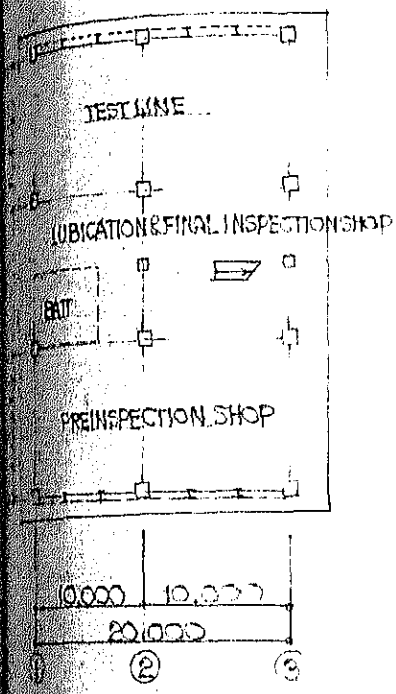
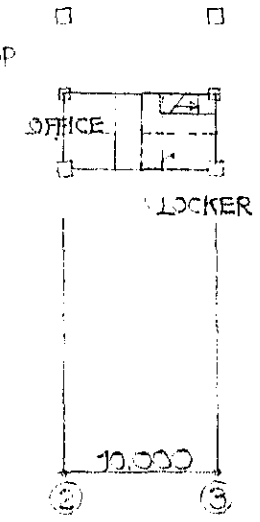
I2 INSPECTION FACTORY

SECTION FACTORY

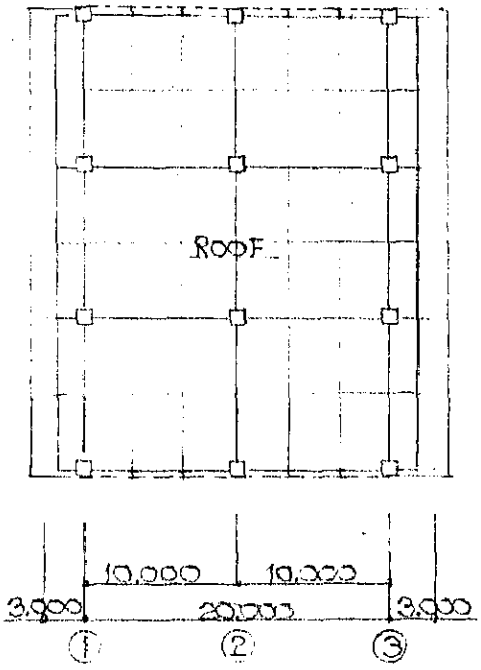
3F PLAN



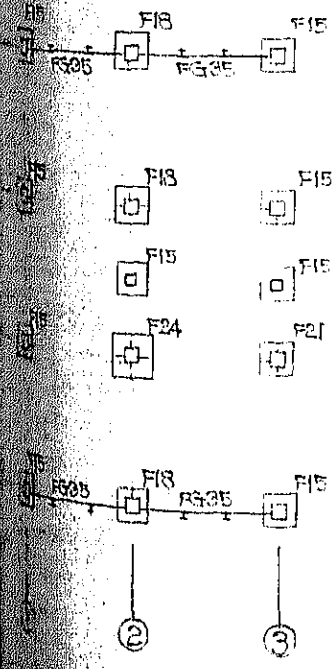
1F PLAN



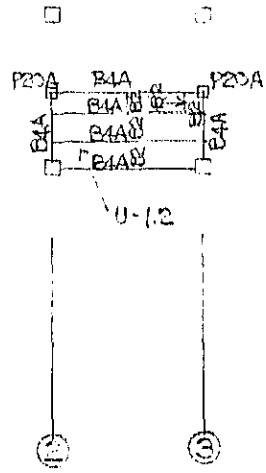
RF PLAN



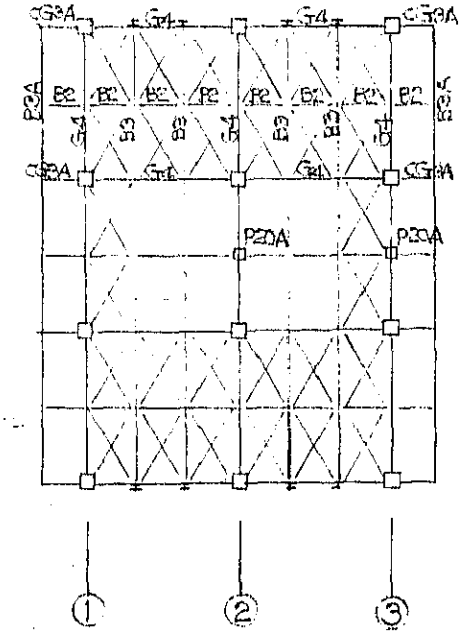
3F KEY PLAN



1F KEY PLAN



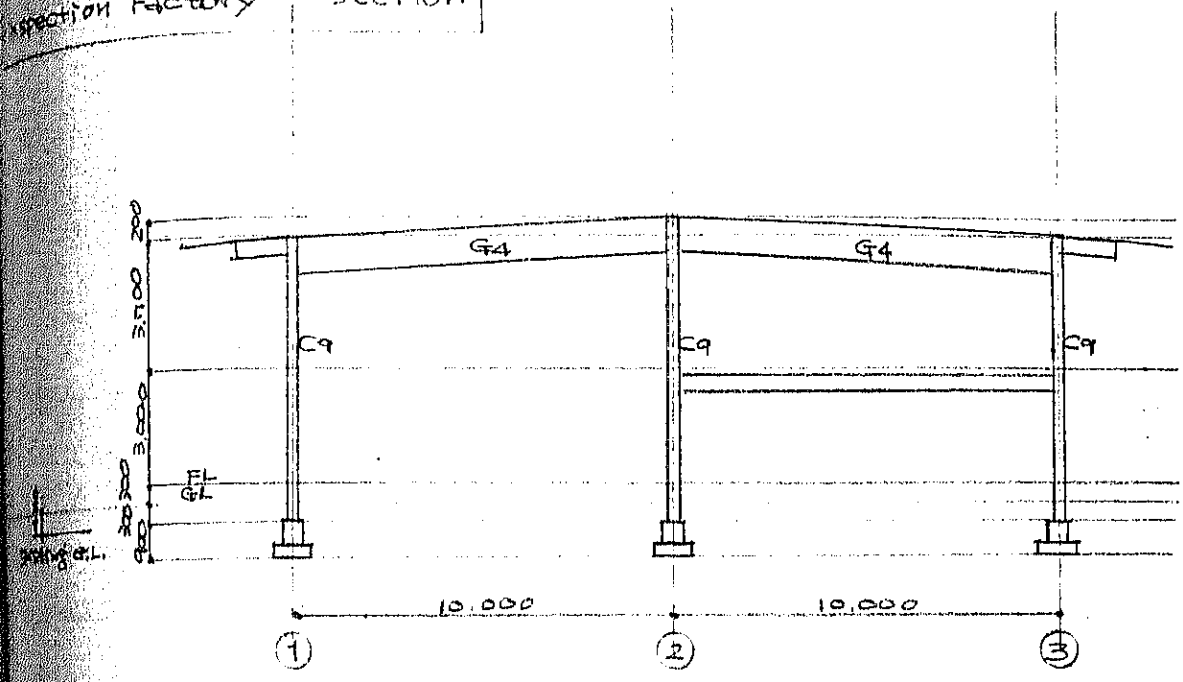
RF KEY PLAN



□ : C9

▭ : P3

Inspection Factory — Section



Unit Load

Floor

	D. L.		L. L.		T. L.
	Shell type roof	0.02	S, B	0.09	0.11 (0.15)
			G, C, F	0.017	0.09 (0.13)
	Ceiling	(0.04)	K	0.03	0.05 (0.09)
		0.02 (0.06)			
	Finish	0.15	S, B	0.30	0.51
	Deck	0.02	G, C, F	0.18	* 0.39
	Ceiling	0.04	K	0.08	0.29
		0.21			
					* With Above Ceiling 0.43
	Step	0.06	S, B	0.30	0.40
	String	0.04	G, C, F	0.18	0.28
			K	0.08	0.18
		0.10			

Beam

	t/m			t/each						
	Skeleton	Finish	Σ	ℓ						
GR	0.25	0	0.25							
GR	0.15	0	0.15							
	0.05	0	0.05							
	1.26	0	1.26							

Column

	t/m			t/each						
	Skeleton	Finish	Σ							
400	0.20	0	0.25							
350	0.15	0	0.15							
	0.05	0	0.05							

Wall

	t/m2			t/m						
	Skeleton	Finish	Σ							
	0.01	0.01	0.02							
	0.01	0.07	0.08							
	0.01	0.04	0.05							
	0.49	0.11	0.60							

Pressure

Velosity of Wind

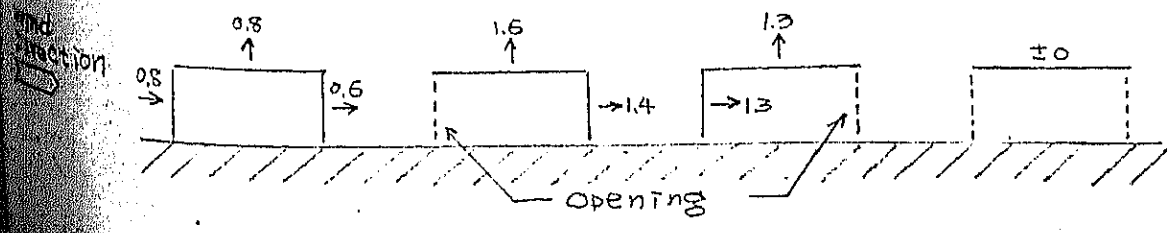
Cyclone 130 Miles/Hour = 130 × 1609.34/3,600
= 58.1 m/sec
→ 60.0 m/sec (h = 15 m)

(In 1970, At chitagon, recorded
103 m.p.h. = 46.0 m/sec)

Velosity Pressure $q = \frac{1}{2}\rho V^2 = \frac{1}{2} \times \frac{1}{8}\left(60\sqrt{\frac{h}{15}}\right)^2$
$= 60\sqrt{h}$

Block	Surface		$\bar{h}$ [m]	$60\sqrt{\bar{h}}$	q [kg/m²]	cq [kg/m²]
Heavy Repair Factory	Monitor Roof	Roof	12.7	214	220	
		Roof	10.5, 6.9	194, 158	200, 160	
		Wall			140, 120	
Parts Storage	Monitor Roof	Roof	9.39 – 9.29	184 – 183	180	
		Wall				
		Roof	7.36 – 7.00	163	160	
		Wall			120	
Inspection Factory	Monitor Roof	Roof				
		Wall				
		Roof	7.20 – 7.00	161	160	
		Wall			120	
Periodical Repair Factory	Monitor Roof	Roof	9.33 – 9.23	183	180	
		Wall				
		Roof	7.23 – 7.00	161	160	
		Wall			120	
Paint & Body Factory	Monitor Roof	Roof	9.41 – 9.31	184	180	
		Wall				
		Roof	9.31 – 7.00	162	160	
		Wall			120	
Retreading & Metal Casting Factory	Monitor Roof	Roof	9.45 – 9.30	184	180	
		Wall				
		Roof	9.30 – 7.00	162	160	
		Wall			120	

Coefficient of Wind Pressure



Axial Force [t]

	D3		C3		C_{B} 3		B3	
S	0.09 × 46.4	4.3	× 84.8	7.6			×	
G,B	0.15 × 10.3	1.5	× 15.6	2.3			×	
C	0.05 × 12.1	0.6	× 22.7	1.1			×	=C3
W	0.15 × 6.7	1.0	× 6.7	1.0			×	
	0.02 × 8.7	0.2	× 0				×	
	0.05 × 0		× 0				×	
	0.05 × 0		× 0				×	
	0.60 × 2.5	1.5	× 0				×	
Σ	9.1	9.1	12.0	12.0			12.0	12.0
W.L.		0		0				0
Σ'	9.1	9.1	12.0	12.0			12.0	12.0
S					0.43 × 13.3	5.7	×	
G,B					0.05 × 10.3	0.5	×	
C					0.05 × 6.7	0.3	×	$=C_{B3}$
W					0.02 × 0		×	
					0.08 × 32.6	2.6	×	
					0.05 × 19.6	1.0	×	
					0.60 × 0		×	
Σ					10.1	10.1	22.1	10.1
W.L.						0		0
Σ'					10.1	10.1	22.1	10.1

	D2		C2		B2		D W	
S	0.09 × 58.0	5.2	× 106.0	9.5	×			
G,B	0.15 × 15.3	2.3	× 20.6	3.1	×			
C	0.05 × 10.6	0.5	× 21.2	1.1	×			
W	0.15 × 6.9	1.0	× 6.9	1.0	×	=C2		
	0.02 × 17.4	0.4	× 0		×			
	0.05 × 0		× 0		×			
	0.05 × 0		× 0		×			
	0.60 × 5.0	3.0	× 0		×			
Σ	12.4	12.4	14.7	14.7	14.7	14.7		
W.L.		0		0		0		
Σ'	12.4	12.4	14.7	14.7	14.7	14.7		
S					0.43 ×			
G,B					0.05 ×			
C					0.05 ×			
W					0.02 ×	$=C_{B2}$	× 5.4	0.1
					0.08 ×			
					0.05 ×		× 1.4	0.8
					0.60 ×			
Σ					24.8	10.1		0.9
W.L.						0		0
Σ'					24.8	10.1		0.9

[tm, t]

Load			C		Ma		Q
	(0.09 × 23.9) (0.05 × 12.1)	P	2.8 × 1.5	4.2			× 1.0	2.8
				4.2				2.8
	−0.326 × 23.9	P	−7.8 × 1.5	−11.7			× 1.0	−7.8
				−11.7				−7.8
	(0.09 × 39.3) (0.05 × 10.6) 0.15	P q	3.7 × 10/4.5 0.15 × 10²/12	8.2 1.3	× 10/8 × 1/8	12.3 1.9	× 1.0 × 10/2	3.7 0.8
				9.5		13.2		4.5
	−0.198 × 39.3	P	−7.0 × 10/4.5	−15.6	× 10/8	−23.3	× 1.0	−7.0
				−15.6		−23.3		−7.0
	0.09 × 10/8 + 0.15	q	0.45 × 10.6²/12	4.2	/8	6.3	× 10.6/2	2.4
				4.2		6.3		2.4
	−0.198 × 10/8	q	0.66 × 10.6²/12	6.2	/8	9.3	× 10.6/2	3.5
				6.2		9.3		3.5
	0.8/0.6 × 0.12 × 10/8	q	0.32 × 7.2²/12 0.24	1.4 ~ 1.1	/8	2.1 ~ 1.6	× 7.2/2	1.2 ~ 0.9
				1.4 1.1		2.1 1.6		1.2 0.9

and Force [t]

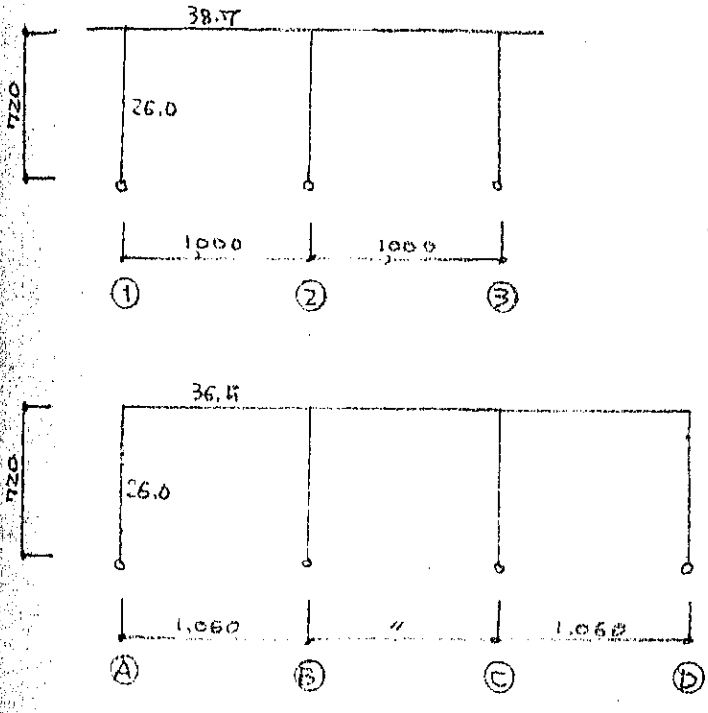
	C	φ		A	H	Q
				0	0	0
	0.8+0.6	0.12	5.3 × 2.3	12.2	2.1	2.1
	0.8+0.6	0.12	5.3 × 2.3	12.2	2.1	4.2
				0	0	0
	0.8+0.6	0.12	20.9 × 3.5	71.8	12.1	12.1

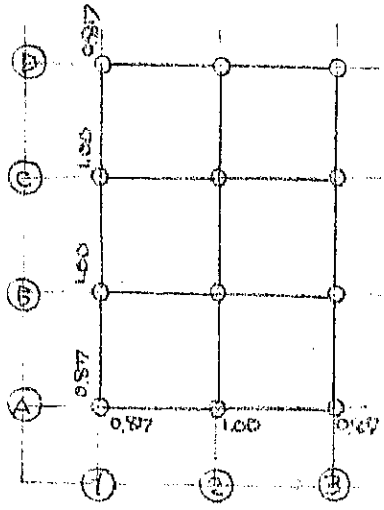
Seismic Force [t]

	W	K	KW	Q
	0			
	0			
	0			
	0			
	0	0.10	0	0
1.0×26.0×32.3	42.0			
0.15×{(10.0×8)+(10.6×9)}/3 + 0.05×{(1.5×8)+(10.6×18)}/3	30.8			
(0.15×6.9×12/2)	6.2			
(0.08×4.0×30.6/2)	5.0			
W = 89.7/839.8 = 0.11	89.7	〃	9.0	9.0
0.8×10.0×5.3	15.4			
0.6×{(10.0×4)+(2.3×3)}/3	4.8			
(0.8×6.9×2/2)	0.3			
	5.0			
W = 25.5/53.6 = 0.48	25.5	〃	2.6	12.0

Stiffness Ratio

	J	P_n/P_i	1000	1060		650		
[illegible]	38,700		38.7	36.5				
[illegible]	22,500					34.6 (X0.76 = 26.0)		





Distribution Factor & Inflection Point

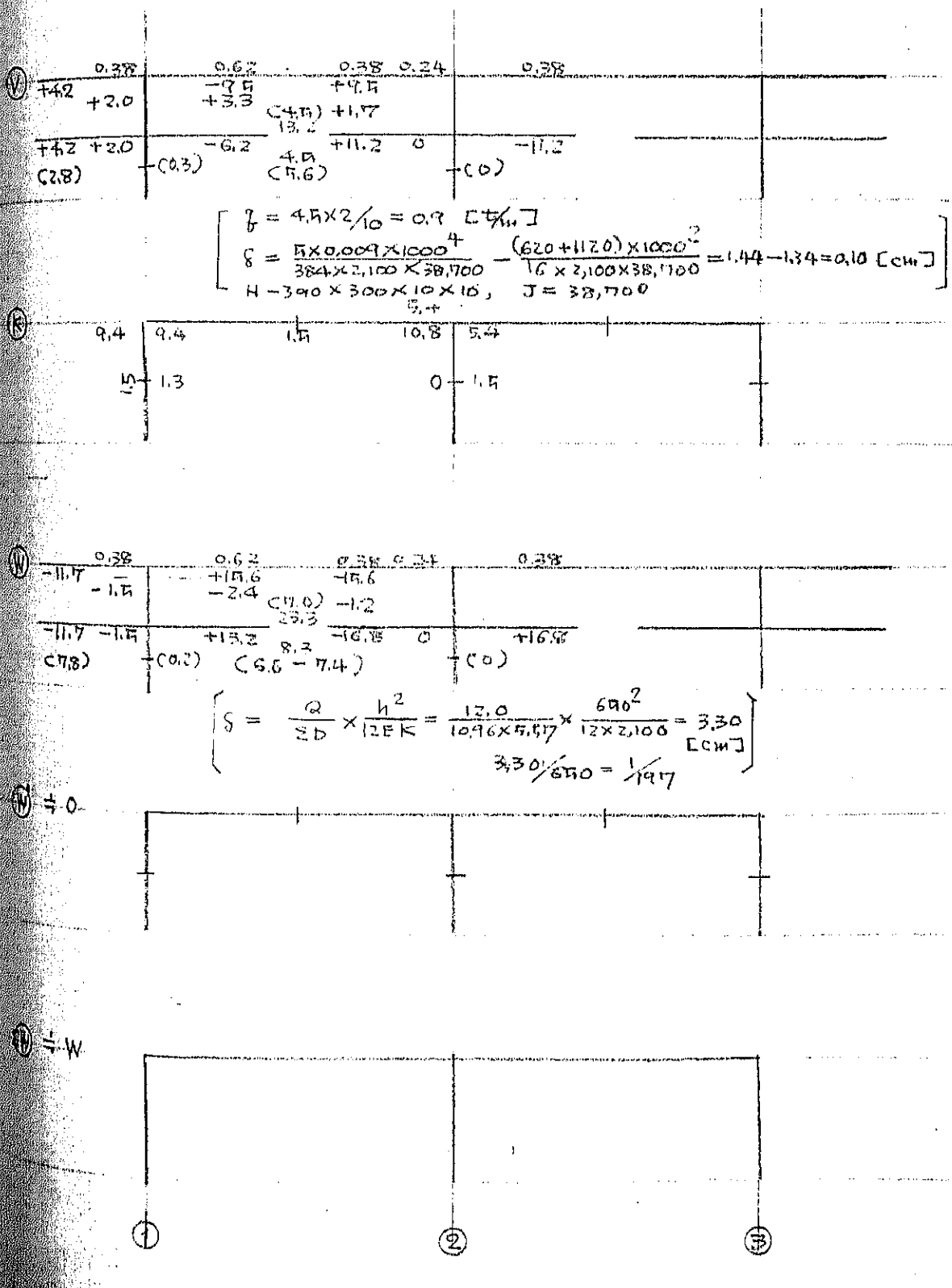
[illegible]	E	a	D	D′	α	D″	Y_0	Y_1	$Y_{2\cdot3}$	ΣY	Q	P_1	TM	MU	ML
[illegible]	1.49	0.19	4.87	0.87			0				1.3	6.5	9.4	9.4	0
[illegible]	2.98	0.21	5.57	1.00			0				1.5	〃	10.8	10.8	0
[illegible]	1.40	0.18	4.79	0.817			0				1.0	〃	7.2	7.2	0
[illegible]	2.81	0.21	5.51	1.00			0				1.1	〃	7.9	7.9	0

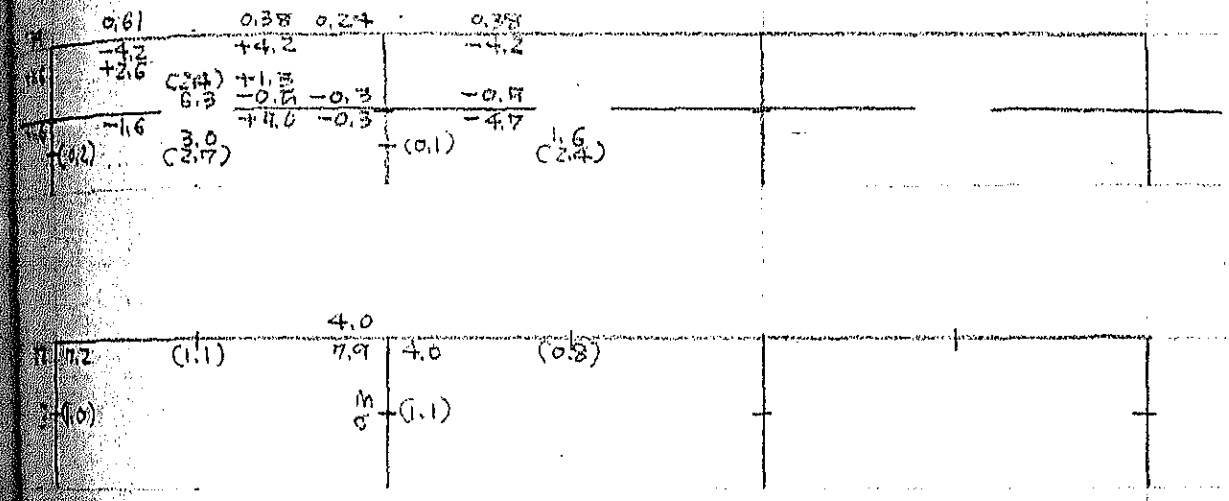
Unit Stress

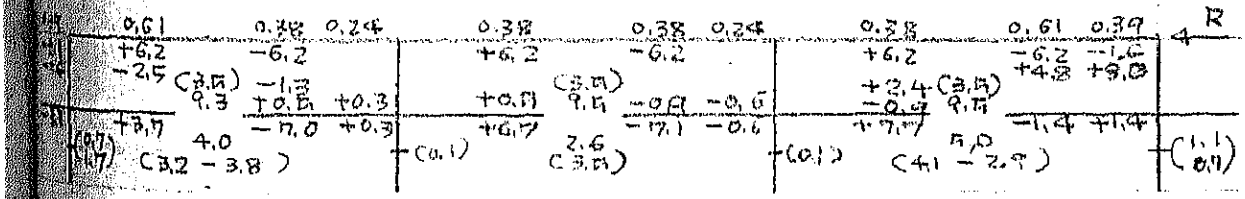
DIR.	ΣD	Q	Q/ΣD		Di	Qi	Q/ΣD
←	10.96	12.0	1.1		2.74	12.0/3	1.5
↓	11.22	12.1	0.9		3.74	12.1/3	1.1

ress

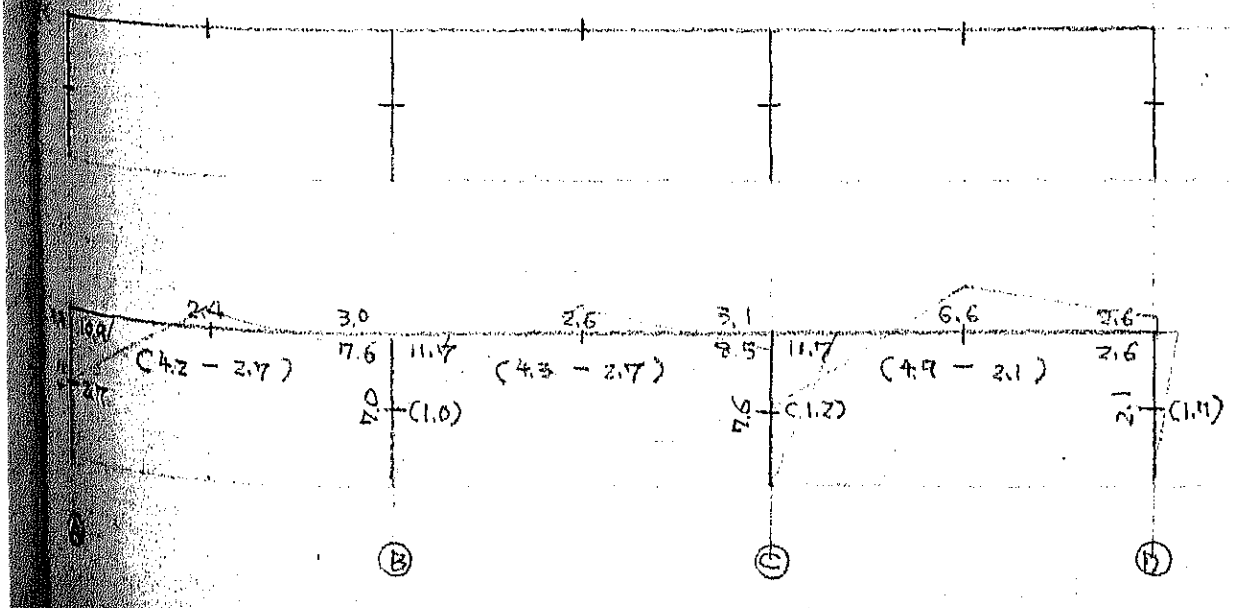
(B) FRAME


0.38
0.62
0.38
0.24
0.38
+4.2
+2.0
−7.5
+3.3
(4.5)
13.2
+4.5
+1.7
+4.2
+2.0
−6.2
4.5
+11.2
0
−11.2
(2.8)
(0.3)
(5.6)
(0)
δ = 4.5×2/10 = 0.9 [cm]
δ = 5×0.009×1000^4 / 384×2,100×38,700 − (620+112.0)×1000^2 / 16×2,100×38,700 = 1.44−1.34 = 0.10 [cm]
H−390×300×10×16, J = 38,700
9.4
9.4
1.5
10.8
5.4
5.4
1.5
1.3
0
1.5
0.38
0.62
0.38
0.24
0.38
−11.7
−1.5
+15.6
−2.4
(17.0)
29.3
−1.2
−15.6
−11.7
−1.5
+13.2
8.3
−16.8
0
+16.8
(7.8)
(0.2)
(5.6 − 7.4)
(0)
δ = Q/ΣD × h^2/12EK = 12.0/10,976×5,617 × 690^2/12×2,100 = 3.30 [cm]
3.30/690 = 1/197
± 0
± W
①
②
③

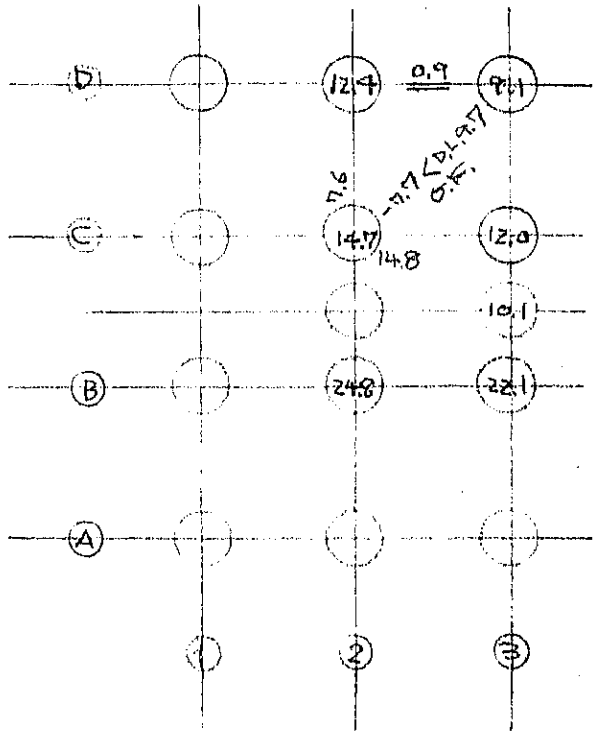




R = −0.5 + 0.2 = −0.3 ≠ 0



ooting



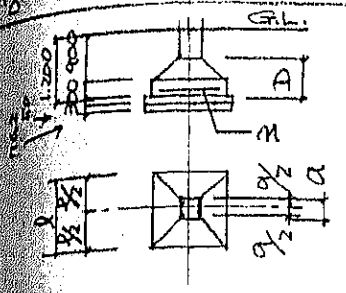
ndent Footing

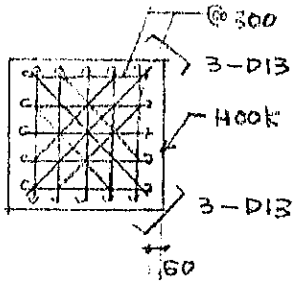
N	fc	fca	An	Pu	l	Type
1	B1	5.4	1.69	1.30	1.5	F15
2			2.22	1.49	〃	F15
3			1.87	1.37	〃	F15
5			4.09	2.03	2.1	F21
4			2.30	1.52	1.8	F18
6			2.73	1.65	〃	F18
9			4.59	2.15	2.4	F24

ntinuous Footing

N	fc	fca	An	B11	B	Type
11	B2	3.2	0.29	0.29	0.35	FG1

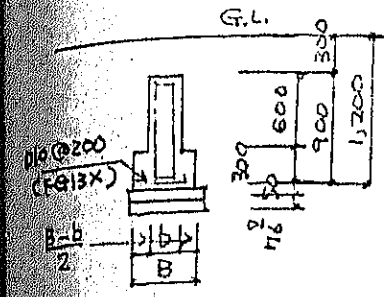
Design of Independent Footings





x	A	fca	Na	a	ℓ/a	M/Na	Q/N	M	Q	D	j	at	Cp	2D+a	QA	M.
1200	9.00	54	48.6	550	5.45	0.365	0.243	9.8	11.8	800	62.1	7.9	12.7	215	66.8	10-D13 @300
1200	7.29	〃	39.4	〃	4.91	0.285	0.240	6.2	9.4	〃	〃	5.0	10.1	〃	〃	9-D13 〃
1200	5.76	〃	31.1	〃	4.36	0.240	0.238	4.1	7.4	700	53.4	3.8	9.2	195	52.0	8-D13 〃
1200	4.41	〃	23.8	〃	3.82	0.197	0.233	2.6	5.5	〃	〃	2.4	6.9	〃	〃	7-D13 〃
1200	3.24	〃	17.5	〃	3.27	0.160	0.229	1.5	4.0	600	44.6	1.7	6.0	175	39.0	6-D13 〃
1200	2.25	〃	12.2	〃	2.73	0.110	0.217	0.7	2.6	〃	〃	0.8	3.9	〃	〃	5-D13 〃

Design of Foundation Beam



	b	TOP R.	BTM R.	SIDE R.	Stirp.	TIE
2G	350	2-D19	2-D19	2-D10	□D10 @200	⌐D10 @600
3G	〃	〃	〃	〃	〃	〃
RG	〃	〃	〃	〃	〃	〃

For Stress Between Piling Footing

w = (FG35) 1.26 + (Brick Wainscot) 0.6×2.9
= 3.0 [t/m]

Span 4.5 [m]

M_0	$3.0\times4.5^2/8$	7.6	[tm]	a_t	5.4	[cm²]) 2-D19
Q	$\times4.5/2$	6.8	[t]	p	6.4	[cm]

b 35 D 90 j 70.9 — Q_{AL} 12.4 [t] > Q

w = 1.26 + (0.6×1.5) + (0.08×3.5) = 2.84

Span 5.3

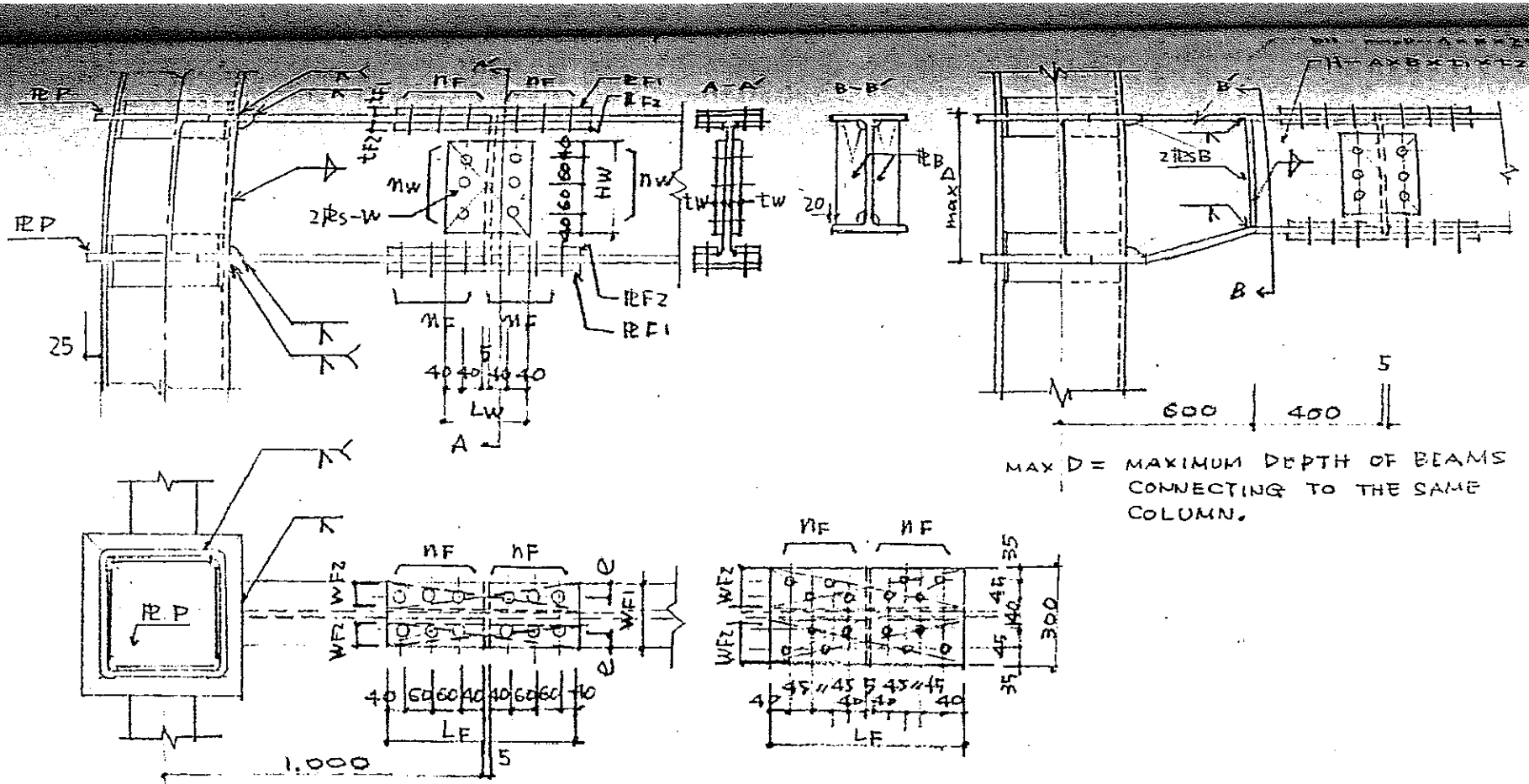
M_0	$2.84\times5.3^2/8$	10.0		a_t	7.0	~ 3-D19
Q	$\times5.3/2$	7.5				

Design of Beam

			Stress V	K	W_1	W_2	1.5V	V+K	V+W_1	V+W_2	max	Member	ℓ_b	ℓ_b	λ_b	η	C	f_b	Z	B/F	Type	Note
↩	M	O.E	6.2	9.4	13.2		9.3	3.2	7.0		9.3	H-390×300							1,980			
		C	4.5	2.0	8.3	/	6.8	6.5	3.8	/	6.8	×10×16										
		I.E	11.2	5.4	16.8		16.8	16.6	28.0		28.0		333	8.10	41.1	6.58	1.6	1.60		0.59		
	Q		5.6	1.5	7.4		8.4	7.1	1.8		8.4										G4	
↕	M	O.E	1.6	7.2	10.9	2.6	2.4	5.6	9.3	4.2	9.3	〃							1,980			
		C	3.0	1.6	2.4	6.6	4.5	4.6	0.6	3.6	4.6											
		I.E	5.0	4.0	3.0		7.5	9.0	8.0		9.0											
	Q		2.7	1.1	4.2	4.9	4.1	3.8	1.5	2.2	4.1										〃	

Design of Column

			Stress V	K	W_1	W_2	1.5V	V+K	V+W_1	V+W_2	max	Member	ℓ_K / ℓ_b	ℓ_K / ℓ_b	λ_K / λ_b	η	C	f_c / f_b	A / Z	σ/f	Type	Note
A2	↕	N	12.4	1.1	-4.2	-2.1	18.6	13.5	8.2	10.3	18.6	D-350×350										
		M U	1.6	7.2	10.9	2.6	2.4	8.8	9.3	4.2	9.3	×9										
		L												Cf. Chart								
		Q	0.2	1.0	2.7	1.7	0.3	1.2	2.5	1.9	2.5											
B1	↩	N	22.1	1.5	-14.4		33.2	23.6	7.7		33.2	〃								OK	C9	
		M U	2.0	9.4	1.5		3.0	11.4	3.5		11.4											
		L				/				/												
		Q	0.3	1.3	0.2		0.5	1.6	0.5		1.6											
B2	↩	N	24.8	0	-14.8		37.2	24.8	10.0		37.2	〃										
		M U	0	10.8	0		0	10.8	0		10.8											
		L				/				/												
		Q	0	1.5	0		0	1.5	0		1.5											
	↕	N	24.8	0.3	-17.6		37.2	27.1	17.2		37.2	〃										
		M U	0.3	7.9	8.5		0.5	8.2	8.8		8.8											
		L				/				/												
	Q		0.1	1.1	1.2		0.2	1.2	1.3		1.3											



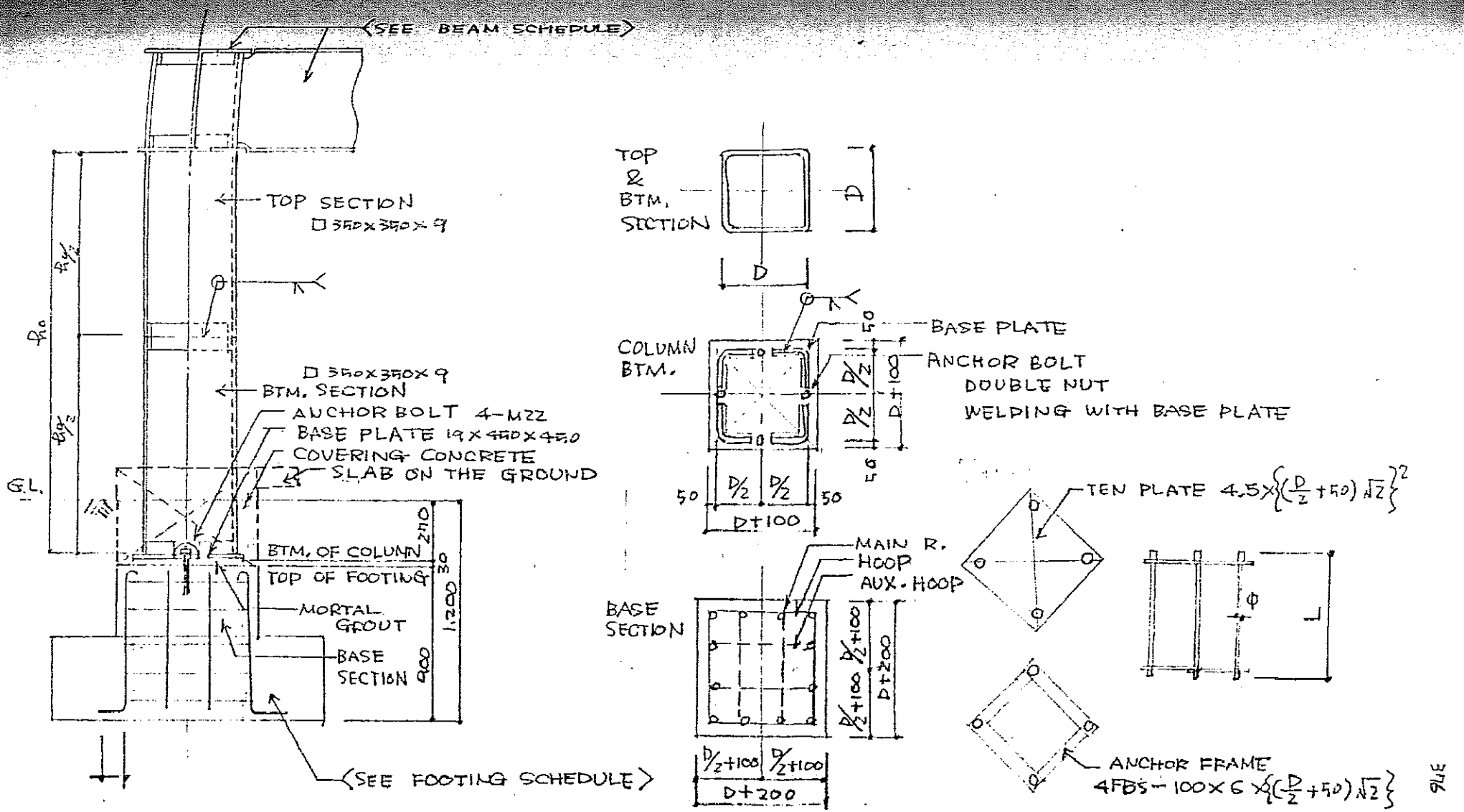
MAX D = MAXIMUM DEPTH OF BEAMS CONNECTING TO THE SAME COLUMN.

WF	e
150	30
175	30
200	35
250	45

$$ta \geq \sqrt{3}\,\frac{tF}{fd}$$

G7	H 900×300×16×28	28							
G8	H 800×300×14×26	28	16	19 × 300 × 615	22 × 107 × 615	2×6-M22	12 × 165 × 620	10 − M22	
G7	H 700×300×13×24	25	16	19 × 300 × 525	19 × 107 × 525	2×5-M22	9 × 165 × 560	9 − M22	
G6	H 588×300×12×20	22	16	16 × 300 × 435	16 × 107 × 435	2×4-M22	9 × 165 × 440	7 − M22	
G6A	H 600×200×11×17	19	16	16 × 200 × 405	16 × 73 × 405	2×3-M22	9 × 165 × 440	6 − M22	
G5	H-482×300×11×15	16	16						
G5A	H 500×200×10×16	16	16	12 × 200 × 405	16 × 73 × 405	2×3-M22	9 × 165 × 380	6-M22	
G4	H 390×300×10×16	16	16						
G4A	H 400×200×8×13	16	16	9 × 200 × 285	12 × 73 × 285	2×2-M22	9 × 165 × 260	4 − M22	

375

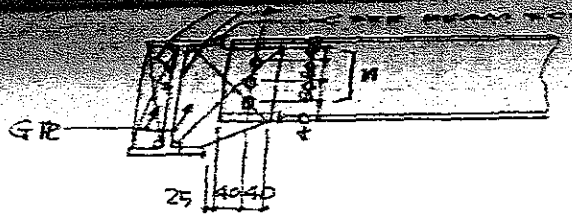

(SEE BEAM SCHEDULE)
TOP SECTION
□ 350×350×9
□ 350×350×9
BTM. SECTION
ANCHOR BOLT 4-M22
BASE PLATE 19×450×450
COVERING CONCRETE
SLAB ON THE GROUND
G.L.
BTM. OF COLUMN
TOP OF FOOTING
MORTAL GROUT
BASE SECTION
(SEE FOOTING SCHEDULE)
TOP & BTM. SECTION
D
COLUMN BTM.
BASE PLATE
ANCHOR BOLT
DOUBLE NUT
WELDING WITH BASE PLATE
D/2
D+100
50
BASE SECTION
MAIN R.
HOOP
AUX. HOOP
D+200
TEN PLATE 4.5×{(D/2+50)√2}²
ANCHOR FRAME
4FBS-100×6×{(D/2+50)√2}
Φ
L

Design of Sub Beam

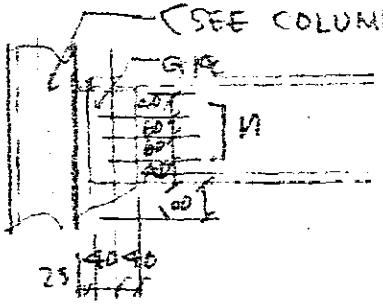
	h	ℓ	@	w D.L.	w W.L.	w T.L.	δ	M_D	Q	J_n	Z_n	Member	J	Z	ℓ_b	i_b	λ_b	q	C	f_b	B/f	Type
	7.2	10.6	2.2T	0.02	1.6×0.16	0.236	0.481 (S.L. 0.05)	6.76	2.55	10,656	281.5	H-350×175	13,600	775	530	4.58	114.7	8.33	4.75	1.25	0.47	B3A
	〃	〃	3.33	0.02	0.8×0.16	0.108	0.310	4.35	1.64	6,868	181.4	H-300×150	7,210	481	530	3.87	137.0	8.61	〃	1.15	0.42	B3
	3.15	10.0	1.9	0.51		0.51	1.019	12.73	5.10	31,591	796.1	H-450×200	33,500	1,490	500	5.18	96.7	8.32	〃	1.35	0.63	B4A
	〃	5.3						9.89	5.60	7,046	618.3	〃	〃	〃	185							〃

$p = 50.53 \times 5.0 \times 0.3 \times \frac{3}{8} + 50.5 \times 0.06 \times \frac{3}{4} + 50.08 \times 3.85 \times 5.0 \times \frac{3}{8} = 5.6$

$23 P \ell^3 / 648 EI = 23 \times 5.6 \times 530^3 / 648 \times 2,100 \times 22 = 7,045$ ㎝



ONE SIDE FLANGE CUT

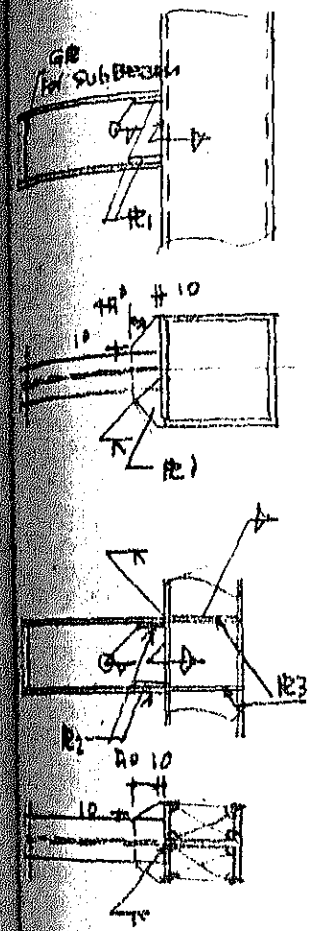


MK			
B4A	H-496×200×9×14	〃	〃
B4	H-488×300×8×13	〃	4-M22
B3A	H-350×175×7×11	〃	〃
B3	H-300×150×6.5×9	〃	3-M22
B2A	H-250×125×6×9	9	〃
B2	H-200×100×5.5×8	〃	2-M22
B9	H-900×300×16×28	19	12-M22
B6A	H-588×300×12×20	16	7-M22
B6	H-600×200×11×17	〃	〃
B5	H-500×200×10×16	12	6-M22
B3A	H-350×350×12×19	12	2×3-M22

Design of Cantilever

h	l	@	w D.L.	w W.L.	w T.L.	P (S.L. 0.05)	M	@	Jn	Zn	Member	J	Z	lb	ib	λb	η	C	fb	σ/f	Type
5.0	1.5	10.6	0.62	1.6×0.16	0.236	6.23	7.35	6.23	5567.5	389.6	H-350×175	13,600	775	150	4.58	32.8	8.33	1.75	1.60	0.50	cG3A
			{0.236×	3.25×	10.6}+	{0.05×	12.1}														

...LE OF CANTILEVER

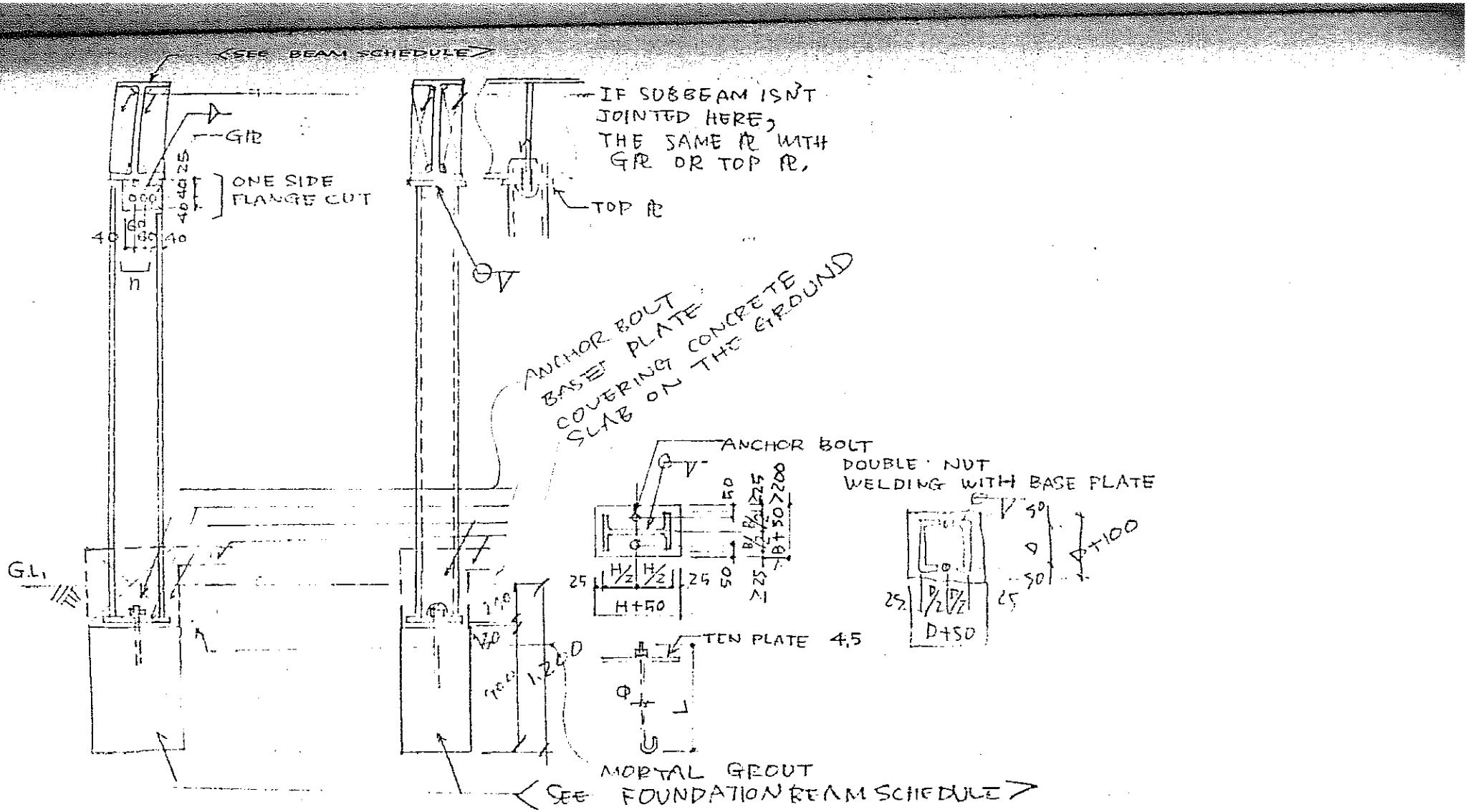


MARK	MEMBER	R1	R2	R3
CG4	H-400×200×8×13	R12	R12	R12
CG3A	H-350×175×7×11	〃	〃	〃
CG3	H-300×150×6.5×9	R9	R01	R9
CG2	H-200×100×5.5×8	〃	〃	〃

DESIGN OF POST

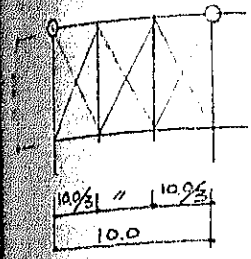
BTM	TOP	ℓ	@	D.L. w	D.L. φ	N	W.L. w	W.L. φ	M_D	Q	J_H	Z_H	Member	J	f_{bk} / E_b	i_E / i_b	λ_E / λ_b	M / C	f_{ck} / f_c	A / E	e/f	Type
0.3	7.2	6.9	10.5/3	0.62	0.017 (S.L.) 0.05	0.48	0.8×0.12	0.32	1.90	1.10	1955.4	79.4	H-300×150	9.210	690 / "	3.29 / 3.87	210 / 178	8.61 / 1.00	0.22 / 0.60	46.8 / 481	0.47	P3
0.3	7.2	6.9		0.8×	0.12× 5.3/2 × 3.9/2 = 0.49 [t] Qv 0.49× 3.0/6.9 = 0.21 QL 3.9/6.9 = 0.28 MD 0.78× 1.0 = 0.83	10.1			0.83		6943	346	□-200²×8	3.620	390	7.78	50.1		1.38	59.8 / 362		P.C.A

$\frac{0.49 \times 6.9^3 \times 300}{48 \times 2,100} = 6943$


<SEE BEAM SCHEDULE>
GIR
ONE SIDE FLANGE CUT
IF SUBBEAM ISN'T JOINTED HERE, THE SAME AS WITH GR OR TOP R.
TOP R
ANCHOR BOLT
BASE PLATE
COVERING CONCRETE SLAB ON THE GROUND
ANCHOR BOLT
DOUBLE NUT
WELDING WITH BASE PLATE
G.L.
TEN PLATE 4.5
MORTAL GROUT
<SEE FOUNDATION BEAM SCHEDULE>

P1	H-200×100×5.5×8	PL 9	2-M22	PL 16×190×200	2-M20×900	
P2	H-200×100×5.5×8	DO	〃	PL 〃×250×200	2-M 〃×〃	
P2A	H-250×125×6.5×9	DO	3-M22	PL 〃×300×200	2-M 〃×〃	
P3	H-300×150×6.5×9	DO	〃	PL 〃×350×200	2-M 〃×〃	
P3A	H-350×175×7×11	PL 12	4-M22	PL 〃×400×225	2-M 〃×〃	
P4	H-400×200×8×13	DO	〃	PL 〃×450×250	2-M 〃×〃	
P4A	H-450×200×9×14	DO	5-M22	PL 〃×500×250	2-M 〃×〃	
P25	H-250×250×9×14	PL 9	2×2-M22	PL 19×300×300	〃	
P20A	□-200×200×8	TOP PL 16×300×300	〃	PL 16×250×300	〃	
P25A	□-250×250×8	〃 19×300×350	〃	PL 19×300×350	〃	

Design of Bracing



h 6.90

@ 3.33

Cq A $0.8 \times 0.12 \times 3.33 = 0.32$

·Q $0.32 \times 6.9/2 = 1.10$

D $1.10 \times 6.26/6.30 = 1.30 \sim \times 1 = 1.30$, $An = 130/2.4 = 0.5$

$$Jn = \frac{13 \times 0.0002 \times 626^3 \times 300}{384 \times 2,100} = 237.3$$

$$Zn = \frac{3 \times 0.02 \times 6.26^2 \times 100}{8 \times 2.4} = 12.2$$

L − 130×130×9

A 22.7 , J 366.0 , Z 38.7

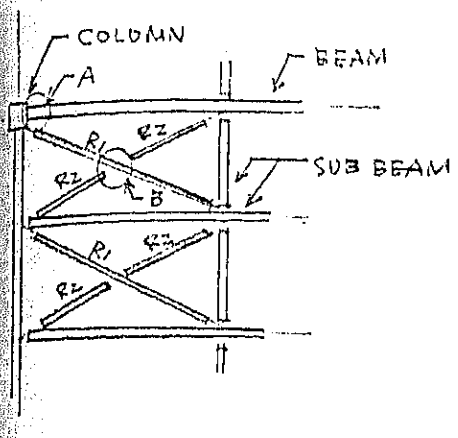
$$Jn' = \frac{5 \times 0.0002 \times 313^3 \times 300}{384 \times 2,100} = 11.4$$

$$Zn' = \frac{0.02 \times 3.13^2 \times 100}{8 \times 2.4} = 1.0$$

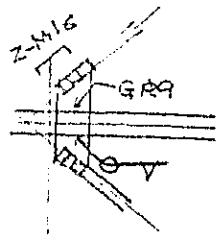
L − 75×75×6

A 8.7 , J 46.1 , Z 8.5

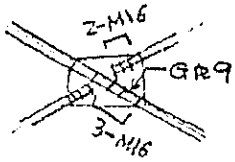
BRACING SCHEDULE



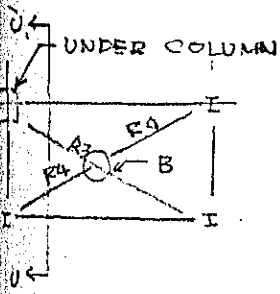
A

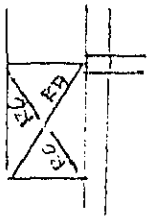


B.



MONITOR ROOF





C – C' SECTION

Mark	Member	Note
R_1	L-130×130×9	At. Paint & Body F. ~ L-130×130×12
2	L-75×75×6	
3	L-100×100×10	
4	L-75×75×6	
5	〃	
6	〃	

Design of Shell Type Roof

Bldg.	Roof Level [M]	$q = e_0 \sqrt{h}$	C	Cq [kg/m²]
Heavy Repair Factory	10.5 ~ 13.0	194 ~ 216	1.6	310 ~ 346
Parts Storage	17.0 ~ 9.5	185 ~ 185	〃	293 ~ 296
Inspection Factory	〃		〃	
Periodical Repair F.	〃		〃	
Paint & Body Factory	〃		〃	
Retreading & M.C. F.	〃		〃	

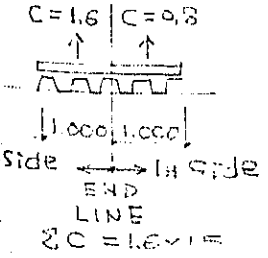
Continuous Beam Type

$$\frac{M}{Z} = \frac{wl^2}{8Z} \le f \quad \sim \quad l_z \le \sqrt{\frac{8Zf}{w}}$$

$$\frac{5\,wl^4}{384\,EI} \le \frac{l}{300} \quad \sim \quad l_I \ge \sqrt[3]{\frac{384 \times 2{,}100\,I}{300 \times 5\,w}}$$

S-60 0.8 Use Z 61.33 [cm³/m]
I 619.94 [cm⁴/m]
Self-w 13.5 [kg/m²]

w	Net w	l_z	l_I	l min
1.1 × 0.346 [t/m²]	0.00472 [t/cm²]	373.6 [cm]	407.6 [cm]	373.6 [cm]
× 0.310	0.00433	396.0	423.3	396.0
× 0.296	0.00417	405.9	430.7	405.9
× 0.293	0.00373	441.1	455.3	441.1



$$l_z \le \sqrt{\frac{8 \times 61.33 \times 1.4}{w}} = \sqrt{\frac{686.896}{w}}$$

$$l_I \le \sqrt[3]{\frac{384 \times 2{,}100 \times 619.94}{300 \times 5 \times w}} = \sqrt[3]{\frac{333{,}279.744}{w}}$$

Allowable Span [cm]

	M. Roof	Roof
H.R. Factory	370	390
Generally	400	440

Antilever Type

$$\frac{M}{Z} = \frac{w l^2}{2Z} \leq f \quad \sim \quad l_Z \leq \sqrt{\frac{2Zf}{w}}$$

$$\frac{w l^4}{8EI} \leq \frac{l}{250} \quad \sim \quad l_I \leq \sqrt[3]{\frac{8 \times 2{,}100\, I}{250\, w}}$$

w	Net w	l_Z	l_I	l_{min}
0.348 [t/m]	0.00333 [t/cm]	196.7 [cm]	210.9 [cm]	196.7 [cm]
0.310	0.00297	208.2	219.1	208.2
0.296	0.00283	213.3	222.7	213.3
0.253	0.00240	231.7	235.2	231.7

$$l_Z \leq \sqrt{\frac{2 \times 51.33 \times 0.75^* \times 1.4}{w}} = \sqrt{\frac{128.793}{w}}$$

$$l_I \leq \sqrt[3]{\frac{8 \times 2{,}100 \times 619.94 \times 0.75^*}{250\, w}} = \sqrt[3]{\frac{31{,}244.976}{w}}$$

$\sim$

Allowable Span = 190 [cm]

Designed Type

0.8 ⟶ Size up to 1.0 M/C

Design of Mezzanine Floor

$w = 0.51$ [t/m²]

t = 1.2 Deck Plate Z = 35.5 J = 13.6

(CAL-31)

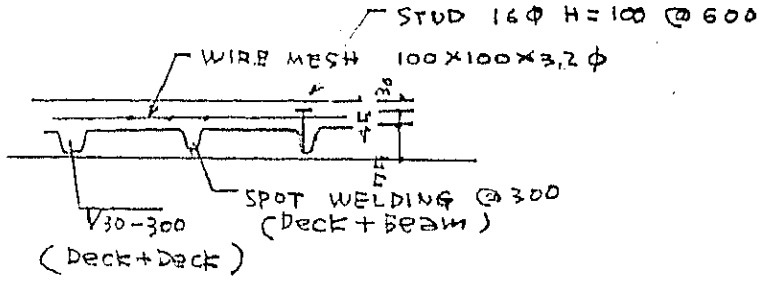
$$\frac{w l^2}{8Z} < f \sim l > \sqrt{\frac{8Zf}{w}}$$

$$= \sqrt{\frac{8 \times 35.5 \times 1.4}{0.0051}} = 279.2$$

$$\frac{5\,w l^4}{384\,EJ} < \frac{l}{300} \sim l > \sqrt[3]{\frac{384\,EJ}{1500\,w}}$$

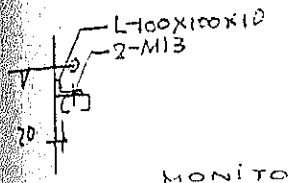
$$= \sqrt[3]{\frac{384 \times 2{,}100 \times 13.6}{1500 \times 0.0051}} = 242.9$$

—— Allowable Span 240 [cm]



Design of Furring Strip

Side Wall



MONITOR ROOF [-120×60×25-4.5 @≒900

GENERAL [-100×50×20-3.2 @≒900
OR -2.3 @≒700

MONITOR ROOF ~ GENERAL WALL

	SPAN			@	D.L.	W.L.		
H.R.F.	3.68	~	3.85	0.9~0.7	50	220	~	140
P.S.	3.60	~	3.60	〃	〃	120	~	120
I.F.	/	~	3.33	〃	〃	/	~	120
P.R.F.	3.53	~	3.90	〃	〃	180	~	120
P.B.F.	3.45	~	3.35	〃	〃	180	~	120
P.M.C.F.	3.00	~	3.38	〃	〃	180	~	120

(H.R.F. MONITOR ROOF)

D.L. $0.05 \times 0.9 = 0.045$ [t/m]

W.L. $0.22 \times 0.8 \times 0.9 = 0.158$ [〃]

span 3.68 [m]

[-100×50×20-2.3

$$\frac{\gamma}{f} = \frac{3.68^2 \times 100}{8 \times 1.4}\left(\frac{0.045}{6.96} + \frac{0.158}{16.1}\right)$$

$$= 2.03 < 2.10$$

$$\delta = \frac{5 \times 368^4}{384 \times 2100}\sqrt{\left(\frac{0.00045}{19.6}\right)^2 + \left(\frac{0.00158}{80.7}\right)^2}$$

$$= 3.49 \text{ [cm]}$$

[-100×50×20-3.2

$$\delta = \frac{5 \times 368^4}{384 \times 2100}\sqrt{\left(\frac{0.00045}{24.5}\right)^2 + \left(\frac{0.00158}{101.7}\right)^2}$$

$$= 2.67 \text{ [cm]}$$

[-100×50×20-4.5

$$\delta = \frac{5 \times 368^4}{384 \times 2100}\sqrt{\left(\frac{0.00045}{30.9}\right)^2 + \left(\frac{0.00158}{139}\right)^2}$$

$$= 2.10 \text{ [cm]}$$

[-120×60×25-4.5

$$= \sqrt{\left(\frac{\quad}{58.0}\right)^2 + \left(\frac{\quad}{252.0}\right)^2}$$

$$= 1.13 \text{ [cm]}$$

$\delta/\text{span} = 1.13/368 = 1/324 < 1/300$ O.K.

(H.R.F. MONITOR ROOF)

D.L. $0.05 \times 0.9 = 0.045$ [t/m]

W.L. $0.18 \times 0.8 \times 0.9 = 0.130$ [〃]

Span 3.60 [m]

[- 100 × 50 × 20 - 3.2

$$\delta = \frac{5 \times 360^4}{384 \times 2{,}100} \sqrt{\left(\frac{0.00045}{24.5}\right)^2 + \left(\frac{0.00158}{107}\right)^2}$$

$= 2.47$ [cm]

[- 100 × 50 × 20 - 4.5

$$\delta = \sqrt{\left(\frac{\quad}{30.9}\right)^2 + \left(\frac{\quad}{139}\right)^2}$$

$= 1.92$ [cm]

[- 120 × 60 × 25 - 4.5

$$\delta = \sqrt{\left(\frac{\quad}{58.0}\right)^2 + \left(\frac{\quad}{292.0}\right)^2}$$

$= 1.03$ [cm]

$\delta/\text{span} = 1.03/360 = 1/346 < 1/300$ O.K.

(H.R.F. GENERAL WALL)

D.L. $0.05 \times 0.9 = 0.045$ [t/m]

W.L. $0.14 \times 0.8 \times 0.9 = 0.101$ [〃]

Span 3.85 m

[- 100 × 50 × 20 - 2.3

$$\delta = \frac{1 \times 385^4}{185 \times 2{,}100} \sqrt{\left(\frac{0.00045}{19.0}\right)^2 + \left(\frac{0.00101}{80.7}\right)^2}$$

$= 1.51$ [cm]

[- 100 × 50 × 20 - 3.2

$$\delta = \sqrt{\left(\frac{\quad}{24.5}\right)^2 + \left(\frac{\quad}{107}\right)^2}$$

$= 1.17$ [cm]

$\delta/\text{span} = 1.17/385 = 1/330 < 1/300$ O.K.

(〃)

D.L. $0.02 \times 0.7 = 0.014$ [t/m]

W.L. $0.14 \times 0.8 \times 0.7 = 0.078$ [〃]

Span 3.85 m

[- 100 × 50 × 20 - 2.3

$$\delta = \frac{1 \times 385^4}{185 \times 2{,}100} \sqrt{\left(\frac{0.00014}{19.0}\right)^2 + \left(\frac{0.00078}{80.7}\right)^2}$$

$= 0.69$ [cm]

$\delta/\text{span} = 0.69/385 = 1/560 < 1/300$ O.K.