2.02	-17.56	9.37	-4.29	-1.24
	9 6	-0.66	-1.54	-17.70	7.88	-3.37	-0.88
	9 7	-0.66	-1.48	-17.56	7.62	-3.44	-0.74
	9 8	-0.84	-1.41	-18.06	7.41	-4.43	-0.65
C5A	10 1	-0.64	-4.02	-8.67	20.57	-3.09	-1.63
	10 2	-0.41	-3.24	-28.45	15.13	-2.81	-0.42
	10 3	-0.80	-4.29	-38.45	20.09	-3.39	-1.04
	10 4	-0.62	-4.57	-37.11	21.57	-2.58	-1.64
	10 5	-0.81	-3.59	-21.24	17.69	-2.83	-2.00
	10 6	-0.31	-2.57	-10.92	12.95	-1.48	-1.38
	10 7	-0.40	-2.22	-13.90	11.01	-1.86	-0.91
	10 8	-0.49	-2.13	-13.83	10.49	-2.55	-0.81
C5B	11 1	-1.00	-3.42	-25.80	18.95	-5.90	-1.43
	11 2	-0.36	-1.97	-32.39	12.48	-3.41	-0.43
	11 3	-0.71	-2.43	-42.79	16.16	-4.52	-0.90
	11 4	-0.74	-2.68	-43.50	17.39	-5.00	-1.48
	11 5	-1.06	-2.46	-31.75	14.96	-5.72	-1.67
	11 6	-0.62	-2.04	-21.20	11.52	-3.90	-1.22
	11 7	-0.53	-1.65	-21.06	9.64	-3.29	-0.78
	11 8	-0.59	-1.57	-20.69	9.19	-3.73	-0.66
C6A	12 1	-0.53	-2.40	-13.78	15.70	-3.54	0.27
	12 2	-0.47	-1.38	-15.54	8.87	-3.18	0.47
	12 3	-0.26	-2.12	-31.62	13.00	-2.43	0.85
	12 4	-0.62	-2.70	-42.22	16.59	-3.72	0.43
	12 5	-0.49	-2.70	-41.77	16.55	-3.04	0.03
	12 6	-0.63	-1.97	-25.96	12.48	-3.28	-0.30
	12 7	-0.27	-1.38	-15.11	8.88	-1.93	0.07
	12 8	-0.36	-1.25	-17.51	7.92	-2.52	0.22
C6B	13 1	-0.43	-2.15	-24.81	15.01	-2.99	0.24
	13 2	-0.31	-1.16	-20.83	8.34	-2.22	0.47
	13 3	-0.04	-1.48	-32.94	11.30	-1.08	0.71
	13 4	-0.34	-1.76	-42.78	13.92	-2.47	0.39
	13 5	-0.30	-1.74	-42.85	13.74	-2.50	0.00
	13 6	-0.51	-1.42	-30.87	10.84	-3.11	-0.21

REACTIONS

NODE	L.C.	- X --	- Y --	- Z --	- MX --	- MY --	- MZ --
13	7	-0.22	-1.15	-20.86	8.21	-1.72	0.06
13	8	-0.25	-0.98	-21.29	7.20	-1.96	0.23
14	1	-1.13	1.26	-12.61	-5.87	-4.06	-0.18
14	2	-0.80	0.49	-11.26	-3.10	-2.67	-0.04
14	3	-0.74	0.34	-10.98	-2.56	-2.38	-0.04
14	4	-0.71	-0.01	-10.44	-1.27	-2.23	-0.05
C48B 14	5	-0.74	-0.22	-10.22	-0.56	-2.29	-0.05
14	6	-0.74	-0.08	-10.35	-1.05	-2.34	-0.04
14	7	-0.77	0.26	-10.87	-2.25	-2.50	-0.02
14	8	-0.83	0.48	-11.19	-3.05	-2.78	-0.03
15	1	-1.09	2.37	-7.39	-6.81	-4.18	0.02
15	2	-0.70	1.54	-8.19	-3.99	-2.51	0.04
15	3	-0.64	1.39	-8.37	-3.45	-2.24	0.01
C48A 15	4	-0.61	1.01	-8.86	-2.15	-2.10	-0.02
15	5	-0.59	0.81	-9.13	-1.44	-2.04	-0.01
15	6	-0.60	0.95	-8.95	-1.92	-2.10	-0.01
15	7	-0.63	1.29	-8.51	-3.14	-2.22	0.02
15	8	-0.71	1.53	-8.23	-3.93	-2.56	0.04
16	1	-0.14	2.65	-10.08	-7.78	-1.28	0.26
16	2	-0.17	1.45	-16.87	-4.51	-1.41	0.48
16	3	-0.23	1.42	-13.81	-4.23	-1.57	0.68
C7A 16	4	-0.16	1.31	-27.38	-3.32	-1.11	0.73
16	5	-0.27	1.20	-38.13	-2.78	-1.68	0.90
16	6	-0.19	1.11	-39.86	-2.63	-1.17	0.67
16	7	-0.26	1.19	-26.40	-3.43	-1.59	0.60
16	8	-0.15	1.29	-15.69	-4.01	-1.21	0.40
17	1	-2.15	-0.42	-61.00	-4.01	-5.25	-0.26
17	2	-1.58	-0.99	-56.69	-1.63	-3.65	0.12
17	3	-1.64	-1.13	-56.98	-1.12	-3.62	0.21
17	4	-1.73	-1.52	-70.90	0.33	-3.62	0.11
C7B 17	5	-1.72	-1.78	-80.18	1.26	-3.62	0.28
17	6	-1.66	-1.71	-78.85	1.07	-3.43	0.11
17	7	-1.56	-1.35	-65.20	-0.27	-3.43	0.19
17	8	-1.59	-1.08	-55.51	-1.28	-3.63	0.02
18	1	-0.37	3.83	-22.75	-7.74	-3.02	0.11
18	2	-0.18	2.77	-22.27	-4.92	-1.74	0.06
18	3	-0.12	2.67	-22.52	-4.41	-1.48	0.03
18	4	-0.11	2.32	-23.04	-3.00	-1.41	-0.01
C7C 18	5	-0.14	2.04	-23.24	-2.06	-1.49	-0.09
18	6	-0.18	2.04	-23.07	-2.24	-1.63	-0.13
18	7	-0.19	2.36	-22.55	-3.54	-1.70	-0.09
18	8	-0.22	2.64	-22.29	-4.57	-1.90	-0.00
19	1	-1.48	-1.63	-47.85	-4.51	-3.63	-0.66
19	2	-1.33	-2.73	-54.90	-1.09	-3.20	-0.05
19	3	-1.33	-2.82	-55.05	-0.71	-3.04	-0.00
19	4	-1.34	-3.08	-52.23	0.39	-3.19	0.25
C8A 19	5	-1.55	-4.09	-69.94	3.56	-3.45	0.22
19	6	-1.63	-4.85	-82.72	5.81	-3.83	0.38
19	7	-1.61	-4.71	-83.81	5.22	-3.57	0.05
19	8	-1.43	-3.71	-66.26	2.09	-3.55	0.06
20	1	-0.98	5.39	-67.93	-11.21	-3.84	0.19



REACTIONS

NODE	L.C.	- X --	- Y --	- Z --	- MX --	-MY --	-MZ --
26	5	-2.40	-9.13	-65.42	-8.16	-2.37	-0.27
26	6	-2.42	-9.19	-65.57	-8.01	-2.36	-0.23
26	7	-2.43	-9.06	-64.94	-8.08	-2.51	-0.18
26	8	-2.87	-10.83	-75.27	-8.09	-2.78	-0.00
27	1	1.51	-3.36	33.77	31.12	-0.48	-0.00
27	2	1.05	-1.06	1.23	10.66	2.57	-0.00
27	3	1.12	-1.07	1.42	10.57	3.22	-0.00
C12 27	4	1.15	-1.07	1.49	10.50	3.55	-0.00
27	5	1.17	-1.07	1.54	10.45	3.74	-0.00
27	6	1.18	-1.06	1.57	10.36	3.89	-0.00
27	7	1.18	-1.04	1.65	10.31	3.87	-0.00
27	8	1.00	-1.10	1.24	11.09	1.94	-0.00
28	1	-0.41	-1.06	-139.09	5.89	-1.81	-0.46
28	2	-0.19	0.45	-109.01	0.04	-0.74	-0.42
28	3	-0.17	0.46	-108.96	-0.00	-0.60	-0.40
28	4	-0.16	0.47	-108.89	-0.03	-0.50	-0.38
C13 28	5	-0.16	0.48	-108.88	-0.05	-0.47	-0.38
28	6	-0.17	0.49	-108.83	-0.08	-0.52	-0.40
28	7	-0.21	0.49	-109.21	-0.08	-0.65	-0.42
28	8	-0.21	0.42	-107.76	0.16	-0.84	-0.39
29	1	0.76	-0.34	-63.76	4.92	0.37	-0.46
29	2	0.31	0.38	-55.61	0.83	0.21	-0.35
29	3	0.35	0.38	-56.05	0.79	0.41	-0.32
29	4	0.37	0.38	-56.25	0.74	0.53	-0.30
C14 29	5	0.38	0.38	-56.37	0.74	0.57	-0.30
29	6	0.37	0.37	-56.48	0.78	0.56	-0.31
29	7	0.35	0.34	-56.49	0.86	0.46	-0.34
29	8	0.26	0.37	-55.48	0.88	0.07	-0.32