3 DORMITORY

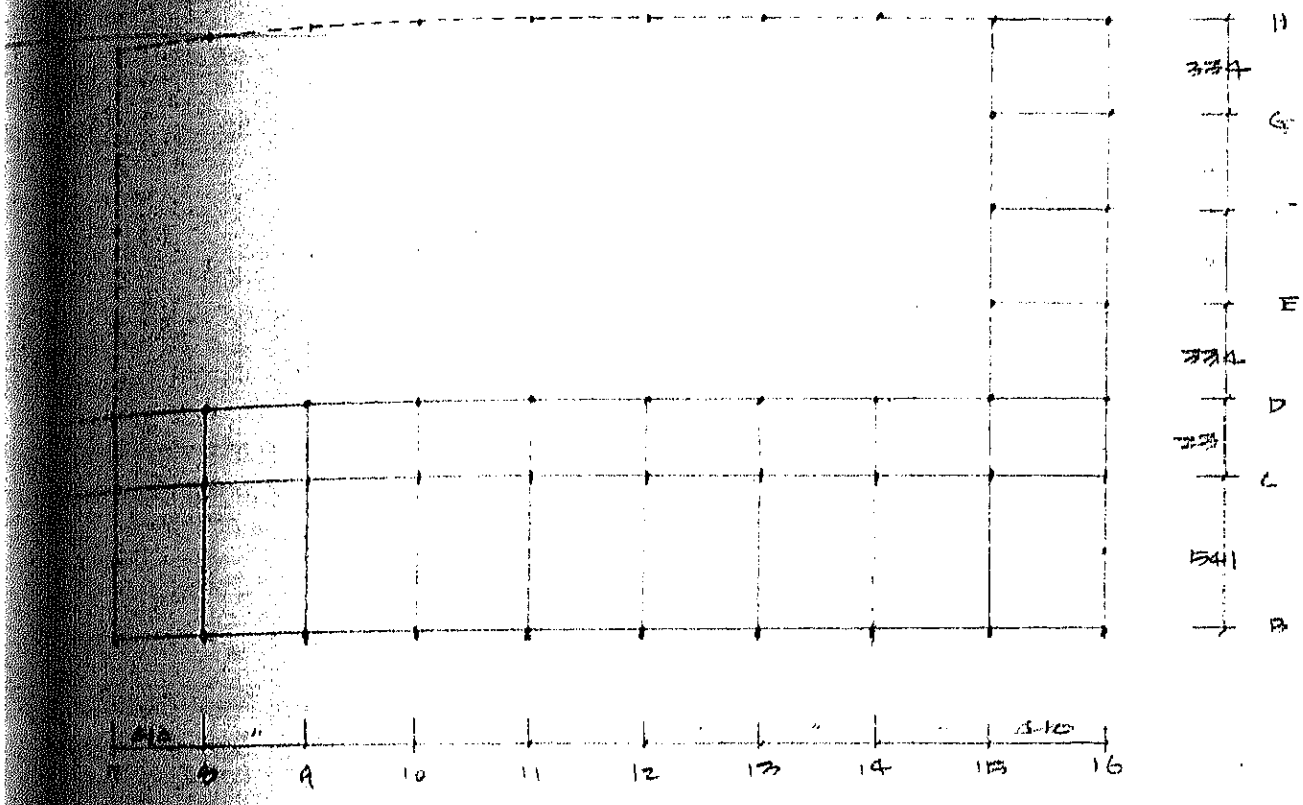
1 LOAD

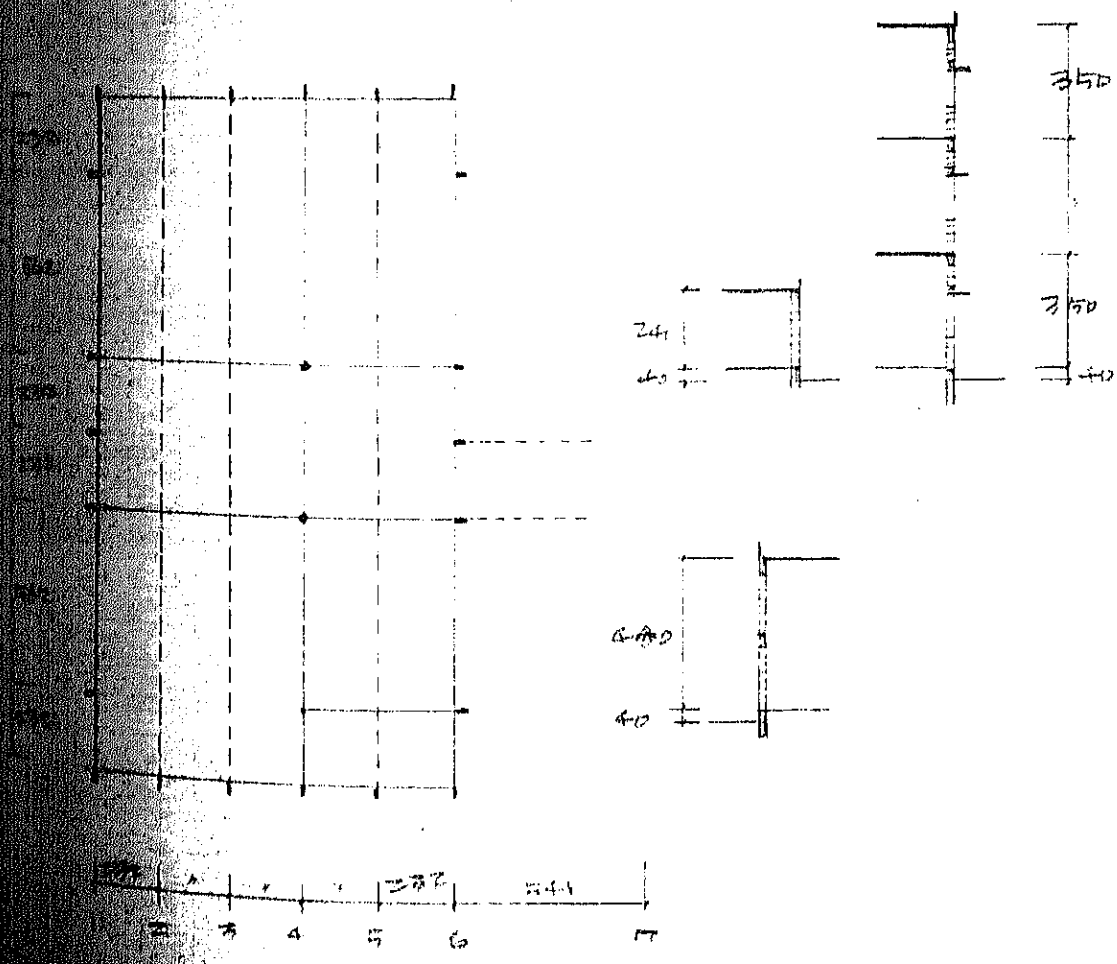
1 DEAD LOAD

ROOF	LIME CONCRETE	10 cm	200	510 kg/m² (DINING ROOM 460 ")
	R.C. SLAB	12 cm	290	
	CEILING		20	
FLOOR	TERAZZO TILE	5	100	410 "
	R.C. SLAB	12	290	
	CEILING		20	
WALL	BRICK	24.9	490	540 "
	CEMENT MORTAR	2.5	50	
BEAM	20×50	340 kg/m		
	20×75	510 "	20×90	610 "
COLUMN	20×75	510 "	40 ϕ	310 "
	20×40	300 "	40×40	390 "
	20×20	190 "		

2 LIVE LOAD

	SLAB	BEAM	EARTHQUAKE
ROOF	100	50	0
FLOOR	150	150	60





DINING ROOM

3.2 C, Mo Q OF BEAM

DORMITORY

$w = 0.56$ (0.5+1) $w_u = 0.5w$

B $l_x = 2.70$ $l_y = 4.10$ $\lambda = 1.52$ $w'_x = 0.34$ $w''_u = 1.21$

$C = 1.6 \times 2w + 1.40w'$ 2.7 3.0

$M_0 = 2.5 \times 2w + 2.10w'$ 3.5 6.1

$Q = 1.85 \times 2w + 2.45w'$ 2.9 5.3

GF09 $l_x = 4.10$ $\lambda = 1.0$ $w'_x = 0.44$ $w''_u = 0.81$

$C = 1.175w + 1.40w'$ 1.6 2.1

$M_0 = 2.9w + 2.10w'$ 2.5 3.3

$Q = 2.1w + 2.45w'$ 2.1 2.8

GF09 $l_x = 2.32$ $l_y = 4.10$ $\lambda = 1.77$ $w'_x = 0.34$ $w''_u = 1.91$
$Q_x = 4.10$

$C = (1.45 + 1.175)w + 1.4w'$ 2.2 4.5

$M_0 = (2.75 + 2.9)w + 2.1w'$ 3.5 6.9

$Q = (1.57 + 2.1)w + 2.45w'$ 2.8 6.1

GF09 $l_x = 2.32$ $l_y = 4.1$ $\lambda = 1.77$ $w = 0.44$ $w'_u = 0.89$

$C = 1.45w + 1.4w'$ 1.4 1.5 2.5

$M_0 = 2.3w + 2.1w'$ 2.1 2.3 5.3

$Q = 1.7w + 2.45w'$ 1.8 1.9 4.8

GF09 16

$C = 1.6w + 1.4w'$ 1.5 2.0

$M_0 = 2.5w + 2.1w'$ 2.3 3.1

$Q = 1.85w + 2.45w'$ 1.9 2.5

1.5 1.6

$C = (1.45 + 1.6)w + 1.4w'$ 2.1 4.4

$M_0 = (2.3 + 2.5)w + 2.1w'$ 3.3 6.5

$Q = (1.57 + 1.85)w + 2.45w'$ 2.6 5.9

G496 

$l_x = 4.10$ $l_y = 5.41$ $\lambda = 1.32$ $w'_k = 0.61$ $w'_u = 1.74$

$C = 4.1 \times 2w + 2.45w'$ 5.8 8.2

$M_0 = 6.3 \times 2w + 3.56w'$ 9.9 13.3

$Q = 3.15 \times 2w + 3.11w'$ 5.3 6.6

G480 

$l_x = 2.32$

$w' = 0.34$

$C = 0.33 \times 2.10 + 0.45w'$ 0.5 0.5

$M_0 = 0.46 \times 2w + 0.67w'$ 0.9 0.9

$Q = 0.66 \times 2w + 1.16w'$ 1.1 1.1

G460 

$l_x = 4.10$ $l_y = 5.41$ $\lambda = 1.32$

$l_x = 1.70$ $l_y = 4.10$ $\lambda = 1.57$ $w'_k = 0.61$ $w'_u = 1.74$

$C = (4.1 + 4.35)w + 2.44w'$ 5.9 8.9

$M_0 = (1.63 + 7.6)w + 3.66w'$ 9.7 14.2

$Q = (3.15 + 3.7)w + 2.11w'$ 5.4 8.7

G480B' 

$l_x = 2.32$ $w'_k = 0.44$ $w'_u = 1.96$

$C = 0.5w + 0.61w'$ 0.6 1.5

$M_0 = 0.83w + 0.91w'$ 0.9 2.2

$Q = 0.45w + 1.32w'$ 1.1 3.2

G460B 

$l_x = 2.32$ $w'_k = 0.44$ $w'_u = 0.49$

$C = 0.33w + 0.45w'$ 0.4 0.4 1.2

$M_0 = 0.46w + 0.67w'$ 0.6 0.6 1.8

$Q = 0.66w + 1.16w'$ 0.9 0.9 2.1

LAUNDRY

ガラス 

$l_x = 2.24$ $l_y = 4.10$ $\lambda = 1.83$ $w' = 0.34$

$C = 1.12 \times 2w + 1.0w'$ 2.5

$M_0 = 2.18 \times 2w + 2.1w'$ 2.9

$Q = 2.1 \times 2w + 2.05w'$ 3.1

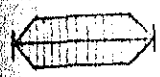
GIRDER 

C = 0.45 W + 0.63 W'　　0.9

M0 = 1.15 W + 1.74 W'　　1.3

Q = 1.4 W + 1.6 W'　　1.4

PURLING 2.00 M

B1 

C = 6.0 × 2W + 8.25 W'　　8.3

M0 = 9.5 × 2W + 12.4 W'　　12.7

Q = 4.2 × 2W + 3.11 W'　　6.3

B2 

C = 1.05 × 2W + 1.19 W'　　2.3

M0 = 2.9 × 2W + 2.69 W'　　4.3

Q = 2.0 × 2W + 2.32 W'　　3.2

B3 

C = 2.9 × 2W + 3.63 W'　　4.3

M0 = 4.6 × 2W + 7.45 W'　　6.7

Q = 2.7 × 2W − 2.81 W'　　2.2

B4 

C = 0.32 × 2W + 0.46 W'　　0.6

M = 0.53 × 2W + 0.69 W'　　0.9

Q = 0.7 × 2W + 1.16 W'　　1.3

CANTI 

C = 0.32 × 0 + 0.46 W'　　0.4

M = 0.53 W + 0.69 W'　　0.6

Q = 0.7 W + 1.16 W'　　0.9

$l = 4.64$　　$P = 4.2 + 1.3 = 5.5$　　$w' = 0.51$

$L = 2.21\,w + 5.5 \times 4.64/2 - 1.19\,w'$　　5.2

$M_0 = 3.12\,w +$　　$/2 - 3.64\,w'$　　9.4

$Q = 2.69\,w + 5.5/2$　　$+ 2.21\,w$　　5.3

$l = 6.96$　　$P = 6.2 + 3.3 = 9.5$　　$w' = 0.61$

$L = 4.21\,w + 9.5 \times 6.96 \times 5/8 + 4.04\,w'$　　14.0

$M_0 = 7.24\,w + 9.5 \times 6.96 \times 3/16 + 6.03\,w'$　　29.5

$Q = 4.04\,w + 9.5$　　$+ 3.40\,w'$　　13.7

$l = 3.64$　　$P = 3.2 + 3.2 = 6.4$　　$w' = 0.61$

$p = 9.5$

$L = 2.21\,w + 9.5 \times 3.64/2 + 1.19\,w'$　　6.5　　12.7

$M_0 = 3.12\,w +$　　$/4 + 2.69\,w'$　　11.4　　14.3

$Q = 2.69\,w + 9.5/2$　　$+ 2.21\,w'$　　5.15　　11.5

$l_2 = 3.2$　　$l_1 = 2.0$　　$\gamma = 2.3$　　$w' = 0.44$

$L = 2.9\,w + 2.3\,w'$　　2.6

$T = 6.6\,w + 2.3 \times 2.0$　　4.1

$Q = 2.4\,w + 2.3\,w'$　　2.6

$l = 3.2$　　$w' = 1.6$

$L = 0.45\,w'$　　0.6

$M_0 = 0.64\,w'$　　0.8

$Q = 1.16\,w'$　　1.6

$l = 5.62$　　$w' = 1.26$

$L = 2.63\,w'$　　3.3

$M_0 = 2.45\,w'$　　5.0

$Q = 2.81\,w'$　　3.5

AXIAL FORCE OF COLUMN

ROOF & FLOOR		WALL		BEAM	COLUMN	W	P
		0.10 × 4.1	0.41				
6.56×4.1×2.71	6.77	0.64 × 3.06	2.49	2.61	1.63	12.78	12.8
		1.27 × 2.15	3.25				
1.64 × "	6.00	1.11 × 3.47	4.26	2.61	1.79	17.84	30.7
		1.27 × 2.15	3.25				
"	6.00	1.11 × 3.47	4.26	2.61	2.63	18.78	49.5
		0.10 × 3.4	0.34				
2.46×3.15×1.35	1.55	0.64 × 1.91	1.22	1.06	1.09	5.26	5.3
		1.27 × 1.21	1.54				
1.64 × "	1.49	1.11 × 1.91	2.12	1.06	1.74	8.00	13.3
		1.27 × 1.21	1.54				
"	1.49	1.11 × 1.91	2.12	1.06	1.66	8.09	22.2
		0.10 × 2.1	0.21				
2.46×4.1×2.71	3.11	0.64 × 1.21	0.77	1.47	0.40	6.02	6.0
		1.27 × 3.11	3.94				
2.46 × "	3.00	1.11 × 1.21	1.34	1.47	0.66	10.44	16.4
		1.27 × 3.11	3.95				
"	3.00	1.11 × 1.21	1.34	1.47	0.99	10.75	27.2
				2.93	0.53	22.77	22.8
0.82×4.1×3.67	0.84						
		1.64 × 3.67	6.26				
2.46 × "	6.57	1.27 × 2.56	3.25	2.93	1.05	22.06	44.9
		1.64 × 3.67	6.26				
"	6.57	1.27 × 2.56	3.25	2.93	1.58	22.64	67.4
		0.10 × 2.5	0.25				
2.46 × 2.05 × 2.52	2.84	0.64 × 1.21	0.77	1.32	0.40	6.69	5.17
	0.63	1.64 × 4.3	7.05				
2.46 × "	2.79	1.11 × 1.21	1.34	1.38	2.66	13.45	19.5
	0.63	1.64 × 4.3	7.05				
"	2.79	1.11 × 1.21	1.34	1.38	0.99	14.18	33.7
		0.10 × 4.1	0.41				
2.46 × 4.1 × 1.16	2.43			1.62	0.40	4.86	4.9
		0.15 × 3.47	0.57				
2.46 × "	2.73			1.62	0.66	5.19	10.0
		0.15 × 3.47	0.57				
"	2.73			1.62	0.90	5.51	15.6
				0.52		2.44	18.0
2.46 × 2.05 × 1.67	1.92						
		0.10 × 2.1	0.21				
2.46 × 2.05 × 1.16	1.21			0.91	0.40	2.95	3.0
	0.63	1.64 × 1.91	3.13				
1.64 × "	1.28			0.91	0.66	6.67	9.6
	0.63	1.64 × 1.91	3.13				
"	1.28			0.91	0.99	7.00	16.6
2.46 × 2.05 × 1.67	1.92						
				2.52		2.44	19.1

ROOF		WALL		BEAM	COLUMN	W	P
2.56 × 2.15 × 3.14	3.63			1.72	0.53		6.1
				1.30	0.53		1.9
		0.10 × 2.30	0.23				
2.81 × 1.16 × 1.16	0.69	1.30 × 2.64	2.14	0.64	2.65		7.1
		0.10 × 2.30	0.23				
2.81 × 3.32 × 3.41	4.70	1.30 × 3.14	2.74	3.64	2.65		13.0
		0.10 × 2.30	0.23				
2.81 × 2.32 × 1.16	1.37	1.30 × 2.04	2.74	1.03	2.65		8.1
		0.10 × 4.10	0.41				
2.81 × 1.16 × 3.41	2.35	1.30 × 3.14	4.06	1.26	2.65		11.7
2.81 × 3.48 × 3.41	7.05	1.21 × 3.48	7.11	2.91	0.90		19.0
		0.10 × 4.10	0.41				
2.81 × 2.32 × 3.41	4.70	1.21 × 3.48	5.04	2.36	2.65		17.6
		1.30 × 3.10	4.03				
		0.10 × 4.10	0.41				
2.81 × (3.48 × 6.29 − 5.45)	0.13	1.30 × 3.10	5.06	4.40	2.65		20.6
2.32 × 5.13	6.07						
2.81 × 3.48 × 6.29	11.16	1.21 × 4.26	5.07	1.01	2.03		35.3
1.16 × 2.17	1.60	0.10 × 4.10	0.41				
2.81 × (2.32 × 5.13 − 2.45)	4.70	1.30 × 3.14	5.06	4.74	2.65		19.2
		0.10 × 2.30	2.23				
1.81 × 1.16 × 2.32	1.30	1.30 × 2.04	2.74	1.01	2.65		7.7
1.16 × 2.17	1.60	0.10 × 2.30	0.23				
2.81 × 1.16 × 2.32	1.91	1.30 × 2.04	2.74	1.01	2.65		10.3
2.81 × 5.45 × 6.29	16.61			11.09	1.61		31.3

2.4 SEISMIC FORCE

DORMITORY

ROOF	0.51 × 36.9 × 17.73	148.5	
PARAPET	0.1 × [illegible]	9.9	
WALL	0.64 × (36.9 × 9 + 2.43)	23.6	
	0.54 × 1.5 × 36.5	29.6	
	0.46 × 1.39 × 41.0	26.0	
BEAM	0.24 × 12.9	41.4	
	0.51 × 51.3	26.2	
COLUMN	0.51 × 2.15 × 10	11.0	
	0.30 × 1.76 × [illegible]	5.3	
	0.14 × [illegible] × 10	4.1	321.6
2ND FLOOR	0.47 × (36.9 × 17.73 + 2.18)	135.1	
WALL	0.77 × (36.2 × 9 + 2.43)	248.4	
	0.54 × 3.0 × 36.5	59.1	
	0.46 × 3.75 × 41.0	51.9	
BEAM		67.6	
COLUMN	0.51 × 3.5 × [illegible]	17.9	
	0.30 × 3.5 × [illegible]	10.5	
	0.14 × 3.5 × [illegible]	6.7	317.1
1ST FLOOR		317.1	
ROOF	0.51 × (2.7 × 2.4 + 4.1 × 16.7)	6.7	
BEAM	0.24 × 12.2	2.9	326.6

	W	K	Σ	Q
3	321.6	0.1	32.2	32.2
2	317.1	0.3	37.1	69.9
1	326.6	0.3	38.7	108.6

LAUNDRY

ROOF	0.51 × 4.1 × 12.0 =	25.1	
WALL	0.24 × 1.15 × 13.7	9.5	
	0.15 × 1.15 × 14.73	3.2	
BEAM	0.36 × 35.7	12.1	
COLUMN	0.19 × 1.9 × 3	3.1	51.0 × 0.1 = 5.1

DINING

ROOF	0.46 × 11.6 × 20.52	109.5	
	0.44 × 2.7 × 7.32	2.4	
WALL	1.73 × 4.74	8.2	
	1.24 × 18.1	21.9	
	0.10 × 6.4 =	6.4	
BEAM	0.36 × 64.5	21.9	
	0.51 × 28.1	34.6	
	0.61 × 24.43	13.3	
COLUMN	0.51 × 26 × 22	24.2	
	0.31 × 2.6 × 1	0.8	
	0.39 × 2.6 × 1	1.0	
	0.4 × 2.6 × 1	0.5	311.1 × 0.1 = 31.1

FENCE

WALL	0.15 × 1.4 × 3.42	0.7	
BEAM	0.24 × 7.42	1.3	
COLUMN	0.19 × 1.4	0.3	2.4 × 0.1 = 0.2

WIND PRESSURE

$q = 60\sqrt{2.0} = 93\ kg/m^2$

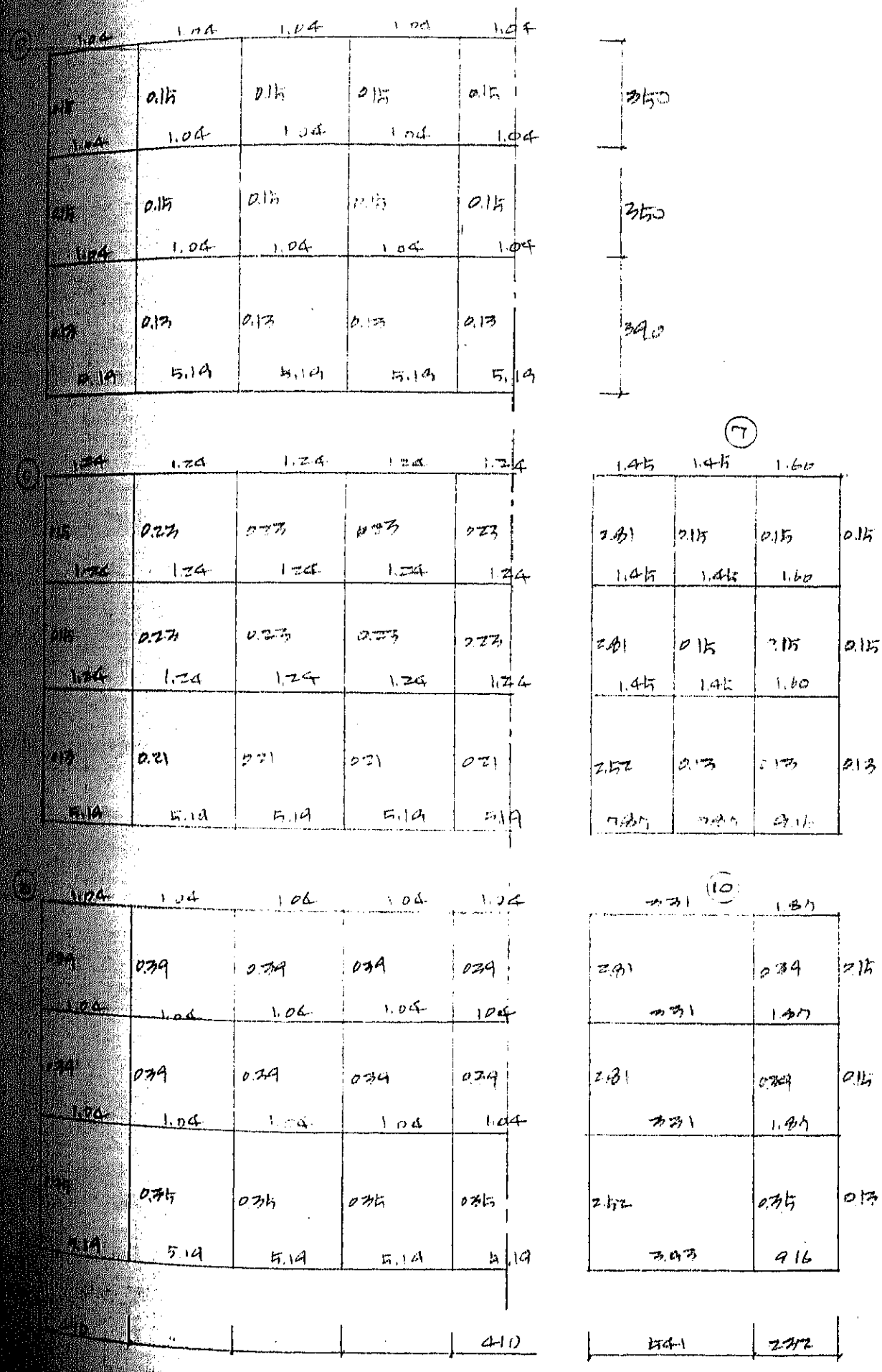
$w = 93 \times 2.0 \times 0.5 = 93$

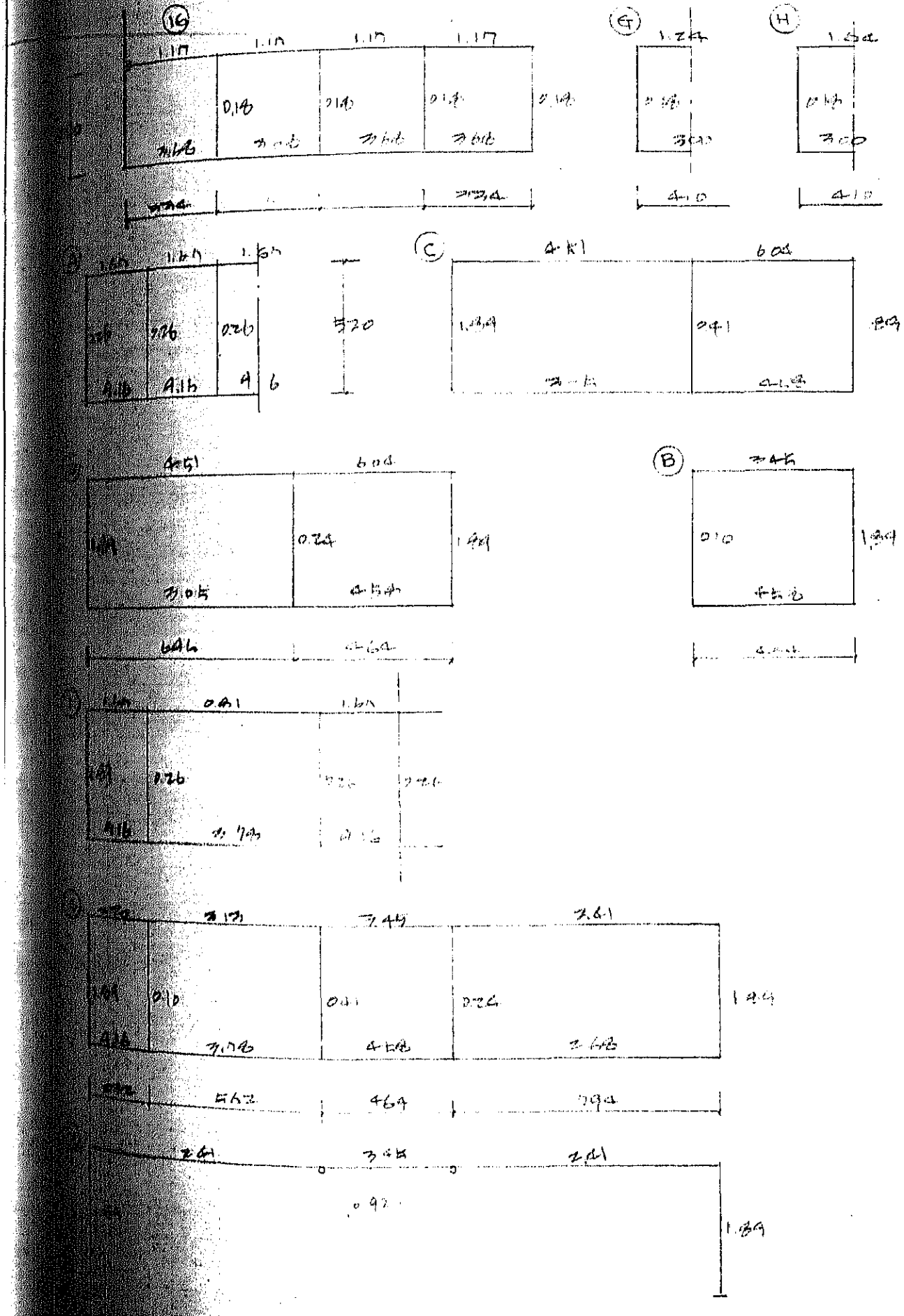
$W = 93 \times 4.1 \times 2.6 = 1060\ kg = 1.1\ T$

3-5 SHEAR WALL

	b × D	I_c	l_c	I_c/l_c	α_c	k_c	$k_c = 10^3$
2C	20 × 75	937	357	26.1		2.31	
	75 × 20	1317		37		0.37	
	20 × 45	21.3		6.1		0.61	
	45 × 20	3.2		2.3		0.23	
	20 × 20	5.1		1.5		0.15	
1C	20 × 175	937	349	25.2		2.52	
	175 × 20	17		3.5		0.35	
	20 × 45	21.3		5.5		0.55	
	45 × 20	9.2		2.1		0.21	
	20 × 20	5.1		1.3		0.13	
GF	20 × 450	29.2	410	71	1.46 1.75	1.24	1.04
			332	12.6	1.49	1.87	1.60
			270	10.6	1.32		1.45
	20 × 175	937	541	182	1.32	3.31	2.173
FG	35 × 950	1127.6	410	51.9		5.19	
			232	91.6		9.16	
			270	113.7		11.37	
			154	39.3		3.93	
C	20 × 20	5.1	280	1.8		.18	
GF	20 × 50	20.2	334	47	1.36	1.17	
FG	35 × 175	1220	410	30.0		3.00	
			334	36.9		3.69	

	b×h	J_{cr}	l	$K_{1,2}$	φ	R_e	$K_0 = 10^3$
C	28×175	998	520	1.89		1.89	
	75×28	129	"	2.6		0.36	
	28×28	5.1	"	1.0		0.10	
	40×40	21.3	"	41		0.41	
	40φ	12.6	"	2.4		0.34	
G	28×50	29.2	232	12.6	1.175	2.20	1.67
	"	"	562	5.2	1.56	0.81	
	28×175	998	464	21.2	1.63	3.45	
			794	12.4	1.95	2.41	
	28×90	170.1	696	24.0	1.86	4.51	
			464	36.6	1.65	6.04	
FG	35×90	212.6	232	91.6		9.16	
	"		464	45.8		4.58	
	"		562	30.8		3.08	
	"		696	20.5		2.05	
	"		794	26.4		2.64	





CALCULATION OF STRESS

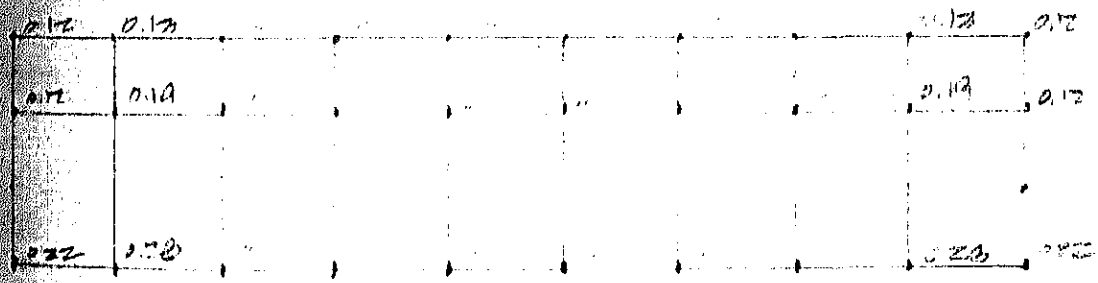
	0.12	0.13	0.12	0.19	0.22	0.28
	0.4	0.7	0.6	1.0	1.2	1.5
	0.44	0.45	0.45	0.51	0.43	0.45
	0.12	0.13	0.12	0.19	0.22	0.28
	1.5	1.5	1.4	2.2	2.6	3.3
	0.450	0.450	0.450	0.450	0.440	0.450
	0.11	0.12	0.11	0.19	0.24	0.28
	2.3	2.3	2.1	3.7	4.6	5.4
	0.55	0.55	0.54	0.55	0.55	0.55

ΣQ

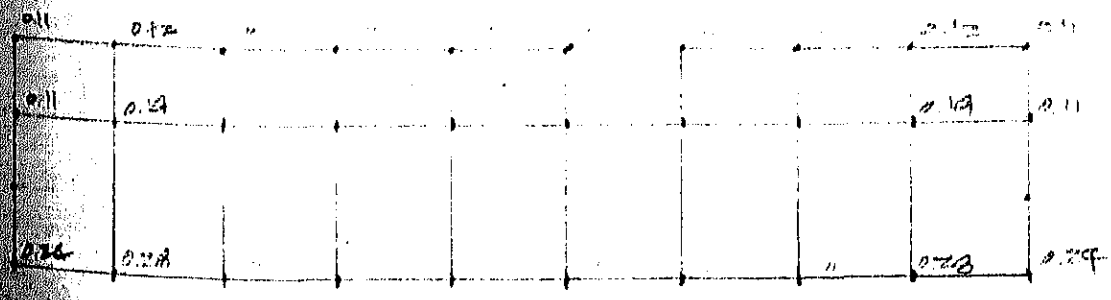
$= 2.12$

$= 6.96$

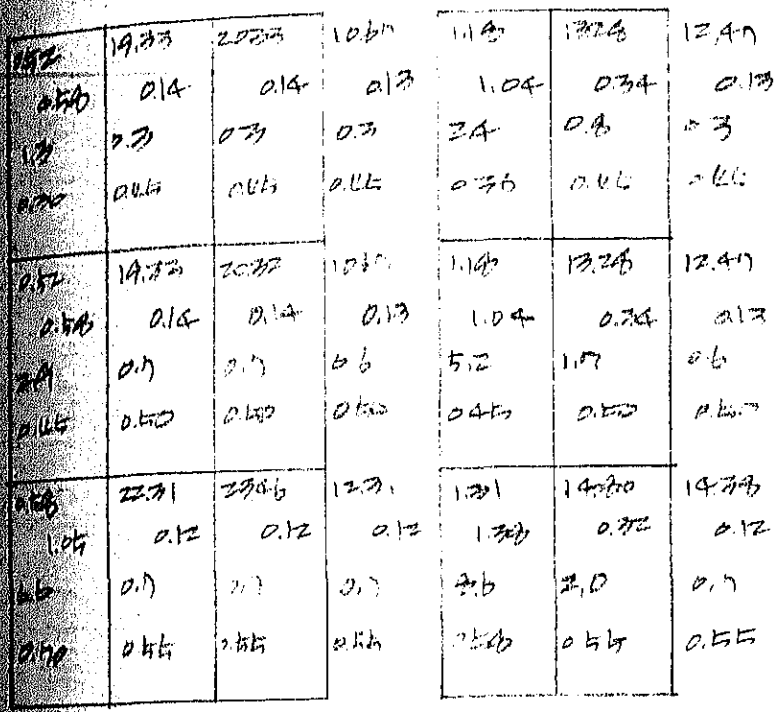
$= 10.96$

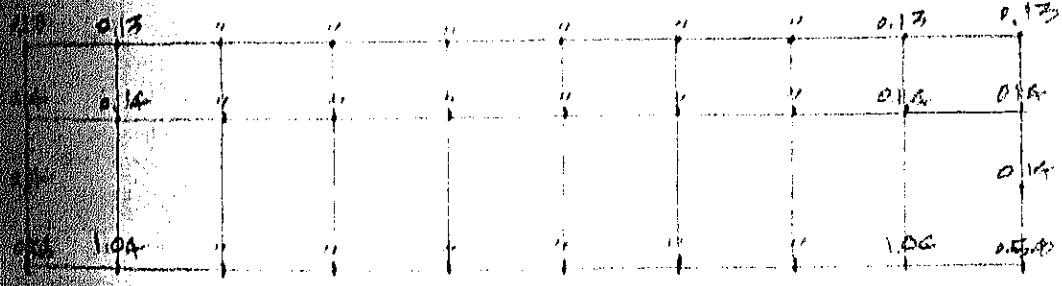


$\Sigma D = 5.12$

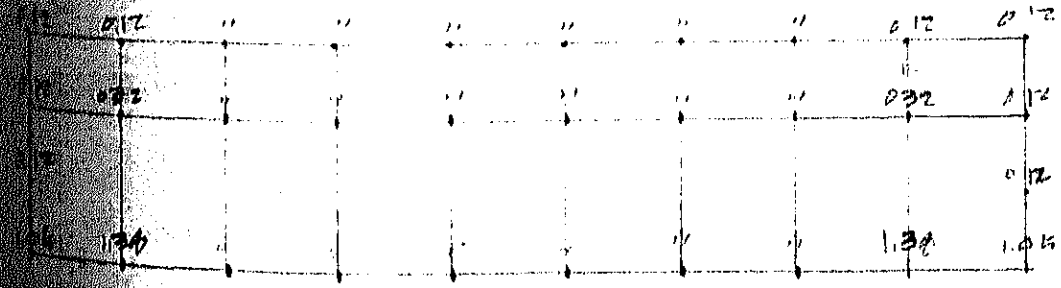


$\Sigma D = 5.64$

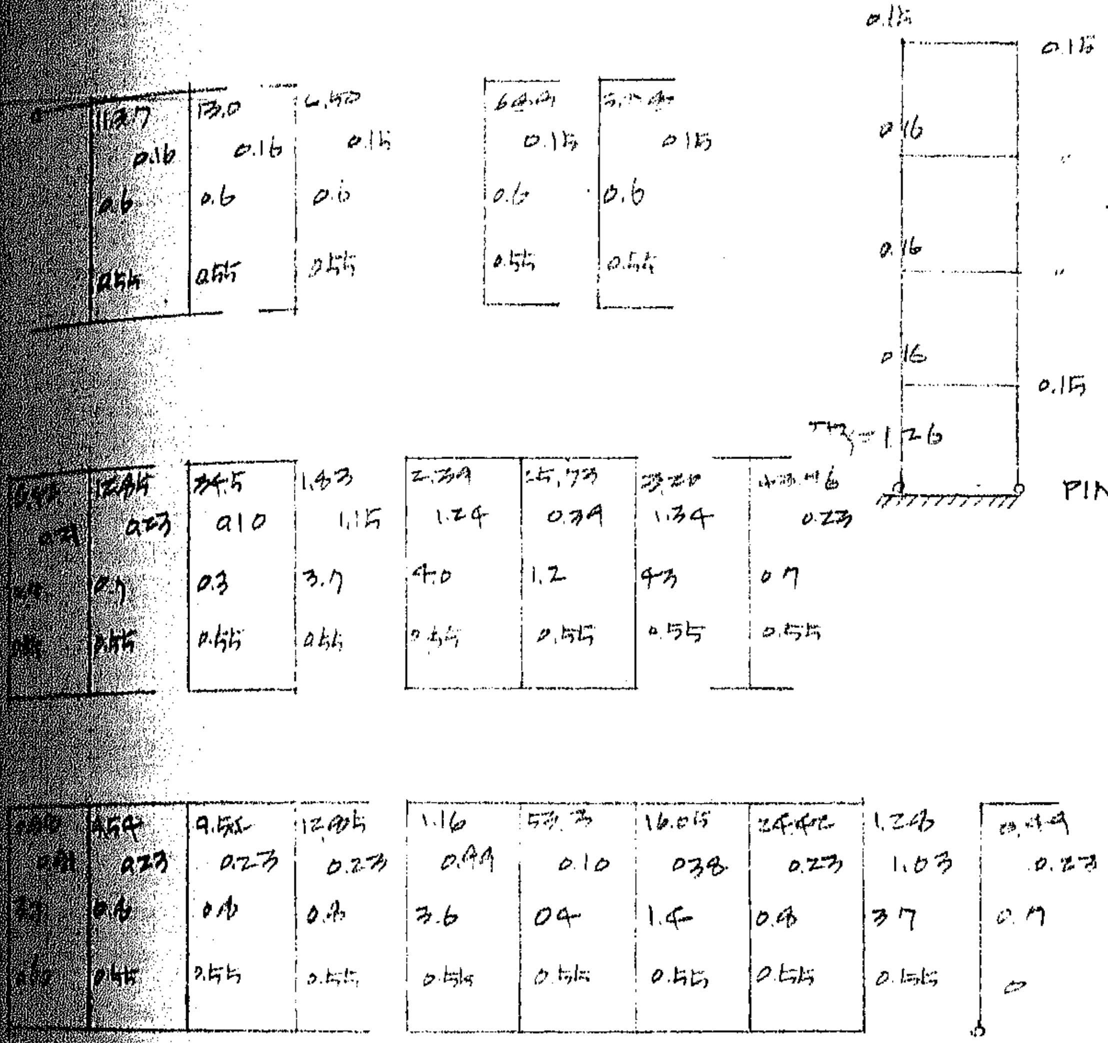




エリア＝14.6



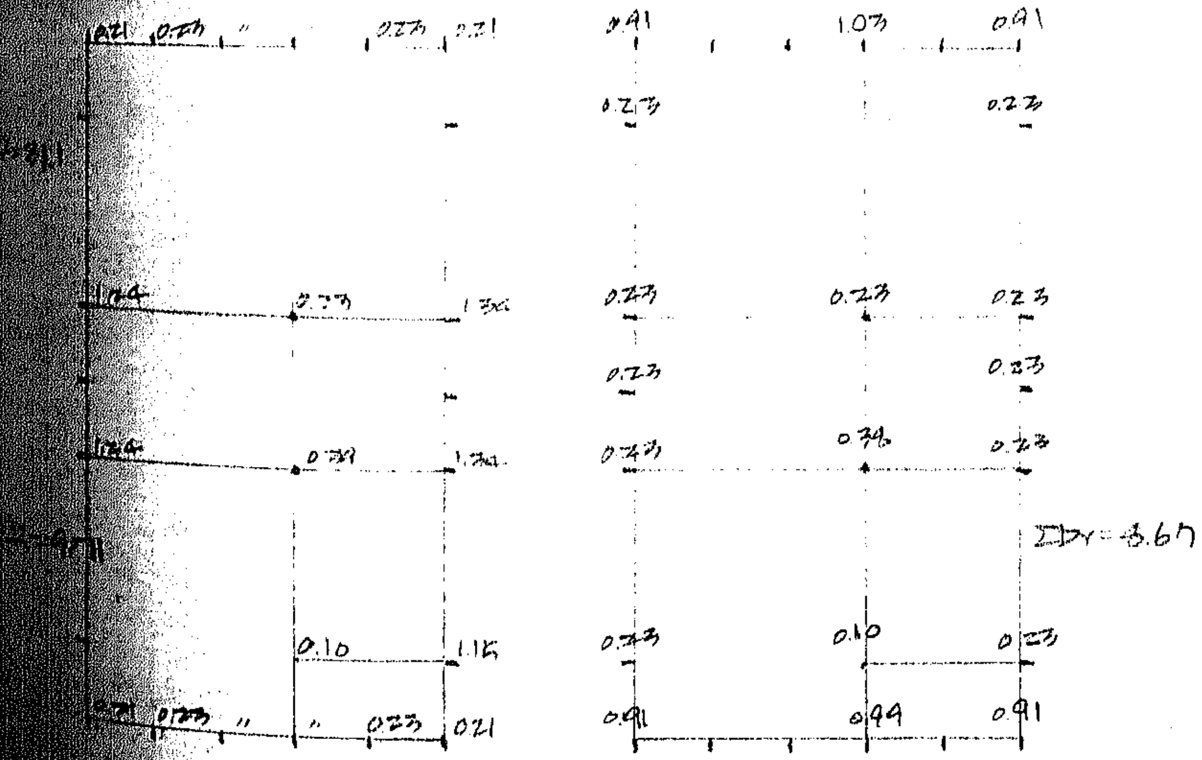
エリア＝17.39



0.15
0.15
0.16
0.16
0.16
0.15
ΣDy = 1.26
PIN JOINT
11.27 0.16 0.6 0.55
13.0 0.16 0.6 0.55
6.55 0.15 0.6 0.55
64.9 0.15 0.6 0.55
5.59 0.15 0.6 0.55
12.44 0.23 0.7 0.55
34.5 0.10 0.3 0.55
1.43 1.15 3.7 0.55
2.39 1.24 4.0 0.55
15.73 0.39 1.2 0.55
33.20 1.34 4.3 0.55
13.46 0.23 0.7 0.55
4.54 0.23 0.6 0.55
9.56 0.23 0.6 0.55
12.05 0.23 0.6 0.55
1.16 0.99 3.6 0.55
53.3 0.10 0.4 0.55
16.05 0.38 1.4 0.55
24.42 0.23 0.6 0.55
1.23 1.03 3.7 0.55
10.19 0.23 0.7 0

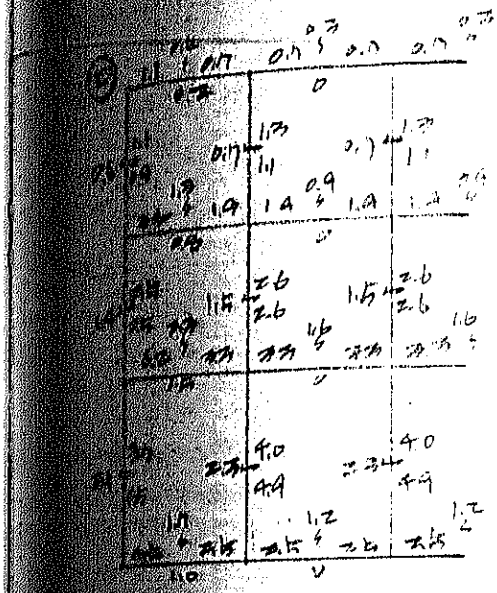
ΣDx = 1.30

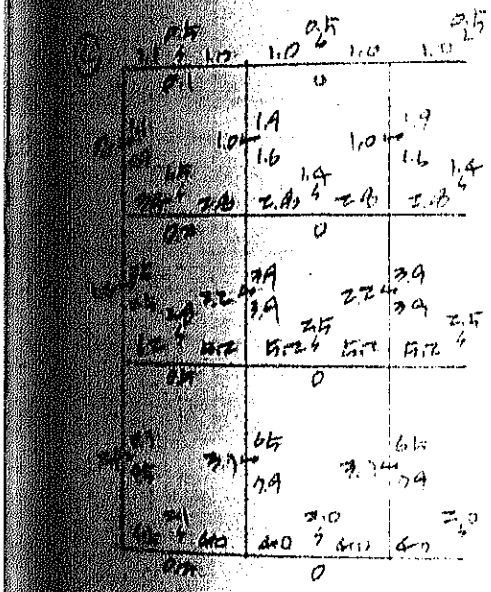
Q = 5.1

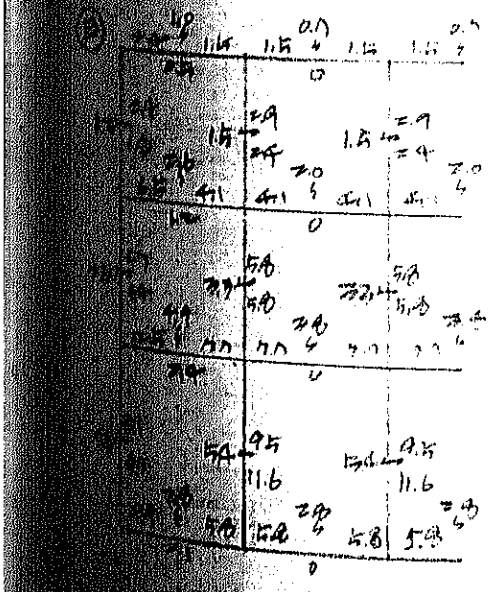


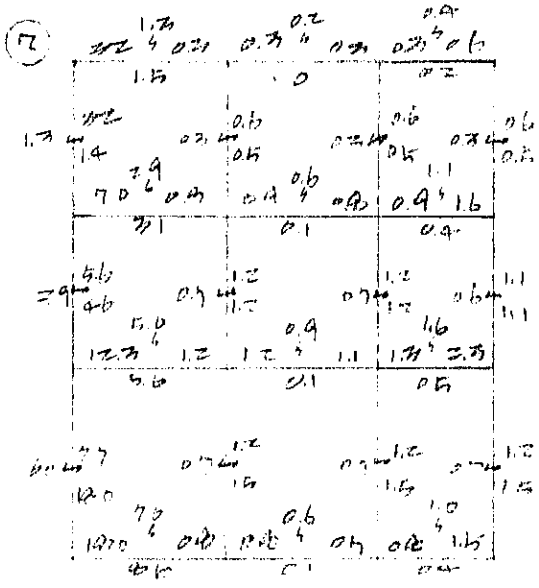
0.21 0.23 0.23 0.21
0.91 1.03 0.91
0.23 0.23
1.24 0.23 1.30 0.23 0.23 0.23
0.23 0.23
1.24 0.39 1.30 0.23 0.39 0.23
ΣDy = 3.67
0.10 1.15 0.23 0.10 0.23
0.21 0.23 0.23 0.21 0.91 0.99 0.91

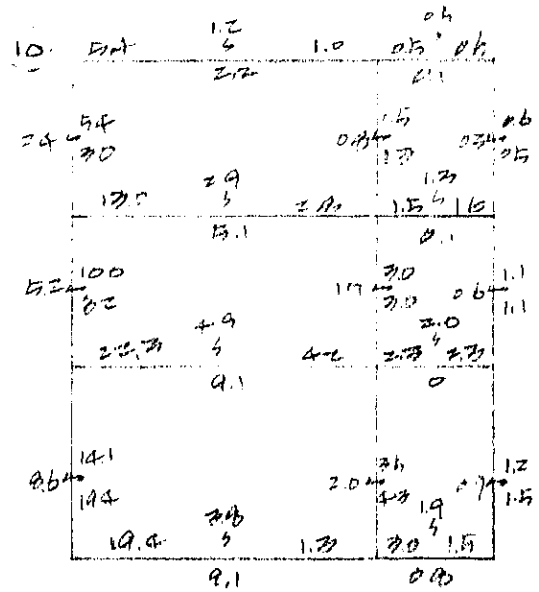
DIAGRAM OF SEISMIC FORCE











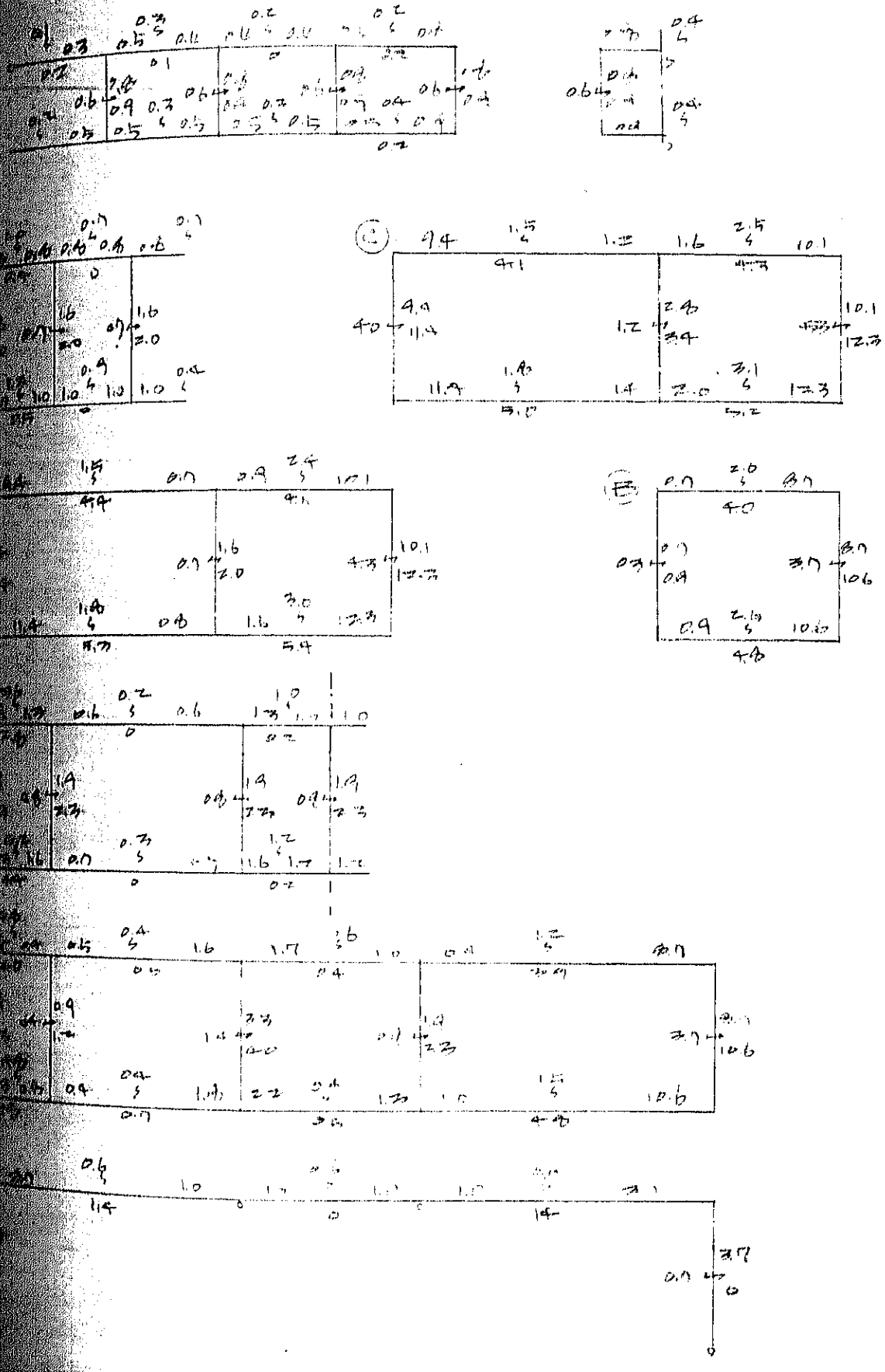
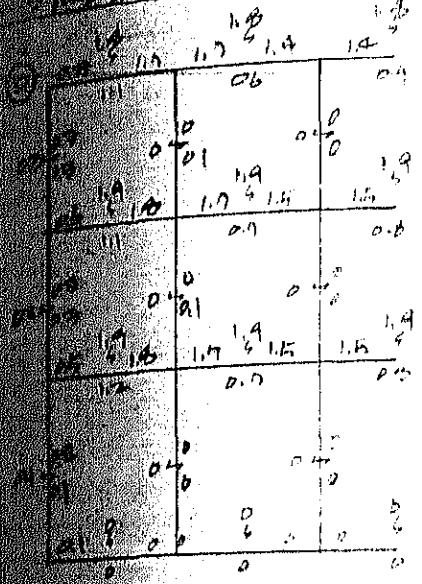
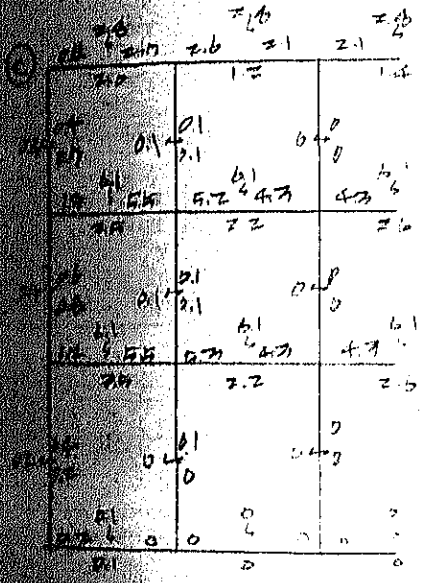
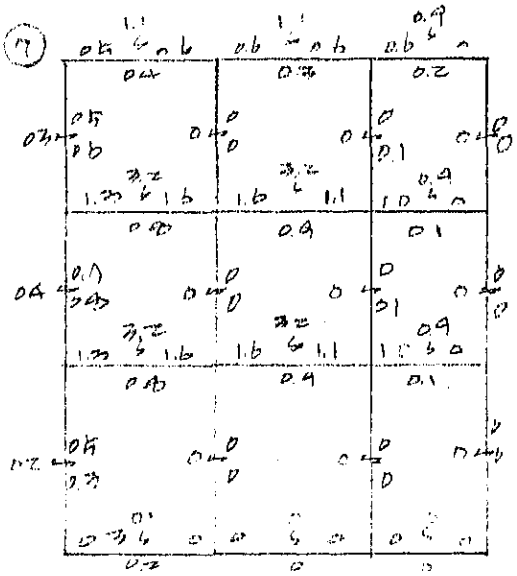
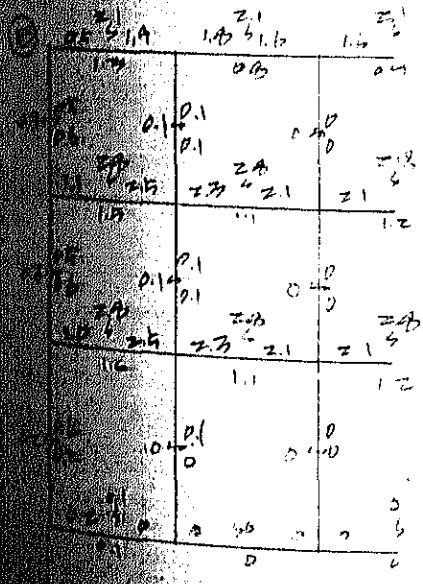


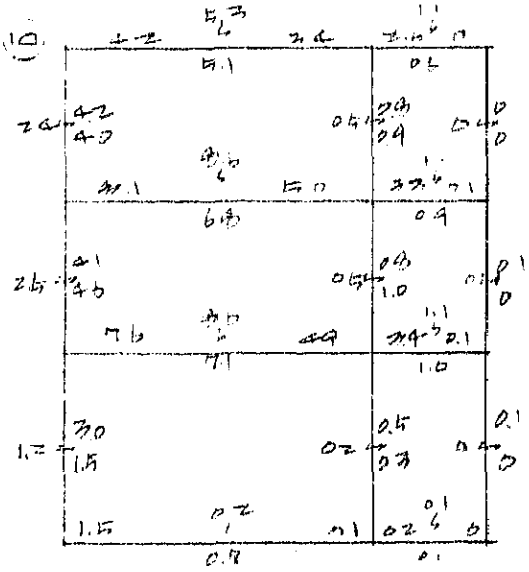
DIAGRAM OF VERTICAL LOAD

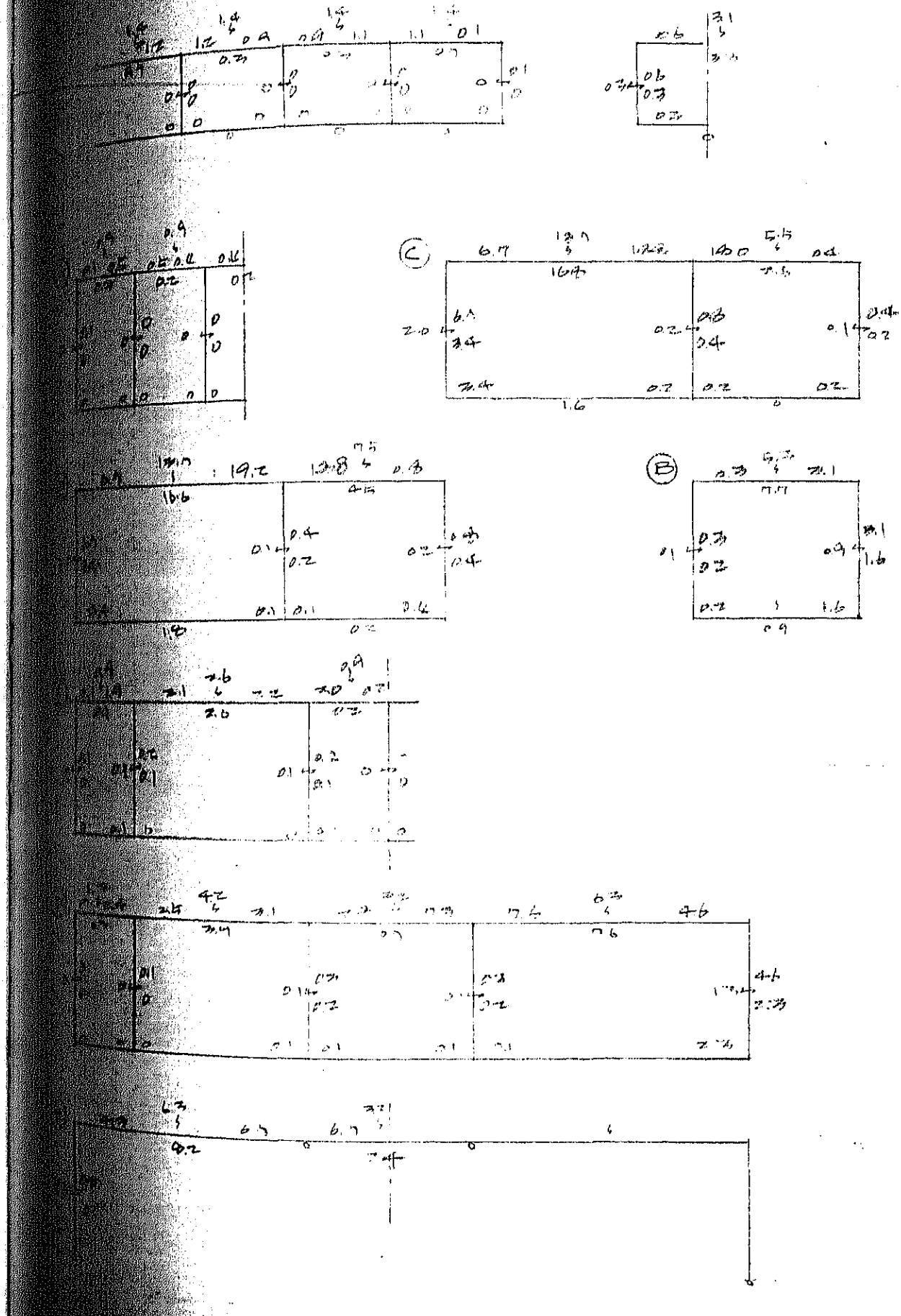










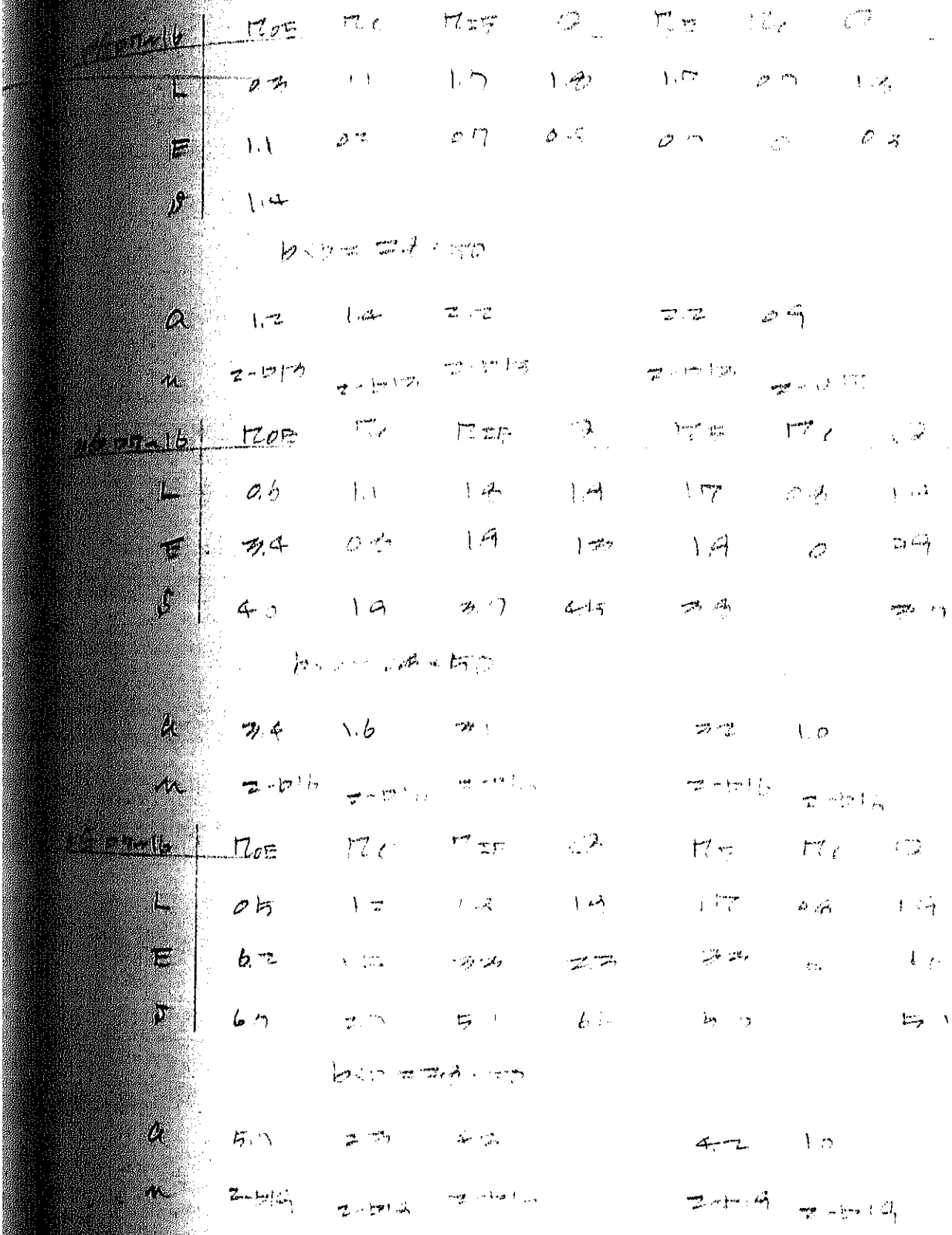


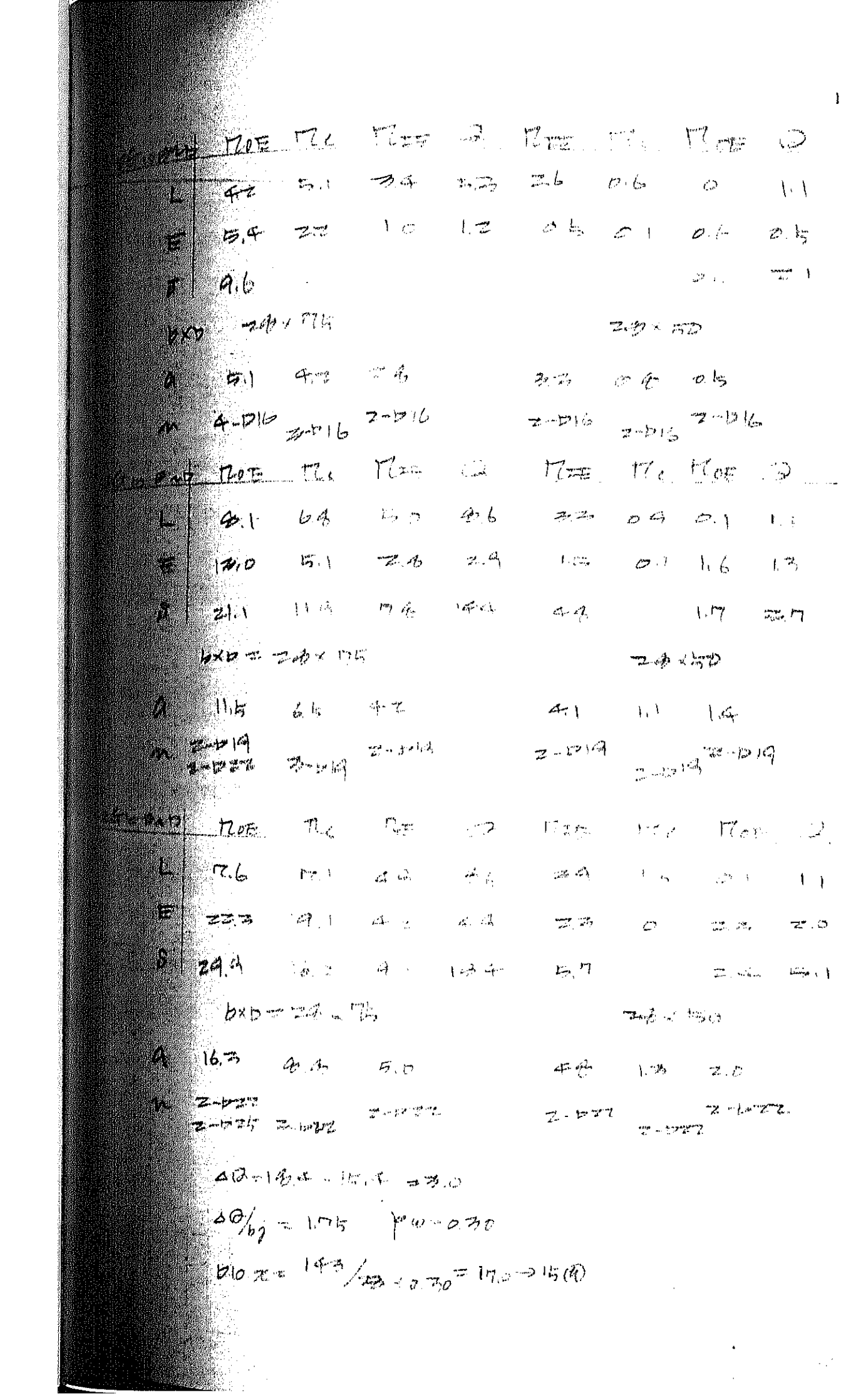
WEIGHT OF SECTION

L	0.5	1.3	1.9	2.1	1.9	0.9	2.1
E	2.4	0.5	1.5	1.0	1.5	0	0.7
S	2.9		3.4	4.1	3.3		3.5
L	1.1	1.5	2.5	2.8	2.3	1.2	2.8
E	6.5	1.2	4.1	2.6	4.1	0	2.0
S	7.6	2.7	6.6	4.8.0	6.4		6.8
L	1.0	1.6	2.5	2.8	2.3	1.2	2.8
E	12.5	2.4	7.7	4.9	7.7	0	3.8
S	13.5	4.0	10.2	12.6	10.0		10.4

$\Delta Q = 10.6 - 9.9 = 2.7$

$\Delta Q = 10.5 - 9.9 = 0.5$





L	0.6	3.3	3.1	L	1.2	0.7	1.4
E	0.0	0	0.4	E	2.5	0.2	0.3
S	1.4			S			
A	1.2	4.2			1.5	0.9	
M	2-0.16	2-0.16			2-0.16	2-0.16	

L	0.1	0.3	0.6	2.9	0.5	0.2	0.9
E	1.6	0.4	0.8	1.0	0.8	0	0.1
S	1.7	0.1	1.3	2.9	1.3		2.3
A	1.4	0.6	1.1		1.1	0.3	
M	2-0.16	2-0.16			2-0.16	2-0.16	

L	0.3	1.7	2.1	5.3
E	0.1	0.5	0.7	2.0
S	1.0	11.7	11.6	4.3
A	0.15	6.4	6.4	
M	2-0.22	2-0.22	2-0.22	

L	6.7							
E	9.0							
S	13.7							
A	7.0							
W								

L	6.7	16.6						
E	9.4							
S	16.1							
A								
W								

L	01							
E	6.9							
S	7.0							
A	5.9							
W								