

伊勢崎市公設地方卸売市場建設

(守衛所棟・屋外便所棟・防火用水・塵芥集積所棟)

構造計算書



55.9

水	認	調	査	設	計



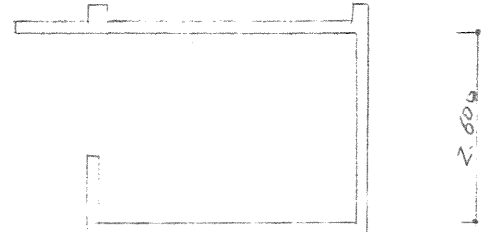
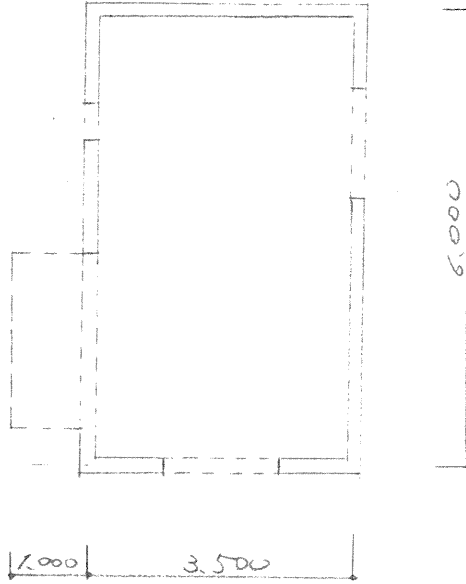
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守衛棟

補強、コンクリートブロック造



仮定荷重

×_下

=====	二層防水 (下地共)	60
=====	床版 t=120	288
	断熱材	0
		<hr style="width: 50px; margin-left: auto; margin-right: 0;"/>
		373 → 380

LL=100 TL=430

梁自重 25×30 $w = 140 \text{ } \frac{1}{m}$

使用ブロック A種 t=15cm $w = 260 \text{ } \frac{1}{m^2}$ (上地共)

WIS .44 $\frac{1}{m^2}$

耐力壁のテコ (耐力壁の実長 $2.5 \times 0.3 = 0.75 \text{ m}$)

$$A = 6.0 \times 3.5 = 21.0 \text{ m}^2 < 60 \text{ m}^2 \quad \text{OK}$$

$$\rightarrow l = 3.5 + 0.8 + 1.1 = 5.4 \text{ m}$$

$$\downarrow l = 3.7 + 1.5 + 1.3 + 0.75 = 7.25 \text{ m}$$

壁量

$$\rightarrow \frac{l}{A} = \frac{540}{21} = 25.7 > 15 \text{ cm/m}^2$$

$$\downarrow \quad = \frac{725}{21} = 34.5 > 15$$

最大隣壁の中心間の距離 $l = 600 \text{ cm} < 15 \times 50 = 750 \text{ cm}$

OK

耐力壁の厚さ テコ

$$h = 2.6 \quad \frac{h}{20} = 13.0 \text{ cm} < 15 \text{ cm} \quad \text{OK}$$

耐力壁の配筋

7行・ヨコ筋 $\phi 10 \sim 700 @ 2=71L$

1-1-補強筋 $1-\phi 13$

底設計 $t = 12.0 \quad d = 9.0$

$$w = 0.48$$

$$\frac{w}{1.10}$$

$$M = 0.48 \times 1.0^2 / 2 = 0.24$$

$$\frac{1.10}{1.10}$$

$$Q = 0.48 \times 1.0 = 0.48$$

$$\alpha_t = \frac{24 \times 1.14}{2.0 \times 9} = 1.52$$

$\phi 10 \sim 767 - 200 @$

$$\frac{Q}{f_{0.2}} = 2.9$$

OK

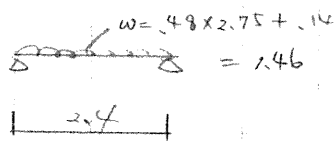
スラブ設計

$l_y = 6.000$ $l_x = 3.500$ $\lambda = 1.71$ $\chi = 12.0$ $d = 9.0$
 $w = .48$ $wl_x = 1.68$ $wl_x^2 = 5.88$

$M_{x1} = 0.080 \times 5.88 = 0.47$	$\alpha_x = 2.98$	$D_{10} - 238 \rightarrow D_{10}, D_{13} \sim 200 \text{ @}$
$M_{x2} = 0.050 \times \text{"} = 0.30$	$\alpha_x = 1.90$	$D_{10} \sim 373 \rightarrow D_{10} \sim 200 \text{ @}$
$M_{y1} = 0.057 \times \text{"} = 0.34$	$\alpha_x = 2.15$	$D_{10} \sim 330 \rightarrow D_{10} \sim 200 \text{ @}$
$M_{y2} = 0.028 \times \text{"} = 0.16$	$\alpha_x = 1.01$	"
$Q_x = .53 \times 1.68 = 0.89$	$\gamma = 5.37$	$D_{10} \sim 558$
$Q_y = .47 \times 1.68 = 0.79$	$\gamma = 4.77$	$D_{10} \sim 628$

) ok

0.15) の設計



$M_0 = \frac{1.46 \times 2.4^2}{8} = 1.05$
 $Q = \frac{1.46 \times 2.4}{2} = 1.75$

$b = 25$ $D = 30$ $d = 25$

$\alpha_x = 2.4$ 2 - D16

$\gamma_{saj} = 5.7^{\circ}$ 2 - D16

$\gamma_{bf} = 3.19 < 7.0$ st D10 ~ 250 @

水平応力

$\times \bar{x}$ $.48 \times 1.75 \times 6.1 = 5.12$

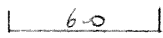
$.48 \times 1.0 \times 2.3 = 1.10$

梁 $.14 \times 6.0 = .84$

$\gamma_{2.7}$ $.26 \times 1.25 \times 3.25 = 1.06$

$8.12 \times .2 = 1.63$

$$w = 1.63/6 = 0.27$$



$$m_0 = 1.22$$

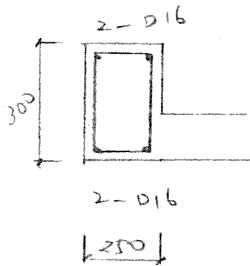
$$\theta = .87$$

$$b = 30 \quad D = 25 \quad d = 20$$

$$a_t = 3.48 \quad 2 - D16$$

$$\frac{\rho}{s_{a_s}} = 3.30 \quad 2 - D16$$

$$\frac{\rho}{b_t} = 1.54 \quad st \quad D10 - 200 @$$



$$st \quad D10 - 200 @$$

基礎梁

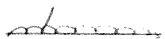
$$b = 25$$

$$D = 60$$

$$d = 55$$

$$w = 360 \text{ kg/m}$$

$$w = .36 + .44 \times .35 + .26 \times .8 = .73$$



$$m_0 = .53$$

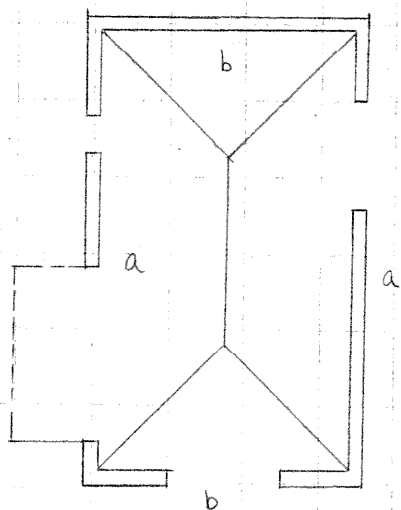
$$\theta = .88$$

$$a_t = .55 \quad 2 - D16$$

$$\frac{\rho}{s_{a_s}} = 1.30 \quad 2 - D16$$

$$\frac{\rho}{b_t} = .73 \quad st \quad D10 - 250 @$$

基ソ算定



軸力

a. 梁 $14 \times 6.0 = .84$

マテ $.48 \times (6+2.5) \times 1.75 \times \frac{1}{2} = 3.57$

$.48 \times 2.5 \times 1.0 = 1.20$

70,7 $.26 \times 3.5 \times 2.5 = 2.18$

Jシ $.37 \times 1.0 \times 2.0 = .74$

梁 $.36 \times 6.0 = 2.16$

$10.69 / 6 = 1.78 \text{ t/m}$

b. 梁 $14 \times 3.5 = .49$

マテ $.48 \times 3.5 \times 1.75 \times \frac{1}{2} = 1.47$

70,7 $.26 \times 3.5 \times 2.5 = 2.28$

梁 $.36 \times 3.5 = 1.26$

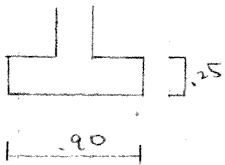
$5.50 / 3.5 = 1.57$

地耐力 $R = 4.0 \text{ t/m}^2 < 3.3 \text{ t}$

$R' = 4.0 - 2.0 \times 1.0 \times 1.0 = 2.0 \text{ t/m}^2$

$90 \text{ cm} < 3.3 \text{ t}$

$1.78 \div 0.9 = 1.98 < 2.0$



$\sigma_L = \frac{10.69}{6.0 \times 9} = 1.98 \rightarrow 2.0$

$M = \frac{2.0 \times 4.5^2}{2} = .21$

$Q = 2.0 \times 4.5 = .90$

$t = 25 \quad d = 20$

$\alpha t = 0.6$

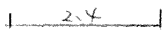
D13 ~ 250 @

$\frac{Q}{b_t} = 0.6 \quad \text{OK}$

$\frac{Q}{f_{0.2}} = 2.4 \quad \text{OK}$

基礎梁の反力とエック

$w = 2.0 \times 9 - .36 = 1.44$



$M_0 = 1.0 \times$

$\theta = 1.73$

$b = 25$

$D = 60$

$d = 55$

$\alpha t = 1.1$

2-D16

$\frac{Q}{f_{0.2}} = 2.6$

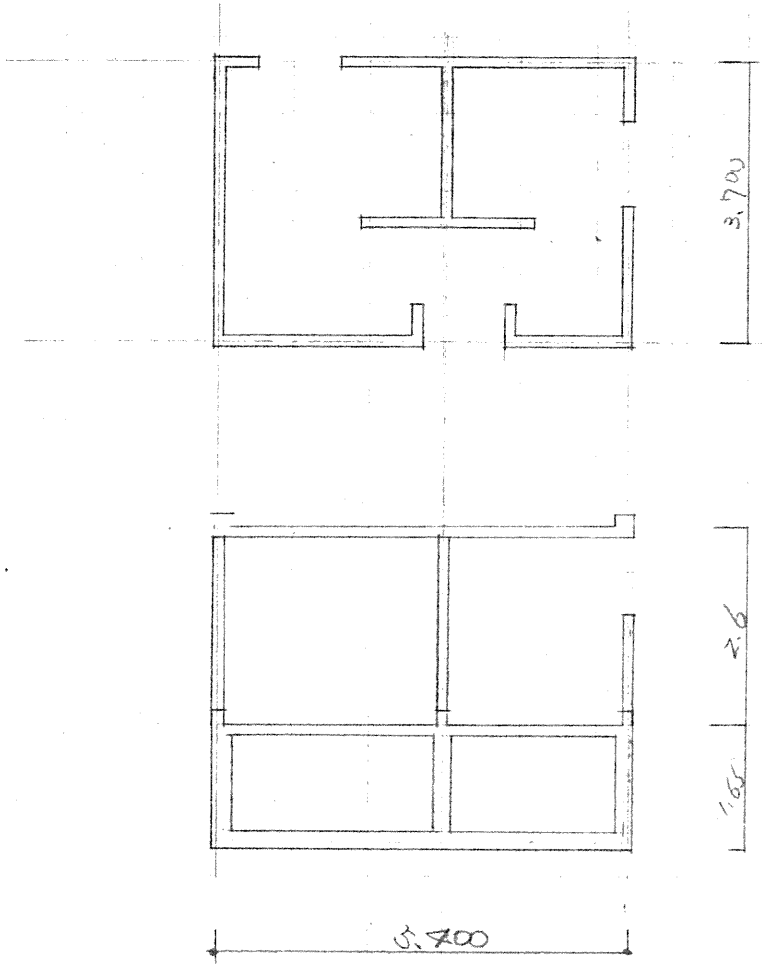
2-D16

$\frac{Q}{b_t} = 1.4 \quad \text{OK}$

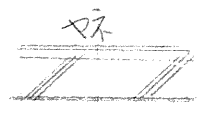
D10 ~ 250 @

便所棟

補強コンクリートブロック造



仮定荷重



シート防水 (下地 マルマ)	60
床版 ⑦ 120	288
シタニ断熱材	25
	373
	↓
	380

L.L = 100

F.L = 480

床

=====	モルタル	② 30	60
=====	床版	① 120	288
	モルタル	③ 30	60
			<hr/> 408 → 410
	LL	180	FL = 590

梁自重 25 x 30 w = 140

使用ブロック A種 ④ 150 w = 260 (仕上共)

W15 .44 t/m²

耐力壁のチェック (耐力壁の実長 2.4 x 0.3 = .72^m 以上)

$A = 3.7 \times 5.4 = 19.98 \text{ m}^2 < 60 \text{ m}^2 \quad \text{OK}$

← $l = 2.7 + 1.6 + 3.8 = 8.1 \text{ m}$

↓ $l = 3.7 + 2.0 + 1.8 = 7.5$

壁量

← $\frac{R}{A} = \frac{810}{19.98} = 40.5 > 15 \text{ t/m}^2 \quad \text{OK}$

↓ $\frac{R}{A} = \frac{750}{19.98} = 37.5 > 15$

最大隣壁の中心間の距離 $l = 370 \text{ cm} < 15 \times 50 = 750 \text{ cm}$
OK

耐力壁の厚さチェック

$R = 2.4 \text{ m} \quad \frac{R}{20} = \frac{240}{20} = 12 \text{ cm} < 15 \text{ cm}$
OK

耐力壁の配筋

9行・ヨJ共 D10 ~ 700 @ シングル

J-T-Δw 補強筋 1-013

スラブ設計 (2F)

$l_y = 3.7$ $l_x = 3.0$ $w = .48$ $\lambda = 1.24$
 $wl_x = 1.47$ $wl_x^2 = 4.32$ $f = 12$ $d = 9$

$M_{x1} = .067 \times 4.32 = .29$ $\alpha_t = 1.84$ D10 ~ 385 → D10 ~ 200 @

$M_{x2} = .038 \times . = .17$ $\alpha_t = 1.08$ "

$M_{y1} = .056 \times . = .25$ $\alpha_t = 1.59$ D10 ~ 446 → D10 ~ 250 @

$M_{y2} = .028 \times . = .12$ $\alpha_t = 0.76$ "

$Q_x = .49 \times 1.47 = .71$ $\varphi = 7.28$ D10 ~ 70.1) OK

$Q_y = .46 \times 1.47 = .67$ $\varphi = 7.04$ D10 ~ 74.2) OK

スラブ設計 (1F)

$l_y = 3.7$ $l_x = 3.0$ $w = .59$ $\lambda = 1.24$

$wl_x = 1.77$ $wl_x^2 = 5.31$ $f = 12$ $d = 9$

$M_{x1} = .067 \times 5.31 = .36$ $\alpha_t = 2.28$ D10 ~ 311 → D10 ~ 200 @

$M_{x2} = .038 \times . = .20$ $\alpha_t = 1.27$ "

$M_{y1} = .056 \times . = .30$ $\alpha_t = 1.90$ D10 ~ 373 → D10 ~ 250 @

$M_{y2} = .028 \times . = .15$ $\alpha_t = .95$ "

$Q_x = .49 \times 1.77 = .87$ $\varphi = 5.25$ D10 ~ 571) OK

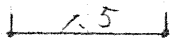
$Q_y = .46 \times 1.77 = .81$ $\varphi = 4.89$ D10 ~ 613) OK

↑

750

かりょうの設計

$$w = .48 \times 2.7 + .14 = 1.44$$



$$M_o = .71$$

$$Q = 1.08$$

$$b = 25 \quad D = 30 \quad d = 25$$

$$a_T = .93 \quad z = 0.16$$

$$\frac{Q}{f_{a-f}} = 3.52 \quad z = 0.16$$

$$\frac{Q}{b_f} = 1.97 < 7.0 \quad \text{st } \phi 10 \sim 250 @$$

水平応力

$$\text{スチール} \quad .48 \times 3.7 \times 2.7 = 4.796$$

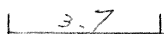
$$\text{コンクリート} \quad .14 \times 3.7 = .518$$

$$\text{トコナリ} \quad .26 \times 1.4 \times 3.7 = 1.347$$

$$6.661 \times 0.2 = 1.332$$

$$w = \frac{1.34}{3.7} = 0.363$$

$$w = .363$$



$$M_o = 0.62$$

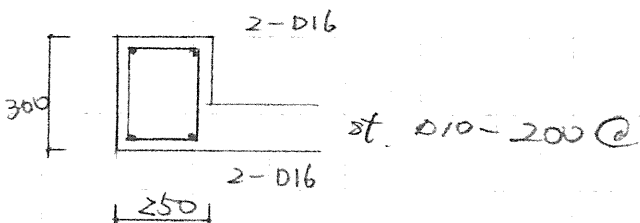
$$Q = 0.67$$

$$b = 30 \quad D = 25 \quad d = 20$$

$$a_T = 1.77 \quad z = 0.16$$

$$\frac{Q}{f_{a-f}} = 2.72$$

$$\frac{Q}{b_f} = 1.27 \quad \text{st } \phi 10 \sim 200 @$$



基礎梁

$b = 25$ $D = 150$ $d = 140$ $w = 960 \text{ kg/m}$

$w = .59 \times 2.7 + .96 + .44 \times 2 + .26 \times 1.3$
 $= 2.98$ $M_0 = 0.84$

1.5 $Q = 2.24$

$\alpha_f = 0.34$ 2-D16

$\frac{Q}{b} = 0.73$ st. D10 ~ 250 @

軸力

柱 $.48 \times 5.55 \times 3.85 = 10.26$

梁 $.14 \times (3.7 \times 3 + 5.4 \times 2) = 3.07$

門窗 $.26 \times (2.7 + 1.65 + 4.3 + 3.7 + 2.0 + 2.6$
 $+ 2.35 + .8) \times 2.2 = 11.50$

$.26 \times 1.1 \times 1.3 \times 2 = .74$

床 $.59 \times 5.55 \times 3.85 = 12.61$

梁 $.96 \times (3.7 \times 3 + 5.4 \times 2) = 21.02$

板 $.44 \times 22.3 \times .2 = 1.96$

屋版 $.66 \times 5.55 \times 3.85 = 14.10$

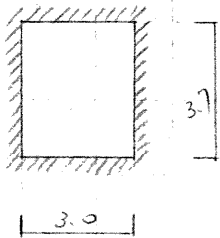
75.26

$\frac{P}{A} = \frac{75.26}{5.55 \times 3.85} = 3.52 < 4.0$

設計地耐力

地反力に及ぶ底板設計

$$w = 3.52 - .66 = 2.86$$



$$l_x = 3.0$$

$$l_y = 3.7$$

$$\lambda = 1.23$$

$$w = 2.86$$

$$wl_x = 8.58$$

$$wl_x^2 = 25.74$$

$$t = 25$$

$$d = 20$$

$$M_{x1} = .065 \times 25.74 = 1.67$$

$$\alpha_1 = 7.76$$

$$D13 \sim 266 \rightarrow D13 \sim 200 @$$

$$M_{x2} = .039 \times 25.74 = 1.00$$

$$\alpha_1 = 2.85$$

"

$$M_{y1} = .050 \times 25.74 = 1.29$$

$$\alpha_1 = 3.68$$

$$D13 \sim 345 \rightarrow D13 \sim 200 @$$

$$M_{y2} = .028 \times 25.74 = .72$$

$$\alpha_1 = 2.05$$

"

$$Q_x = .49 \times 8.58 = 4.20$$

$$\psi = 11.4$$

$$D13 \sim 350$$

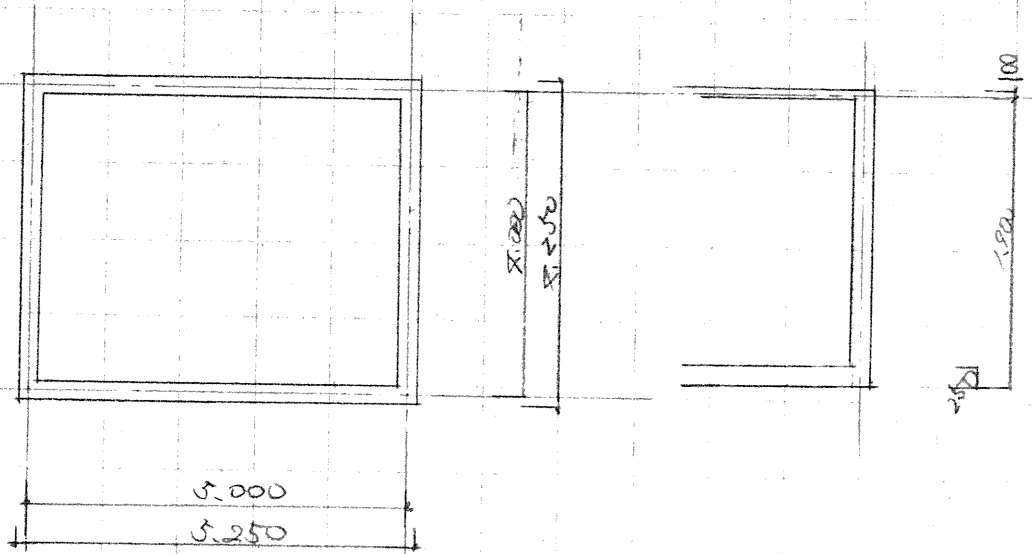
$$Q_y = .46 \times 8.58 = 3.95$$

$$\psi = 10.7$$

$$D13 \sim 373$$

} OK

防水用水



仮定荷重

又

防水層	15	
均質コンクリート ②25	50	
床版 ①120	288	
	<hr/>	
	353	→ 360

L.L = 100

T.L = 460

床版

コンクリート防水	60	
床版 ②250	600	
	<hr/>	
	660	

L.L 水量 1300

T.L = 1960

加

24 x 25 = 600

60

) 660

床版設計

$l_y = 5.0$ $l_x = 7.0$ $\lambda = 1.25$ $w = .46$
 $wl_x = 1.84$ $wl_x = 2.36$ $t = 12$ $d = 9$

$M_{x1} = .065 \times 2.36 = .48$	$a_t = 3.04$	D10~233	→ D10~200 @
$M_{x2} = .045 \times " = .33$	$a_t = 2.09$	D10~339	"
$M_{y1} = .055 \times " = .41$	$a_t = 2.60$	D10~273	"
$M_{y2} = .028 \times " = .21$	$a_t = 1.33$	D10~533	"
$Q_x = .49 \times 1.84 = .90$	$\phi = 5.43$	D10~552) OK
$Q_y = .46 \times 1.84 = .85$	$\phi = 5.13$	D10~584	

底版設計

$l_y = 5.0$ $l_x = 7.0$ $\lambda = 1.25$ $w = 1.96$
 $wl_x = 7.84$ $wl_x^2 = 31.36$ $t = 25$ $d = 20$

$M_{x1} = .065 \times 31.36 = 2.04$	$a_t = 5.81$	D13~218	→ D13~200 @
$M_{x2} = .045 \times 31.36 = 1.41$	$a_t = 7.02$	D13~315	"
$M_{y1} = .055 \times 31.36 = 1.73$	$a_t = 7.93$	D13~257	"
$M_{y2} = .028 \times 31.36 = .88$	$a_t = 2.51$	D13~506	"
$Q_x = .49 \times 7.84 = 3.84$	$\phi = 10.42$	D13~383) OK
$Q_y = .46 \times 7.84 = 3.61$	$\phi = 9.80$	D13~408	

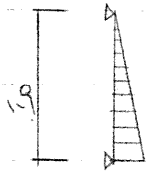
土圧壁

土圧のみの場合



$$t = 1.8$$

$$P = 0.5 \times 1.8 \times 1.9 = 1.71$$



$$M_0 = \frac{wl^2}{9\sqrt{3}} = \frac{1.71 \times 1.9^2}{9\sqrt{3}} = 0.40$$

$$Q = \frac{wl}{3} = \frac{1.71 \times 1.9}{3} = 1.09$$

$$t = 25 \quad d = 20$$

$$a_t = 1.14 \quad 010 \sim 622 \rightarrow 010 \sim 200 @$$

$$\frac{Q}{f_{aj}} = 2.96 \quad 010 \sim 1013 \quad 8K$$

軸力

$$\times \text{不} \quad 46 \times 5.25 \times 4.25 = 10.26$$

$$\text{加} \quad 66 \times (5.0 + 4.0) \times 1.53 \times 2 = 18.18$$

$$\text{底版} \quad 1.96 \times 5.25 \times 7.25 = 73.73$$

$$\underline{\underline{72.17}}$$

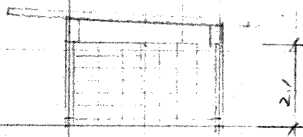
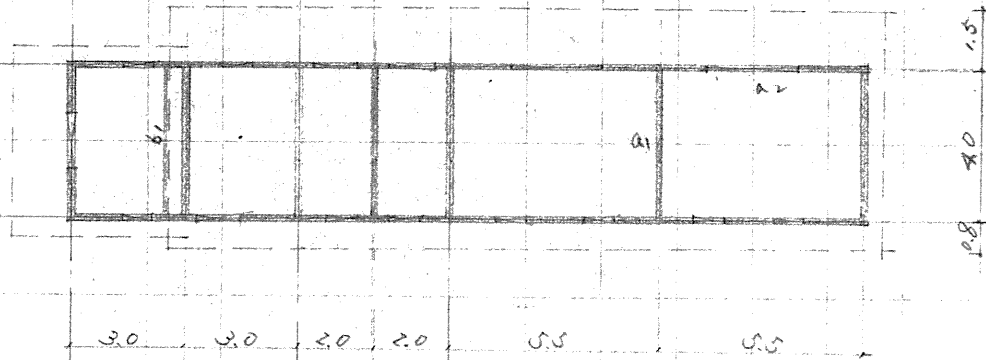
$$\frac{P}{A} = \frac{72.17}{5.25 \times 7.25} = 3.23 < 4.0 \quad \text{設計地耐力}$$

地反力による底版検討

$$w = 3.23 - 1.96 = 1.27$$

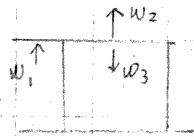
よって底版設計に存す

§4. 塵芥集積所棟



⇒ 211-1710-7 t. 150

1. 折版の設計



w_1 : 自重 - 吹上り = $0.02 - 0.12 \times 2.0 = -0.22$

$M = 0.22 \times 1.5^2 / 2 = 0.25$

$Q = 0.22 \times 1.5 = 0.33$

w_2 : 自重 - 吹上り

= $0.02 - 0.12 \times 1.3 = -0.136$

$M = 0.136 \times 2.0^2 / 8 = 0.28$

$Q = 0.136 \times 2.0 / 2 = 0.28$

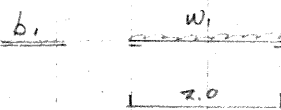
w_3 : 自重 + 雪

= $0.02 + 0.06 = 0.08$

∴ w_2 を検討

丸型折版 Ⅱ型 ④0.8 $I_x = 280.43$ $Z_x = 35.17$

$M = 0.28 \text{ t.m}$ $\frac{M}{Z} = \frac{28}{35.17} = 0.8 < 1.4 \times 1.5 = 2.1$ (OK)



$w_1 = 0.136 \times 1.5 = 0.21$

$M = 0.21 \times 2.0^2 / 8 = 0.42$

$I = 100 \times 50 \times 20 \times 3^2$ $I_x = 107$ $Z_x = 21.3$

$\frac{M}{Z} = \frac{42}{21.3} = 1.98 < 1.4 \times 1.5 = 2.1$ (OK)

2. 耐力壁の検討 壁厚 15 cm

a) 耐力壁で囲まれた面積 : $5.5 \times 4.0 = 22.0 < 60.0 \text{ m}^2$ (O.K)

b) 対隣壁の中心間距離 : $550 \text{ cm} < 15 \times 50 = 750 \text{ cm}$ (O.K)

c) 壁量

X方向 $l_x = 2.10 \times 2 - (0.4 \times 9 + 1.2 \times 3 + 2.4 \times 2) = 30.0 \text{ m}$

$l_x/A = 3000 / (21.0 \times 4.0) = 3.57 > 15$ (O.K)

Y方向 $l_y = 3.7 \times 7 - 1.6 = 24.9$

$l_y/A = 2430 / (21.0 \times 4.0) = 28.9 > 15$ (O.K)

おしよりの設計

$b \times D = 25 \times 40$

$d = 35$

$w = 300$

$w = 0.02 \times 3.5 + 0.3 = 0.37$

$M_0 = 0.27$

$Q = 0.44$

$\sigma_t = 0.44$

2-D19

$\tau = 0.57$

st D10 ~ 200 @

基礎設計

9. 軸力

柱梁 30×80

0.58 t/m

柱 $0.02 \times 6.3 \times 1.0 = 0.13$

梁 $0.30 \times 4.0 = 1.20$

柱 $0.26 \times 4.0 \times 2.1 = 2.18$

梁 $0.58 \times 4.0 = 2.32$

5.83

$\frac{5.83}{4.0} = 1.46 \text{ t/m}$

a2

柱 $0.02 \times 3.5 \times 3.5 = 0.245$

梁 $0.30 \times 5.5 = 1.65$

ブーム $0.26 \times 5.5 \times 2.1 = 3.00$

梁 $0.58 \times 5.5 = 3.19$

$8.23 / 5.5 = 1.50$

地耐力 $R = 40 \text{ t/m}^2$ とす

$R' = 40 - 2.0 \times 1.0 \times 1.0 = 20 \text{ t/m}^2$

や 80 cm とす

$1.50 \div 0.8 = 1.9 < 2.0$

$\sigma_c = \frac{8.23}{5.5 \times 0.8} = 1.9$

$M = \frac{1.9 \times 0.4^2}{2} = 0.15$

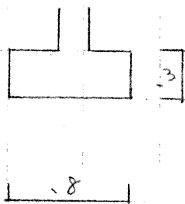
$Q = 1.9 \times 0.4 = 0.76$

$t = 30 \quad d = 25$

$\alpha_t = 0.84$

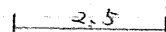
$\frac{Q}{b_d} = 0.43$

D10 ~ 2088 → 200 @



基礎梁の反力計算

$1.9 \times 0.9 - 0.58 = 1.13$



$M_0 = 0.88$

$Q = 1.41$

$b \times D = 30 \times 80 \quad d = 70$

$\alpha_t = 0.72 \quad 2 - D22$

$T = 0.77 \quad D10 \sim 200 @$

No 20

