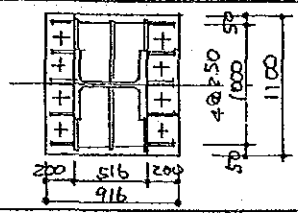
DECISION OF COLUMN BASE (12)
[柱脚の断面算定]

LOCATION			H-108 (107, 201, 202)		K-106, 203	
COLUMN SIZE			H-516x500 x22x40		H-350² x12 x19	
DIRECTION			X	※X	※Y	Y
PERMANENT CONDITIONS		M (tm)	15.2		4.5	
		N (t)	594.5		179.1	
		Q (t)	50.8		15.0	
TEMPORARY CONDITIONS		M (tm)	34.5	4.0	21.4	11.5
		N (t)	819.5	372.7	272.7	23.4
		Q (t)	114.9	13.3	71.4	38.4
FIGURE					Same as B-107	
BASE PLATE	(LxBxt)		916x1100x38		750x400x25	
CAP PLATE	(THICK.)		—		—	
RIB PLATE	(HxBxt)		22		16	
WING PLATE	(HxBxt)		22		—	
ANCHOR BOLT	(n-Dφ)		8-25φ		4-25φ	
SHEAR KEY	(HxBxt)					
CONC.	e=M/N (cm)		$\frac{15.2\times10^2}{594.5}=2.56 < \frac{110}{6}$			
	σc<fc (kg/cm2)		$\frac{594.5\times10^3}{91.6\times110}\times\left(1+\frac{6\times2.56}{110}\right)=67.2 < 70$			
ANCHOR BOLT	P/(n*A)<ft (t/cm2)				N/bD²f = 0.009 → Pt=a²φ M/bD²f = 0.0028 → at=75x40Pt/2 = 3cm²	
BASE PLATE	M=α wlx^2 (tcm)		0.085x0.067x25.8² = 3.8			
	t>√(6xM/fb) (cm)		√(6x3.8/1.85) = 3.5 → 3.8			
CAP PLATE	M=α wlx^2 (tcm)					
	t>√(6xM/fb) (cm)					
RIB PLATE	τ=σcA/(txH) (t/cm2)		$\frac{0.067\times25.8\times55}{22\times50}=0.86 < 0.9$			
	H/t					
	WELDING τ < fs (t/cm2)					
WING PLATE	τ=σcA/(txH) (t/cm2)		$\frac{0.067\times30\times32.9}{2.2\times50}=0.6 < 0.9$			
	H/t					
	WELDING τ < fs (t/cm2)					
ALLOW-ABLE STRESS	CONC. :fc(t/cm2)					
	A.BOLT :ft(t/cm2)					
	PLATE :fb(t/cm2)					
	PLATE :fs(t/cm2)					
REMARKS						

NOTATION: L,H,B,t,D --- LENGTH, HEIGHT, WIDTH, THICKNESS, DIAMETER (mm)
e --- ECCENTRICITY
σc --- COMPRESSIVE STRESS, N/(B*L) OR OTHER EQUATION DUE TO e
P --- UP-LIFT FORCE FOR COLUMN BASE (t)
α --- COEFFICIENT FOR BENDING MOMENT OF SLAB

DECISION OF COLUMN BASE (13)
[柱脚の断面算定]

LOCATION		K-107, 202		K-108, 201	
COLUMN SIZE		H-450² x16x25		H-450² x16x25	
DIRECTION		X	半X	X	Y
PERMANENT CONDITIONS	M (tm)	0.0			
	N (t)	288.5		304.0	
	Q (t)	0.0		0.0	
TEMPORARY CONDITIONS	M (tm)	6.2	6.2		
	N (t)	386.2	190.2	389.8	
	Q (t)	20.6	20.6	0.0	
FIGURE		Same as H-103		Same as H-103	
BASE PLATE	(LxBxt)	750x700x30		750x700x30	
CAP PLATE	(THICK.)	—		—	
RIB PLATE	(HxBxt)	19		19	
WING PLATE	(HxBxt)	19		19	
ANCHOR BOLT	(n-Dφ)	8-25φ		8-25φ	
SHEAR KEY	(HxBxt)				
CONC.	e=M/N (cm)				
	σc<fc (kg/cm2)			$\frac{304\times10^3}{75\times70}=57.9$	<70.0
ANCHOR BOLT	P/(n*A)<ft (t/cm2)				
BASE PLATE	M=α wlx^2 (tcm)			0.085 x 0.058 x 22.5² = 2.50	
	t>√(6xM/fb) (cm)			√(6x2.5/1.85) = 2.85 → 3.0	
CAP PLATE	M=α wlx^2 (tcm)				
	t>√(6xM/fb) (cm)				
RIB PLATE	τ=σ cA/(txH) (t/cm2)			$\frac{0.058\times22.5\times35}{1.9\times30}=0.8$	<0.9
	H/t				
	WELDING τ < fs (t/cm2)				
WING PLATE	τ=σ cA/(txH) (t/cm2)			$\frac{0.058\times12.5\times26.3}{1.9\times30}=0.33$	<0.9
	H/t				
	WELDING τ < fs (t/cm2)				
ALLOW-ABLE STRESS	CONC. :fc(t/cm2)				
	A.BOLT :ft(t/cm2)				
	PLATE :fb(t/cm2)				
	PLATE :fs(t/cm2)				
REMARKS					

NOTATION: L,H,B,t,D --- LENGTH, HEIGHT, WIDTH, THICKNESS, DIAMETER (mm)
e --- ECCENTRICITY
σc --- COMPRESSIVE STRESS, N/(B*L) OR OTHER EQUATION DUE TO e
P --- UP-LIFT FORCE FOR COLUMN BASE (t)
α --- COEFFICIENT FOR BENDING MOMENT OF SLAB

5. Design of Beam & Girder (梁の設計)

5.1 Design of Beam (小梁の設計)

SHEET 161 OF

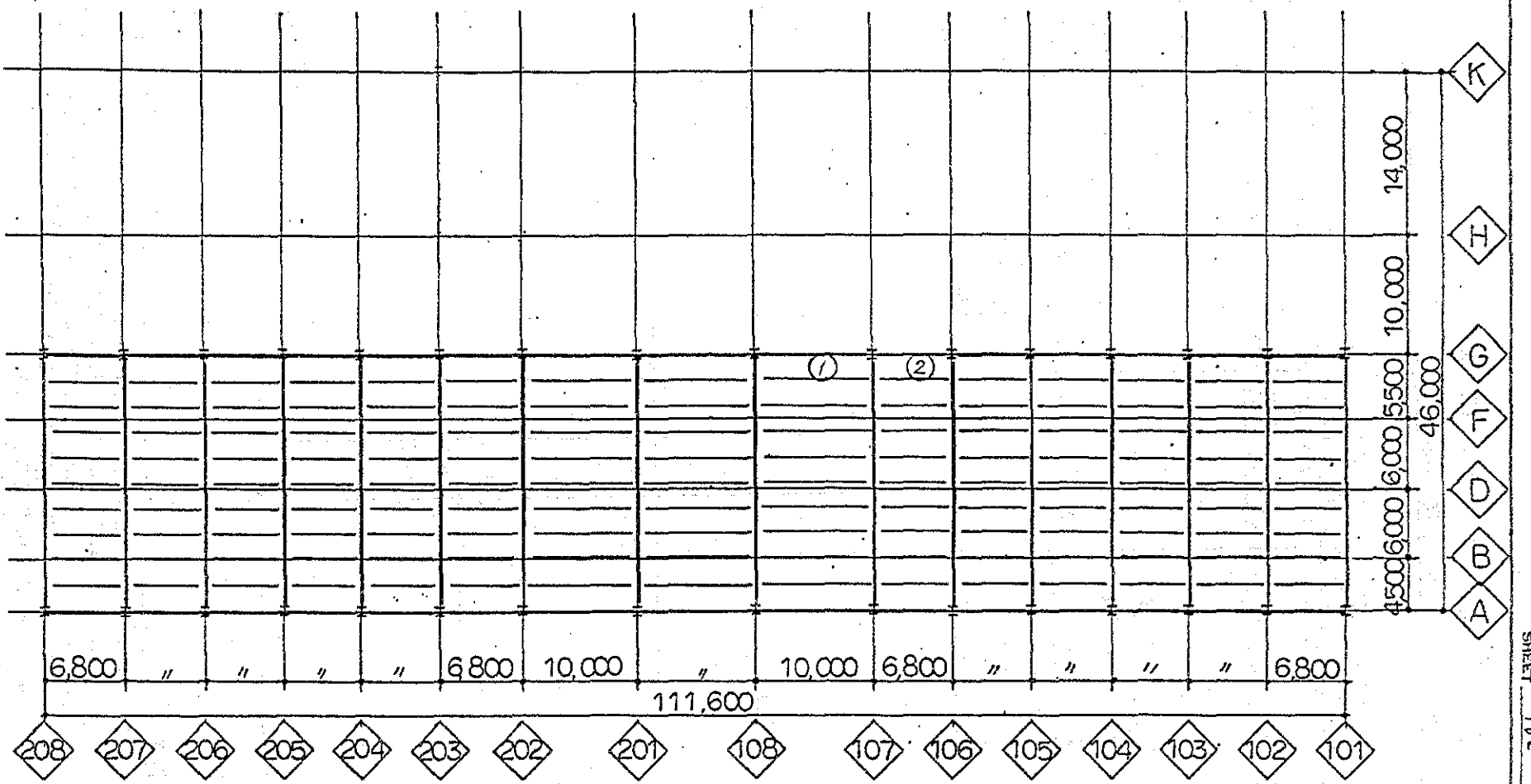
NOTE: $\sigma b/fb < 1.0$
$\tau/fs < 1.0$
$\delta/L < 1/300$

DECISION OF BEAM MEMBER ( )
[小梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	RA (t)	RB (t)	RC (t)	Mmax (tm)	MEMBER (Z,As,fb,fs)	σb / fb	τ / fs	δ / L	REM.
RF						Z= As= fb= fs=				
1	w=0.595×2.2=1.3, 10.0	6.5		6.5	16.3	H-450×200 z=1490 f_b=1.6 I=33500	1.10 / 0.69	0.16 / 0.18	2.92 / 1/413	
2	w=1.3, 6.8	4.4		4.4	7.5	H-350×175 z=775 f_b=1.6 I=13600	0.97 / 0.61	0.18 / 0.20	1.28 / 1/531	

NOTATION : RA,RB,RC --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
Mmax --- MAXIMUM BENDING MOMENT (tm)
Z,As --- SECTION COEFFICIENT,AREA FOR SHEAR (cm3,cm2)
fb,fs --- ALLOWABLE STRESS FOR BENDING AND SHEAR (t/cm2)
$\sigma b, \tau$ --- STRESS OF BENDING AND SHEAR (t/cm2)
δ --- DEFLECTION (cm)
L --- SPAN LENGTH (cm)

FORM 04



RFL

SHEET 162 OF

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NOTE: $\sigma b/fb < 1.0$
$\tau/fs < 1.0$
$\delta/L < 1/300$

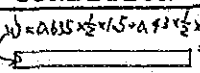
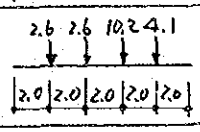
DECISION OF BEAM MEMBER ( )
[小梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	RA (t)	RB (t)	RC (t)	Mmax (tm)	MEMBER (Z, As, fb, fs)	σb / fb	τ / fs	δ / L	REM.
5TH	w=0.765×2.5=1.9					H-588	1.16	0.19	3.86	
1.	14.0	13.3		13.3	46.6	I=118,000 Z=4020 As= fb=1.6 fs=	0.73	0.21	1/363	
2.	w=0.765×2.27=1.7 14.0	11.9		11.9	41.7	ditto	1.04 / 0.65	0.17 / 0.19	3.93 / 1/408	
3.	w=0.635×2.0=1.27 10.0	6.4		6.4	15.9	H-400×200 Z=1190 I=23700 f_b=1.6	1.34 / 0.89	0.2 / 0.22	3.32 / 1/301	
4	w=0.635×2.0=1.27 6.8	4.3		4.3	7.3	H-350×175 Z=775 I=13600	0.94 / 0.59	0.18 / 0.20	1.23 / 1/549	
5	w=0.765×$\frac{1}{2}$×1.68=0.64 5.4	1.7		1.7	2.3	H-300 Z=424 I=6320	0.54 / 0.34	0.09 / 0.10	0.53 / 1/1018	
6	w=0.765×2.27=1.74 8.6	7.5		7.5	16.1	H-450 Z=1490 I=33500	1.08 / 0.68	0.19 / 0.21	1.76 / 1/489	
7	P_1=1.7+5.0+1.7=8.4 P_2=7.5 1.68 / 2.58 / 2.27	9.0		6.9	15.7	H-400	1.32 / 0.82	0.28 / 0.31	0.58 / 1/781	
8	w_1=1.74 P=9.0 w_2=1.51 8.6 / 5.4	15.4		16.7	68.1	H-700 Z=5760 I=201,000	1.18 / 0.74	0.18 / 0.20	2.99 / 1/476	
9	w=1.285×2.0=2.57 6.8	8.7		8.7	14.9	H-400×200 Z=1190 I=23700	1.25 / 0.78	0.27 / 0.30	1.44 / 1/473	
10	P=4.0 w=2.57 2.5 / 7.5	15.9		13.9	37.6	H-600 Z=2590 I=77,600	1.45 / 0.91	0.24 / 0.27	2.39 / 1/429	
11	w=0.635×2.0=1.27 3.95	2.5		2.5	2.5	H-300	0.59 / 0.37	0.13 / 0.14	0.30 / 1/1317	

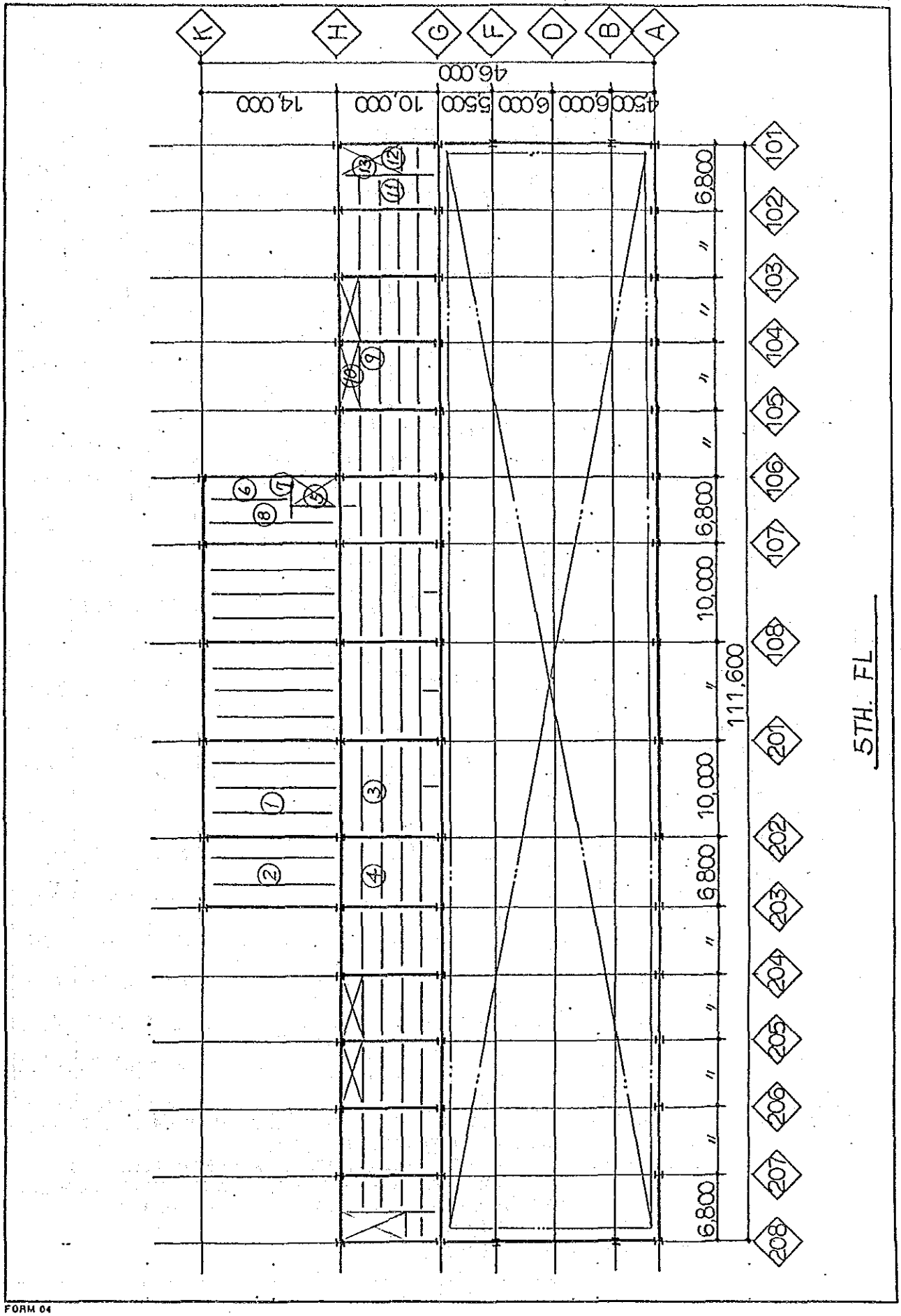
NOTATION : RA, RB, RC --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
Mmax --- MAXIMUM BENDING MOMENT (tm)
Z, As --- SECTION COEFFICIENT, AREA FOR SHEAR (cm3, cm2)
fb, fs --- ALLOWABLE STRESS FOR BENDING AND SHEAR (t/cm2)
σb, τ --- STRESS OF BENDING AND SHEAR (t/cm2)
δ --- DEFLECTION (cm)
L --- SPAN LENGTH (cm)

NOTE: σ b/fb < 1.0
τ /fs < 1.0
δ /L < 1/300

DECISION OF BEAM MEMBER ( )
[小梁の応力算定と断面算定]

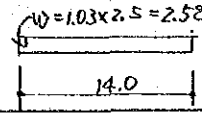
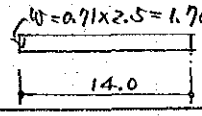
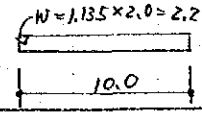
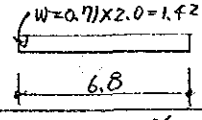
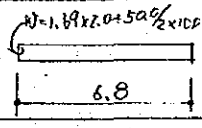
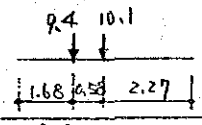
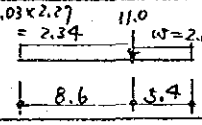
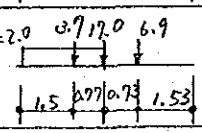
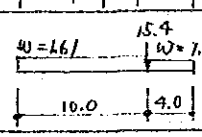
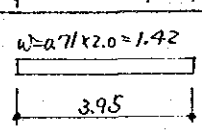
LOCATION	LOAD CONDITION	RA (t)	RB (t)	RC (t)	Mmax (tm)	MEMBER (Z,As,fb,fs)	σb/fb	τ/fs	δ/L	REM.
12	w=0.635×½×1.5+0.43×½×6.5=1.9  2.85	2.7		2.7	1.9	H-300 I=6320 Z=424 As= fb= fs=	0.45 0.28	0.14 0.16	0.1 1/2850	
13	2.6 2.6 10.2 4.1  2.0 2.0 2.0 2.0 2.0	8.5		11.0	35.8	H-600 Z=2590 I=77.600	1.38 0.86	0.17 0.19	1.86 1/537	

NOTATION : RA,RB,RC --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
Mmax --- MAXIMUM BENDING MOMENT (tm)
Z,As --- SECTION COEFFICIENT,AREA FOR SHEAR (cm3,cm2)
fb,fs --- ALLOWABLE STRESS FOR BENDING AND SHEAR (t/cm2)
σ b,τ --- STRESS OF BENDING AND SHEAR (t/cm2)
δ --- DEFLECTION (cm)
L --- SPAN LENGTH (cm)


K
H
G
F
D
B
A
46,000
14,000
10,000
5500
6,000
6,000
4500
6,800
"
"
"
"
6,800
10,000
111,600
10,000
6,800
"
"
6,800
101
102
103
104
105
106
107
108
201
202
203
204
205
206
207
208
5TH. FL

NOTE: $\sigma b/fb < 1.0$
$\tau/fs < 1.0$
$\delta/L < 1/300$

DECISION OF BEAM MEMBER ( )
[小梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	RA (t)	RB (t)	RC (t)	Mmax (tm)	MEMBER (Z, As, fb, fs)	σb / fb	τ / fs	δ / L	REM.
4TH						Z= As= fb= fs=				
1	w=1.03×2.5=2.58 	18.1		18.1	63.2	H-700 Z=5760 f_b=1.6 I=201,000	1.10 / 0.69	0.20 / 0.22	3.06 / 1/458	
2	w=0.71×2.5=1.78 	12.5		12.5	43.6	H-588 Z=4020 f_b=1.6 I=118,000	1.08 / 0.68	0.18 / 0.11	3.59 / 1/389	
3	w=1.135×2.0=2.27 	11.4		11.4	28.4	H-600×200 Z=2590 f_b=1.6 I=77,600	1.10 / 0.69	0.17 / 0.19	1.8 / 1/551	
4	w=0.71×2.0=1.42 	4.8		4.8	8.2	H-350 Z=775 I=13600	1.06 / 0.66	0.20 / 0.22	1.38 / 1/491	
5	w=1.89×2.0+50%/2×10t=5.86 	20.0		20.0	34.0	H-600 Z=2590 I=77,600	1.31 / 0.82	0.30 / 0.19	1.00 / 1/680	
6		11.0		8.5	19.3	H-450 Z=1490 I=33,500	1.30 / 0.81	0.27 / 0.30	0.50 / 1/906	
7	w=1.03×2.27=2.34 11.0 w=2.03 	20.3		21.0	88.0	H-800 Z=7290 I=292,000	1.21 / 0.76	0.19 / 0.21	2.63 / 1/532	
8	w=2.0 3.7 17.0 6.9 	16.7		15.4	29.9	H-600	1.15 / 0.72	0.25 / 0.28	0.33 / 1/1372	
9	w=4.61 15.4 w=1.35 	15.5		21.4	74.6	H-700 Z=5760 I=201,000	1.30 / 0.81	0.29 / 0.27	2.89 / 1/492	
10	w=0.71×2.0=1.42 	2.8		2.8	2.8	H-300 Z=424 I=6320	0.66 / 0.41	0.19 / 0.16	0.67 / 1/570	

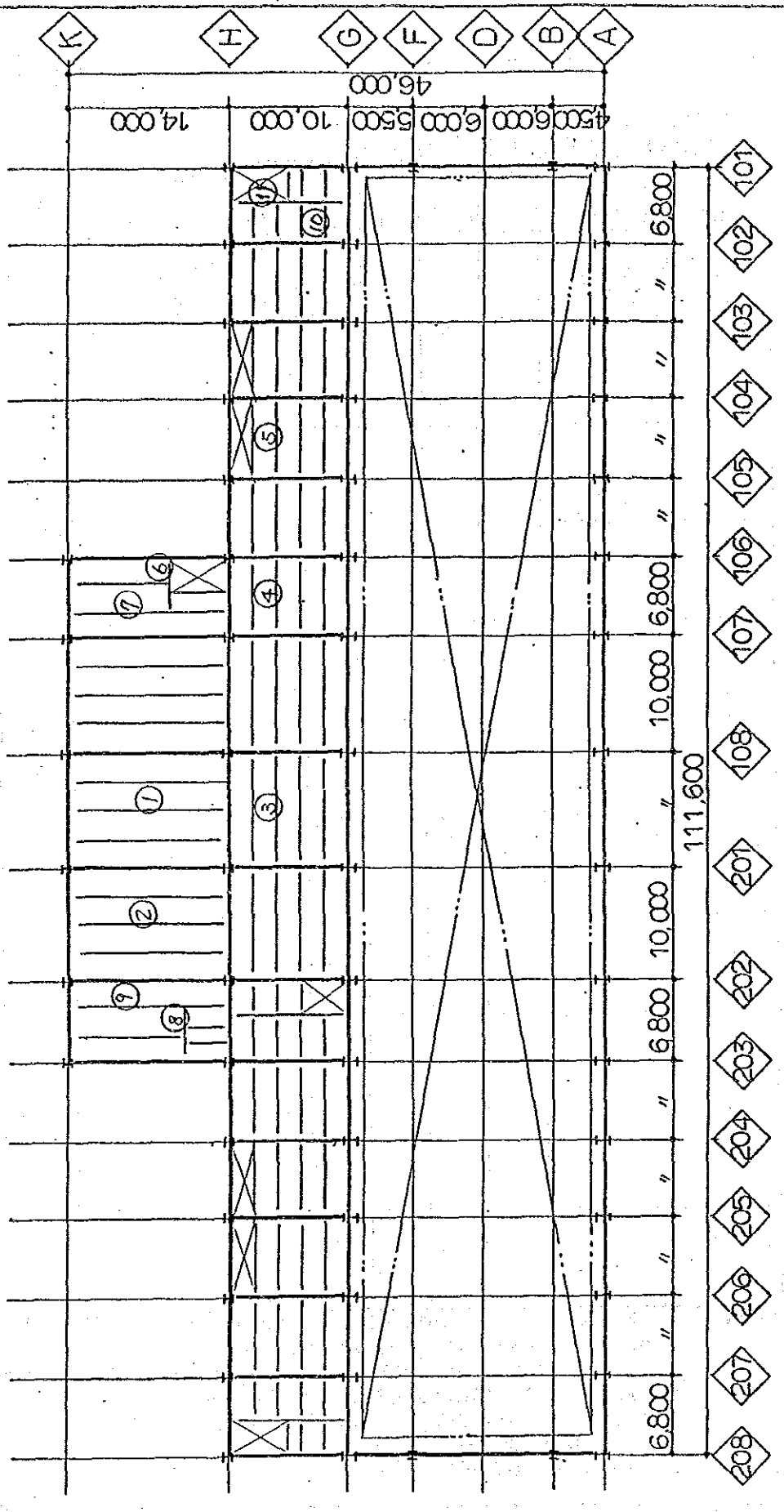
NOTATION : RA, RB, RC --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
Mmax --- MAXIMUM BENDING MOMENT (tm)
Z, As --- SECTION COEFFICIENT, AREA FOR SHEAR (cm3, cm2)
fb, fs --- ALLOWABLE STRESS FOR BENDING AND SHEAR (t/cm2)
σb, τ --- STRESS OF BENDING AND SHEAR (t/cm2)
δ --- DEFLECTION (cm)
L --- SPAN LENGTH (cm)

NOTE: σ b/fb < 1.0
τ /fs < 1.0
δ /L < 1/300

DECISION OF BEAM MEMBER ( )
[小梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	RA (t)	RB (t)	RC (t)	Mmax (tm)	MEMBER (Z,As,fb,fs)	σb/fb	τ/fs	δ/L	REM.
11	2.8 5.5 4.8 4.8 ↓ ↓ ↓ ↓ 2.0 2.0 2.0 2.0 2.0	8.4		9.5	20.4	H-600 I=97600 Z=2590 As= fb= fs=	1.10 0.69	0.19 0.16	1.61 1/621	

NOTATION : RA,RB,RC --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
Mmax --- MAXIMUM BENDING MOMENT (tm)
Z,As --- SECTION COEFFICIENT,AREA FOR SHEAR (cm3,cm2)
fb,fs --- ALLOWABLE STRESS FOR BENDING AND SHEAR (t/cm2)
σ b,τ --- STRESS OF BENDING AND SHEAR (t/cm2)
δ --- DEFLECTION (cm)
L --- SPAN LENGTH (cm)


K
I
G
F
D
B
A
46,000
14,000
10,000
5,500
6,000
6,000
4,500
6,800
"
"
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"
6,800
10,000
111,600
10,000
6,800
"
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101
102
103
104
105
106
107
108
201
202
203
204
205
206
207
208
1
2
3
4
5
6
7
8
9
10
11
4TH. FL

FORM 04

NOTE: $\sigma b/fb < 1.0$
$\tau /fs < 1.0$
$\delta /L < 1/300$

DECISION OF BEAM MEMBER ( )
[小梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	RA (t)	RB (t)	RC (t)	Mmax (tm)	MEMBER (Z,As,fb,fs)	σb / σb/fb	τ / τ/fs	δ / δ/L	REM.
OPE						Z= As= fb= fs=				
1	20/0 = 2.5 W=(1.005+0.195)x2.2 = 2.64 3.0 11.0	20.4		19.1	69.1	H-700 Z=5760 I=201.050	1.20 0.75	0.22 0.24	3.28 1/426	
2	W=(1.005+0.195)x1.75=2.22 14.0	15.5		15.5	54.4	H-588 Z=4020 I=118.000	1.35 0.85	0.22 0.24	4.48 1/313	
3	W=(1.24+0.195)x3x1.85+0.435x1.85+(1.005+0.195)x5x1.75=4.30 14.0	30.1		30.1	105.4	H-800 Z=7290 I=292.000	1.45 0.90	0.27 0.30	3.51 1/399	
4	W=(1.005+0.195)x2.27=2.88 8.6	12.4		12.4	26.6	H-500 Z=1910 I=47.800	1.39 0.87	0.25 0.28	2.09 1/422	
5	10.5 12.4 W=2.0 1.68 0.58 2.27	14.6		14.0	26.6	do	1.39 0.87	0.28 0.31	0.98 1/943	
6	W=2.88 P=14.6 W=2.51 8.6 5.4	25.4		27.5	111.9	H-900 Z=9140 I=411.000	1.22 0.76	0.19 0.21	2.37 1/590	
7	P=4.0 W=5.65 W=3.65 1.3 3.7 5.0	24.2		26.3	67.2	H-700	1.06 0.66	0.29 0.32	1.47 1/680	
8	P=4.5 W=1.825x2.27=4.14 1.3 8.7	24.6		21.3	54.8	H-588 Z=4020 I=118.000	1.36 0.85	0.35 0.39	2.25 1/449	
9	W=1.823x2.27=4.14 10.0	20.7		20.7	51.8	H-588 Z=4020 I=118.000	1.29 0.81	0.29 0.32	2.18 1/459	
10	W=1.825x2.27=4.14 P=9.0 5.9 2.5	20.1		23.7	48.8	H-588	1.21 0.76	0.34 0.38	1.35 1/622	

NOTATION : RA,RB,RC --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
Mmax --- MAXIMUM BENDING MOMENT (tm)
Z,As --- SECTION COEFFICIENT,AREA FOR SHEAR (cm3,cm2)
fb,fs --- ALLOWABLE STRESS FOR BENDING AND SHEAR (t/cm2)
$\sigma b, \tau$ --- STRESS OF BENDING AND SHEAR (t/cm2)
δ --- DEFLECTION (cm)
L --- SPAN LENGTH (cm)

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NOTE: $\sigma b/fb < 1.0$
$\tau/fs < 1.0$
$\delta/L < 1/300$

DECISION OF BEAM MEMBER ( )
[小梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	RA (t)	RB (t)	RC (t)	Mmax (tm)	MEMBER (Z, As, fb, fs)	σb / fb	τ / fs	δ / L	REM.
11	P=20.1 P=20.1 2.27 | 2.26 | 2.27	20.1		20.1	45.6	H-588 I=118,000 Z=4020 As= fb= fs=	1.13 0.71	0.38 0.31	0.84 1/809	
12	w=1.825×2.27=4.14 5.3	11.0		11.0	14.5	H-400 Z=1190 I=23,700	1.22 0.76	0.39 0.41	0.85 1/629	
13	P=5.1 P=11.0 1.73 | 0.53 | 2.27	8.7		7.4	16.8	ditto	1.41 0.88	0.27 0.30	0.60 1/755	
14	w=3.65 P=8.7 w=4.14 4.7 | 5.3	23.5		24.3	70.6	H-700 Z=5760 I=201,000	1.23 0.77	0.27 0.30	1.63 1/613	
15	w=2.825×2.27=6.41 5.5	17.6		17.6	24.2	H-500 Z=1910 I=47,800	1.27 0.79	0.35 0.39	0.76 1/723	
16	w=2.825×2.0=5.65 6.0	17.0		17.0	25.4	ditto	1.33 0.83	0.34 0.38	0.95 1/632	
17	w=1.825×2.0=3.65 5.5	10.0		10.0	13.8	H-400	1.16 0.72	0.31 0.35	0.87 1/632	
18	w=1.825×2.0=3.65 6.0	11.0		11.0	16.4	ditto	1.38 0.86	0.34 0.38	1.24 1/483	
19	w=6.41 P=4.0/2=2.0 2.25 | 2.25	15.4		15.4	18.5	H-450 Z=1490 I=33,500	1.24 0.78	0.38 0.42	0.54 1/833	
20	P=2.6 1.6 | 1.6	1.3		1.3	2.1	H-300 Z=424 I=6,320	0.50 0.31	0.07 0.07	0.13 1/2461	
21	w1=3.72 P=1.3 P=1.3 w2=2.41 w1 1.8 | 1.5 | 1.2	10.1		10.7	12.9	H-400	1.08 0.68	0.33 0.37	0.43 1/1046	

NOTATION : RA,RB,RC --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
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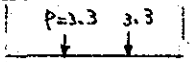
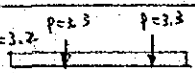
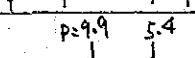
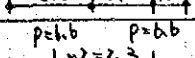
fb,fs --- ALLOWABLE STRESS FOR BENDING AND SHEAR (t/cm2)
$\sigma b, \tau$ --- STRESS OF BENDING AND SHEAR (t/cm2)
δ --- DEFLECTION (cm)
L --- SPAN LENGTH (cm)

NOTE: $\sigma b/fb < 1.0$
$\tau/fs < 1.0$
$\delta/L < 1/300$

DECISION OF BEAM MEMBER ( )
[小梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	RA (t)	RB (t)	RC (t)	Mmax (tm)	MEMBER (Z,As,fb,fs)	σb / $\frac{\sigma b}{fb}$	τ / $\frac{\tau}{fs}$	δ / $\frac{\delta}{L}$	REM.
22	P=3.3 3.3  1.7 1.6 1.7	3.3		3.3	5.6	H-350 Z= 775 As= fb= 1.6 fs=	0.72 0.45			
23	W=3.2 P=2.3 P=3.3  1.7 2.5 1.3	11.9		12.3	17.2	H-450 Z=1490	1.15 0.72			
24	P=9.9 5.4  2.0 0.8 1.2	6.6		8.7	13.2	H-400 Z=1190	1.11 0.69			
25	P=6.6 P=6.6 W=2.3  3.5 5.0 3.5	20.4		20.4	64.5	H-700 Z=5760 I=201.000	1.12 0.7		2.17 1/552	

NOTATION : RA,RB,RC --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
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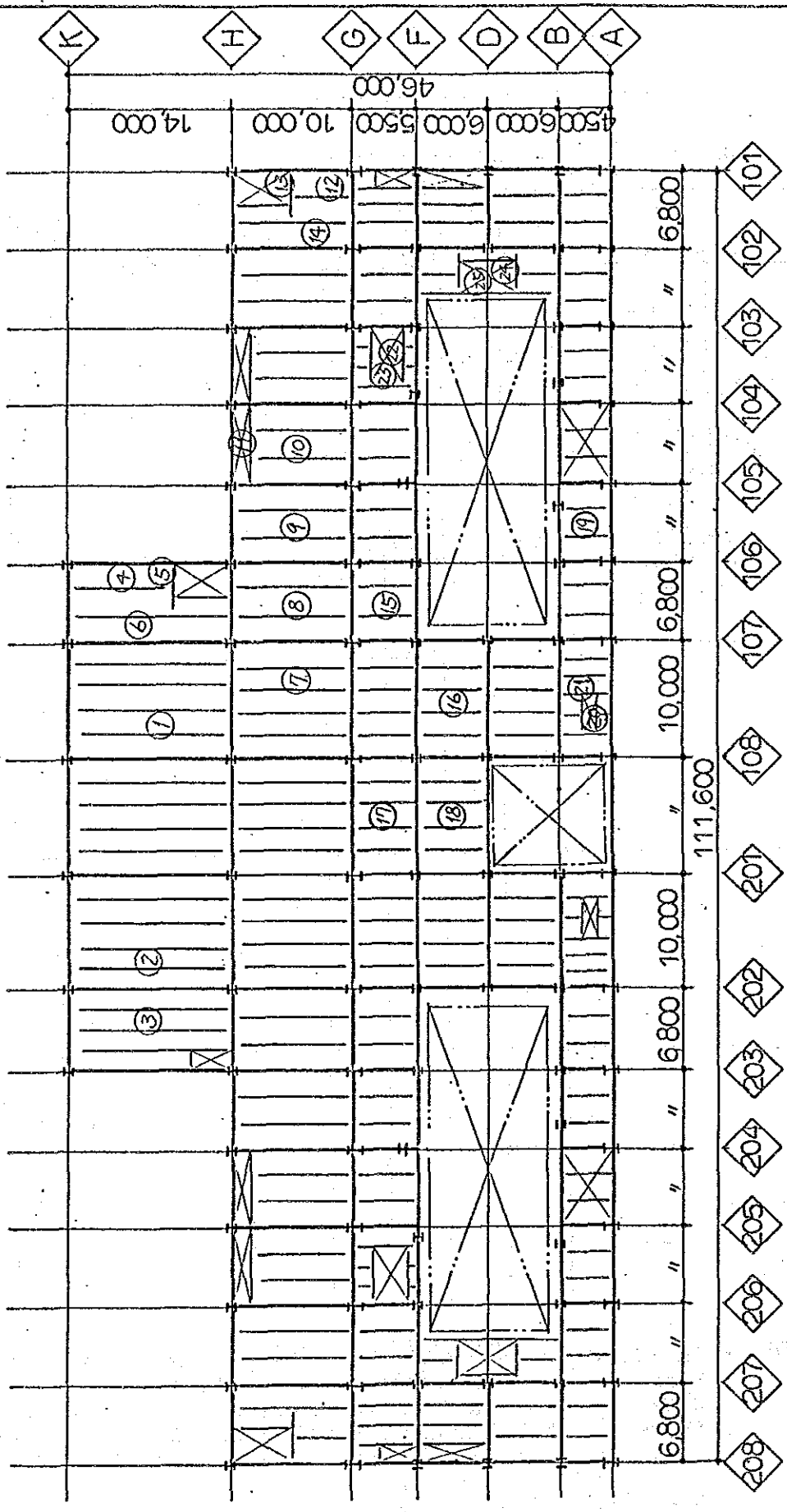
fb,fs --- ALLOWABLE STRESS FOR BENDING AND SHEAR (t/cm2)
$\sigma b, \tau$ --- STRESS OF BENDING AND SHEAR (t/cm2)
δ --- DEFLECTION (cm)
L --- SPAN LENGTH (cm)


K
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FORM 04

NOTE: $\sigma b/fb < 1.0$
$\tau/fs < 1.0$
$\delta/L < 1/300$

DECISION OF BEAM MEMBER ( )
[小梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	RA (t)	RB (t)	RC (t)	Mmax (tm)	MEMBER (Z,As,fb,fs)	σb / fb	τ / fs	δ / L	REM.
MEZ						Z= As= fb= fs=				
1	W=1.225×2.0=2.45; 14.0	17.2		17.2	60.0	H-700 Z=5760 I=201,000	1.04 / 0.65	0.19 / 0.21	2.90 / 1/482	
2	W=0.905×2=1.81; 14.0	12.7		12.7	44.3	H-588 Z=4020 I=118,000	1.10 / 0.69	0.18 / 0.20	3.65 / 1/383	
3	W=1.225×2.27=2.78; 8.6	12.0		12.0	25.7	H-500 Z=1910 I=47,800	1.35 / 0.84	0.24 / 0.27	1.97 / 1/436	
4	P=11.7 P=12.0 W=3.4; 1.68 0.58 2.27	16.4		17.0	29.8	H-600 Z=2590 I=77,600	1.15 / 0.72	0.26 / 0.29	0.34 / 1/1332	
5	W=2.8 P=16.4 W=2.4; 8.6 5.4	25.5		27.9	115.7	H-900 Z=9140 I=411,000	1.27 / 0.79	0.19 / 0.21	2.42 / 1/578	
6	W=0.905×2.27=2.05; 8.6	8.8		8.8	19.0	H-450 Z=1490 I=33,500	1.28 / 0.80	0.22 / 0.24	2.08 / 1/413	
7	W=3.4 P=8.0 P=8.8; 2.27 0.58 1.68	13.9		12.6	22.8	H-500 Z=1910	1.19 / 0.74	0.28 / 0.31	0.42 / 1/1078	
8	W=2.05 P=12.6 W=1.99; 8.6 5.4	18.9		21.0	86.7	H-800 Z=7290 I=292,000	1.19 / 0.74	0.19 / 0.21	2.56 / 1/546	
9	W=3.69 P=7.0/4=1.75; 7.5 2.5	18.9		19.8	48.4	H-588 Z=4020	1.20 / 0.75	0.28 / 0.31	2.02 / 1/495	
10	P=36.6/4=9.0 W=3.7; 0.9 7.5	23.6		16.5	36.8	H-600 Z=2590	1.42 / 0.89	0.36 / 0.40	1.57 / 1/515	

NOTATION : RA,RB,RC --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
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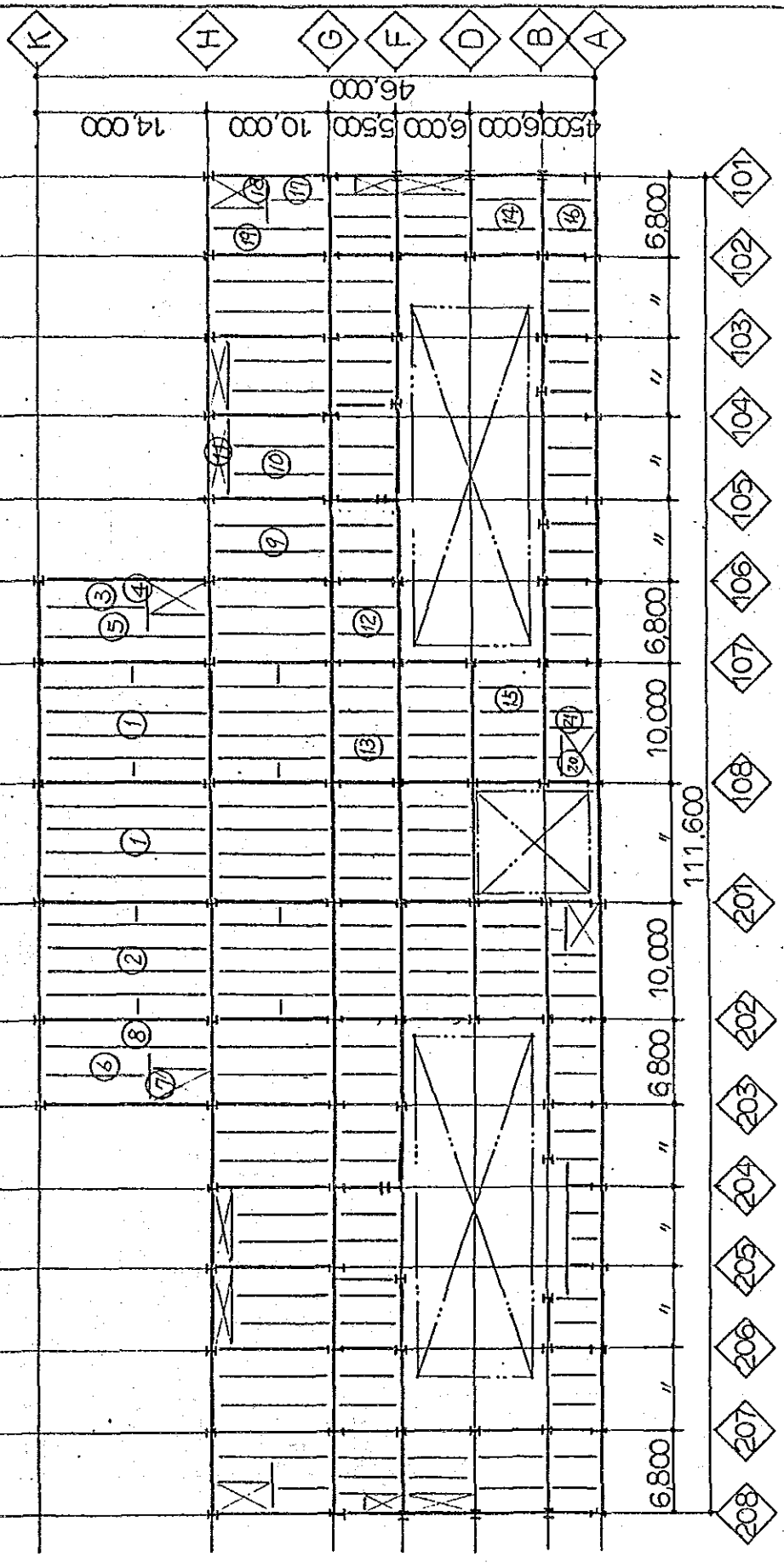
fb,fs --- ALLOWABLE STRESS FOR BENDING AND SHEAR (t/cm2)
$\sigma b, \tau$ --- STRESS OF BENDING AND SHEAR (t/cm2)
δ --- DEFLECTION (cm)
L --- SPAN LENGTH (cm)

NOTE: $\sigma b/fb < 1.0$
$\tau /fs < 1.0$
$\delta /L < 1/300$

DECISION OF BEAM MEMBER ( )
〔小梁の応力算定と断面算定〕

LOCATION	LOAD CONDITION	RA (t)	RB (t)	RC (t)	Mmax (tm)	MEMBER (Z, As, fb, fs)	σb / fb	τ / fs	δ / L	REM.
11	P=23.6 P=23.6 2.27 2.26 2.27	23.6		23.6	53.6	H-588 I=118,000 Z=4020 As= fb= fs=	1.33 0.83	0.33 0.37	0.99 1/686	
12	W=1.625×2.27=3.69 5.5	10.2		10.2	14.0	H-400 Z=1190 I=23,700	1.18 0.74	0.32 0.35	0.88 1/623	
13	W=1.625×2.0+18.5/4.5=7.36 5.5	20.2		20.2	27.8	H-500 Z=1910 I=47,800	1.46 0.91	0.40 0.45	0.87 1/632	
14	W=1.625×2.27=3.69 6.0	11.1		11.1	16.6	H-400 Z=1190	1.39 0.87	0.35 0.39	1.25 1/480	
15	W=1.625×2.0+18.5/6.0=6.33 6.0	19.0		19.0	28.5	H-500 Z=1910	1.49 0.93	0.38 0.42	1.06 1/566	
16	W=1.625×2.27=3.69 4.5	8.3		8.3	9.3	H-350 Z=775 I=13,600	1.21 0.75	0.39 0.38	0.69 1/652	
17	W=1.625×2.27=3.69 4.7	8.7		8.7	10.2	ditto	1.32 0.82	0.36 0.39	0.82 1/573	
18	P=3.7 P=8.7 W=1.14 1.73 0.53 2.27	7.6		7.9	15.1	H-400 Z=1190	1.27 0.79	0.25 0.27	0.54 1/838	
19	W=3.25 P=7.6 W=3.69 5.3 4.7	20.5		22.0	62.5	H-700 Z=5760 I=201,000	1.09 0.68	0.24 0.27	1.43 1/699	
20	P=3.1 2.35 2.35	1.6		1.6	3.6	H-300 Z=424 I=6,320	0.85 0.53	0.08 0.09	0.51 1/921	
21	W=3.25 P=1.6 W=2.35 1.65 2.65	7.5		6.2	8.2	H-350 Z=775 I=13,600	1.06 0.66	0.31 0.34	0.54 1/833	

NOTATION : RA, RB, RC --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
Mmax --- MAXIMUM BENDING MOMENT (tm)
Z, As --- SECTION COEFFICIENT, AREA FOR SHEAR (cm3, cm2)
fb, fs --- ALLOWABLE STRESS FOR BENDING AND SHEAR (t/cm2)
σb, τ --- STRESS OF BENDING AND SHEAR (t/cm2)
δ --- DEFLECTION (cm)
L --- SPAN LENGTH (cm)


K
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NOTE : $\sigma b/fb < 1.0$ $\sigma b/fb+\sigma c/fc < 1.0$
$\sigma c/fc < 1.0$ $\tau/fs < 1.0$
$\delta/L < 1/300$

DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb / -	fc / fb / fs	σb/fb	σc/fc	σb/fb + σc/fc	τ/fs	δ/L
RFL																	
A,G LINE	W=0.91 Roof 0.595×½×2.2 Parapet 0.12 SIDING 0.045×½×5.9 / 6.8	3.1		3.1	5.3	2.1	27.8	H-350 / 680 / 340	63.14 / 13.600 / 775	3.95	86	1.03 / 1.6	0.68 / 0.28	0.44 / 0.28	0.56	0.13 / 0.14	0.89 / 1/764
	W=0.91 / 10.0	4.6		4.6	11.4	11.4	27.0	H-400 / 1000 / 500	84.12 / 23.700 / 1190	4.54	110	0.773 / 1.6	0.96 / 0.4	0.32 / 0.28	0.68	0.36 / 0.4	2.38 / 1/420
5TH																	
A LINE 101~107	6.8							SEE WIND BEAM									
107~202	10.0							SEE WIND BEAM									
G,H LINE 102~105	W=1.54 Dead 1.285×½×2.0 Para 0.12 SIDING 0.045×½×5.9 / 6.8	5.2		5.2	8.9	5.2	17.8	H-400 / 227 / 680	84.12 / 23.700 / 1190	4.54 / 5.26	150 / 43	0.425 / 1.6	0.75 / 0.31	0.21 / 0.33	0.64		2.86 / 1/790
G LINE 105~107	W=0.89 Roof 0.635×½×2.0 Para 0.12 SIDING 0.045×½×5.9 / 6.8	3.0		3.0	5.1	3.0	9.3	H-400 / 227 / 680				0.425 / 1.6	0.93 / 0.18	0.11 / 0.17	0.35		0.50 / 1/1360
107~202	W=0.89 / 10.0	4.5		4.5	11.1	4.5	22.0	H-400 / 250 / 500			110 / 48	0.773 / 1.6	0.93 / 0.39	0.26 / 0.22	0.61		2.33 / 1/429

NOTATION : Ra,Rb,Rc --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
M,Q,N --- STRESS OF BENDING MOMENT (tm), SHEAR (t) AND AXIAL FORCE (t)
l,e,s --- SUFFIX FOR PERMANENT, SEISMIC AND TEMPORARY CONDITIONS
lb,lk --- BUCKLING LENGTH FOR BENDING AND AXIAL FORCE (cm)
A,I,Z --- SECTION AREA (cm2),GEOMETRICAL MOMENT OF INERTIA (cm4),SECTION MODULUS (cm3)
imin,λk --- MINIMUM RADIUS OF GYRATION (cm), BUCKLING COEFFICIENT
i,η,λb --- CONSTANTS FOR CALCULATION OF ALLOWABLE BENDING MOMENT
σb,σc,τ --- STRESS FOR BENDING MOMENT, AXIAL FORCE AND SHEAR FORCE (t/cm2)
fb,fc,fs --- ALLOWABLE STRESS FOR BENDING MOMENT, AXIAL FORCE AND SHEAR FORCE (t/cm2)
δ,L --- DEFLECTION AND SPAN LENGTH (cm)

NOTE : $\sigma b/fb < 1.0$ $\sigma b/fb+\sigma c/fc < 1.0$
$\sigma c/fc < 1.0$ $\tau/fs < 1.0$
$\delta/L < 1/300$

DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb	fc / fb / fs	σb / σb/fb	σc / σc/fc	σb/fb + σc/fc	τ / τ/fs	δ / δ/L
H LINE	w=6.1 Roof 0.765×½×19.0 / 〃 0.635×½×2.0				35.3	20.7		H-600	334.4	4.12	69	1.21	1.36	0.08			1.04
106~107	6.8 FENCE 0.11	20.7		20.7			19.4	285	77,600	5.01	57	1.6					
								285	2590		—		0.57	0.04	0.61		1/653
	w=6.1				19.1	19.1		H-500	114.2	4.33	58	1.31	1.00	0.31			0.21
107~108	5.0 5.0	11.5	38.2	11.5			35.0	250	47,800	5.14	49	1.6					
								250	1910				0.42	0.16	0.58		1/2380
	w=6.1				76.3	30.5		H-700	235.5	6.78	37	1.98	1.32	0.15			1.88
108~201	10.0	30.5		30.5			35.0	250	201,000 5760			1.6	0.55	0.07	0.62		1/531
K LINE	w=5.6 Roof 0.765×½×14.0 / Para 0.12 / SID 0.045×½×5.9				32.4	19.0		H-600	334.4	4.12	55	1.34	1.25	0.28			0.96
106~107	6.8	19.0		19.0			37.3	227	77,600 2590			1.6	0.52	0.14	0.66		1/908
	w=5.6				17.5	17.5		H-450	76.0	4.4	57	1.32	1.17	0.49			0.27
107~108	5.0 5.0	10.5	35.0	10.5			37.3	250	33,500 1490			1.6	0.49	0.25	0.74		1/857
	w=5.6				70.0	28.0		H-700	235.5	6.78	37	1.98	0.12	0.13			1.73
108~201	10.0	28.0		28.0			31.7	250	201,000 5760			1.6	0.57	0.06	0.57		1/578
H LINE	SAME AS 102~105				8.9	5.2		H-500	114.2	9.33	157	0.388	0.47	0.36			0.43
103~105							40.9	680	47,800	5.14	132	0.897					
								680	1910				0.37	0.62	0.99		1/1581
G LINE	w=0.9 P=11.0 Roof 0.635×½×2.0 / Para 0.12 / SID 0.045×½×5.9				23.3	9.5		H-500			91	0.981	1.22	0.16			
101~102	3.05 2.85	7.7		9.5			17.8	395				1.6	(0.76) 0.51	0.11	0.62		
								395									

NOTATION : Ra,Rb,Rc --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
M,Q,N --- STRESS OF BENDING MOMENT (tm), SHEAR (t) AND AXIAL FORCE (t)
l,e,s --- SUFFIX FOR PERMANENT, SEISMIC AND TEMPORARY CONDITIONS
lb,lk --- BUCKLING LENGTH FOR BENDING AND AXIAL FORCE (cm)
A,I,Z --- SECTION AREA (cm2),GEOMETRICAL MOMENT OF INERTIA (cm4),SECTION MODULUS (cm3)
imin,λk --- MINIMUM RADIUS OF GYRATION (cm), BUCKLING COEFFICIENT
i,η,λb --- CONSTANTS FOR CALCULATION OF ALLOWABLE BENDING MOMENT
σb,σc,τ --- STRESS FOR BENDING MOMENT, AXIAL FORCE AND SHEAR FORCE (t/cm2)
fb,fc,fs --- ALLOWABLE STRESS FOR BENDING MOMENT, AXIAL FORCE AND SHEAR FORCE (t/cm2)
δ,L --- DEFLECTION AND SPAN LENGTH (cm)

NOTE : $\sigma b/fb < 1.0$ $\sigma b/fb+\sigma c/fc < 1.0$
$\sigma c/fc < 1.0$ $\tau/fs < 1.0$
$\delta/L < 1/300$

DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	M1 / Me / Ms	Q1 / Qe / Qs	N1 / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb / -	fc / fb / fs	σb / σb / fb	σc / σc / fc	σb/fb + σc/fc	τ / τ / fs	δ / δ / L
101 LINE	w=2.4 Roof 0.635×½×6.8 Para 0.12 S10 0.045×½×5.9 5.0 5.0	4.5	15.0	4.5	7.5	7.5	0.9	H-500	114.2	4.33	115	0.719	0.39	0.99			
							55.2	500	47.800	5.14	97	1.18					
							56.1	500	1910		-		0.22	0.45	0.67		
102 LINE 105 LINE	w=6.5 Roof 0.635×½×6.8 Pan 1.285×½×6.8 10.0	32.5		32.5	81.3	32.5		H-700	235.5	6.78	29	1.52	1.41				
							0.1		201.000			1.6					
								200	5760				0.88				
103 LINE 104 LINE	P Pc=26¼ Pan 1.285×6.8 w=8.7 4.0 10 4.0	20.1	179.9	-20.1	74.7	89.5	4.6	H-800	267.4	6.62	30	1.52	1.02	0.35		0.88	
							89.6	200	292.000	7.80	26	1.6					
							94.2	200	7290				0.43	0.15	0.58	0.95	
106 LINE G-H	w=4.3 Roof 0.635×6.8 10.0	21.5		21.5	53.8	21.5		H-588	192.5	6.85	29	1.52	1.39	0.40			
							77.2		118.000			1.6					
								200	4020				0.56	0.18	0.74		
H-K	w=2.9 Roof 0.765×½×6.8 Para 0.12 S10 0.045×½×5.9 7.0 7.0	7.7	25.4	7.7	17.8	12.7		H-488	163.5	7.09	99	0.894	0.57	0.47			
							77.1	700	71.000	7.97	88	1.92					
								700	2910				0.29	0.35	0.62		
107 LINE G-H	w=5.3 Roof 0.635×½×6.8 0.635×½×10.0 5.0 5.0	10.0	33.2	10.0	16.6	16.6	7.0	H-488		7.09	28	1.53	0.57	0.62			
							95.6	200		7.97	25	1.6					
							102.6	200					0.24	0.27	0.51		
H-K	w=1.9 Roof 0.765×2.5 14.0	13.3		13.3	46.6	13.3		H-588	192.5	6.85	209	0.23	1.16				3.89
							0.1		118.000			1.6					
								1400	4020				0.73				1/364
108 LINE G-H	w=6.4 Roof 0.635×10.0 10.0	32.0		32.0	80.0	32.0		H-700	235.5	6.78	29	1.52	1.39				1.97
							0.3		201.000								
								200	5760				0.87				1/507

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σb,σc,τ --- STRESS FOR BENDING MOMENT, AXIAL FORCE AND SHEAR FORCE (t/cm2)
fb,fc,fs --- ALLOWABLE STRESS FOR BENDING MOMENT, AXIAL FORCE AND SHEAR FORCE (t/cm2)
δ,L --- DEFLECTION AND SPAN LENGTH (cm)

NOTE : σ b/fb < 1.0　σ b/fb+σ c/fc < 1.0
σ c/fc < 1.0　τ /fs < 1.0
δ /L < 1/300

DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb / -	fc / fb / fs	σb / σb / fb	σc / σc / fc	σb/fb + σc/fc	τ / τ / fs	δ / δ / L
4TH																	
A LINE	W=0.05				0.3	0.2		H-294	72.38	4.71	144	0.461	0.04	0.16			
101~107	6.8	0.2		0.2			11.5	680 / 680	11,300 / 771	5.32	128	1.08	0.02	0.23	0.25		
107~202	W=0.05 / 10.0	0.3		0.3	0.6	0.3	11.5	H-350* / 1000 / 1000	92.18 / 10800 / 867	6.29 / 6.87	151 / 146	0.378 / 1.26	0.07 / 0.04	0.12 / 0.21	0.25		
C LINE	W=0.71 P=9.5 SLAB 0.71×1.0 / 3.95 2.85	6.4		7.9	25.8	7.9	0.0	H-500 / 395	114.2 / 1910			1.6	0.84	1.35			
102~106	W=1.69 HP 1.69×1.0 / 6.8	5.7		5.7	9.8	5.7	0.0	H-350 / 680	63.14 / 13600 / 775	8.95	172	0.316 / 1.6	0.79	1.26	0.0		1/412
107~202	W=3.1 A/C 1.135×1.0 Block 0.4×5 / 10.0	15.5		15.5	38.8	15.5	0.0	H-488 / 1000	163.5 / 71000 / 2910	7.09	142	0.475 / 1.6	0.83	1.33	0.0		1/369
H LINE	W=0.9 8.4 SLAB 0.71×1.0 SID 0.045×5 / 3.95 2.85	6.6		7.9	18.9	7.9	10.5	H-500 / 285 / 395	114.2 / / 1910	9.33 / 5.14	91 / 55	0.98 / 1.6	0.41	0.99 / 0.06	0.09 / 0.47		
102~103 105~106	W=1.9 HP 1.69×1.0 SID 0.045×5 / 6.8	6.5		6.5	11.0	6.5	19.7	H-400 / 680	84.12 / 23700 / 1190	9.54	150	0.425 / 1.6	0.38	0.92 / 0.36	0.23 / 0.74		1/641
106~107	W=12.0 SLAB 1.03×1/2×14.0 0.71×1.0 Block 0.4×5.0×2 / 6.8	40.8		40.8	69.4	40.8	18.3	H-700 / 285	235.5 / 201000 / 5760	6.78	42	1.44 / 1.6	0.5	1.20 / 0.09	0.08 / 0.54		1/260

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δ ,L --- DEFLECTION AND SPAN LENGTH (cm)

NOTE : σ b/fb < 1.0 $\quad$ σ b/fb+σ c/fc < 1.0
σ c/fc < 1.0 $\quad$ τ /fs < 1.0
δ /L < 1/300

DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	M1 / Me / Ms	Q1 / Qe / Qs	N1 / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λ k / λ b / -	fc / fb / fs	σ b / σ b/fb	σ c / σ c/fc	σ b/fb + σ c/fc	τ / τ/fs	δ / δ/L
108~201	w=12.3, 10.0, SLAB 1.03×½×14.0, A/C 1.13×1.0, Block 0.4×5.0×2	61.5		61.5	153.8	61.5	15.5	H-912 250	369.0 498.000 10900	6.56	38 - -	1.97 1.6	1.41 (0.88) 0.59	0.09 0.02	0.61		
201~202	w=10.1, 5.0, 5.0, SLAB 0.71×½×14.0, A/C 1.13×1.0, Block 0.4×5.0×2	19.0	63.2	19.0	31.6	31.6	51.4	H-450 250 250	157.4 56.100 2550	7.18 5.18	35 48 1.6	1.79 1.6	1.24 0.52	0.33 0.15	0.67		0.29 1/1729
202~203	w=10.2, 6.8, LAV 0.79×½×14.0, SLAB 0.71×1.0, Block 0.4×5.0×2	34.7		34.7	59.0	34.7	18.3	H-588 250	192.5 118.000 4020	6.85 7.87	37 - -	1.48 1.6	1.47 0.61	0.10 0.05	0.66		1.15 1/591
K LINE 106~107	w=7.5, 6.8, SLAB 1.03×½×14.0, WALL 0.026×3.0, SID 0.045×5.0	25.5		25.5	43.4	25.5	18.3	H-588 227		6.87	33 - -	1.50 1.6	1.08 0.45	0.10 0.05	0.50		
107~108	w=7.5, 5.0, 5.0	14.1	47.0	14.1	23.4	23.5	51.5	H-500 250 250	114.2 47.000 1910	4.33 5.14	58 49 -	1.31 1.6	1.23 0.51	0.45 0.23	0.74		0.25
108~201	w=7.5, 10.0	37.5		37.5	93.8	37.5	15.6	H-800 250	267.4 292.000 7290	6.62	38 - -	1.47 1.6	1.29 0.54	0.06 0.03	0.57		1.59 1/628
201~202	w=5.3, 5.0, 5.0, SLAB 0.71×½×14.0, WALL 0.026×3.0, SID 0.045×5.0	10.0	33.2	10.0	16.6	16.6	51.5	H-450 250 250	96.76 33.500 1490	9.40 5.18	57 48 -	1.32 1.6	1.11 0.46	0.53 0.27	0.73		
202~203	w=5.3, 6.8	18.0		18.0	30.6	18.0	18.3	H-600 227	134.9 72.600 2590	9.18	55 - -	1.39 1.6	1.18 0.49	0.14 0.07	0.56		
H LINE 107~108	w=12.3, 5.0, 5.0, see 108-201	23.1	77.0	23.1	38.4	38.5	51.4	H-488 250	163.5 71.000 2910	7.04	36 - -	1.48 1.6	1.32 0.55	0.31 0.14	0.69		

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δ ,L --- DEFLECTION AND SPAN LENGTH (cm)

NOTE : $\sigma b/fb < 1.0$ $\sigma b/fb + \sigma c/fc < 1.0$
$\sigma c/fc < 1.0$ $\tau/fs < 1.0$
$\delta/L < 1/300$

DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb / −	fc / fb / fs	σb / σb / fb	σc / σc / fc	σb/fb + σc/fc	τ / τ / fs	δ / δ / L
H-LINE	w=1.9 sec 102-103				11.0	6.5		H-450	157.4	4.40	155	0.398	0.93	0.13			
							19.7	680	33,500	5.18	131	0.837					
103-105	6.8	6.5		6.5				680	2550		−		0.39	0.22	0.56		

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NOTE : σ b/fb < 1.0　σ b/fb+σ c/fc < 1.0
σ c/fc < 1.0　τ /fs < 1.0
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DECISION OF GIRDER
【大梁の応力算定と断面算定】

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb / -	fc / fb / fs	σb / σb/fb	σc / σc/fc	σb/fb + σc/fc	τ / τ/fs	δ / δ/L
101 LINE	w=2.6 SLAB 0.71×½×6.8 SID 0.045×5.0	4.9	16.2	4.9	8.1	8.1	27.7	H-400 / 500 / 500	84.12 / 23.700 / 1190	4.57 / 5.26 / -	110 / 95 / -	0.993 / 1.19	0.68 / 0.38	0.33 / 0.28	0.66		
102 LINE	a=8.2 P=11/2 SLAB 0.71×½×6.8 1.69×½×6.8	14.9	55.0	17.7	28.2	28.9	9.1 / 49.0 / 58.1	H-600 / 200 / 200	134.4 / 77.600 / 2590	4.12 / 5.01	49 / 90	1.39 / 1.6	1.09 / 0.45	0.93 / 0.21	0.66		
103 LINE	w=11.5 P=11/2 SLAB 1.69×6.8	21.1	75.8	23.9	38.5	39.3	95.1	H-488 / 200 / 200	163.5 / 71.000 / 2910	7.04 / 7.97	28 / 25	1.53 / 1.6	1.32 (0.83) / 0.55	0.28 / 0.12	0.67	0.73 / 0.80	
104, 105	P=45/2 SLAB 1.69×6.8 w=11.5	21.6	94.5	21.6	35.9	36.0	11.5 / 61.7 / 73.2	H-488 / 200 / 200				1.53 / 1.6	1.23 / 0.51	0.45 / 0.20	0.71		
106 LINE G-H	w=8.2 SLAB 1.69×½×6.8 0.71×½×6.8	41.0		41.0	102.5	41.0	7.9 / 31.9 / 39.8	H-800 / 200	267.4 / 292.000 / 7290	6.62 / 7.80	30 / 26	1.53 / 1.6	1.41 (0.88) / 0.59	0.15 / 0.07	0.66		1.74 / 1/574
H-K	w=1.5 SLAB 1.03×½×2.5 SID 0.049×5.0	4.0	13.1	4.0	8.2	6.6	1.6 / 38.7 / 40.3	H-488 / 700 / 700	163.5 / 71.000 / 2910	7.04 / 7.97	99 / 88	0.894 / 1.92	0.32 / 0.15	0.25 / 0.19	0.34		
107 LINE G-H	w=10.1 SLAB 0.71×⅔×6.8 A/C 1.135×½×10.0 Block 0.4×5.0	50.5		50.5	126.3	50.5	48.9	H-900 / 200	309.8 / 411.000 / 9140	6.39 / -	91 / -	1.51 / 1.6	1.38 (0.86) / 0.58	0.16 / 0.07			1.52 / 1/659
H-K	w=2.6 SLAB 1.69×2.5	18.2		18.2	63.7	18.2	0.2 / 0.3 / 0.5	H-700 / 1400	235.5 / 201.000 / 5760	6.78 / -	206 / -	0.225 / 1.6	1.11 / 0.69				3.98 / 1/454
108 LINE G-H	w=11.4 SLAB 1.135×10.0	21.4	71.2	21.4	35.6	35.6	13.6 / 85.7 / 99.3	H-488 / 200 / 200	163.5 / 71.000 / 2910	7.04 / 7.97	28 / 25	1.53 / 1.6	1.22 / 0.51	0.61 / 0.27	0.78		

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NOTE : $\sigma b/fb < 1.0$ $\sigma b/fb+\sigma c/fc < 1.0$
$\sigma c/fc < 1.0$ $\tau/fs < 1.0$
$\delta/L < 1/300$

DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb / -	fc / fb / fs	σb / σb/fb	σc / σc/fc	σb/fb + σc/fc	τ / τ/fs	δ / δ/L
201 LINE	W=1.8 SLAB 0.71×2.5				44.1	12.6	0.2	H-588	192.5	6.85	204	0.23	1.10				3.63
	14.0						0.3		118.000			1.6					
H-K		12.6		12.6			0.5	1400	4020		-		0.67				1/385
203 LINE	W=1.1 W=2.0 SLAB 0.71×2.5 SID 0.045×5.0 LAV 0.79×1/2×2.5 Block 0.35×5.0				12.6	12.3	1.6	H-488	163.5	7.04	99	0.894	0.43	0.25			
	7.0 7.0						38.1	700	71.000	7.97	88	1.42					
H-K		2.1	18.0	8.7			40.3	700	2910				0.20	0.19	0.39		

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NOTE : σ b/fb < 1.0　　σ b/fb+σ c/fc < 1.0
σ c/fc < 1.0　　τ /fs < 1.0
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DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb / -	fc / fb / fs	σb / σb / fb	σc / σc / fc	σb/fb + σc/fc	τ / τ / fs	δ / δ / L
OPE																	
A LINE	W=6.5 SLAB 2.825×½×4.5 SIDI 0.045×½×5.0				37.6	22.1		H-488	163.5	7.04	32	1.51	1.29	0.01			
101~104	6.8	22.1		22.1			1.4	227	71,000 2910			1.6	0.54	0.01	0.55		
104~105	W=0.8 GRATING 0.325×½×4.5 SIDING 0.045×½×5.0 6.8	2.7		2.7	4.6	2.7	1.1	H-350 227	63.14 13,600 775	3.95 4.58	57 50	1.32 1.6	0.59 0.25	0.02 0.01	0.26		
105~106	W=6.8 SLAB 2.825×½×4.5 SIDI 0.045×½×5.0 EXT ½×4.0/6.8 6.8	23.1		23.1	39.3	23.1	1.1	H-488 227	163.5 71,400 2910	7.04	32	1.51 1.6	1.35 0.56	0.01 0.01	0.57		
107~108	W=0.7 W=6.5 SLAB 2.825×½×4.5 SIDI 0.045×½×5.0 5.0 5.0	8.9		24.6	46.6	29.6	1.6	H-588 200	192.5 118,000 4020	6.85	29	1.52 1.6	1.16 0.48	0.01 0.01	0.49		
B LINE	W=14.8 SLAB 2.825×½×10.5 6.8	50.3		50.3	85.5	50.3	18.4	H-800 227	267.4 292,000 7290	6.62	34	1.50 1.6	1.17 0.49	0.07 0.03	0.52		0.67
102~103	W=6.4 W=23.3 SLAB 2.825×½×16.5 2.825×½×4.5 2.4 6.8 6.4	-1.0	93.7	25.2	49.0	54.0	31.9	H-588 227	192.5 118,000 4020	6.85	33	1.50 1.6	1.22 0.51	0.17 0.08	0.59		
103~104	W=6.4 SLAB 2.825×½×4.5 5.8	18.6		18.6	26.9	18.6	31.9	H-500 227	114.2 47,800 1910	4.33	52	1.37 1.6	1.41 0.59	0.28 0.14	0.73		
104~105	W1=6.4 W2=0.7 GRATE 0.325×½×4.5 1.0 6.8 1.0	8.8		8.8	9.7	8.8	17.1	H-350 227 227	63.14 13600 775	3.95 4.58	57 50	1.32 1.6	1.25 0.52	0.27 0.14	0.66		

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σb,σc,τ --- STRESS FOR BENDING MOMENT, AXIAL FORCE AND SHEAR FORCE (t/cm2)
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NOTE : $\sigma b/fb < 1.0$ $\sigma b/fb + \sigma c/fc < 1.0$
$\sigma c/fc < 1.0$ $\tau/fs < 1.0$
$\delta/L < 1/300$

DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb	fc / fb / fs	σb/fb	σc/fc	σb/fb + σc/fc	τ/fs	δ/L
105~106	W=6.7 SLAB 2.825×½×4.5 / 5.8	19.4		19.4	28.2	19.4	17.1	H-600 / 227	134.4 / 77,600 / 2590	4.12	55 / -	1.39 / 1.6	1.09 / 0.45	0.13 / 0.06	0.57		
107~108	W=11.3 W=14.8 SLAB 2.825×½×10.5 / SLAB 2.825×(2.0+1.0) / 5.0 5.0	60.9		69.6	163.7	69.6	33.2	H-912 / 200	364.0 / 498,000 / 10900	6.56	30	1.52 / 1.6	1.50 (0.94) / 0.63	0.09 / 0.04	0.67		1/6
D LINE 101~102	W=14.0 SLAB 2.825×½×6.0 / 1.825×½×6.0 / 6.8	47.6		47.6	80.9	47.6	0.0	H-700 / 227	235.5 / 201,000 / 5760	6.78	33	1.52 / 1.6	1.40 / 0.88	0.0			0.92 / 1/739
107~108	W=17.0 SLAB 2.825×6.0 / 10.0	85.0		85.0	212.5	85.0	0.0	BH-1100 / 200	514.1 / 1,014,000 / 18,447	8.67			1.15 / 0.72				
108~201	W=5.5 SLAB 1.825×½×6.0 / 10.0	27.5		27.5	68.8	27.5	0.0	H-710 / 200	235.5 / 201,000 / 5760	6.78	29	1.52 / 1.6	1.19 / 0.74	0.0			
E LINE 101~102	W=10.5 SLAB 1.825×½×11.5 / 6.8	35.7		35.7	60.7	35.7	18.4	H-700 / 227		6.78	33	1.52 / 1.6	1.05 / 0.44	0.08 / 0.04	0.48		
102~103	W=7.8 W=24.7 SLAB 2.825×½×17.5 / 2.825×½×5.5 / 2.4 1.6 3.4	7.9	85.3	34.2	26.6	49.8	31.9	H-500 / 227	114.2 / 97,800 / 1910	4.33	52	1.37 / 1.6	1.39 / 0.58	0.28 / 0.14	0.72		
103~104	W=0.9 GRATING 0.325×½×5.5 / 5.8	2.6		2.6	3.8	2.6	31.9	H-350 / 227	63.14 / 13600 / 775	3.95	57	1.33 / 1.6	0.49 / 0.20	0.57 / 0.26	0.46		
104~105	W=0.9 / 7.8	3.5		3.5	6.8	3.5	17.1	H-350 / 227		3.95	57	1.33 / 1.6	0.88 / 0.37	0.27 / 0.14	0.57		

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DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb	fc / fb / fs	σb / σb/fb	σc / σc/fc	σb/fb + σc/fc	τ / τ/fs	δ / δ/L
105~106	W=7.8 SLAB 2.825×½×5.5 6.8	26.5		26.5	45.1	26.5	17.1	H-588 227	192.5 118.000 4020	6.85	33 –	1.50 1.60	1.12 0.47	0.09 0.04	0.51		
106~107	W=7.8 3.4 3.4	10.0	33.2	10.0	11.3	16.6	33.2	H-400 227 227	89.12 23.700 1190	9.54 5.26	50 93	1.38 1.6	0.95 0.40	0.39 0.19	0.59		
107~108	W=16.2 SLAB 2.825×½×11.5 10.0	81.0		81.0	202.5	81.0	33.2	BH-1100 200	514.1 1.014.000 18.947	8.67	23	1.55 1.6	1.10 (0.69) 0.46	0.06 0.03	0.49		
108~201	W=10.5 SLAB 1.825×½×11.5 10.0	52.5		52.5	131.3	52.5	33.2	H-900 200	308.8 411.000 9140	6.39	31	1.51 1.6	1.44 0.60	0.11 0.05	0.65		1.58 1/632
℄ LINE 101~102	W=14.1 SLAB 1.825×½×15.5 6.8	47.9		47.9	81.5	47.9	0.0	H-700 227	235.5 201.000 5760	6.78	33	1.50 1.6	1.41 0.88	0.0			
105~107 102~103	W=16.9 SLAB 2.825×½×5.5 1.825×½×10.0 6.8	57.5		57.5	97.7	57.5	0.0	H-800 227	268.4 292.000 7290	6.62	34	1.50 1.6	1.34 0.89	0.0			
103~105	W=10.0 SLAB 1.825×½×11.0 GIRT 0.325×½×5.5 6.8	34.0		34.0	57.8	34.0	0.0	H-588 227	192.5 118.000 4020	6.85	33	1.50 1.6	1.44 0.90	0.0			
107~108	W=21.9 SLAB 2.825×½×15.5 10.0	109.5		109.5	273.8	109.5	0.0	BH-1100	514.1 1.014.000 18.947				1.48 0.93			0.45	1.37 1/946
108~201	W=19.1 SLAB 2.825×½×13.0 1.825×½×5.5 10.0	95.5		95.5	238.8	95.5	0.0	BH-1100									

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NOTE : σ b/fb < 1.0　　σ b/fb+σ c/fc < 1.0
σ c/fc < 1.0　　τ /fs < 1.0
δ /L < 1/300

DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	M1 / Me / Ms	Q1 / Qe / Qs	N1 / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb / -	fc / fb / fs	σb/fb	σc/fc	σb/fb + σc/fc	τ/fs	δ/L
H LINE	W=9.2 SLAB 1.825×½×10.0 SIDI 0.045×½×5.0				53.2	31.3		H-588	192.5	6.85	33	1.50	1.32	0.03			
101~106	6.8	31.3		31.3			5.0	227	118,000 4020		-	1.6	0.55	0.01	0.56		
202~203 106~107	W=22.0 W=13.5 SLAB 1.825×½×10.0 STAIR 0.93×7.0 COM 1.075×½×7.0 Block 0.4×0.5×2 CURB 0.15×7.0 3.4 3.4	74.2		60.5	125.1	74.2	5.8	H-900 227	309.8 411,000 9140	6.39	86	1.98 1.6	1.37 0.57	0.02 0.01	0.58		
201~202 107~108	W=20.7 COM 1.075×½×14.0 SLAB 1.825×½×10.0 5.0 5.0 Block 0.4×5.0×2	38.9	129.4	38.9	64.7	64.7	46.6	H-700 200 200	235.5 201,000 5760	6.78 7.87	29 25	1.52 1.6	1.12 0.47	0.20 0.09	0.56		
108~201	W=20.2 COM 1.005×½×14.0 SLAB 1.825×½×10.0 10.0 Block 0.4×5×2.	101.0		101.0	252.5	101.0	32.9	BH-1100	514.1 1,019,100 18,447			1.6	1.37 0.86				
K LINE	W=7.6 COM 1.075×½×14.0 SIDI 0.045×½×5.0				43.9	25.8		H-588	192.5	6.85	33	1.50	1.09	0.03			
106~107	6.8	25.8		25.8			5.3	227	118,000 4020			1.6	0.45	0.01	0.46		
107~201	W=7.6 5.0 5.0	14.2	47.6	14.2	23.8	23.8	93.1	H-500 220 220	114.2 47,800 1910	4.33 5.14	51 43	1.37 1.6	1.25 0.52	0.82 0.40	0.92		
201~202	W=7.1 COM 1.005×½×14.0 SIDI 0.045×½×5.0 10.0	35.5		35.5	88.8	35.5	51.5	H-800 220	267.4 292,000 7290	6.62	23	1.50 1.6	1.22 0.57	0.19 0.08	0.59		
202~203	W1=8.8 W2=7.6 COM 1.075×½×14.0 LAV 1.24×½×14.0 SIDI 0.045×½×5.0 3.4 3.4	28.9		26.9	47.5	28.9	5.3	H-588 175	192.5 118,000 4020	6.85	26	1.57 1.6	1.18 0.49	0.03 0.01	0.50		
H LINE	W=0.3 SIDI 0.045×½×5.0 Beam				1.7	1.0		H-350 680 680	63.14 13600 775	3.35 9.58	172 148	0.816 0.727	0.22 0.20	0.08 0.17	0.37		
103~105	6.8	1.0		1.0			5.0										

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DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	M1 / Me / Ms	Q1 / Qe / Qs	N1 / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb / -	fc / fb / fs	σb/fb	σc/fc	σb/fb + σc/fc	τ/fs	δ/L
101 LINE	W=3.4 SLAB 2.825×½×2.3 SIDI 0.045×½×5.0 4.5				8.6	7.7		H-350	63.14	3.95	114	0.729	1.11	0.10			
A-B		7.7		7.7			6.6	450	13600 775		-		0.46	0.09	0.55		
B-D	W=3.4 P=6.8 3.0 3.0	13.6		13.6	25.5	13.6	3.4	H-500 600	114.2 47,800 1910	4.33	139	0.495	1.34				
													0.84				
D-F	W=2.2 SLAB 1.825×½×2.3 SIDI 0.045×½×5.0 6.0	6.6		6.6	9.9	6.6	14.4	H-500 600 600		4.33 5.14	139 117	0.495 0.991	0.52 0.35	0.13 0.18	0.53		
F-G	W=2.2 5.5	6.1		6.1	8.3	6.1	25.5	H-350 350 350	63.14 13600 775	3.95 4.58	89 76	1.0 1.41	1.07 0.57	0.40 0.27	0.78		
G-H	W=0.1 P W=2.2 SIDI 0.045×½×5.0 SLAB 1.825×½×2.3 P: 1.825×2.3×5.0 5.0 5.0	-0.4	28.2	4.8	5.1	6.2	31.1	H-350 500 500		3.95 4.58	127 109	0.593 1.07	0.65 0.40	0.49 0.55	0.95		
102 LINE	W=6.5 SLAB 2.825×2.3 4.5				16.5	14.6		H-400	84.12	4.54	99	0.894	1.39	0.20			
A-B		14.6		14.6			17.2	450	23,700 1190			1.6	(0.87) 0.58	0.15	0.73		
B-D	W=6.5 P=23.8 P: Pipe 6.8 2.825×2.0×3.0 3.0 3.0	31.4		31.4	65.0	31.4	8.9	H-700 400	235.5 201,000 5760	6.78	59	1.30 1.6	1.13 (0.70) 0.47	0.04 0.02	0.99		
D-F	W=5.3 P=23.8 SLAB 1.825×½×2.3 2.825×½×2.3 3.0 3.0	27.8		27.8	39.6	27.8	8.9	H-700									
F-G	W=5.3 5.5	14.6		14.6	20.0	14.6	8.9	H-450 550	96.76 33,500 1490	4.4	125	0.612 1.6	1.34 (0.84) 0.56	0.09 0.10	0.66		

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DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb / −	fc / fb / fs	σb/fb	σc/fc	σb/fb + σc/fc	τ/fs	δ/L
G-H	W=4.2 P=13/4 SLAB 1.825×2.3 (5.0 / 5.0)	7.9	29.2	7.9	13.1	13.1	21.6	H-450 500 500	96.76 33,500 1490	4.40 5.18 −	114 97	0.729 1.10 1.6	0.88 0.50	0.33 0.30	0.80		
103 LINE F-G	W=3.6 SLAB 2.825×1/2×2.3 GRAT 0.325×1/2×2.3 (5.5)	9.9		9.9	13.6	9.9	1.8 10.7 12.5	H-400 250 250	84.12 23,700 1190	4.54 5.26	55 98	1.39 1.6	1.19 0.48	0.15 0.07	0.55		
104 LINE A-B	W=3.6 (4.5)	8.1		8.1	9.1	8.1		H-350 775				1.6	1.17 0.73				
F-G	W=0.7 GRAT 0.325×2.3 (5.5)	1.9		1.9	2.6	1.9		H-350									
G-H	W=4.2 P=4/4 SLAB 1.825×2.3 (5.0 / 2.5 / 2.5)	6.8	34.0	12.4	18.7	19.8	25.9	H-450 500	96.76 33,500 1490	4.40	114	0.729 1.6	1.23 0.51	0.27 0.25	0.76		
105 LINE F-G	W=3.6 P=19.9 SLAB 2.825×1/2×2.3 GRAT 0.325×1/2×2.3 P: 2.825×2.3×1/2×5.5 0.325×2.3×1/2×5.5 (3.0 / 1.0)	−1.8		32.5	21.7	23.5	30.8	H-450 300		4.40	68	1.22 1.6	1.46 0.61	0.32 0.17	0.78		
106 LINE F-G	W=6.5 SLAB 2.825×2.3 (5.5)	17.9		17.9	24.6	17.9	1.9 8.8 10.7	H-500 550	119.2 47,800 1910	4.33	127	0.593 1.6	1.29 0.54	0.09 0.10	0.64		
G-H	W=4.2 SLAB 1.825×2.3 (10.0)	21.0		21.0	52.5	21.0	30.3	H-588 1000	192.5 118,000 4020	6.85	146	0.449 1.6	1.31 0.55	0.16 0.24	0.79		2.21 1/452
H-K	W=1.3 P=17.4 COM 1.075×1/2×2.3 W=1.3 SIDE 0.045×1/2×5.0 P: 1.075×2.3×1/2×8.5 (7.0 / 1.5 / 5.5) 0.43×1.2×1/2×5.5 0.43×5.0×1/2×5.5	2.6	24.3	2.2	14.0	17.7	53.0	H-500 550 550	119.2 47,800 1910	4.33 5.14	127 107	0.593 1.09	0.73 0.45	0.46 0.52	0.97		

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DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb / −	fc / fb / fs	σb / fb	σc / fc	σb/fb + σc/fc	τ / fs	δ / L
10? LINE B-F	W=2.8 SLAB 2.825×½×2.0 6.0	8.4		8.4	12.6	8.4	15.2	H-400 600	84.12 23.700 1190	4.54	132 −	0.549 1.6	1.06 0.44	0.18 0.22	0.66		
F-G	W=6.1 SLAB 2.825×½×4.3 5.5	16.8		16.8	23.1	16.8	3.9	H-500 550	114.2 47.800 1910	4.33	127	0.593 1.6	1.21 0.76	0.03			
G-H	W=3.9 W=4.9 SLAB 2.825×½×1.0 1.825×½×2.1 1.825×½×2.0 5.0 5.0	20.7		23.3	55.4	23.3	0.4	H-588 1000	192.5 118.000 4020	6.85	146	0.949 1.6	1.38 0.86				
H-K	W=2.3 CON 1.075×½×4.3 14.0	16.1		16.1	56.4	16.1	0.2	H-588				1.6	1.90 0.88				1/66 1/301
108 LINE A-B	W=1.3 STAIR 0.4?×3.0 4.5	2.9		2.9	3.3	2.9	23.7	H-350 450	63.14 13.600 775	3.95	114	0.729 1.6	0.43 0.18	0.38 0.35	0.53		
B-D	W=2.8 SLAB 2.825×½×2.0 6.0	8.4		8.4	12.6	8.4	23.8	H-400 600	84.12 23.700 1190	4.54	132	0.549 1.6	1.06 0.44	0.28 0.34	0.78		
D-F	W=4.7 SLAB 2.825×½×2.0 1.825×½×2.0 6.0	14.1		14.1	21.2	14.1	10.9	H-450 600	96.76 33.500 1490	4.40	136	0.517 1.6	1.42 0.59	0.11 0.14	0.73		
F-G	W=4.7 5.5	12.9		12.9	17.8	12.9	18.4	H-450 550		4.40	125	0.612 1.6	1.19 0.50	0.19 0.21	0.71		
H-K	W=2.0 CON 1.005×2.0 7.0 7.0	5.2	17.6	5.2	12.3	8.8	53.8	H-488 700 700	163.5 71.000 2910	7.04 7.97	99 88	0.894 1.42	0.42 0.20	0.33 0.25	0.45		

NOTATION : Ra,Rb,Rc --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
M,Q,N --- STRESS OF BENDING MOMENT (tm), SHEAR (t) AND AXIAL FORCE (t)
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σb,σc,τ --- STRESS FOR BENDING MOMENT, AXIAL FORCE AND SHEAR FORCE (t/cm2)
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δ,L --- DEFLECTION AND SPAN LENGTH (cm)

NOTE : $\sigma b/fb < 1.0$　$\sigma b/fb + \sigma c/fc < 1.0$
$\sigma c/fc < 1.0$　$\tau /fs < 1.0$
$\delta /L < 1/300$

DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCA-TION	LOAD CONDITION	Ra	Rb	Rc	M1 / Me / Ms	Q1 / Qe / Qs	N1 / Ne / Ns	MEMBER / lb / lk	A / I / Z	imin / i / η	λ k / λ b / –	fc / fb / fs	σ b / σ b/fb	σ c / σ c/fc	σ b/fb + σ c/fc	τ / τ/fs	δ / δ/L
203 LINE H-K	W=3.5, w. ΔV 1.24×½×2.3, 0.1, SDl 0.045×½×5.0, Block 0.4×5, 7.0, 5.5, P: 0.4×5.0×2×1.0	10.2	24.5	-0.3	14.6	14.4	53.0	H-488 / 700 / 700	163.5 / 71,000 / 2910	2.04 / 7.97	99 / 88 / –	0.894 / 1.42	0.50 / 0.23	0.32 / 0.24	0.47		

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NOTE : σ b/fb < 1.0　　σ b/fb+σ c/fc < 1.0
σ c/fc < 1.0　　τ /fs < 1.0
δ /L < 1/300

DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λ k / λ b / -	fc / fb / fs	σ b / σ b / fb	σ c / σ c / fc	σ b/fb + σ c/fc	τ / τ / fs	δ / δ / L
MEX																	
A LINE	W=5.3 SLAB 1.625×½×4.5 RC.2.29×5.5				30.6	18.0		H-600	134.4	4.12	55	1.34	1.18	0.01			
101~105	6.8	18.0		18.0			1.2	227	27.600 / 2.590			1.6	0.49	0.01	0.50		
105~106	W=5.3 P P P=4.0 1.9 1.5 1.5 1.9	24.0		24.0	45.0	29.0	2.9	H-588	192.5	6.85	33	1.50	1.12	0.02			
								227	118.000 / 9020			1.6	0.47	0.01	0.48		
107-108	W=1.6 W=5.3 5.0 5.0	12.6		21.9	45.2	21.9	2.6	H-588			73	1.17	1.12	0.01			
								500				1.6	0.47	0.01	0.48		
B LINE	W=8.5 SLAB 1.625×½×10.5				49.1	26.9		H-588			33	1.50	1.22	0.01			
101~102	6.8	28.9		28.9			3.3	227				1.6	0.51	0.01	0.52		
102~103	W=3.7 W=13.4 SLAB 1.625×½×16.5 1.125×½×4.5 2.4 4.0 3.4	3.6	45.6	18.7	14.1	26.9	22.0	H-900 / 227	84.12 / 23.700	9.54 / 5.26	50 / 43	1.38 / 1.6	1.18 / 0.49	0.26 / 0.13	0.62		
								227	1190								
103~104	W=3.7 SLAB 1.625×½×4.5 5.8	10.7		10.7	15.6	10.7	4.1	H-400			50	1.38 / 1.6	1.31 / 0.55	0.05 / 0.02	0.57		
								227									
104~105	W=3.7 8.8	16.3		16.3	35.8	16.3	0.0	H-600	134.4			1.6	1.38 / 0.86				1/77 / 1/497
								227	27.600 / 2.590	5.91	95						
105~106	W=3.7 P P P=4.0 1.9 1.5 1.5 1.9	18.6		18.6	35.8	18.6	2.2	H-600		4.12	55	1.39 / 1.6	1.38 / 0.58	0.02 / 0.01	0.59		
								227									

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NOTE : $\sigma b/fb < 1.0$ $\sigma b/fb+\sigma c/fc < 1.0$
$\sigma c/fc < 1.0$ $\tau/fs < 1.0$
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DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb / -	fc / fb / fs	σb / fb	σc / fc	σb/fb + σc/fc	τ / fs	δ / L
106~107	W=3.7	4.7	15.8	4.7	5.3	7.9		H-350	63.14	3.95	57	1.32	0.68	0.35			
							22.0	227	13600	4.58	50	1.6					
								227	795		-		0.28	0.18	0.46		
107~108	P1 P2 SLAB 1.625×½×6.0, 1.625×½×10.5, P1=16/2, P2=18.5/2	37.4		46.9	106.5	46.9		H-900	309.8	6.39	31	1.57	1.17	0.01			2.26
							9.2		411.000			1.6					
								200	9140				0.49	0.01	0.50		1/442
D LINE 101~102	W=9.8 SLAB 1.625×½×12.0	33.3		33.3	56.6	33.3		H-588	192.5	6.85			1.41				
							0.0		118.000			1.6					
								227	4020				0.88				
107~108	P=21.5/2, P=18.5/2, W=9.8	59.4		58.6	147.7	59.4		H-912					1.36				
							0.0										
								200	10900				0.85				
108~201	W=4.9 SLAB 1.625×½×6.0	24.5		24.5	61.3	24.5		H-700	235.5	6.78			1.06				1.51
							0.0		201.000			1.6					
								200	5760				0.66				1/662
F LINE 101~102	W=9.3 SLAB 1.625×½×11.5	31.6		31.6	53.8	31.6		H-588	192.5	6.85	26	1.54	1.39	0.01			
							2.3		118.000			1.6					
								175	4020				0.56	0.01	0.57		
102~103	W=4.5 N3=14.2 SLAB 1.625×½×5.5, 1.625×½×17.5	4.6	49.0	19.6	15.3	28.6		H-400	84.12	4.54	50	1.38	1.29	0.26			
							22.0	227	23.700	5.26	43	1.6					
								227	1190				0.54	0.13	0.67		
103~104	W=4.5 SLAB 1.625×½×5.5	13.1		13.1	18.9	13.1		H-450	96.76	4.40	52	1.37	1.27	0.09			
							9.1		33500								
								227	1490				0.53	0.02	0.55		
104~105	W=4.5	17.6		17.6	34.2	17.6		H-600	134.4	4.12	55	1.34	1.32	0.0			
							0.0	227	77.600	5.01	95	1.6					
								227	2590				0.83				

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NOTE : $\sigma b/fb < 1.0$ $\sigma b/fb+\sigma c/fc < 1.0$
$\sigma c/fc < 1.0$ $\tau/fs < 1.0$
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DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb	fc / fb / fs	σb / σb/fb	σc / σc/fc	σb/fb + σc/fc	τ / τ/fs	δ / δ/L
105~106	W=4.5 SLAB 1.625×½×5.5	15.3		15.3	26.0	15.3	2.2	H-500 / 227	119.2 / 47.800 / 1910	9.33	52 / -	1.37 / 1.6	1.36 / 0.57	0.02 / 0.01	0.58		
106~107	W=4.5	5.8	19.2	5.8	6.5	9.6	22.0	H-350 / 227	63.14 / 13.600 / 775	3.95	57	1.32 / 1.6	0.84 / 0.35	0.35 / 0.18	0.53		
107~108	P1=24/2 P2=16.5/2 SLAB 1.125×½×11.5 W=9.3	57.6		55.7	141.8	57.6	4.2	H-912 / 200	/ / 10900			1.6	1.30 / 0.81				
108~201	W=9.3 SLAB 1.625×½×11.5	46.5		46.5	116.3	46.5	4.2	H-900 / 200	309.8 / 411.000 / 9140	6.39	31	1.51 / 1.6	1.27 / 0.53	0.01 / 0.01	0.54		
G LINE 103~104 101~102	W=12.6 SLAB 1.625×½×15.5	42.8		42.8	72.8	42.8	32.2	H-700 / 227	235.5 / 201.000 / 5760	6.78	34	1.50 / 1.6	1.26 / 0.53	0.14 / 0.06	0.59		
102~103	W=13.5 SLAB 1.625×½×15.5 LP ½×12/6.8	17.3	57.4	17.3	19.5	28.7	32.2	H-450 / 227 / 227	96.76 / 33.500 / 1490	4.40 / 5.18	52 / 44	1.37 / 1.6	1.31 / 0.55	0.33 / 0.16	0.71		
104~105	W=13.9 SLAB 1.625×½×15.5 HP ¼×36/6.8	47.3		47.3	80.3	47.3	53.7	H-700 / 227	235.5 / 201.000 / 5760	6.78	34	1.50 / 1.6	1.39 / 0.58	0.23 / 0.10	0.68		
105~106	W=13.4 SLAB 1.625×½×15.5 C/C ⅔×7.0/6.8	17.1	57.0	17.1	19.4	28.5	53.7	H-450 / 227 / 227	96.76 / 33.500 / 1490	4.40 / 5.18	52 / 44	1.37 / 1.6	1.30 / 0.54	0.55 / 0.27	0.81		
107~108	W=12.6 SLAB 1.625×½×15.5	23.6	78.8	23.6	39.4	39.4	47.3	H-488 / 200 / 200	163.5 / 71.000 / 2910	7.04 / 7.97	28 / 25	1.53 / 1.6	1.35 / 0.56	0.29 / 0.13	0.69		

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DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb / -	fc / fb / fs	σb / σb/fb	σc / σc/fc	σb/fb + σc/fc	τ / τ/fs	δ / δ/L
108-201	W=12.6 10.0	63.0		63.0	157.5	63.0	47.3	H-912 / 200	364.0 / 498000 / 10900	6.56	20 / -	1.52 / 1.6 /	1.94 (0.90) / 0.60	0.13 / 0.06	0.66		
H LINE 101-102	W=9.7 W=2.7 SLAB 1.625×½×10.0 P.C. 0.29×5.5 STAIR 0.43×½×5.0 3.4 3.4	27.0		15.2	37.6	27.0	6.7	H-488 / 285	163.5 / 71.000 / 2910	7.04	40	1.46 / 1.6 /	1.29 / 0.54	0.04 / 0.02	0.56		
102-103	W=10.6 6.8 SLAB 1.625×½×10.0 P.C. 0.29×5.5 L.P ½×12.0/6.8	36.0		36.0	61.3	36.0	5.9	H-700 / 227	235.5 / 201.000 / 5760	6.78	33	1.50 / 1.6 /	1.06 / 0.44	0.02 / 0.01	0.45		
103-105	W=1.6 6.8 P.C. 0.29×5.5	5.4		5.4	9.2	5.4	5.7	H-400 / 680 / 680	84.12 / 23.700 / 1190	4.54 / 5.26	150 / 129	0.425 / 0.86 /	0.77 / 0.60	0.07 / 0.11	0.71		
105-106	W=10.0 6.8 SLAB 1.625×½×10.0 P.C. 0.29×5.5 C/C ±×7.0/6.8	34.0		34.0	57.8	34.0	19.2	H-588 / 227	192.5 / 118.000 / 4020	6.85	33	1.50 / 1.6 /	1.44 / 0.60	0.10 / 0.04	0.64		
106-107	P=0.4×5.5×7 W=1.1 W=4.6 3.4 3.4 SLAB 1.625×½×10.0 STAIR 0.43×½×7.0 EQIP 1.225×½×14.0 Block 0.4×5.5×2	69.7		50.1	115.1	69.7	25.1	H-900 / 227	309.8 / 411.000 / 9140	6.39	36	1.48 / 1.6 /	1.26 / 0.53	0.08 / 0.04	0.57		
107-108	W=21.1 5.0 5.0 SLAB 1.625×½×10.0 EQIP 1.225×½×14.0 Block 0.4×5.5×2	39.6	132.0	39.6	65.9	66.0	64.1	H-700 / 200	235.5 / 201.000 / 5760	6.78	29	1.52 / 1.6 /	1.14 / 0.48	0.27 / 0.12	0.60		
108-201	W=18.9 10.0 SLAB 1.625×½×10.0 EAT 1.225×½×14.0 Block 0.4×5.5	94.5		94.5	236.3	94.5	9.9	BH-1100 /	/ 18,447			/ 1.6 /	1.28 / 0.80				
K LINE 106-107	W=10.2 6.8 EQIP 1.225×½×14.0 P.C. 0.29×5.5	34.7		34.7	59.0	34.7	41.1	H-700 / 200	235.5 / 201.000 / 5760	6.78	29	1.52 / 1.6 /	1.02 / 0.43	0.17 / 0.07	0.50		

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DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb / -	fc / fb / fs	σb / σb / fb	σc / σc / fc	σb/fb + σc/fc	τ / τ / fs	δ / δ / L
108~201	w=10.2, 10.0				127.5	51.0		H-700	309.8	6.39	31	1.51	1.39	0.15			
107~108		51.0		51.0			46.6	200	411.000 9140		-	1.6	0.58	0.07	0.65		
201~202	w=7.9, 10.0, LAB 0.905×½×14.0, RC 0.29×5.5	39.5		39.5	88.8	39.5	82.1	H-800 200	267.4 292.000 7290	6.62	30	1.52 1.6	1.36 0.57	0.31 0.14	0.71		
202~203	w=7.9, 6.8	26.9		26.9	45.7	26.9	41.1	H-588 227	192.5 118.000 4020	6.85	33	1.50 1.6	1.56 0.57	0.21 0.09	0.66		
H UNE	w=18.9, SCAB 1.625×½×10.0, LAB 0.905×½×14.0, block 0.4×5.3×2, 5.0, 5.0				59.1	59.1		H-588 200		6.85	27	1.52	1.47	0.25			
201~202		35.5	118.2	35.5			47.3	200		7.87	25	1.6	0.61	0.11	0.72		

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DECISION OF GIRDER
〔大梁の応力算定と断面算定〕

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb / -	fc / fb / fs	σb / σb / fb	σc / σc / fc	σb/fb + σc/fc	τ / τ / fs	δ / δ / L
101 LINE A-B	W=3.5 SLAB 1.625×½×2.3 RC 0.29×5.5 / 4.5	7.9		7.9	8.9	7.9	11.3 / 4.6 / 15.9	H-400 / 450	84.12 / 23.700 / 1190	4.54	99 / -	0.894 / 1.6	0.75 / 0.47	0.13 / 0.15	0.62		
B-F	W=3.5 / 6.0	10.5		10.5	15.8	10.5	11.5 / 1.0 /	H-600 / 600 / 600	134.4 / 77.600 / 2590	4.12 / 5.01	146 / 120	0.449 / 0.96	0.61 / 0.64	0.09 / 0.2	0.84		
F-G	W=3.5 / 5.5	9.6		9.6	13.2	9.6	7.9 / 40.7 / 48.6	H-488 / 350 / 350	163.5 / 71.000 / 2910	7.04 / 7.97	50 / 44	1.38 / 1.6	0.45 / 0.19	0.30 / 0.14	0.33		
G-H	P=9.3 W=1.6 W=3.5 RC 0.29×5.5 SLAB 1.625×½×2.3 P=1.625×2.3×½×5.0 / 5.0 | 5.0	2.4	25.3	7.2	8.0	10.4	9.4 / 69.1 / 68.5	H-488 / 500 / 500			71 / 63	1.19 / 1.6	0.27 / 0.11	0.42 / 0.24	0.35		
102 LINE A-B	W=3.7 SLAB 1.625×2.3 / 9.5	8.3		8.3	9.4	8.3	27.9 / 6.0 /	H-400 / 450	84.12 / 23.700 / 1190	4.54	99 /	0.894 / 1.6	0.79 / 0.49	0.33 / 0.37	0.86		
B-F	W=3.7 / 6.0	11.1		11.1	16.7	11.1	28.1 / 31.3 /	H-600 / 600	134.4 / 77.600 / 2590	4.12	146 /	0.449 / 1.6	0.69 / 0.40	0.21 / 0.47	0.87		
F-G	W=3.7 / 5.5	10.2		10.2	14.0	10.2	26.6 / 93.1 / 119.7	H-488 / 550	163.5 / 71000 / 2910	7.04	78 /	1.12 / 1.6	0.48 / 0.20	0.73 / 0.43	0.63		
G-H	W=3.7 P=12.9/4 / 5.0 | 5.0	20.0		20.0	53.8	20.0	2.1 / 28.1 / 30.2	H-588 / 1000	192.5 / 118.000 / 4020	6.85	146 /	0.449 /	1.39 (0.84) / 0.56	0.16 / 0.24	0.80		
103 LINE G-H	P1 P2=2.0/4 W=3.7 P1=1.625×2.3×½×8.5 = 15.6 / 3.5 | 5.0	30.7		22.1	64.3	30.7	2.5 / 29.8 / 27.3	H-700 / 850	235.5 / 201.000 / 5.760	6.78	125 /	0.612 /	1.12 (0.7) / 0.47	0.12 / 0.13	0.60		

NOTATION : Ra,Rb,Rc --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
M,Q,N --- STRESS OF BENDING MOMENT (tm), SHEAR (t) AND AXIAL FORCE (t)
l,e,s --- SUFFIX FOR PERMANENT, SEISMIC AND TEMPORARY CONDITIONS
lb,lk --- BUCKLING LENGTH FOR BENDING AND AXIAL FORCE (cm)
A,I,Z --- SECTION AREA (cm2),GEOMETRICAL MOMENT OF INERTIA (cm4),SECTION MODULUS (cm3)
imin,λk --- MINIMUM RADIUS OF GYRATION (cm), BUCKLING COEFFICIENT
i,η,λb --- CONSTANTS FOR CALCULATION OF ALLOWABLE BENDING MOMENT
σb,σc,τ --- STRESS FOR BENDING MOMENT, AXIAL FORCE AND SHEAR FORCE (t/cm2)
fb,fc,fs --- ALLOWABLE STRESS FOR BENDING MOMENT, AXIAL FORCE AND SHEAR FORCE (t/cm2)
δ,L --- DEFLECTION AND SPAN LENGTH (cm)

NOTE : σ b/fb < 1.0　σ b/fb+σ c/fc < 1.0
σ c/fc < 1.0　τ /fs < 1.0
δ /L < 1/300

DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	Ml / Me / Ms	Ql / Qe / Qs	Nl / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λ k / λ b	fc / fb / fs	σ b / σ b / fb	σ c / σ c / fc	σ b/fb + σ c/fc	τ / τ / fs	δ / δ / L
104 LINE G-H	P1 P2=36/4 P1=1.625×2.3×8.5 =31.8 W=3.7 1.5 | 1.0 | 7.5	47.1		25.1	85.1	47.1	2.2 23.6 25.8	H-800 850	267.4 292.000 7290	6.62	128 –	0.584 1.6 0.49	1.17 (0.73)	0.10 0.11	0.60		
105 LINE G-H	P1=36/4 P2=9/4 W=3.7 1.8 | 1.5 | 5.0 | 2.5	23.1		21.8	58.3	23.1	2.0 27.3 29.3	H-588 850	192.5 118.000 4020	6.85	129 –	0.622 1.6 0.60	1.45 (0.91)	0.15 0.16	0.76		
106 LINE G-H	W=3.7 P=7.0/4 7.5 | 2.9	18.9		19.9	48.3	19.9	10.7 39.0 44.7	H-588 1000		6.85	146 –	0.449 1.6 0.5	1.20 (0.75)	0.23 (0.12) 0.39	0.84		
H-K	W=3.0 P=9.0 EQI 1.225×½×2.3 W=1.8 Pc 0.24×5.5 P: 1.225×½×2.3×4.3 0.43×½×5.5×2.5 7.0 | 1.5 | 5.5	7.7	30.7	4.9	19.5	17.4	6.2 71.8 700	H-488 700 2910	163.5 71.000 2910	7.04 7.97 88 1.42	99	0.894 1.6 0.31	0.67	0.48 0.36	0.67		
107 LINE B-F	W=3.5 SLAB 1.625×½×4.3 6.0	10.5		10.5	15.8	10.5	29.5 37.5 600	H-600 2590	134.4 77.600 1.6 0.38	4.12	146	0.449	0.61	0.22 0.49	0.87		
H-K	W=2.6 EQIP 1.225×½×4.3 14.0	18.2		18.2	63.7	18.2	1460	H-700 5760	235.5 201.000 1.6 0.69	6.78			1.11				
108 LINE A-B	W=1.3 STAIR 0.43×3.0 4.5	2.9		2.9	3.3	2.9	18.5 5.6 450	H-350 775	63.14 13600 1.6 0.27	3.95	114	0.729	0.43	0.29 0.40	0.67		
D-F	W=3.3 SLAB 1.625×2.0 6.0	9.9		9.9	14.9	9.9	15.3 59.3 74.6 600	H-488 2910	163.5 71.000 1.6 0.21	7.04	85	1.05	0.51	0.46 0.29	0.50		
F-G	W=3.3 5.5	9.1		9.1	12.5	9.1	9.9 61.9 70.9	H-488									

NOTATION : Ra,Rb,Rc --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
M,Q,N --- STRESS OF BENDING MOMENT (tm), SHEAR (t) AND AXIAL FORCE (t)
l,e,s --- SUFFIX FOR PERMANENT, SEISMIC AND TEMPORARY CONDITIONS
lb,lk --- BUCKLING LENGTH FOR BENDING AND AXIAL FORCE (cm)
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imin, λ k --- MINIMUM RADIUS OF GYRATION (cm), BUCKLING COEFFICIENT
i, η , λ b --- CONSTANTS FOR CALCULATION OF ALLOWABLE BENDING MOMENT
σ b, σ c, τ --- STRESS FOR BENDING MOMENT, AXIAL FORCE AND SHEAR FORCE (t/cm2)
fb,fc,fs --- ALLOWABLE STRESS FOR BENDING MOMENT, AXIAL FORCE AND SHEAR FORCE (t/cm2)
δ , L --- DEFLECTION AND SPAN LENGTH (cm)

NOTE : $\sigma b/fb < 1.0$ $\sigma b/fb+\sigma c/fc < 1.0$
$\sigma c/fc < 1.0$ $\tau/fs < 1.0$
$\delta/L < 1/300$

DECISION OF GIRDER
[大梁の応力算定と断面算定]

LOCATION	LOAD CONDITION	Ra	Rb	Rc	M1 / Me / Ms	Q1 / Qe / Qs	N1 / Ne / Ns	MEMBER lb / lk	A / I / Z	imin / i / η	λk / λb	fc / fb / fs	σb/fb	σc/fc	σb/fb + σc/fc	τ/fs	δ/L
G-H	W=3.3, 10.0	16.5		16.5	41.3	16.5	9.0 96.4 105.4	H-700 500	235.5 201.000 5760	6.78	79 -	1.16 1.6	0.72 0.30	0.45 0.26	0.56		
H-K	W=2.6, 14.0, EQIP 1.225×½×2.0, BATT 1.225×½×2.0, WALL 2×0.026×3.0	18.2		18.2	63.7	18.2	4.4 98.2 52.6	H-700 700	235.5 201.000 5760	6.78	103	0.85 1.6	0.77 0.46	0.22 0.17	0.63		2.08 1/454
201 LINE H-K	W=2.3, 14.0, LAB 0.905×½×2.0, BATT 1.225×½×2.0, WALL 2×0.026×3.0	16.1		16.1	56.4	16.1	4.4 98.2 52.6	H-700 700		6.78	103	0.85 1.6	0.98 0.41	0.22 0.17	0.58		
202 LINE H-K	W=1.9, 14.0, LAB 0.905×½×4.3	13.3		13.3	46.6	13.3		H-588 700	192.5 118.000 4020				1.16 0.73				3.89 1/364
203 LINE H-K	W=2.6, P=11.4, W=1.1, 11.0, 5.5, LAB 0.905×½×2.3, PK. 0.29×5.5, P: 0.905×½×2.3×4.3, 0.43×½×5.5×2.5	6.1	27.8	11.4	21.1	15.7	6.2 71.8 78.0	H-488 700	163.5 71000 2910	7.09 2.97	99 88	0.894 1.42	0.73 0.34	0.48 0.36	0.70		

NOTATION : Ra,Rb,Rc --- SUPPORT REACTION OF LEFT, CENTER AND RIGHT END (t)
M,Q,N --- STRESS OF BENDING MOMENT (tm), SHEAR (t) AND AXIAL FORCE (t)
l,e,s --- SUFFIX FOR PERMANENT, SEISMIC AND TEMPORARY CONDITIONS
lb,lk --- BUCKLING LENGTH FOR BENDING AND AXIAL FORCE (cm)
A,I,Z --- SECTION AREA (cm2),GEOMETRICAL MOMENT OF INERTIA (cm4),SECTION MODULUS (cm3)
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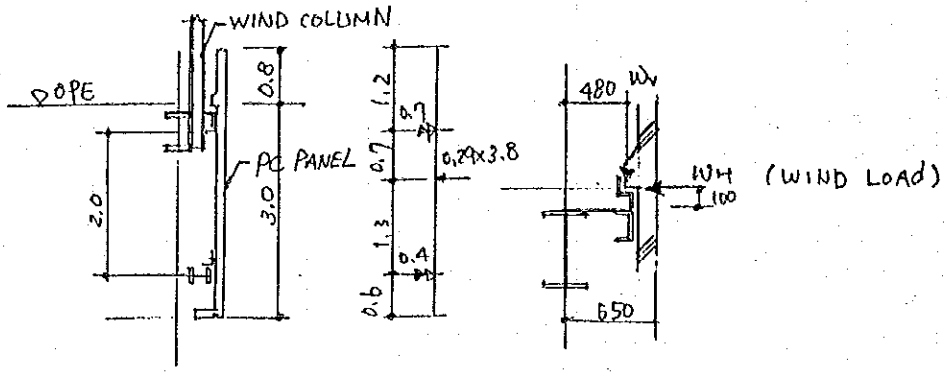
σb,σc,τ --- STRESS FOR BENDING MOMENT, AXIAL FORCE AND SHEAR FORCE (t/cm2)
fb,fc,fs --- ALLOWABLE STRESS FOR BENDING MOMENT, AXIAL FORCE AND SHEAR FORCE (t/cm2)
δ,L --- DEFLECTION AND SPAN LENGTH (cm)

A LINE OPE 108~201



$LW_V = 0.29 \times 4.0 \fallingdotseq 1.2$ T/m

$wW_H = 0.12 \times 3.8 = 0.46$ T/m

Upper Beam

Use H-488×300×11×18

$Z_x = 2910$ $Z_y = 541$

$Z_f = \frac{1.8 \times 30^2}{6} = 270$

$LW_t = \frac{1.2 \times 0.48}{0.47} = 1.23$ T/m

$wW_t = \frac{0.46 \times 0.1}{0.47} = 0.10$ T/m

$LW_H = \frac{1.2 \times 0.48}{10.0} = 0.06$ T/m

$LM_V = \frac{1}{8} \times 1.2 \times \overline{10}^2 = 15.0$ T·m

$LM_H = \frac{1}{8} \times 0.06 \times \overline{10}^2 = 0.8$ T·m

$LM_t = \frac{1}{8} \times 1.23 \times \overline{2.5}^2 = 1.0$ T·m

$wM_H = \frac{1}{8} \times 0.7 \times \overline{10}^2 = 8.8$ T·m

$wM_t = \frac{1}{8} \times 0.1 \times \overline{2.5}^2 = 0.1$ T·m

$L\sigma_V = 1500/2910 = 0.52$

$L\sigma_H = 80/541 = 0.15$

$L\sigma_t = 100/270 = 0.37$

$w\sigma_H = 880/541 = 1.63$

$w\sigma_t = 10/270 = 0.04$

Lower Beam

Use H-300

$Z_x = 481$ $\ell_b = 250$ $f_b = 1.6$

$LW_H = 0.9$ T/m

$LM_H = \frac{1}{8} \times 0.4 \times \overline{10}^2 = 5.0$ T·m

$\sigma_b = \frac{500}{481} = 1.04 < 1.6$ ok

Long Term

$\Sigma\sigma = 0.52 + 0.15 + 0.37 = 1.04 < 1.6$

Short Term

U Flange $\Sigma\sigma = 0.52 + (0.15 + 0.37 - 1.63 - 0.04) = +0.63 < 2.4$

$\Sigma\sigma = 0.52 - ($ 〃 $) = 1.67 < 2.4$

L. Flange $\Sigma\sigma = 0.52 + (0.15 - 0.37 - 1.63 + 0.04) = 1.29 < 2.4$

$\Sigma\sigma = 0.52 - ($ 〃 $) = 2.33 < 2.4$

H LINE ME8 103-105

$LW_V = 0.29 \times 6.3 = 1.83$ T/m
$wW_H = 0.12 \times 5.5 = 0.66$ T/m

Use H-700
$Z_x = 5760$ $Z_f = 722$
$Z_f = \frac{2.4 \times 30^2}{6} = 360$ $l_b = 680$

$LW_t = \frac{1.83 \times 0.43}{0.676} = 1.16$ T/m
$wW_t = \frac{0.66 \times 0.45}{0.676} = 0.44$ T/m

$LM_V = \frac{1}{8} \times 1.83 \times 6.8^2 = 10.6$ T·m
$LM_t = \frac{1}{12} \times 1.16 \times 6.8^2 = 4.5$ T·m
$wM_H = \frac{1}{8} \times 0.66 \times 6.8^2 = 3.8$ T·m
$wM_t = \frac{1}{12} \times 0.44 \times 6.8^2 = 1.7$ T·m

$L\sigma_V = 1060 / 5760 = 0.18$
$L\sigma_t = 450 / 360 = 1.25$
$w\sigma_H = 380 / 722 = 0.53$
$w\sigma_t = 170 / 360 = 0.47$

Long Term
$\Sigma\sigma = 0.18 + 1.25 = 1.43 < 1.6$ ok

Short Term
Upper Flange
$\Sigma\sigma = 0.18 + (1.25 - 0.53 - 0.46) = 0.44 < 2.4$
$\Sigma\sigma = 0.18 - (\quad " \quad) = 0.08 < 2.4$
Lower Flange
$\Sigma\sigma = 0.18 + (1.25 + 0.53 - 0.46) = 1.50 < 2.4$
$\Sigma\sigma = 0.18 - (\quad " \quad) = 1.14 < 2.4$

H LINE 5TH 103~105

M_L = 8.9 T.m M_S = 5.0 T.m

N_S = 40.9 T

Use H-488

A = 163.5 i = 7.04 l_k = 680 λ = 97 f_c = 0.916

Z_x = 2910 i_b = 7.97 l_b = 227 λ = 28 f_b = 1.6

Z_y = 541

$$\sigma_{bx} = \frac{890}{2910} = 0.31$$

$$\sigma_{by} = \frac{500}{541} = 0.92$$

$$\sigma_c = \frac{40.9}{163.5} = 0.25$$

$$\sum \frac{\sigma}{f} = \frac{0.31+0.92}{1.5\times1.6} + \frac{0.25}{1.5\times0.916} = 0.69 < 1.0 \quad OK$$

H LINE OPE 103~105

M_L = 1.7 T.m M_S = 4.0 T.m

N_S = 5.0 T

Use H-500

A = 114.2 i = 4.33 l_k = 680 λ = 157 f_c = 0.388

Z_x = 1910 i = 5.14 l_b = 227 λ = 44 f_b = 1.6

Z_y = 214

$$\sigma_{bx} = \frac{170}{1910} = 0.09$$

$$\sigma_{by} = \frac{400}{214} = 1.87$$

$$\sigma_c = \frac{5.0}{114.2} = 0.04$$

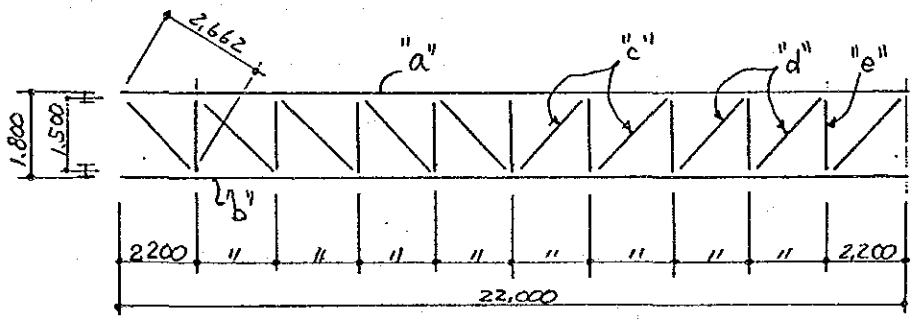
$$\sum \frac{\sigma}{f} = \frac{0.09+1.87}{1.5\times1.6} + \frac{0.04}{1.5\times0.388} = 0.89 < 1.0 \quad OK$$

5.3 Design of Roof Truss (ルーフ・トラスの設計)

T1 (108 LINE)

a) Design Data (due to COMPUTER OUT PUT DATA)

LOAD	M (t.m)		Q (t)	
	CENTER	G END	CENTER	G END
V.L.	255.3	112.6	33.4	67.5
H.L.	24.7	78.8	4.9	4.9
C.D.L.	2.7	0.3	0.3	0.3
C.L.L.	7.6	1.1	0.8	0.8
C.H.L.	2.9	1.4	0.4	0.4
PERMANENT	255.3	112.6	33.4	67.5
TEMPORARY	280.2	193.1	38.3	72.4



b) MEMBER FORCE

MEMBER	PERMANENT	TEMPORARY
a	-170.2	-186.8
b	+170.2 -75.1	+186.8 -128.7
c	+59.3	+68.0
d	+119.8	+128.5
e	-67.5	-72.4

c) CHECK OF SECTION

- MEMBER "a"

  Use H-300²

  $A = 119.8\,cm^2$ $i = 7.51$ $l_k = 220$ $\lambda = 29$ $f_c = 1.52$

  $\sigma_c = \frac{170.2}{119.8} = 1.42$ $\frac{\sigma_c}{f_c} = 0.93 < 1.0$ ok

- MEMBER "b"

  Use H-300²

  $A = 119.8\,cm^2$ $i = 7.51$ $l_k = 440$ $\lambda = 59$ $f_c = 1.30$

  $\sigma_t = \frac{170.2}{119.8} = 1.42$ $\frac{\sigma_t}{f_t} = 0.89 < 1.0$ ok

  $\sigma_c = \frac{75.1}{119.8} = 0.63$ $\frac{\sigma_c}{f_c} = 0.48 < 1.0$ ok

- MEMBER "c"

  Use 2L-130²×15

  $A = 36.75 \times 2$ $A_e = (2\times13 - 6.5 - 2.35\times2)\times1.5\times2 = 44.4$ $f_t = 1.6$

  $\sigma_t = \frac{59.3}{44.4} = 1.34$ $\frac{\sigma_t}{f_t} = 0.84 < 1.0$ ok

- MEMBER "d"

  Use 2L-200²×15

  $A = 57.75 \times 2$ $A_e = 2\times(2\times20 - 10 - 2.35\times2)\times1.5 = 75.9$ $f_t = 1.6$

  $\sigma_t = \frac{119.8}{75.9} = 1.58$ $\frac{\sigma_t}{f_t} = 0.99 < 1.0$ ok

- MEMBER "e"

  Use 2L-130²×12

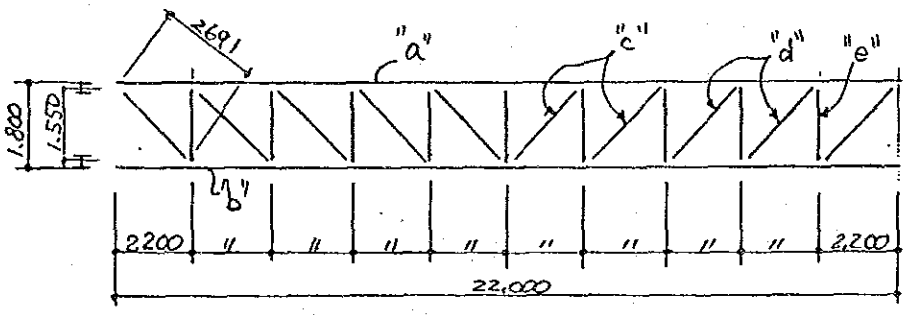
  $A = 29.76 \times 2$ $i = 3.96$ $l_k = 150$ $\lambda = 38$ $f_c = 1.47$

  $\sigma_c = \frac{67.5}{59.52} = 1.13$ $\frac{\sigma_c}{f_c} = 0.77 < 1.0$ ok

T2 (104 LINE)

a) Design Data (due to COMPUTER OUT PUT DATA)

LOAD	M (t.m)		Q (t)	
	CENTER	G END	CENTER	G END
V.L.	190.9	83.1	24.9	48.6
H.L.	33.6	58.3	2.3	2.3
C.D.L.	1.5	0.1	0.1	0.1
C.L.L.	3.9	0.3	0.3	0.3
C.H.L.	4.8	2.9	0.7	0.7
PERMANENT	190.9	83.4	24.9	48.6
TEMPORARY	227.8	86.1	27.2	50.9



b) MEMBER FORCE

MEMBER	PERMANENT	TEMPORARY
a	−123.2	−147.0
b	+123.2 −53.8	+147.0 −55.5
c	+43.2	+47.2
d	+84.4	+88.4
e	−48.6	−50.9

c) CHECK OF SECTION

- MEMBER "a"

  Use H-250²

  $A = 92.18\ cm^2$ $i = 6.29$ $l_k = 220$ $\lambda = 35$ $f_c = 1.49$

  $\sigma_c = \frac{123.2}{92.18} = 1.34$ $\frac{\sigma_c}{f_c} = 0.90 < 1.0$ OK

- MEMBER "b"

  Use H-250²

  $A = 92.18\ cm^2$ $i = 6.29$ $l_k = 440$ $\lambda = 70$ $f_c = 1.20$ $f_t = 1.6$

  $\sigma_t = \frac{123.2}{92.18} = 1.34$ $\frac{\sigma_t}{f_t} = 0.84 < 1.0$ ok

  $\sigma_c = \frac{53.8}{92.18} = 0.58$ $\frac{\sigma_c}{f_c} = 0.48 < 1.0$ ok

- MEMBER "c"

  Use 2L-130²x12

  $A = 29.76 \times 2$ $A_e = 0.55A = 32.7$ $f_t = 1.6$

  $\sigma_t = \frac{43.2}{32.7} = 1.32$ $\frac{\sigma_t}{f_t} = 0.83 < 1.0$ OK

- MEMBER "d"

  Use 2L-175²x15

  $A = 50.21 \times 2$ $A_e = 2\times(2\times17.5\times0.875 - 2.35\times2)\times1.5 = 64.65$ $f_t = 1.6$

  $\sigma_t = \frac{84.4}{64.65} = 1.31$ $\frac{\sigma_t}{f_t} = 0.82 < 1.0$ ok

- MEMBER "e"

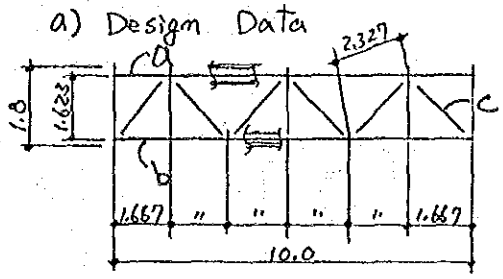
  Use 2L-130²x9

  $A = 22.74 \times 2$ $i = 4.01$ $l_k = 155$ $\lambda = 39$ $f_c = 1.46$

  $\sigma_c = \frac{48.6}{45.48} = 1.07$ $\frac{\sigma_c}{f_c} = 0.73 < 1.0$ ok

T_3, T_4 SUB TRUSS

a) Design Data



PARMANENT LOAD

$W = 0.595 \times 2.2 = 1.31$ T/M

$M = \frac{1}{8} \times 1.31 \times 10.0^2 = 16.4$ T·M

$Q = \frac{1}{2} \times 1.31 \times 10.0 = 6.6$ T

上弦材モーメント

$M = \frac{1}{8} \times 1.31 \times 3.334^2 = 1.82$ T·M

b) CHECK OF SECTION

◦ MEMBER "a"

$N = \frac{16.4}{1.623} = 10.1$ T

$M = 1.82$ T·M

USE H-244

$A = 56.24$ $i = 4.18$ $\ell_k = 500$ $\lambda = 120$ $f_c = 0.664$

$Z = 502$ $i_b = 4.68$ $\ell_b = 333$ $\lambda = 71$ $f_b = 1.6$

$\sigma_b = \frac{182}{502} = 0.36$

$\sigma_c = \frac{10.1}{56.24} = 0.18$

$\frac{\sigma}{f} = 0.23 + 0.27 = 0.50 < 1.0$ OK

◦ MEMBER "b"

$N = 10.1$ T

USE $2L\text{-}75^2 \times 6$

$A = 2 \times 8.727$ $A_e = 9.6$ $f_t = 1.6$

$\sigma_t = \frac{10.1}{9.6} = 1.05$ $\frac{\sigma}{f} = 0.66 < 1.0$ OK

◦ MEMBER "c"

$N = 6.6 \times \frac{2.327}{1.623} = 9.5$ T

USE $2L\text{-}75^2 \times 6$

$A = 2 \times 8.727$ $i = 2.3$ $\lambda = 101$ $f_c = 0.892$

$\sigma_c = \frac{9.5}{2 \times 8.727} = 0.54$ $\frac{\sigma}{f} = 0.61 < 1.0$ OK

6. Design of Bracing

NOTE : σ c/fc < 1.0
σ t/ft < 1.0

6.1 DECISION OF VERTICAL BRACE ( )
[鉛直ブレースの断面算定]

LOCATION	TYPE	MEMBER A / An	ix / iy	lkx / lky	λ x / λ y	lfc / sfc	AXIAL FORCE N1 / ~~1.5~~*Ne	Ne / Ns	σ c / σ c fc	σ t / σ t ft	REMARKS
X Direction											
RF		2L-120²x8							0.43	0.78	
A, G	X	37.52 / 20.64	3.71	586	158	0.383 / 0.574		16.2	0.75	0.32	
5TH		2L-120²x8							0.42	0.77	
A	X	37.52 / 20.64	3.71	559	151	0.420 / 0.63		15.9	0.67	0.32	
		H-250²					27.0	48.8	0.82		
H	K	92.18 / 73.7	6.29	707	112	0.751 / 1.126		75.8	0.73		
4TH		2L-130²x9							0.49	0.88	
A	X	45.48 / 25.01	4.01	559	139	0.495 / 0.742		22.1	0.66	0.37	
		H-300²					54.4	72.7	1.06		
H	K	119.8	7.51	707	94	0.948 / 1.422		127.1	0.75		
OPE		2L-130²x9							0.49		
A	X	45.48	4.01	571	142	0.475 / 0.713		22.3	0.69		
		H-250²					55.1	47.9	1.12		
B	K	92.18	6.29	647	103	0.850 / 1.275		103.0	0.88		
		H-300²					87.4	69.2	1.31		
H	K	119.8	7.51	743	99	0.894 / 1.341		156.6	0.98		
MEZ		2L-130²x9							0.57		
A	X	45.48	4.01	597	149	0.431 / 0.646		26.0	0.88		
		H-250²					32.4	47.4	0.87		
G	K	92.18	6.29	734	117	0.697 / 1.045		79.8	0.83		
		H-300²					49.7	72.4	1.02		
G	K	119.8	7.51	820	109	0.789 / 1.176		122.1	0.87		
		H-350²					83.3	105.0	1.08		
H	K	173.9	8.84	820	93	0.959 / 1.438		188.3	0.75		

NOTATION: TYPE --- K, X OR N
A --- SECTION AREA (cm2)
An --- 0.8xA·(EFFECTIVE AREA FOR TENSION MEMBER) (cm2)
ix,iy --- RADIUS OF GYRATION (cm)
lkx,lky --- BUCKLING LENGTH (cm)
λ x,λ y --- SLENDER RATIO (lkx/ix,lky/iy)
lfc,sfc --- ALLOWABLE COMPRESSIVE STRESS (t/cm2)
N1,Ne --- AXIAL FORCE OF VERTICAL AND SEISMIC LOAD (t)
Ns --- AXIAL FORCE OF TEMPORARY CONDITIONS (N1+1.5xNe) (t)
σ c,σ t --- STRESS OF COMPRESSION AND TENSION (t/cm2)

NOTE : σ c/fc < 1.0
σ t/ft < 1.0

DECISION OF VERTICAL BRACE ( )
[鉛直ブレースの断面算定]

LOCATION	TYPE	MEMBER A / An	ix / iy	lkx / lky	λ x / λ y	lfc / sfc	AXIAL FORCE N1 / ~~1.5~~Ne	Ne / Ns	σ c / σ c / fc	σ t / σ t / ft	REMARKS
Y Direction											
5TH		H-300²					28.6	67.4	0.80		
107	K	119.8	7.51	707	94	0.948 / 1.422		96.0	0.56		
		H-350²					130.0	63.3	0.75		
103	K	173.9	8.84	707	80	1.10 / 1.65			0.68		
4TH		H-250²					45.3	34.8	0.87		
102	K	92.18	6.29	707	112	0.751 / 1.126		80.1	0.77		
		H-300²					59.5	61.2	1.01		
108	K	119.8	7.51	707	94	0.948 / 1.422		120.7	0.71		
		H-250²					18.3	28.0	0.50		
203	K	92.18	6.29	860	137	0.51 / 0.765		46.3	0.65		
OPE		2L-130²×12					—	20.5	0.34		
107	N	59.52	3.96	711	180	0.295 / 0.44		20.5	0.77		
		2L-130²×9					5.8	21.4	0.60		
108	X	45.48	4.01	389	97	0.916 / 1.374		27.2	0.44		
		H-250²					25.7	40.6	0.72		
105	K	92.18	6.29	743	118	0.686 / 1.029		66.3	0.70		
		H-300²					19.5	61.5	0.68		
201	K	119.8	7.51	743	99	0.894 / 1.341		81.0	0.51		
MEZ		H-200²					0.8	33.8	0.54		
108	N	63.53	5.03	790	157	0.388 / 0.582		34.6	0.93		
		2L-130²×9					—	26.8	0.59		
107	X	45.48	4.01	442	110	0.773 / 1.16		26.8	0.51		
		H-300²					17.5	71.7	0.94		
101	K	119.8	7.51	829	109	0.769 / 1.176		89.2	0.63		
		H-300²					23.9	74.9	0.82		
106	K	119.8	7.51	955	127	0.593 / 0.89		98.8	0.92		

NOTATION: TYPE --- K, X OR N
A --- SECTION AREA (cm2)
An --- 0.8xA (EFFECTIVE AREA FOR TENSION MEMBER) (cm2)
ix,iy --- RADIUS OF GYRATION (cm)
lkx,lky --- BUCKLING LENGTH (cm)
λ x,λ y --- SLENDER RATIO (lkx/ix,lky/iy)
lfc,sfc --- ALLOWABLE COMPRESSIVE STRESS (t/cm2)
N1,Ne --- AXIAL FORCE OF VERTICAL AND SEISMIC LOAD (t)
Ns --- AXIAL FORCE OF TEMPORARY CONDITIONS (N1+1.5xNe) (t)
σ c,σ t --- STRESS OF COMPRESSION AND TENSION (t/cm2)

6.2 Design of Horizontal bracing.

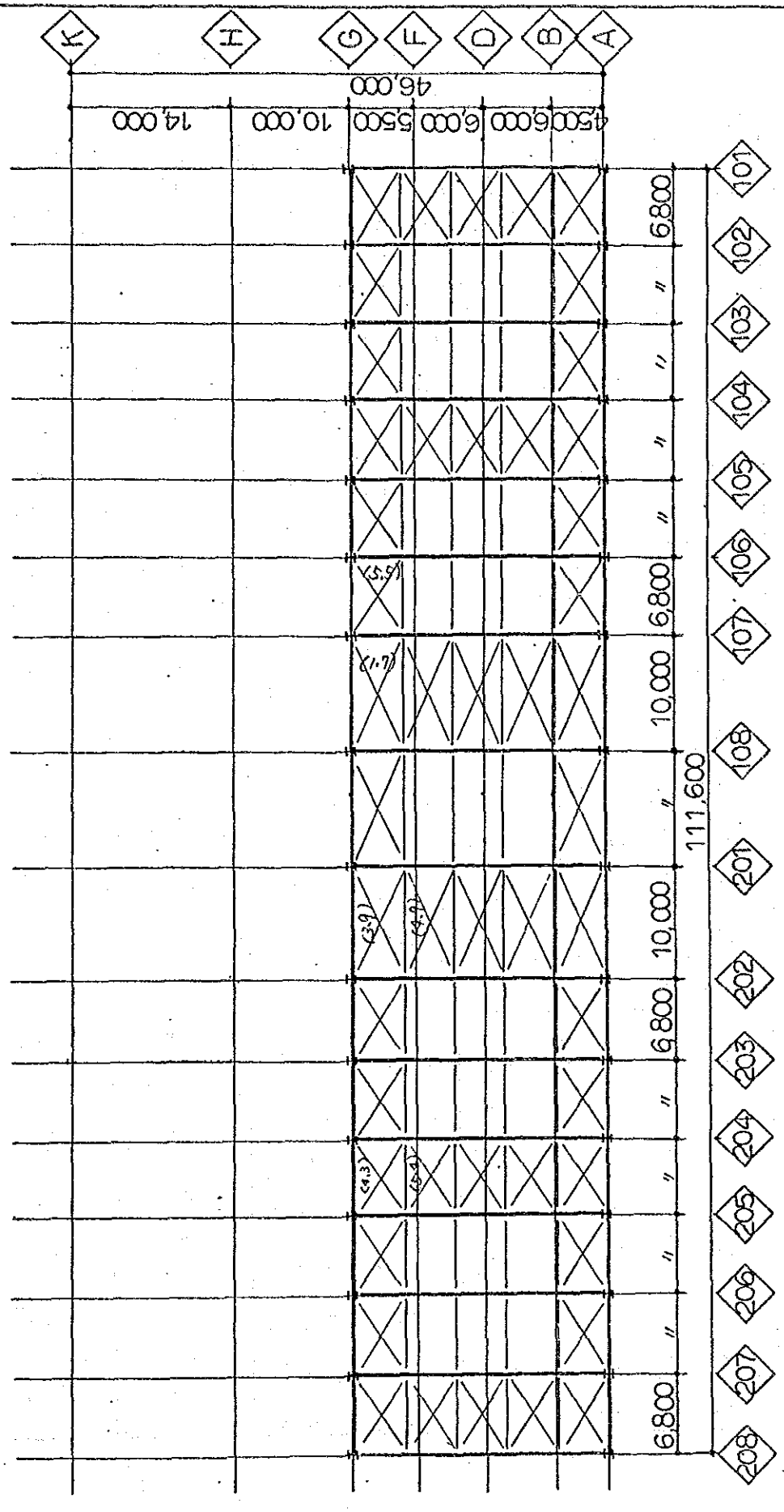
Stress of Holizontal Bracing

R FL

Direction	Frame	Q_1 Upper story (t)	Q_2 Floor (t)	Q_3 Lower story (t)	$Q_1+Q_2-Q_3$ (t)	Load between Frames (t)	No. of Bracing (piece)	Stress of one Bracing (t)
Long span	A	0.0	54.6	163.7	-109.1			
						109.1	30	3.6
	B	0.0	54.6	0.0	54.6			
						54.5	12	4.5
	D	0.0	54.6	0.0	54.6			
		0.0	54.6	0.0	54.6	54.5	12	4.5
	F	0.0	54.6	0.0	54.6			
						109.1	30	3.6
	G	0.0	54.6	163.7	-109.1			
	H							
	K							
Short span	101		22.5	14.9	7.6			
						7.6	10	0.8
	102		22.5	21.6	0.9			
						8.5	4	2.1
	103		22.5	21.6	0.9			
						9.4	4	2.4
	104		22.5	21.6	0.9			
						10.3	10	1.0
	105		22.5	21.6	0.9			
						11.2	4	2.8
	106		22.5	21.6	0.9			
						12.1	4	3.0
	107		22.5	26.3	-3.8			
						8.5	10	0.9
	108		22.5	31.0	-8.5			
						0.0	4	0.0
	201		22.5	31.0	-8.5			
						8.5	10	0.9
	202		22.5	26.3	-3.8			
						12.1	4	3.0
	203		22.5	21.6	0.9			
						11.2	4	2.8
	204		22.5	21.6	0.9			
						10.3	10	1.0
	205		22.5	21.6	0.9			
						9.4	4	2.4
	206		22.5	21.6	0.9			
						8.5	4	2.1
	207		22.5	21.6	0.9			
						7.6	10	0.8
	208		22.5	14.9	7.6			

FORM 04

2/3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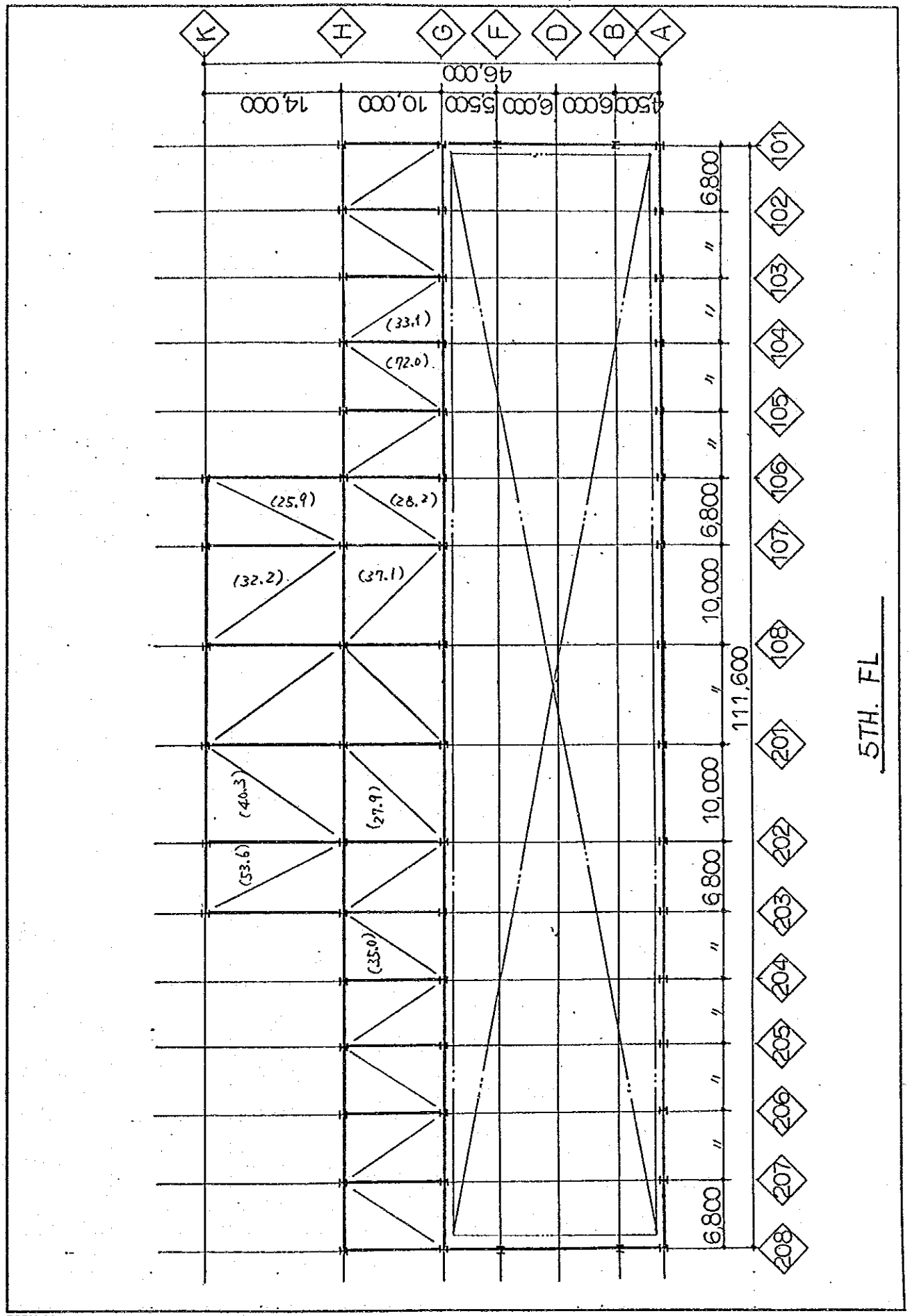
R.F.L

Stress of Holizontal Bracing

5TH FL.

Direction	Frame	Q_1 Upper story (t)	Q_2 Floor (t)	Q_3 Lower story (t)	$Q_1+Q_2-Q_3$ (t)	Load between Frames (t)	No. of Bracing (piece)	Stress of one Bracing (t)
Long span	A							
	B							
	D							
	F							
	G	163.7	132.2	0.0	295.9	295.9	15	19.7
	H	0.0	81.2	260.2	-179.0	116.9	5	23.4
	K	0.0	21.1	138.0	-116.9			
Short span	101	14.9	8.3	51.2	-28.0	-28.0	1	28.0
	102	21.6	11.1	0.0	32.7	4.7	1	4.7
	103	21.6	20.7	74.4	-32.1	-27.4	1	27.4
	104	21.6	20.7	74.4	-32.1	-59.5	1	59.5
	105	21.6	11.1	0.0	32.7	-26.8	1	26.8
	106	21.6	14.4	55.8	-19.8	-46.6	2	23.3
	107	26.3	18.8	51.2	-6.1	-52.4	2	26.2
	108	31.0	21.4	0.0	52.4	0.0	2	0.0
	201	31.0	21.4	0.0	52.4	52.4	2	26.2
	202	26.3	18.8	51.2	-6.1	46.3	2	23.2
	203	21.6	14.4	55.8	-19.8	26.5	1	26.5
	204	21.6	11.1	0.0	32.7	59.2	1	59.2
	205	21.6	20.7	74.4	-32.1	27.1	1	27.1
	206	21.6	20.7	74.4	-32.1	-5.0	1	5.0
	207	21.6	11.1	0.0	32.7	28.0	1	28.0
	208	14.9	8.3	51.2	-28.0			

FORM 04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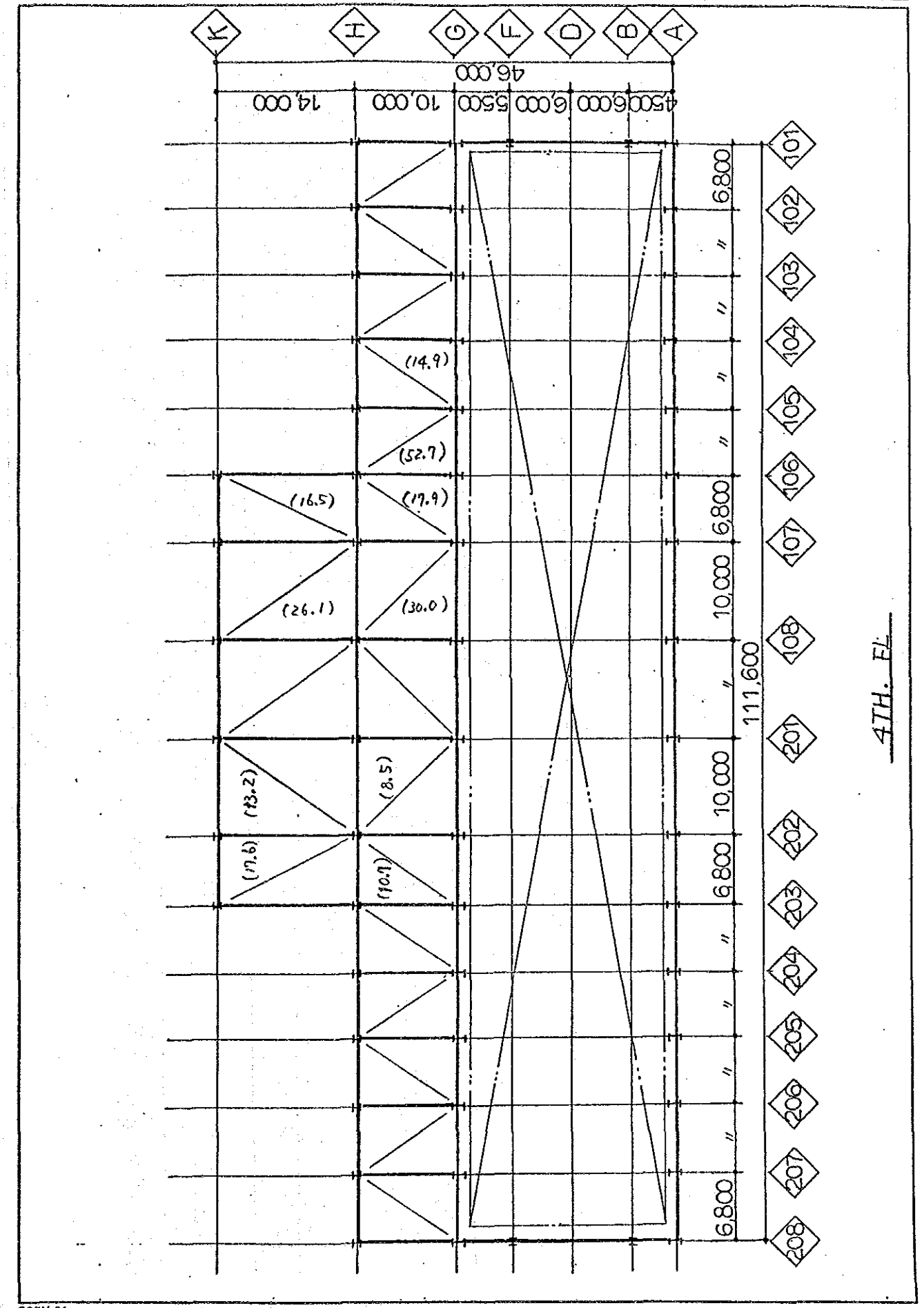
5TH. FL

Stress of Holizontal Bracing

4TH FL

Direction	Frame	Q_1 Upper story (t)	Q_2 Floor (t)	Q_3 Lower story (t)	$Q_1+Q_2-Q_3$ (t)	Load between Frames (t)	No. of Bracing (piece)	Stress of one Bracing (t)
Long span	A							
	B							
	D							
	F							
	G	0.0	83.9	0.0	83.9	83.9	14	6.0
	H	260.2	77.3	375.5	-38.0	45.9	6	7.7
	K	138.0	21.8	205.7	-45.9			
Short span	101	51.2	5.7	50.1	6.8	6.8	1	6.8
	102	0.0	8.5	50.1	-41.6	-34.8	1	34.8
	103	74.4	13.9	65.1	23.2	-11.6	1	11.6
	104	74.4	14.6	65.1	23.9	12.3	1	12.3
	105	0.0	9.2	65.1	-55.9	-43.6	1	43.6
	106	55.8	12.8	54.5	14.1	-29.5	2	14.8
	107	51.2	20.7	0.0	71.9	42.4	2	21.2
	108	0.0	23.5	65.1	-41.6	0.8	2	0.4
	201	0.0	22.5	65.1	-42.6	-41.8	2	20.9
	202	51.2	19.9	0.0	71.1	29.3	2	14.7
	203	55.8	13.7	54.5	15.0	44.3	1	44.3
	204	0.0	9.3	65.1	-55.8	-11.5	1	11.5
	205	74.4	14.6	65.1	23.9	12.4	1	12.4
	206	74.4	13.9	65.1	23.2	35.6	1	35.6
	207	0.0	8.5	50.1	-41.6	-6.8	1	6.8
	208	51.2	5.7	50.1	6.8			

FORM 04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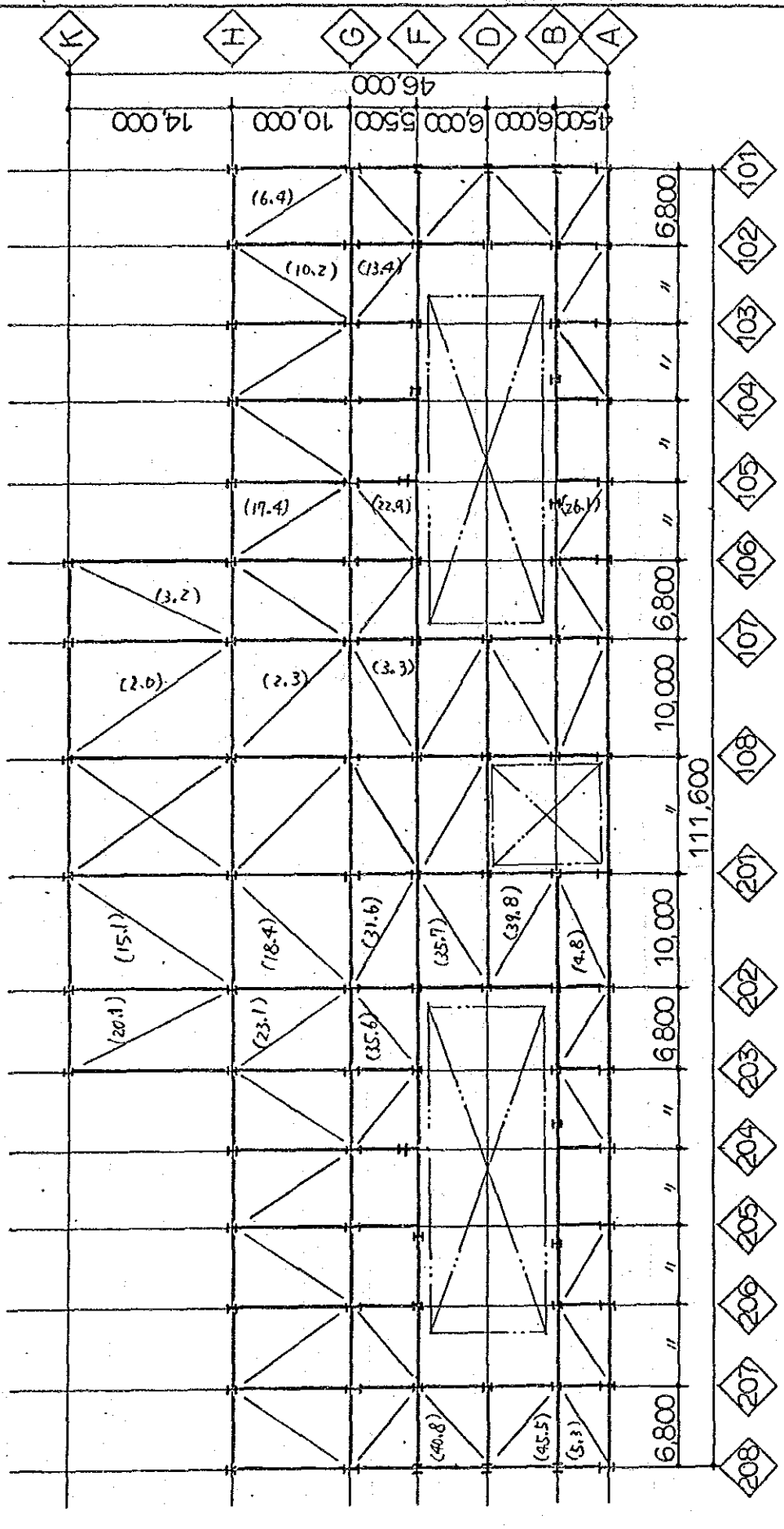
4TH. FL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(3.3)
OPE. FL

Stress of Holizontal Bracing

OPE EL

Direction	Frame	Q_1 Upper story (t)	Q_2 Floor (t)	Q_3 Lower story (t)	$Q_1+Q_2-Q_3$ (t)	Load between Frames (t)	No. of Bracing (piece)	Stress of one Bracing (t)
Long span	A	248.8	42.9	238.6	53.1			
						53.1	12	4.4
	B		11.9	201.2	-189.3			
						-136.2	4	34.1
	D		13.9	0.0	13.9			
						-122.3	4	30.6
	F		18.7	201.2	-182.5			
						-304.8	11	27.7
	G		110.3	0.0	110.3			
						-194.5	15	13.0
	H	375.5	112.5	346.7	141.3			
						-52.7	6	8.8
	K	205.7	33.2	186.2	52.7			
Short span	101	50.1	11.2	87.7	-26.4			
						-26.4	5	5.3
	102	50.1	17.2	66.2	1.1			
						-25.3	3	8.4
	103	65.1	19.0	83.1	1.0			
						-24.3	2	12.2
	104	65.1	19.1	48.1	36.1			
						11.8	1	11.8
	105	65.1	14.4	48.1	31.4			
						43.2	3	14.4
	106	54.5	20.0	106.3	-31.8			
						11.4	4	2.9
	107	0.0	33.0	35.0	-2.0			
						9.4	6	1.6
	108	65.1	37.9	113.4	-10.4			
						-1.0	5	0.2
	201	65.1	36.4	113.4	-11.9			
						-12.9	6	2.2
	202	0.0	32.1	35.0	-2.9			
						-15.8	4	4.0
	203	54.5	22.5	106.3	-29.3			
						-45.1	3	15.0
	204	65.1	14.0	48.1	31.0			
						-14.1	1	14.1
	205	65.1	19.1	48.1	36.1			
						22.0	2	11.0
	206	65.1	19.4	83.1	1.4			
						23.4	3	7.8
	207	50.1	17.0	66.2	0.9			
						26.4	5	5.3
	208	50.1	11.2	87.7	-26.4			

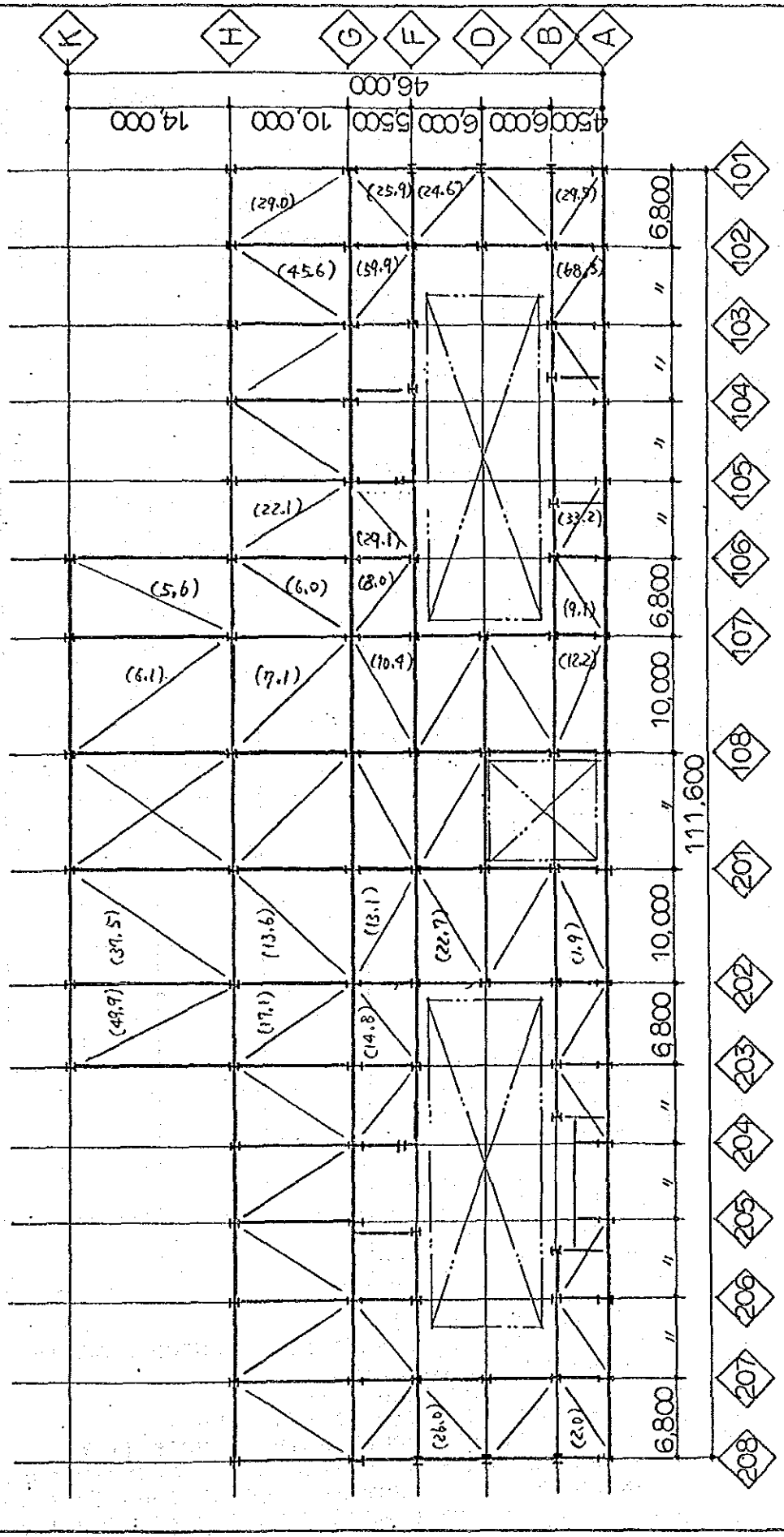
FORM 04

Stress of Holizontal Bracing

ME8 EL

Direction	Frame	Q_1 Upper story (t)	Q_2 Floor (t)	Q_3 Lower story (t)	$Q_1+Q_2-Q_3$ (t)	Load between Frames (t)	No. of Bracing (piece)	Stress of one Bracing (t)
Long Span	A	238.6	32.7	251.4	19.9			
						19.9	12	1.7
	B	201.2	16.1	175.5	41.8			
						61.7	4	15.4
	D	0.0	16.3	0.0	16.3			
						78.0	4	19.5
	F	201.2	22.4	175.5	48.1			
						126.1	11	11.5
	G	0.0	81.6	352.1	-270.5			
						-144.4	15	9.6
	H	346.7	89.2	420.5	15.4			
						-130.5	6	21.8
	K	186.2	26.4	82.1	130.5			
Short Span	101	87.7	10.3	179.7	-81.7			
						-81.7	5	16.3
	102	66.2	15.6	113.3	-31.5			
						-113.2	3	37.7
	103	83.1	14.8	50.5	47.4			
						-65.8	2	32.9
	104	48.1	13.6	0.0	61.7			
						-4.1	1	4.1
	105	48.1	11.0	0.0	59.1			
						55.0	3	18.3
	106	106.3	17.5	158.8	-35.0			
						20.0	4	5.0
	107	35.0	28.5	113.3	-49.8			
						-29.8	6	5.0
	108	113.4	32.1	113.3	32.2			
						2.4	5	0.5
	201	113.4	30.3	113.3	30.4			
						32.8	6	5.5
	202	35.0	27.1	113.3	-51.2			
						-18.4	4	4.6
	203	106.3	18.7	158.8	-33.8			
						-52.2	3	17.4
	204	48.1	10.8	0.0	58.9			
						6.7	1	6.7
	205	48.1	13.6	0.0	61.7			
						68.4	2	34.2
	206	83.1	15.1	50.5	47.7			
						116.1	3	38.7
	207	66.2	15.5	113.3	-31.6			
						81.7	5	16.3
	208	87.7	10.3	179.7	-81.7			

FORM 04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(29.9)
(45.6)
(19.9)
(68.5)
(22.1)
(29.1)
(33.2)
(5.6)
(6.0)
(8.0)
(9.1)
(6.1)
(7.1)
(10.9)
(12.2)
(37.5)
(13.6)
(13.1)
(22.7)
(1.9)
(49.9)
(17.1)
(14.8)
(26.0)
(2.0)
MEZ. FL

NOTE : σ c/fc < 1.0
σ t/ft < 1.0

DECISION OF HORIZONTAL BRACE (3)
〔水平ブレースの断面算定〕

LOCATION	TYPE	MEMBER A / An	ix / iy	lkx / lky	λx / λy	lfc / sfc	AXIAL FORCE N1 / 1.5*Ne	Ne / Ns	σc / fc	σt / ft	REMARKS
F-G 105-106	N	2L-100²×7 2×13.62	3.08	292	95	0.937 1.40		29.1	1.07 0.76		
F-G 201-202	N	2L-100²×7		228				13.1			
G-H 101-102	N	2L-130²×9 2×22.74	4.01	403	100	0.883 1.32		29.0	0.64 0.48		
G-H 102-103	N	2L-130²×9		403	100			45.6	1.00 0.76		
G-H 201-202	N	2L-100²×7 2×13.62	3.08	283	92	0.97 1.45		13.6	0.50 0.39		
H-K 201-202	N	2L-130²×9 2×22.74	4.01	349	86	1.03 1.54		37.5	0.82 0.53		
H-K 202-203	N	2L-150²×10 2×29.21	4.63	519	112	0.751 1.13		49.9	0.85 0.75		

NOTATION: TYPE --- K, X OR N
A --- SECTION AREA (cm2)
An --- 0.8xA (EFFECTIVE AREA FOR TENSION MEMBER) (cm2)
ix,iy --- RADIUS OF GYRATION (cm)
lkx,lky --- BUCKLING LENGTH (cm)
λx,λy --- SLENDER RATIO (lkx/ix,lky/iy)
lfc,sfc --- ALLOWABLE COMPRESSIVE STRESS (t/cm2)
N1,Ne --- AXIAL FORCE OF VERTICAL AND SEISMIC LOAD (t)
Ns --- AXIAL FORCE OF TEMPORARY CONDITIONS (N1+1.5xNe) (t)
σc,σt --- STRESS OF COMPRESSION AND TENSION (t/cm2)

NOTE : σ c/fc < 1.0
σ t/ft < 1.0

DECISION OF HORIZONTAL BRACE (1)
[水平ブレースの断面算定]

LOCATION	TYPE	MEMBER A / An	ix / iy	lkx / lky	λ x / λ y	lfc / sfc	AXIAL FORCE N1 / 1.5*Ne	Ne / Ns	σ c / σ c / fc	σ t / σ t / ft	REMARKS
RFL		2L-90²×6							0.26		
ℓ=6.8m	X	2×10.55	2.77	400	144	0.461 / 0.69		5.5	0.38		
		2L-100²×7							0.18		
ℓ=10.0m	X	2×13.62	3.08	550	179	0.299 / 0.45		4.9	0.27		
SFL		2L-130²×9							0.89		
H-K 201-202	N	2×22.74	4.01	430	107	0.806 / 1.20		40.3	0.74		
		2L-150²×10							0.92		
H-K 202-203	N	2×29.21	4.63	519	112	0.757 / 1.12		53.6	0.82		
		2L-130²×9							0.82		
G-H 107-108	N	2×22.74	4.01	283	71	1.19 / 1.78		37.1	0.46		
		2L-130²×9							0.77		
G-H 203-204	N	2×22.74	4.01	403	100	0.883 / 1.32		35.0	0.58		
		2L-150²×10							1.23		
G-H 104-105	N	2×29.21	4.63	403	87	1.02 / 1.53		72.0	0.80		
4FL		2L-130²×9							0.57		
H-K 107-108	N	2×22.74	4.01	430	107	0.806 / 1.20		26.1	0.48		
		2L-130²×9							0.65		
H-K 202-203	N	.....	.....	519	129	0.575 / 0.86		17.6	0.76		
		2L-100²×7							1.10		
G-H 104-108	N	2×13.62	3.08	283	92	0.97 / 1.45		30.0	0.76		
		2L-130²×9							1.16		
G-H 105-106	N	2×22.74	4.01	403	101	0.872 / 1.30		52.7	0.89		
		2L-100²×7							0.66		
G-H 106-107	N	2×13.62	3.08	403	131	0.558 / 0.83		17.9	0.80		
		.....	.....	.....	.....	.....	.....	.....	.....	.....	
		.....	.....	.....	.....	.....	.....	.....	.....	.....	

NOTATION: TYPE --- K, X OR N
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An --- 0.8xA (EFFECTIVE AREA FOR TENSION MEMBER) (cm2)
ix,iy --- RADIUS OF GYRATION (cm)
lkx,lky --- BUCKLING LENGTH (cm)
λ x,λ y --- SLENDER RATIO (lkx/ix,lky/iy)
lfc,sfc --- ALLOWABLE COMPRESSIVE STRESS (t/cm2)
N1,Ne --- AXIAL FORCE OF VERTICAL AND SEISMIC LOAD (t)
Ns --- AXIAL FORCE OF TEMPORARY CONDITIONS (N1+1.5xNe) (t)
σ c,σ t --- STRESS OF COMPRESSION AND TENSION (t/cm2)

NOTE : σ c/fc < 1.0
σ t/ft < 1.0

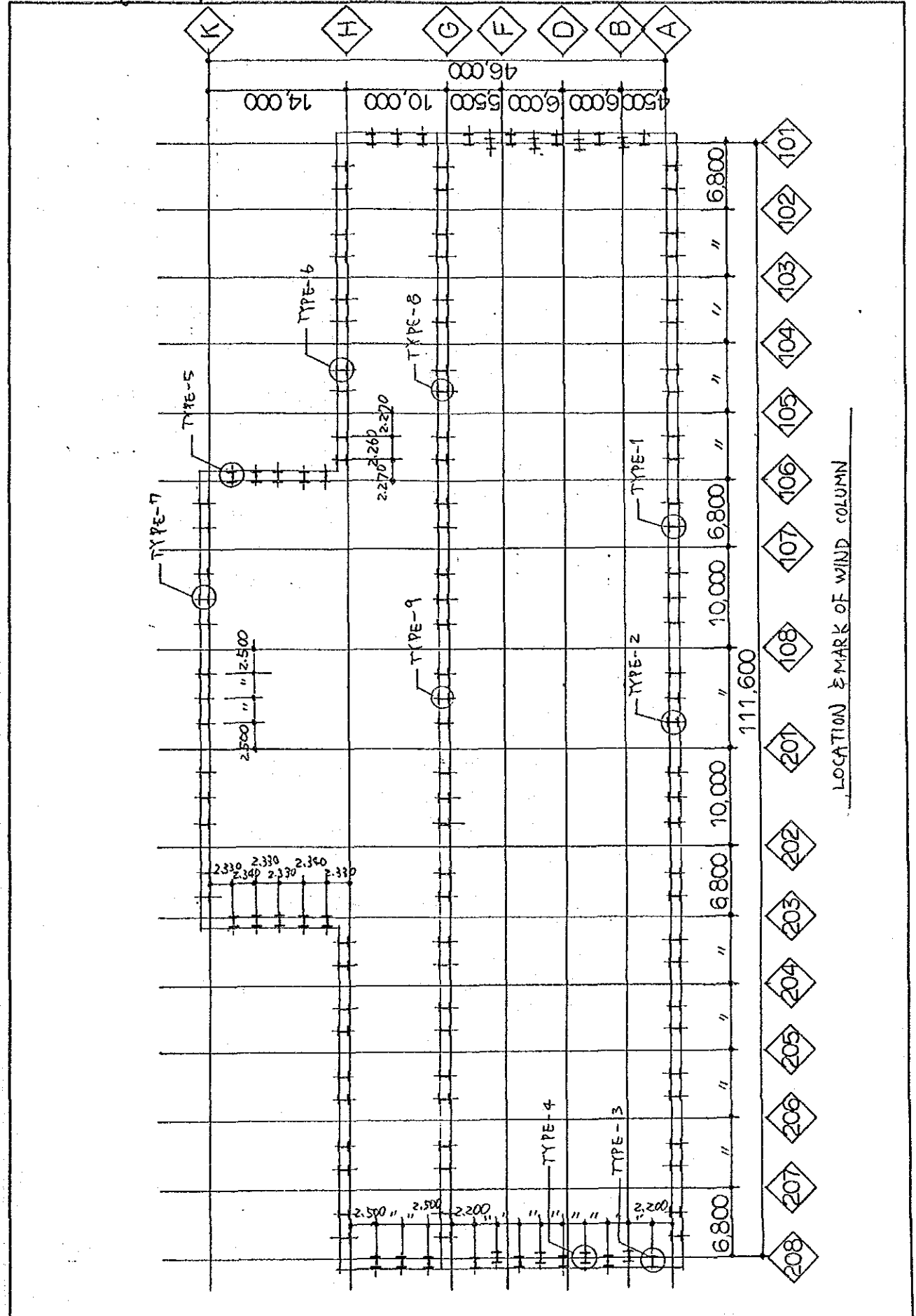
DECISION OF HORIZONTAL BRACE (2)
[水平ブレースの断面算定]

LOCATION	TYPE	MEMBER A / An	ix / iy	lkx / lky	λx / λy	lfc / sfc	AXIAL FORCE N1 / 1.5*Ne	Ne / Ns	σc / fc	σt / ft	REMARKS
OPE FL A-B 105-106	N	2L-100²×7							0.96		
		2×13.62	3.08	272	88	1.01		26.1	0.64		
						1.51					
B-D 207-208	N	2L-130²×9							1.00		
		2×22.04	4.01	302	75	1.15		45.5	0.58		
						1.72					
F-G 102-103	N	2L-100²×7							0.49		
		2×13.62	3.08	292	95	0.937		13.4	0.35		
						1.40					
F-G 202-203	N	2L-130²×9							0.78		
		2×22.79	4.01	292	73	1.17		35.6	0.49		
						1.76					
G-H 102-103	N	2L-100²×9							0.37		
		2×13.62	3.08	403	131	0.558		10.2	0.44		
						0.837					
G-H 202-203	N	2L-130²×9							0.51		
		2×22.79	4.01	403	100	0.883		23.1	0.39		
						1.32					
G-H 201-202	N	2L-100²×7							0.68		
		2×13.62	3.08	283	92	0.97		18.4	0.47		
						1.45					
H-K 201-202	N	2L-100²×7							0.55		
				394	117	0.617		15.1	0.53		
						1.09					
H-K 202-203	N	2L-130²×9							0.49		
		2×22.79	4.01	519	130	0.566		20.1	0.52		
						0.85					
MEX FL A-B 102-103	N	2L-130²×9							1.50		
				272	68	1.22		68.3	0.82		
						1.83					
A-B 105-106	N	2L-100²×7							1.22		
		2×13.62	3.08	272	88	1.01		33.2	0.81		
						1.51					
B-D 207-208	N	2L-100²×7							0.95		
				302	98	0.905		26.0	0.70		
						1.35					
B-D 201-202	N	2L-100²×7							0.83		
				233	76	1.19		22.7	0.49		
						1.71					
F-G 102-103	N	2L-130²×9							1.32		
		2×22.79	4.01	292	73	1.17		59.9	0.75		
						1.75					

NOTATION: TYPE --- K, X OR N
A --- SECTION AREA (cm2)
An --- 0.8xA (EFFECTIVE AREA FOR TENSION MEMBER) (cm2)
ix,iy --- RADIUS OF GYRATION (cm)
lkx,lky --- BUCKLING LENGTH (cm)
λx,λy --- SLENDER RATIO (lkx/ix,lky/iy)
lfc,sfc --- ALLOWABLE COMPRESSIVE STRESS (t/cm2)
N1,Ne --- AXIAL FORCE OF VERTICAL AND SEISMIC LOAD (t)
Ns --- AXIAL FORCE OF TEMPORARY CONDITIONS (N1+1.5xNe) (t)
σc,σt --- STRESS OF COMPRESSION AND TENSION (t/cm2)

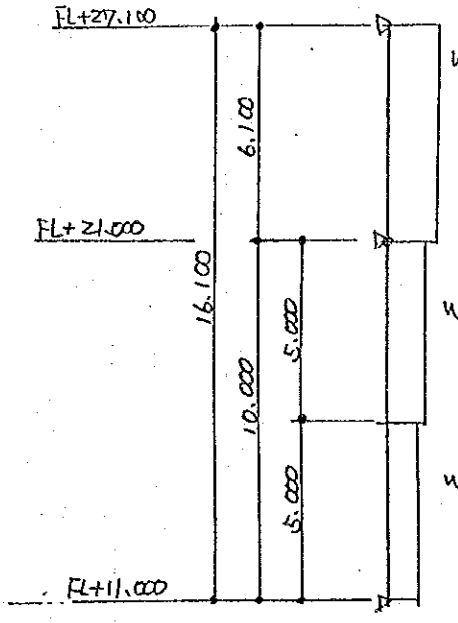
7. Miscellaneous Design

7.1 Design of wind Column



TYPE-1

1) CALCULATION OF STRESS



$W_1 = 187 \times 2.27 = 0.42\ T/m$

$W_2 = 165 \times 2.27 = 0.37\ T/m$

$W_3 = 144 \times 2.27 = 0.33\ T/m$

$Q = \frac{1}{2} \times 0.42 \times 6.1 = 1.28\ T$

$M = \frac{1}{8} \times 0.42 \times \overline{6.1}^2 = 1.95\ T\cdot m$

1.28

$Q = \frac{5.0}{10.0} \times (0.37 \times 7.5 + 0.33 \times 2.5)$

$= 1.8\ T$

$M = 1.8 \times 4.86 - \frac{1}{2} \times 0.37 \times \overline{4.86}^2$

$= 4.38\ T\cdot m$

$Q = \frac{5.0}{10.0} \times (0.37 \times 2.5 + 0.33 \times 7.5)$

$= 1.7\ T$

$N = (0.045 + 0.047) \times 2.27 \times 16.1 = 3.4\ T$

2) CHECK OF SECTION

$M = 4.38\ T\cdot m$

$N = 1.64\ T$

Use H-300×150×6.5×9

$A = 46.78$ $i_x = 12.4$ $\ell_k = 500$ $\lambda = 40$ $f_c = 1.46$

$i_y = 3.29$ $\ell_k = 100$ $\lambda = 30$

$Z = 481$ $i_b = 3.87$ $\ell_b = 100$ $\lambda = 26$ $f_b = 1.6$

$\sigma_b = \frac{438}{481} = 0.91$

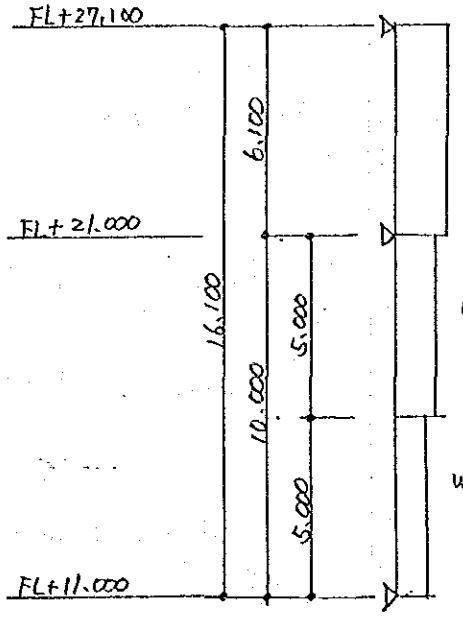
$\sigma_c = \frac{3.4}{46.78} = 0.07$

$\frac{\sigma}{f} = 0.38 + 0.03 = 0.41 < 1.0$ OK

$\delta = \frac{5 \times 0.0035 \times \overline{1000}^2}{384 \times 2100 \times 17210} = 3.0\ cm$ $\quad \delta/\ell = 1/333 < 1/250$

TYPE -2

1) CALCULATION OF STRESS



$W_1 = 187 \times 2.5 = 0.47$ T/m

$W_2 = 165 \times 2.5 = 0.41$ T/m

$W_3 = 144 \times 2.5 = 0.36$ T/m

$Q = \frac{1}{2} \times 0.47 \times 6.1 = 1.43$ T

$M = \frac{1}{8} \times 0.47 \times \overline{6.1}^2 = 2.19$ T·m

1.43

$Q = \frac{5.0}{10.0} \times (0.41 \times 7.5 + 0.36 \times 2.5)$

$= 2.0$ T

$M = 2.0 \times 4.88 - \frac{1}{2} \times 0.41 \times \overline{4.88}^2$

$= 4.88$ T·m

$Q = \frac{5.0}{10.0} \times (0.41 \times 2.5 + 0.36 \times 7.5)$

$= 1.9$ T

$N = (6.045 + 0.047) \times 2.5 \times 16.1 = 3.7$ T

2) CHECK OF SECTION

$M = 4.88$ T·m

$N = 1.81$ T

Use H-300 × 150 × 6.5 × 9

$A = 46.78$ $i_x = 12.4$ $\ell_k = 500$ $\lambda = 40$ $f_c = 1.46$

$i_y = 3.29$ $\ell_k = 100$ $\lambda = 30$

$Z = 481$ $i_b = 3.87$ $\ell_b = 100$ $\lambda = 26$ $f_b = 1.6$

$\sigma_b = \frac{488}{481} = 1.01$

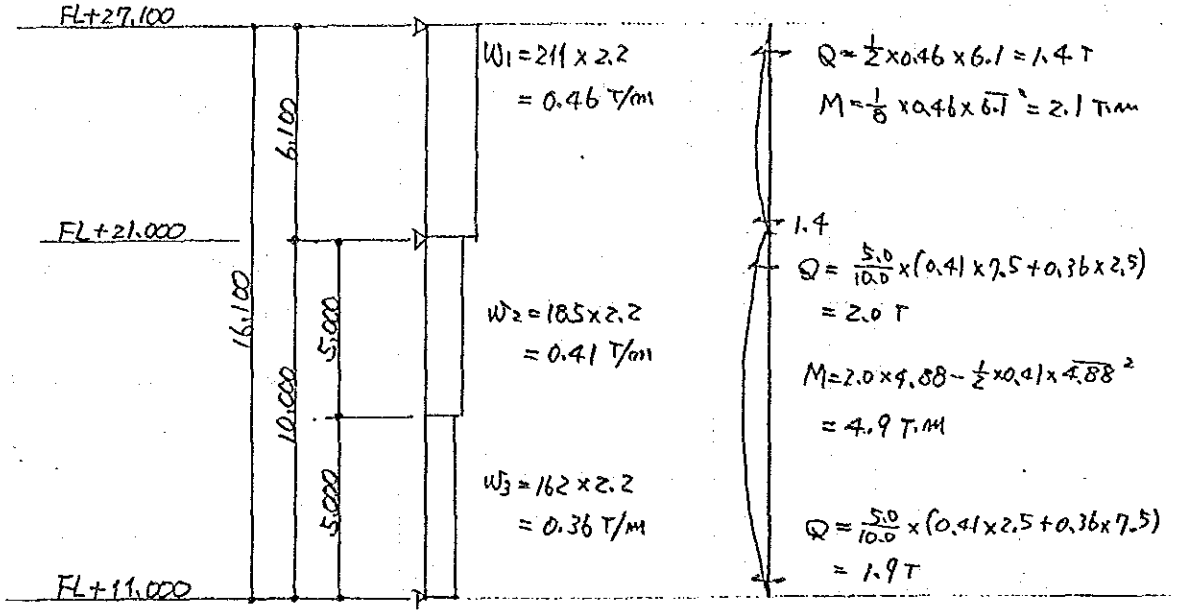
$\sigma_c = \frac{3.7}{46.78} = 0.08$

$\frac{\sigma}{f} = 0.42 + 0.04 = 0.46 < 1.0$ OK

$\delta = \frac{5 \times 0.0039 \times \overline{1000}^4}{384 \times 2100 \times 7210} = 3.4$ cm $\quad \delta/\ell = 1/294 < 1/250$ OK

TYPE-3

1) CALCULATION OF STRESS



$N = (0.045 + 0.047) \times 2.2 \times 16.1 = 3.3\,T$

2) CHECK OF SECTION

$M = 4.9$ T·m

$N = 1.6$ T

Use H-300x150x6.5x9

$A = 46.78$ $i_x = 12.4$ $\ell_k = 500$ $\lambda = 40$ $f_c = 1.46$

$i_y = 3.29$ $\ell_k = 100$ $\lambda = 30$

$Z = 481$ $i_b = 3.07$ $\ell_b = 100$ $\lambda = 26$ $f_b = 1.6$

$$\sigma_b = \frac{490}{481} = 1.01$$

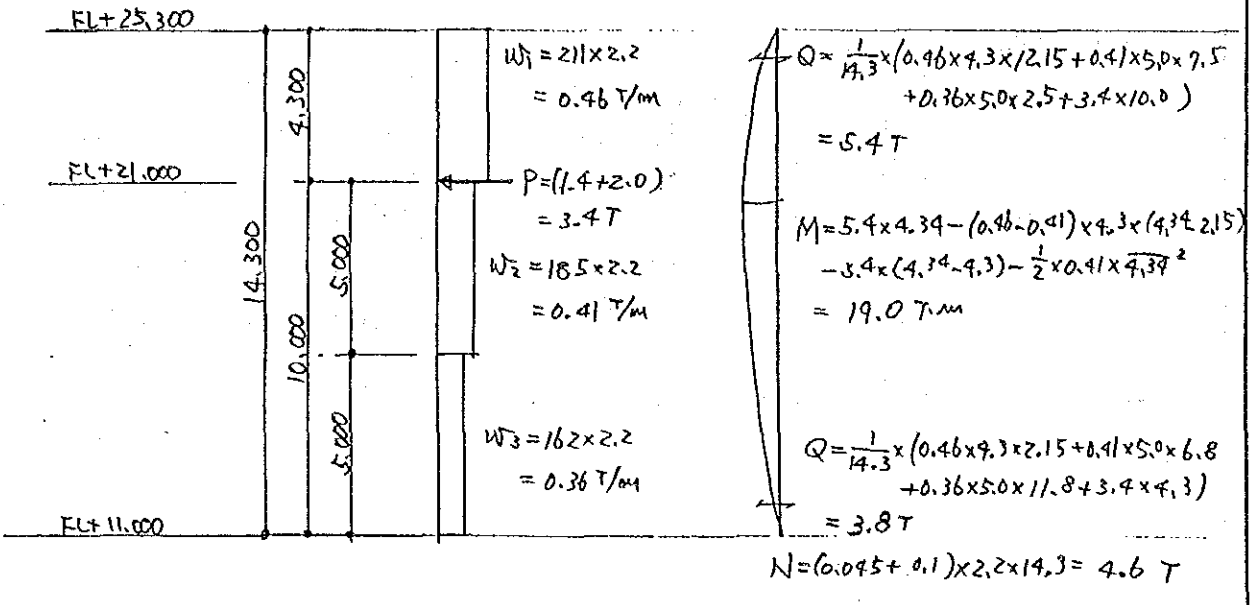
$$\frac{\sigma}{f} = 0.42 + 0.03 = 0.45 < 1.0 \text{ ok}$$

$$\sigma_c = \frac{3.3}{46.78} = 0.07$$

$$\delta = \frac{5 \times 0.0039 \times 1000^4}{384 \times 2100 \times 9210} = 3.4 \text{ cm} \qquad \delta/\ell = 1/294 < 1/250 \text{ ok}$$

TYPE-4

1) CALCULATION OF STRESS



2) CHECK OF SECTION

$M = 19.0$ T·m

$N = 4.6$ T

Use H-400×200×8×13

$A = 84.12$ $i_x = 16.8$ $l_k = 500$ $\lambda = 30$ $f_c = 1.52$

$i_y = 4.54$ $l_k = 100$ $\lambda = 22$

$Z = 1190$ $i_b = 5.26$ $l_b = 100$ $\lambda = 19$ $f_b = 1.6$

$$\sigma_b = \frac{1900}{1190} = 1.60$$

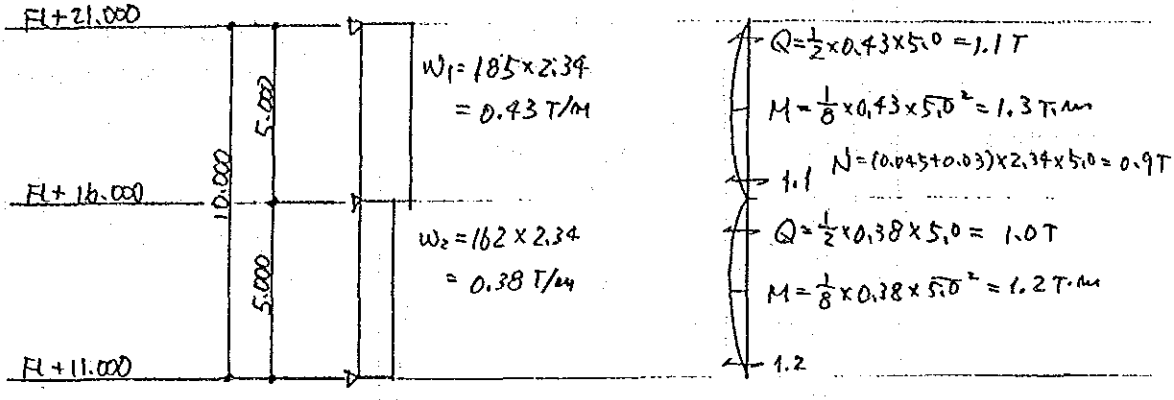
$$\sigma_c = \frac{4.6}{84.12} = 0.05$$

$$\frac{\sigma}{f} = 0.67 + 0.02 = 0.69 < 1.0 \quad \text{ok}$$

$$\delta = \frac{5 \times 0.0045 \times 1430^4}{384 \times 2100 \times 23700} = 4.92\,\text{cm} \quad \delta/\ell = 1/290 < 1/250 \quad \text{ok}$$

TYPE-5

1) CALCULATION OF STRESS



2) CHECK OF SECTION

M = 1.3 T·m

N = 0.9 T

USE H-250×125×6×9

A = 37.66 i_x = 10.4 l_k = 500 λ = 48 f_c = 1.40

i_y = 2.79 l_k = 100 λ = 36

Z = 324 i_b = 3.26 l_b = 100 λ = 31 f_b = 1.6

$\sigma_b = \frac{130}{324} = 0.40$

$\sigma_c = \frac{0.9}{37.66} = 0.02$

$\frac{\sigma}{f} = 0.17 + 0.01 = 0.18 < 1.0$ ok

$\delta = \frac{5 \times 0.0093 \times 500^4}{384 \times 2100 \times 4050} = 0.91$ cm $\delta/\ell = 1/1220 < 1/250$ ok

TYPE-6 same as TYPE-5

TYPE-7 same as TYPE-5

TYPE-8

1) CALCULATION OF STRESS

See TYPE-1

2) CHECK OF SECTION

$M = 1.95$ T·m

$N = (0.045+0.03)\times 2.27\times 6.1 = 1.0$ T

USE H-250×125×6×9

$A = 37.66$ $i_x = 10.4$ $l_k = 610$ $\lambda = 59$ $f_c = 1.30$

$i_y = 2.79$ $l_k = 100$ $\lambda = 36$

$Z = 324$ $i_b = 3.26$ $l_b = 100$ $\lambda = 31$ $f_b = 1.6$

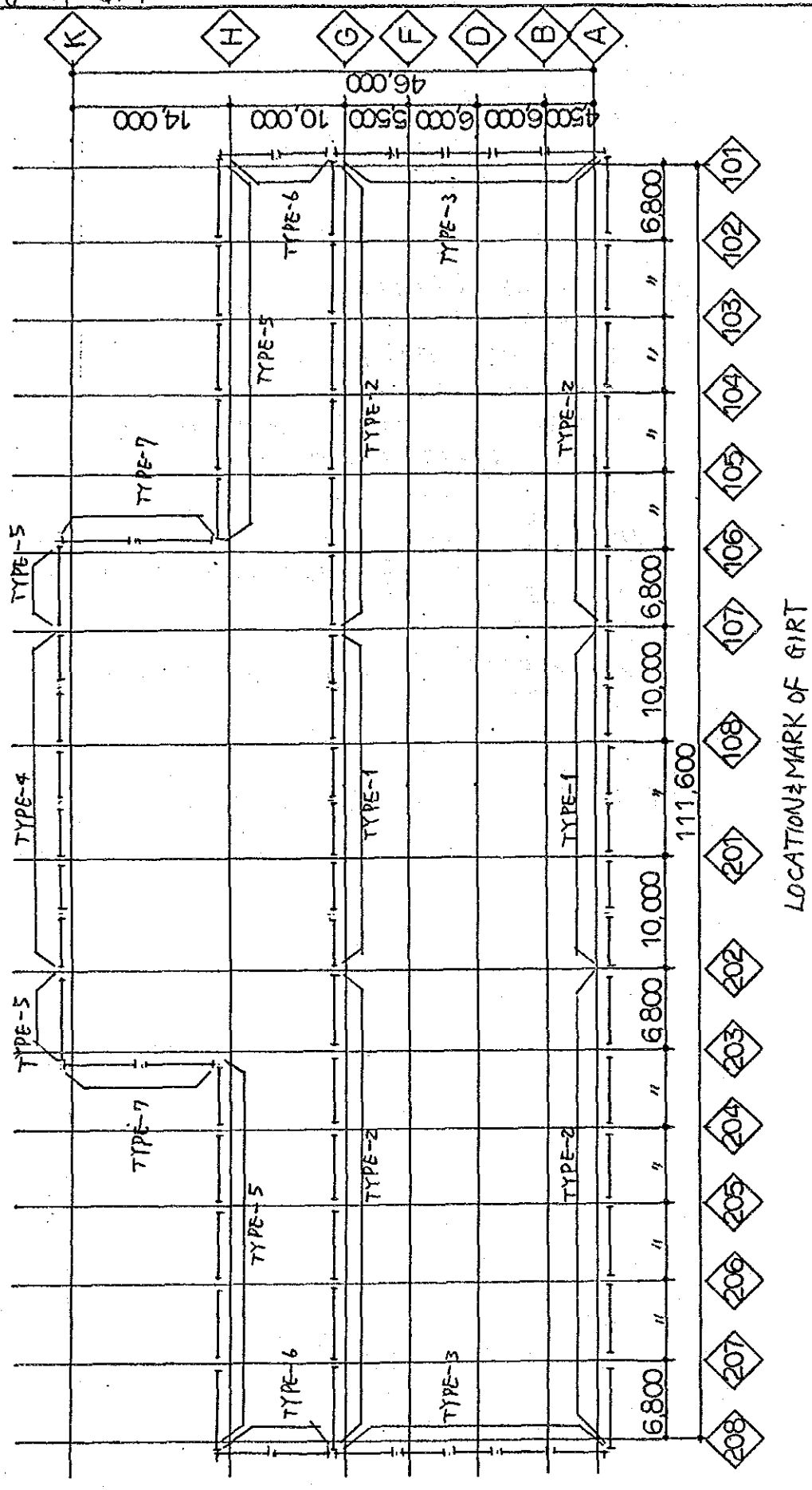
$\sigma_b = \frac{195}{324} = 0.60$

$\frac{\sigma}{f} = 0.25 + 0.02 = 0.27 < 1.0$ ok

$\sigma_c = \frac{1.0}{37.66} = 0.03$

$\delta = \frac{5\times 0.0042\times 610^2}{384\times 2100\times 4050} = 0.89$ cm $\quad \delta/\ell = 1/685 < 1/250$ ok

TYPE-9 same as TYPE-8


K
H
G
F
D
B
A
46,000
14,000
10,000
5500
6,000
6,000
4500
TYPE-6
TYPE-3
TYPE-5
TYPE-2
TYPE-7
TYPE-2
TYPE-5
TYPE-4
TYPE-1
TYPE-1
TYPE-5
TYPE-7
TYPE-2
TYPE-5
TYPE-6
TYPE-3
6800
"
"
"
6,800
10,000
"
111,600
10,000
6800
"
"
"
6,800
101
102
103
104
105
106
107
108
201
202
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204
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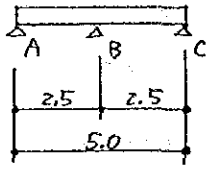
206
207
208
LOCATION & MARK OF GIRT

TYPE - 1

1) CALCULATION OF STRESS

a) WIND LOAD (HORIZONTAL)

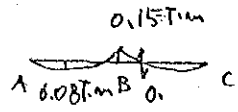
$w = 0.187 \times 1.0 = 0.19$ T/m



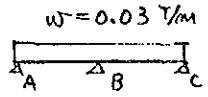
$Q = \frac{1}{2} \times 0.19 \times 2.5 = 0.24$ T

$M = \frac{1}{8} \times 0.19 \times \overline{2.5}^2 = 0.15$ T·m

$C = \frac{1}{12} \times 0.19 \times \overline{2.5}^2 = 0.10$ T·m



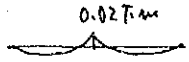
b) DEAD LOAD (VERTICAL)



$Q = \frac{1}{2} \times 0.03 \times 2.5 = 0.04$ T

$M = \frac{1}{8} \times 0.03 \times \overline{2.5}^2 = 0.02$ T·m

$C = \frac{1}{12} \times 0.03 \times \overline{2.5}^2 = 0.02$ T·m



2) CHECK OF SECTION

$M_H = 0.15$ T·m

$M_V = 0.02$ T·m

use $L - 75^2 \times 6$

$I_x = I_y = 46.1$ $\quad Z_x = Z_y = 8.47$ $\quad f_b = 1.6$

$\sigma_{bH} = \frac{15}{8.47} = 1.77$

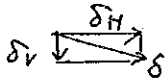
$\sigma_{bV} = \frac{2}{8.47} = 0.24$

$\frac{\sigma}{f} = 0.74 + 0.10 = 0.84 < 1.0$ ok

$\delta_H = \frac{0.0019 \times \overline{250}^4}{185 \times 2100 \times 46.1} = 0.41$

$\delta_V = \frac{0.0003 \times \overline{250}^4}{185 \times 2100 \times 46.1} = 0.07$

$\delta = 0.420$ cm $\quad \delta/\ell = 1/595 < 1/250$ ok

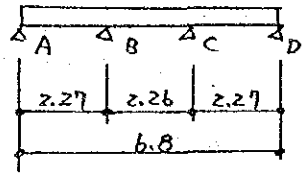


TYPE-2

1) CALCULATION OF STRESS

a) WIND LOAD (HORIZONTAL)

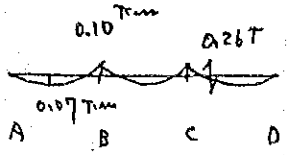
$W = 0.187 \times 1.0 = 0.19\ T/m$



$Q = \frac{1}{2} \times 0.19 \times 2.27 = 0.22\ T$

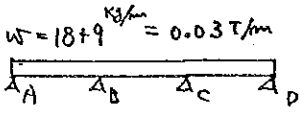
$M = \frac{1}{8} \times 0.19 \times \overline{2.27}^2 = 0.12\ T\cdot m$

$C = \frac{1}{12} \times 0.19 \times \overline{2.27}^2 = 0.08\ T\cdot m$



b) DEAD LOAD (VERTICAL)

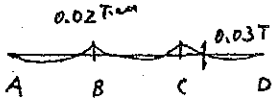
$W = 189\ Kg/m = 0.03\ T/m$



$Q = \frac{1}{2} \times 0.03 \times 2.27 = 0.03\ T$

$M = \frac{1}{8} \times 0.03 \times \overline{2.27}^2 = 0.02\ T\cdot m$

$C = \frac{1}{12} \times 0.03 \times \overline{2.27}^2 = 0.01\ T\cdot m$



2) CHECK OF SECTION

$M_H = 0.10\ T\cdot m$

$M_V = 0.02\ T\cdot m$

USE $L-75^2 \times 6$

$I_x = I_y = 46.1 \qquad Z_x = Z_y = 8.47 \qquad t_b = 1.6$

$\sigma_{bH} = \frac{10}{8.47} = 1.18$

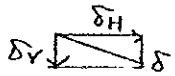
$\sigma_{bV} = \frac{2}{8.47} = 0.24$

$\frac{\sigma}{f} = 0.49 + 0.10 = 0.59 < 1.0$ ok

$\delta_H = \frac{5 \times 0.0019 \times \overline{227}^4}{384 \times 2100 \times 46.1} = 0.68$

$\delta_V = \frac{5 \times 0.0003 \times \overline{227}^4}{384 \times 2100 \times 46.1} = 0.11$

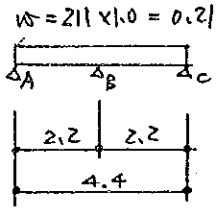
$\delta = 0.69\ cm \quad \frac{\delta}{\ell} = 1/328 < 1/250$ ok



TYPE-3

1) CALCULATION OF STRESS

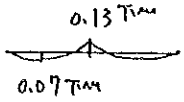
a) WIND LOAD (HORIZONTAL)



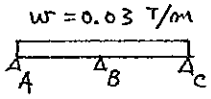
$Q = \frac{1}{2} \times 0.21 \times 2.2 = 0.23$ T

$M = \frac{1}{8} \times 0.21 \times \overline{2.2}^2 = 0.13$ T·M

$C = \frac{1}{12} \times 0.21 \times \overline{2.2}^2 = 0.08$ T·M



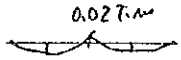
b) DEAD LOAD (VERTICAL)



$Q = \frac{1}{2} \times 0.03 \times 2.2 = 0.03$ T

$M = \frac{1}{8} \times 0.03 \times \overline{2.2}^2 = 0.02$ T·M

$C = \frac{1}{12} \times 0.03 \times \overline{2.2}^2 = 0.0$ T·M



2) CHECK OF SECTION

$M_H = 0.13$ T·M

$M_V = 0.02$ T·M

USE $L-75^2 \times 6$

$I_x = I_y = 46.1$ $\quad Z_x = Z_y = 8.47$ $\quad f_b = 1.6$

$\sigma_{bH} = \frac{13}{8.47} = 1.53$

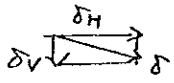
$\sigma_{bV} = \frac{2}{8.47} = 0.24$

$\frac{\sigma}{f} = 0.64 + 0.10 = 0.74 < 1.0$ ok

$\delta_H = \frac{0.0021 \times \overline{220}^4}{185 \times 2100 \times 46.1} = 0.27$

$\delta_V = \frac{0.0003 \times \overline{220}^4}{185 \times 2100 \times 46.1} = 0.04$

$\delta = 0.27$ cm $\quad \delta/\ell = 1/814 < 1/250$ ok

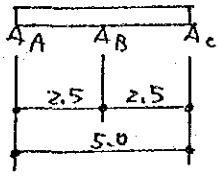


TYPE-4

1) CALCULATION OF STRESS

a) WIND LOAD (HORIZONTAL)

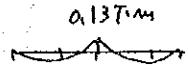
$w = 165 \times 1.0 = 0.17$ T/m



$Q = \frac{1}{2} \times 0.17 \times 2.5 = 0.21$ T

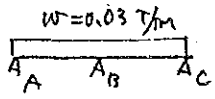
$M = \frac{1}{8} \times 0.17 \times \overline{2.5}^2 = 0.13$ T·m

$C = \frac{1}{12} \times 0.17 \times \overline{2.5}^2 = 0.09$ T·m



b) DEAD LOAD (VERTICAL)

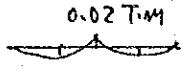
$w = 0.03$ T/m



$Q = \frac{1}{2} \times 0.03 \times 2.5 = 0.04$ T

$M = \frac{1}{8} \times 0.03 \times \overline{2.5}^2 = 0.02$ T·m

$C = \frac{1}{12} \times 0.03 \times \overline{2.5}^2 = 0.02$ T·m



2) CHECK OF SECTION

$MH = 0.13$ T·m

$MV = 0.02$ T·m

USE L-75²×6

$I_x = I_y = 46.1$ $\quad Z_x = Z_y = 8.47$ $\quad f_b = 1.6$

$\sigma_{bH} = \frac{13}{8.47} = 1.53$

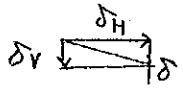
$\sigma_{bV} = \frac{2}{8.47} = 0.24$

$\frac{\sigma}{f} = 0.64 + 0.10 = 0.74 < 1.0$ ok

$\delta_H = \frac{0.0017 \times \overline{250}^4}{185 \times 2100 \times 46.1} = 0.37$

$\delta_V = \frac{0.0003 \times \overline{250}^4}{185 \times 2100 \times 46.1} = 0.07$

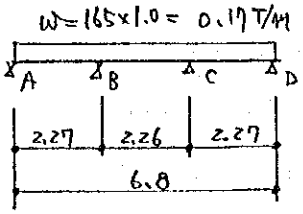
$\delta = 0.38$cm $\quad \delta/\ell = 1/657 < 1/250$ ok



TYPE-5

1) CALCULATION OF STRESS

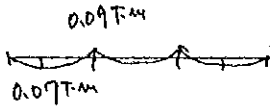
a) WIND LOAD (HORIZONTAL)



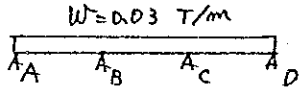
$Q = \frac{1}{2} \times 0.17 \times 2.27 = 0.19\ T$

$M = -\frac{1}{8} \times 0.17 \times \overline{2.27}^2 = 0.11\ T\cdot M$

$C = \frac{1}{12} \times 0.17 \times \overline{2.27}^2 = 0.07\ T\cdot M$



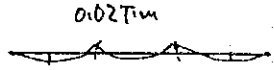
b) DEAD LOAD (VERTICAL)



$Q = \frac{1}{2} \times 0.03 \times 2.27 = 0.03\ T$

$M = \frac{1}{8} \times 0.03 \times \overline{2.27}^2 = 0.02\ T\cdot M$

$C = \frac{1}{12} \times 0.03 \times \overline{2.27}^2 = 0.01\ T\cdot M$



2) CHECK OF SECTION

$M_H = 0.09\ T\cdot M$

$M_V = 0.02\ T\cdot M$

use $L\text{-}75^2 \times 6$

$I_x = I_y = 46.1 \quad Z_x = Z_y = 8.47 \quad f_b = 1.6$

$\sigma_{bH} = \frac{9}{8.47} = 1.06$

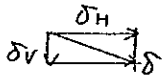
$\sigma_{bV} = \frac{2}{8.47} = 0.24$

$\frac{\sigma}{f} = 0.44 + 0.10 = 0.54 < 1.0$ OK

$\delta_H = \frac{5 \times 0.0017 \times \overline{227}^4}{384 \times 2100 \times 46.1} = 0.61$

$\delta_V = \frac{5 \times 0.0003 \times \overline{227}^4}{384 \times 2100 \times 46.1} = 0.11$

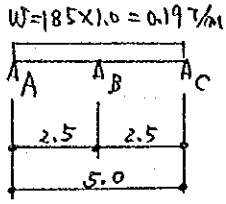
$\delta = 0.62\ cm \quad \delta/\ell = 1/366 < 1/250$ OK



TYPE-6

1) CALCULATION OF STRESS

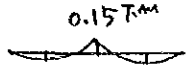
a) WIND LOAD (HORIZONTAL)



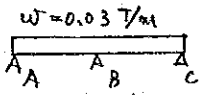
$Q = \frac{1}{2} \times 0.19 \times 2.5 = 0.24\ T$

$M = \frac{1}{8} \times 0.19 \times \overline{2.5}^2 = 0.15\ T\cdot m$

$C = \frac{1}{12} \times 0.19 \times \overline{2.5}^2 = 0.10\ T\cdot m$



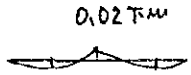
b) DEAD LOAD (VERTICAL)



$Q = \frac{1}{2} \times 0.03 \times 2.5 = 0.04\ T$

$M = \frac{1}{8} \times 0.03 \times \overline{2.5}^2 = 0.02\ T\cdot m$

$C = \frac{1}{12} \times 0.03 \times \overline{2.5}^2 = 0.02\ T\cdot m$



2) CHECK OF SECTION

$M_H = 0.15\ T\cdot m$

$M_V = 0.02\ T\cdot m$

Use $L-75^2 \times 6$

$I_x = I_y = 46.1 \quad Z_x = Z_y = 8.47 \quad f_b = 1.6$

$\sigma_{bH} = \frac{15}{8.47} = 1.77$

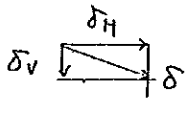
$\sigma_{bV} = \frac{2}{8.47} = 0.24$

$\frac{\sigma}{f} = 0.74 + 0.1 = 0.84 < 1.0$ ok

$\delta_H = \frac{0.0019 \times \overline{250}^4}{185 \times 2100 \times 46.1} = 0.41$

$\delta_V = \frac{0.0003 \times \overline{250}^4}{185 \times 2100 \times 46.1} = 0.07$

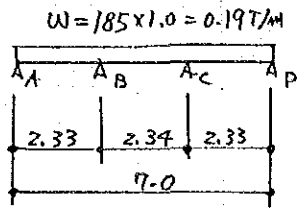
$\delta = 0.42\ cm \quad \delta/\ell = 1/595 < 1/250$ ok



TYPE-7

1) CALCULATION OF STRESS

a) WIND LOAD (HORIZONTAL)

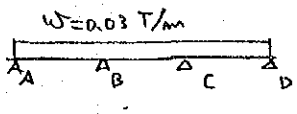


$Q = \frac{1}{2} \times 0.19 \times 2.34 = 0.22\ T$

$M = \frac{1}{8} \times 0.19 \times \overline{2.34}^2 = 0.13\ T{\cdot}M$

$C = \frac{1}{12} \times 0.19 \times \overline{2.34}^2 = 0.09\ T{\cdot}M$

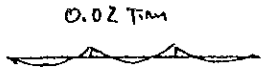
b) DEAD LOAD (VERTICAL)



$Q = \frac{1}{2} \times 0.03 \times 2.34 = 0.04\ T$

$M = \frac{1}{8} \times 0.03 \times \overline{2.34}^2 = 0.02\ T{\cdot}M$

$C = \frac{1}{12} \times 0.03 \times \overline{2.34}^2 = 0.01\ T{\cdot}M$



2) CHECK OF SECTION

$M_H = 0.11\ T{\cdot}M$

$M_V = 0.02\ T{\cdot}M$

USE $L-75^2 \times 6$

$I_x = I_y = 46.1 \quad Z_x = Z_y = 8.47 \quad t_b = 1.6$

$\sigma_{bH} = \frac{11}{8.47} = 1.30$

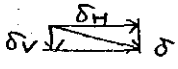
$\sigma_{bV} = \frac{2}{8.47} = 0.24$

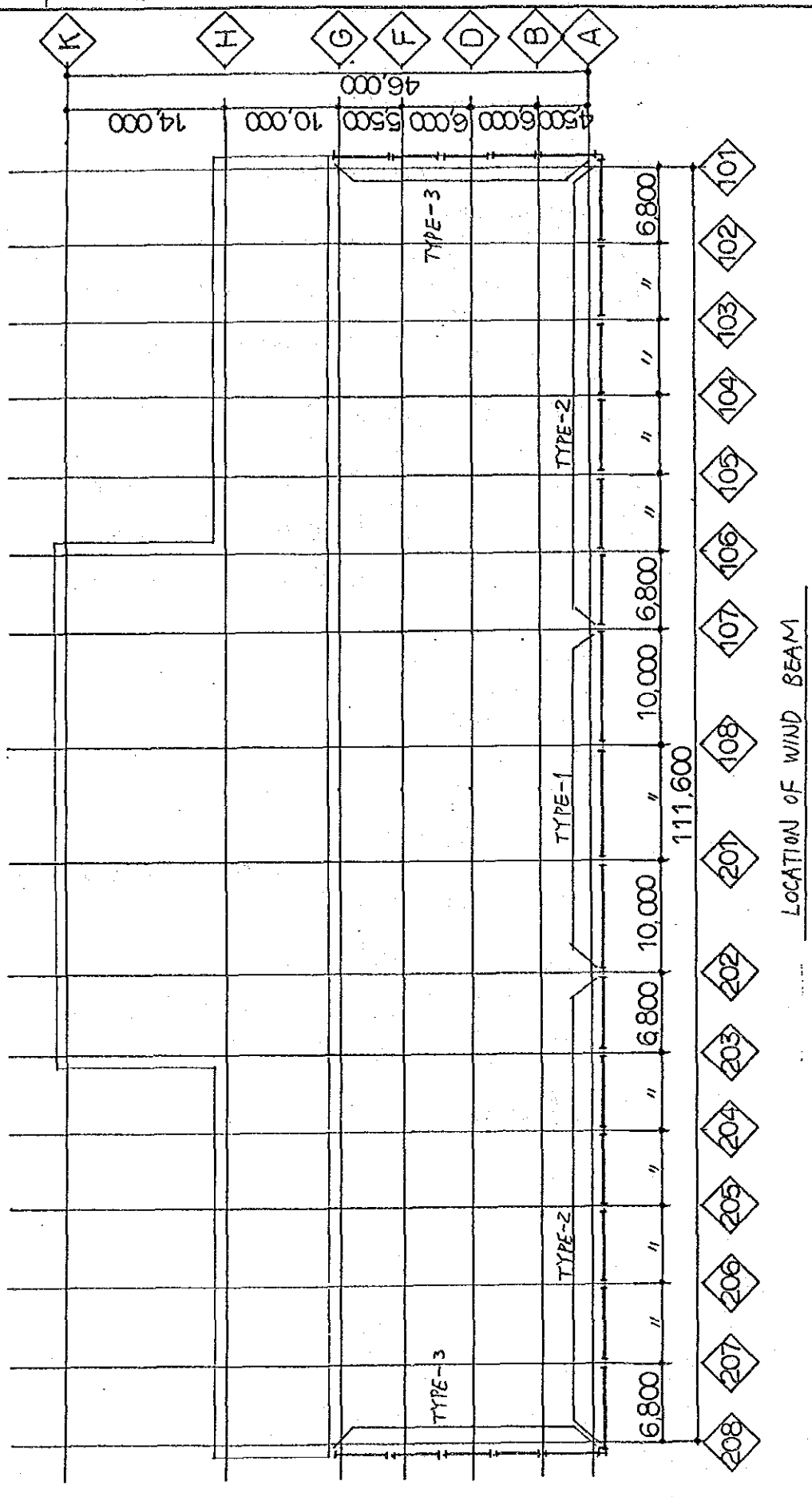
$\frac{\sigma}{f} = 0.54 + 0.10 = 0.64 < 1.0$ ok

$\delta_H = \frac{5 \times 0.0019 \times \overline{239}^4}{384 \times 2100 \times 46.1} = 0.77$

$\delta_V = \frac{5 \times 0.0003 \times \overline{239}^4}{384 \times 2100 \times 46.1} = 0.12$

$\delta = 0.78 \quad \delta/\ell = 1/300 < 1/250$ ok



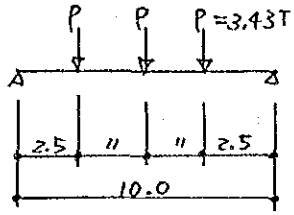


LOCATION OF WIND BEAM

TYPE-1

1) CALCULATION OF STRESS

a) WIND LOAD (HORIZONTAL)



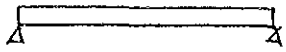
$Q = \frac{1}{2} \times 3 \times 3.43 = 5.15\,T$

$M = 5.15 \times 5.0 - 3.43 \times 2.5$

$= 17.18\ T\cdot m$

b) DEAD LOAD (VERTICAL)

$w = 0.045 \times 6.1 \times \frac{1}{2} + 0.05 = 0.19\,T/m$



$Q = \frac{1}{2} \times 0.19 \times 10.0 = 0.95\,T$

$M = \frac{1}{8} \times 0.19 \times \overline{10.0}^2 = 2.38\ T\cdot m$

2) CHECK OF SECTION

$M_H = 17.18\ T\cdot m$

$M_V = 2.38\ T\cdot m$

use H-390×300×10×16

$Z_x = 1980$ $i_b = 8.09$, $l_b = 250$ $\lambda = 31$ $f_b = 1.6$

$Z_T = 481$

$I_x = 38.700$ $I_y = 7210$

$\sigma_H = \frac{1718}{1980} = 0.87$

$\sigma_V = \frac{238}{481} = 0.49$

$\frac{\sigma}{f} = 0.36 + 0.20 = 0.56 < 1.0$ ok

$\delta_H = \frac{5 \times 0.011 \times \overline{1000}^4}{384 \times 2100 \times 38700} = 1.76$

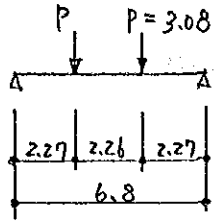
$\delta_V = \frac{5 \times 0.0019 \times \overline{1000}^4}{384 \times 2100 \times 7210} = 1.63$

$\delta = 2.40$ $\delta/l = 1/416 < 1/300$

TYPE - 2

1) CALCULATION OF STRESS

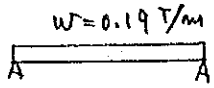
a) WIND LOAD (HORIZONTAL)



$Q = 3.08\ T$

$M = 3.08 \times 2.27 = 6.99\ T\cdot m$

b) DEAD LOAD (VERTICAL)



$Q = \frac{1}{2} \times 0.19 \times 6.8 = 0.65\ T$

$M = \frac{1}{8} \times 0.19 \times 6.8^2 = 1.10\ T\cdot m$

2) CHECK OF SECTION

$M_H = 6.99\ T\cdot m$

$M_V = 1.10\ T\cdot m$

Use H-294 × 200 × 8 × 12

$Z_x = 971 \quad i_b = 5.32 \quad l_b = 227 \quad \lambda = 43 \quad f_b = 1.6$

$Z_y = 160$

$I_x = 11300 \qquad I_y = 1600$

$\sigma_H = \frac{699}{971} = 0.91$

$\sigma_V = \frac{110}{160} = 0.69$

$\frac{\sigma}{f} = 0.38 + 0.29 = 0.67 < 1.0$ OK

$\delta_H = \frac{5 \times 0.01 \times 680^4}{384 \times 2100 \times 11300} = 1.17$

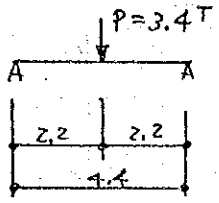
$\delta_V = \frac{5 \times 0.00019 \times 680^4}{384 \times 2100 \times 1600} = 1.57$

$\delta = 1.96\text{cm} \quad \delta/l = 1/346 < 1/300$ OK

TYPE-3

1) CALCULATION OF STRESS

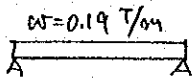
a) WIND LOAD (HORIZONTAL)



$Q = \frac{1}{2} \times 3.4 = 1.7\ T$

$M = \frac{1}{4} \times 3.4 \times 4.4 = 3.74\ T\cdot m$

b) DEAD LOAD (VERTICAL)



$Q = \frac{1}{2} \times 0.19 \times 4.4 = 0.42\ T$

$M = \frac{1}{8} \times 0.19 \times 4.4^2 = 0.46\ T\cdot m$

2) CHECK OF SECTION

$M_H = 3.74\ T\cdot m$

$M_V = 0.46\ T\cdot m$

Use H-300×150×6.5×9

$Z_x = 481 \quad i_b = 3.87 \quad l_b = 220 \quad \lambda = 57 \quad f_b = 1.6$

$Z_y = 67.7$

$I_x = 7210 \quad I_y = 508$

$\sigma_H = \frac{374}{481} = 0.78$

$\sigma_V = \frac{46}{67.7} = 0.68$

$\frac{\sigma}{f} = 0.33 + 0.28 = 0.61 < 1.0$ ok

$\delta_H = \frac{3.4 \times 440^3}{48 \times 2100 \times 7210} = 0.40$

$\delta_V = \frac{5 \times 0.0019 \times 440^4}{384 \times 2100 \times 508} = 0.87$

$\delta = 0.96 \quad \delta/\ell = 1/450 < 1/300$ ok

7-4 DESIGN OF SLAB ( )
[スラブの断面算定]

FL	ROOM NAME	SHAPE	w	t (cm)	d (cm)	D	P	lx (m)	λ	α	β	M (tm)	Q (t)	at	τ	ψ	RE-BAR
						S	E										
				10	12	L	C										
R	Roof		0.475	15	(10.5)			2.2		1/8	1/2	0.29	0.52	1.48	0.50	2.36	#3@204.7
						S	E										
	Cooling			10	12	L	C										
5	Tower		0.615	15	(10.5)			2.5				0.48	0.77	2.44	0.73	3.49	#3@204.7
						S	E										
	Deaerator		0.885	10 15	12 (10.5)	L	C	2.0				0.44	0.89	2.24	0.85	4.04	#3@204.7
						S	E										
	Erectrical			10	12	L	C										
4	Instrument		0.88	15	(10.5)			2.5				0.69	1.10	3.51	1.05	4.99	#3#4
						S	E										
	HP Heater		1.29	10 15	12 (10.5)	L	C	2.0				0.65	1.29	3.31	1.23	5.85	#3#4
						S	E										
				10	12	L	C										
	A/C MACHINE		0.985	15	(10.5)			2.0				0.49	0.99	2.50	0.94	4.49	#3
						S	E										
				13	15	L	C										
3	T/G OVER HAUL		2.425	18	(13.125)			2.27				1.56	2.75	6.36	2.10	9.98	#4#5
						S	E										
				13	15	L	C										
	Computer		0.925	18	(13.125)			2.27				0.60	1.05	2.44	0.80	3.81	#3
						S	E										
				13	15	L	C										
2	T/G Room		1.225	18	(13.125)			2.27				0.79	1.39	3.22	1.06	5.04	#4
						S	E										
				13	15	L	C										
	Control Equip.		0.925	18	(13.125)			2.27				0.60	1.05	2.44	0.80	3.81	#3

NOTE: w --- DESIGN LOAD FOR SLAB (t/m2)
t,d --- SLAB THICKNESS, DISTANCE BETWEEN RE-BAR & COMPRESSIVE END
D --- DIRECTION (S:SHORT SPAN DIR. L:LONG SPAN DIR.)
P --- POSITION (E:END OF SPAN, C:CENTER OF SPAN)
lx,ly --- EFFECTIVE SPAN LENGTH OF SHORTER ONE AND LONGER ONE
λ --- ly/lx
α ,β --- COEFFICIENT FOR BENDING MOMENT AND SHEAR FORCE
M,Q --- BENDING MOMENT (=α wlx^2), SHEAR FORCE (=β wlx)
at --- REQUIRED SECTION AREA OF REINFORCING BAR PER ONE METER WIDTH (cm2) = M/(ftj)
j --- (7/8)*d
τ --- SHEAR STRESS (kg/cm2) = Q/(100j)
ψ --- REQUIRED CIRCUMFERENCE OF REINFORCING BAR (cm) = Q/(faj)