パキスタン回教共

ウェストワーフ火力発 建設 調査

最終報告書 I (3/3)

1990年1月

国際協力事業団

パキスタン回教共和国

ウェストワーフ火力発電所建設計画調査

最終報告書 I (3/3)

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最 終 報 告 書 I

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構　造　計　算　書

目　　次

Ⅰ．一　般　事　項

1. Building Dimensions (発電所本館)

1) Building Area	4,181.6 m2
2) Floor Area	
5th Floor	55.6 m2
4th Floor	1,726.4 m2
Operating Floor	4,181.6 m2
Mezzanine Floor	4,181.6 m2
Ground Floor	4,181.6 m2
Total	14,326.8 m2
3) Building Heught (T/S)	GL+27.1 m
4) Building KVolume	102,057.6 m3

2. Structure (構　造)

1) Main Structure : Steel

2) Foundation : Reinforced concrete mat foundation

3) Slab : Concrete slab and grating floor

4) Wall : Concrete Wall and precast concrete wall

3. Structural Design Method (構造設計法)

3.1 Superstructure

1) All frames in longitudinal direction are designed with vertical braced frames.

2) All frames in transverse direction are designed with vertical braced and open frames.

3) The bracing system will utilize x-braces or portal braces and the brace members are designed for compression and tension.

4) Every end joint of every girder is assumed to be a pin joint except that of a roof truss.

5) Every bottom of every column is assumed to be a pin support.

6) Every member including a roof truss is replaced to a line element.

7) Every structural analysis is based on elastic stiffness.

4. Design Criteria and Code (適用規格基準)

1) "Design Standard for Steel Structure", Architectural Institute of Japan(AIJ), 1970

2) "Standards for Calculation of Reinforced Concrete Structure", AIJ, 1982

3) "Standards for Structural Design of Building Foundation", AIJ, 1974

4) "Manual for Loads of Buildings", AIJ, 1981

5. Structural Materials and Allowable Stresses (使用材料と許容応力)

1) Qualities of materials

Structural steel : JIS G3101 SS41, JIS G3106 SM41 or equivalent — F=2400kg/cm²

High Strength Bolt : JIS B1186 F10T or equivalent

Concrete : F=210kg/cm² (compressive strength of 28 days)

Reinforcement : Deformed bar, ASTM A615 Grade 40 or equivalent — F=2800kg/cm²

2) Physical constants of structural steel

Modulus of elasticity $E=2.1\times10^{6}$ kg/cm²

3) Allowable stresses

Allowable stresses for each materials are shown in Table 5.1 to 5.7.

Table 5.1 Allowable Unit Stresses of Steel

	Allowable Unit Stress (t/cm²)
Allowable Tensile Stress f_t	$f_t = \frac{F}{1.5} = 1.6$
Allowable Shear Stress f_s	$f_s = \frac{F}{1.5\sqrt{3}} = 0.92$
Allowable Compressive Stress f_c	when $\lambda \leqq \Lambda$ $f_c = \frac{\{1-0.4(\lambda/\Lambda)^2\}F}{\nu}$ when $\lambda > \Lambda$ $f_c = \frac{0.277F}{(\lambda/\Lambda)^2}$ where $\nu = 3/2 + 2/3 \cdot (\lambda/\Lambda)^2$ $\Lambda = \sqrt{\frac{\pi^2 E}{0.6F}}$: Critical slenderness ratio
Allowable Bending Stress f_b	$f_b = \mathrm{Max}(f_{b1}, f_{b2})$, but not more than f_t $f_{b1} = \{1-0.4\frac{(l_b/i)^2}{C \cdot \Lambda^2}\}f_t$ $f_{b2} = \frac{900}{(l_b \cdot h/A_f)}$ where $C = 1.75-1.05(\frac{M_2}{M_1})^2 + 0.3(\frac{M_2}{M_1})^2$, but not more than 2.3
Allowable Bending Stress of Bearing Plate f_{b3}	$f_{b3} = \frac{F}{1.3} = 1.85$

Notes: 1. Each allowable stress indicated in this table is permanent.
2. Temporary allowable stresses are 1.5 times as much as those in this table.
3. Allowable bending stress f_b is that for a shape steel, a plate girder and another built-up member which are bended around the principal axis of maximum moment of inertia. This is not, however, applied to box section.
4. Symbols in this table are defined as follows:
   - λ : Slenderness ratio for compression memeber
   - l_b : length of compressive side flange btween supports
   - h : Depth of beam(cm)
   - Af : Cross sectional area of compressive side flange(cm²)
   - i : Radius of gyration of area of Tee section, comprising compressive side flange and one-sixth of depth of beam, around the axis of web(cm)

Table 5.2 Allowable Unit Stresses in Welded Joints (t/cm²)

Welding Position	Permanent Stresses					Temporary Stresses
	Groove Weld				Fillet Weld	
	Tension	Compress	Bending	shear		
(1)	1.44	1.44	1.44	0.83	0.83	Permanent stresses × 1.5
(2)	1.20	1.20	1.20	0.70	0.70	

Notes: (1) Flat or horizontal in the shop
(2) Overhead or vertical in the shop and flat or horizontal in the field

Table 5.3 Allowable Strength per Medium Bolts (SS41)

Bolt Nominal Dia.	Dia. of Bolt Hole (mm)	Bolt Gross Area (cm²)	Permanent Strength			Temporary Strength (t)
			Shear (t)		Tension (t)	
			Single shear	Double shear		
M12	12.5	1.13	1.02	2.03	1.36	Permanent Stresses x 1.5
M16	16.5	2.01	1.81	3.62	2.41	
M20	20.5	3.14	2.83	5.65	3.77	
M22	22.5	3.80	3.42	6.84	4.56	
M24	24.5	4.52	4.07	8.14	5.42	

Table 5.4 Allowable Strength per High Strength Bolts (F10T)

Bolt Nominal Dia.	Dia. of Bolt Hole (mm)	Bolt Effect. Area (cm²)	Permanent Strength			Temporary Strength (t)
			Shear (t)		Tension (t)	
			Single shear	Double shear		
M16	17.0	1.57	3.02	6.03	6.23	Permanent Stresses x 1.5
M20	21.5	2.45	4.71	9.42	9.73	
M22	23.5	3.03	5.70	11.4	11.8	
M24	25.5	3.53	6.78	13.6	14.0	

Table 5.5 Allowable Unit Stresses of Concrete (kg/cm²)

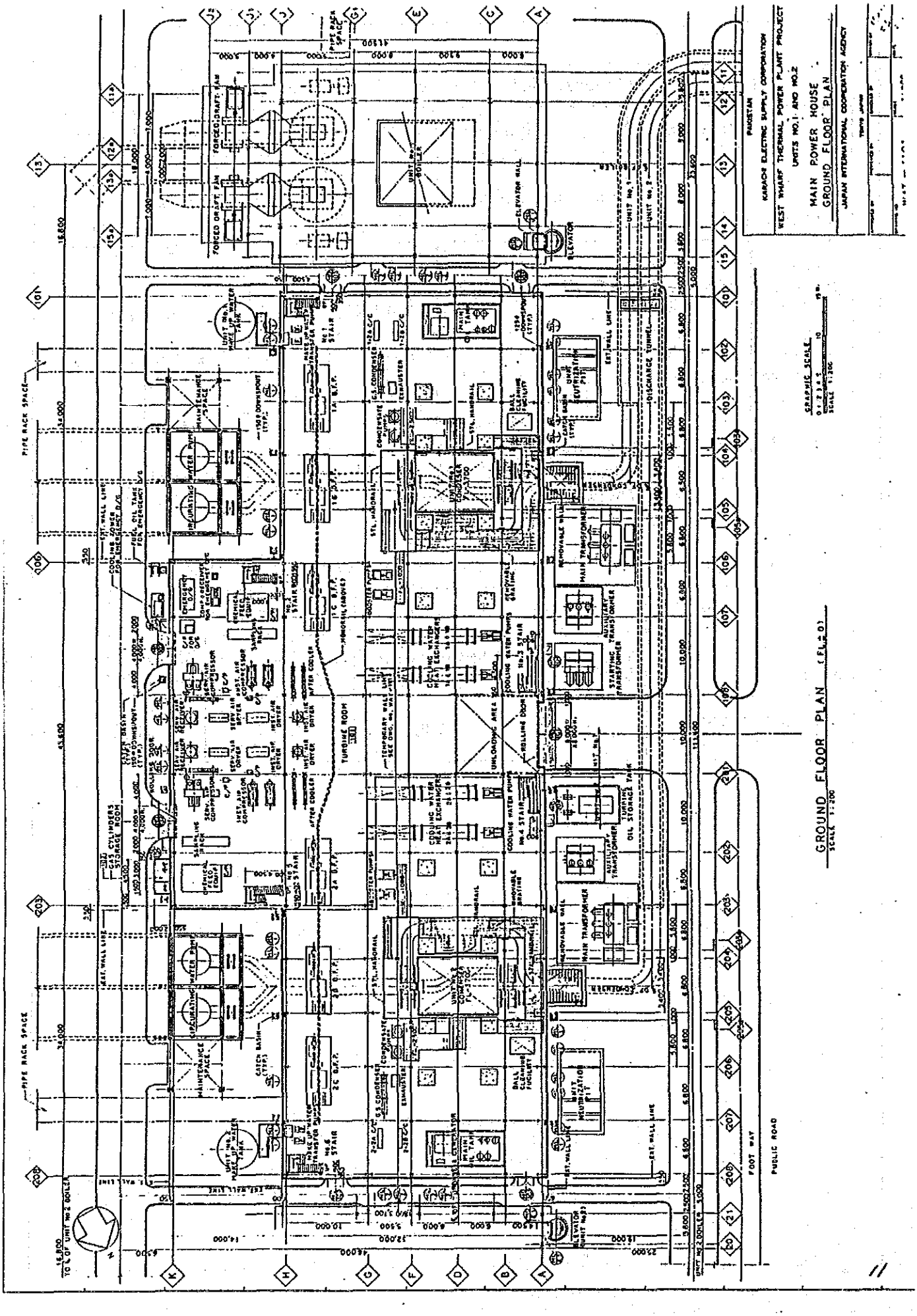
Stresses / Materials		Permanent Stresses					Temporary Stress	
		Compress	Shear	Bond			Compress	Shear Bond
				A	B	C		
Normal Concrete Fc=210	Plain bar	70	7.0	8.4	12.6	8.4	P.Stress	P.S.
	Deformed bar			14.0	21.0	14.0		
Normal Concrete Fc=250	Plain bar	80	7.5	9.0	13.5	9.0	x 2.0	x 1.5
	Deformed bar			15.6	23.5	15.6		

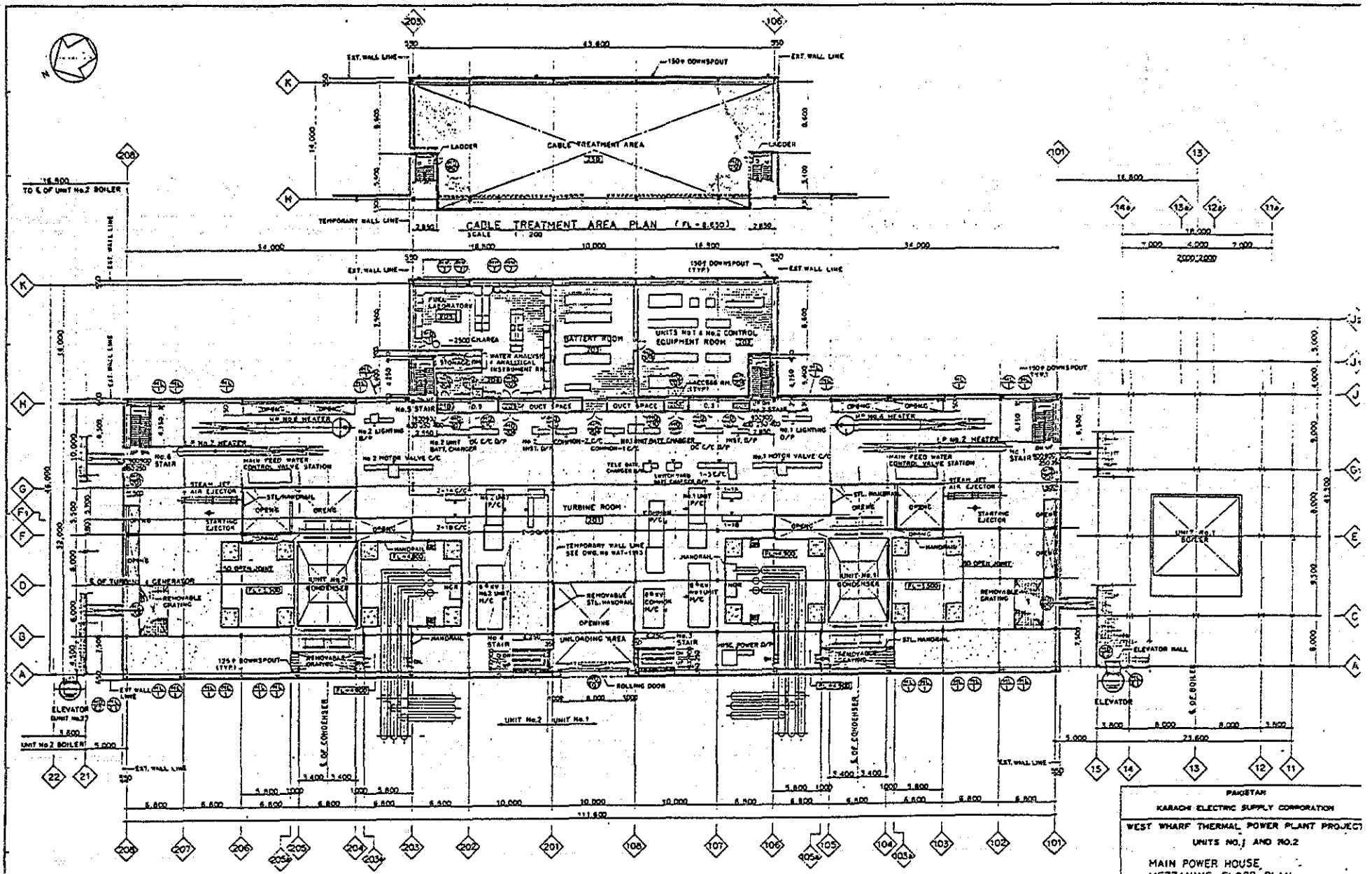
Remarks A : Top bar of flexural members
B : Bar, except "Item A", of flexural members
C : Anchors and lap splices

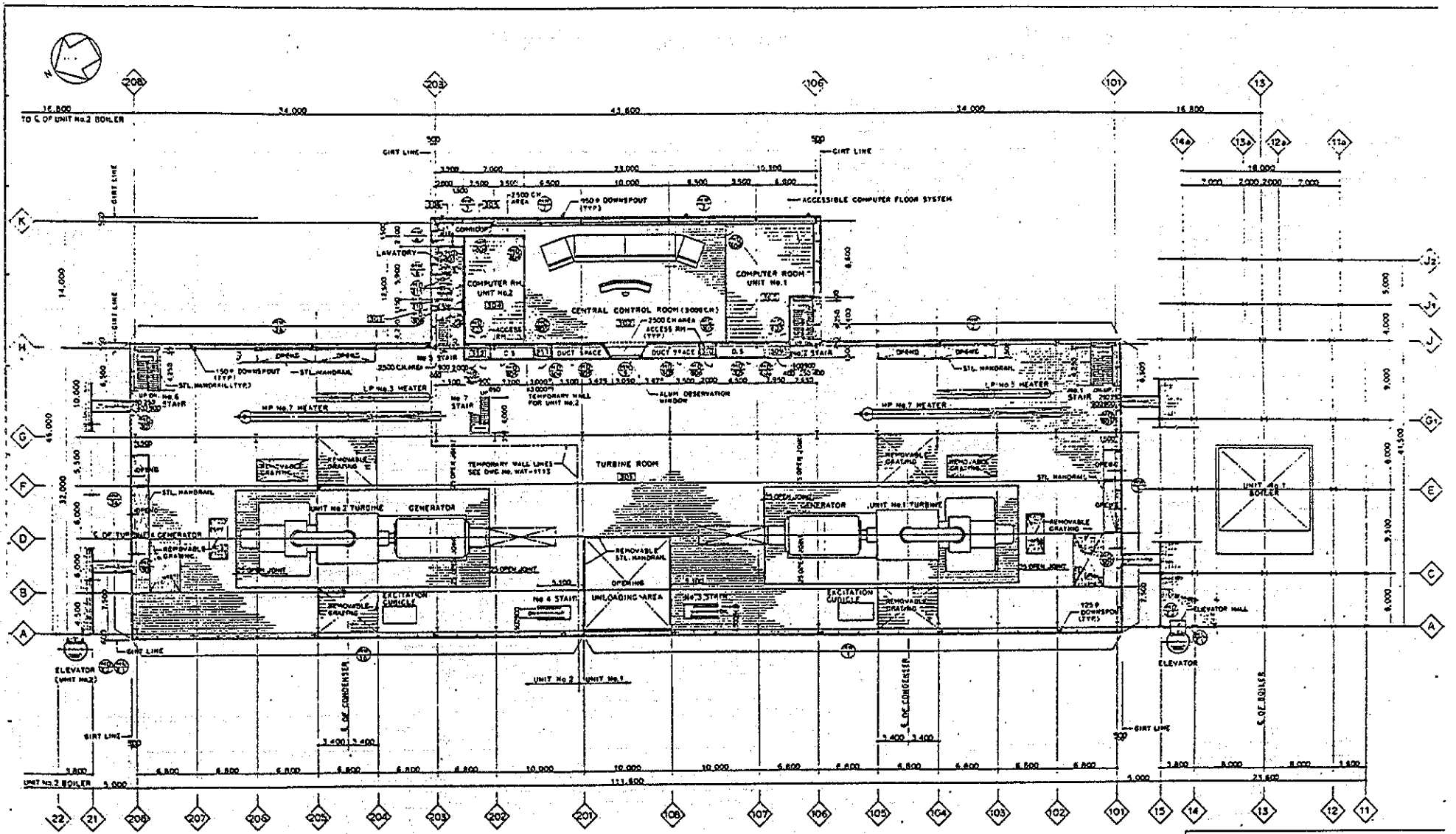
Table 5.6 Allowable Unit Stresses of Reinforcing Bars (kg/cm²)

Stresses / Material	Permanent Stresses		Temporary Stresses	
	Tension Compression	Shear Reinforcement	Tension Compression	Shear Reinforcement
Deformed bar ASTM A615 Grade40	1850	1850	2800	2800

6. General drawing (建屋全体図)




CABLE TREATMENT AREA PLAN (FL + 8.630)
SCALE 1 : 200
MEZZANINE FLOOR PLAN (FL + 5.500)
SCALE 1 : 200
GRAPHIC SCALE
SCALE 1:200
PAKISTAN
KARACHI ELECTRIC SUPPLY CORPORATION
WEST WHARF THERMAL POWER PLANT PROJECT
UNITS NO.1 AND NO.2
MAIN POWER HOUSE
MEZZANINE FLOOR PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN
TURBINE ROOM
BATTERY ROOM
UNITS NO.1 & NO.2 CONTROL EQUIPMENT ROOM
CABLE TREATMENT AREA
UNLOADING AREA
UNIT No.2
UNIT No.1
ELEVATOR
ELEVATOR WELL
ROLLING DOOR



OPERATING FLOOR PLAN (FL +11,000)
SCALE 1 : 200

GRAPHIC SCALE
SCALE 1 : 200

PAKISTAN
KARACHI ELECTRIC SUPPLY CORPORATION
WEST WHARF THERMAL POWER PLANT PROJECT
UNITS NO.1 AND NO.2
MAIN POWER HOUSE
OPERATING FLOOR PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN

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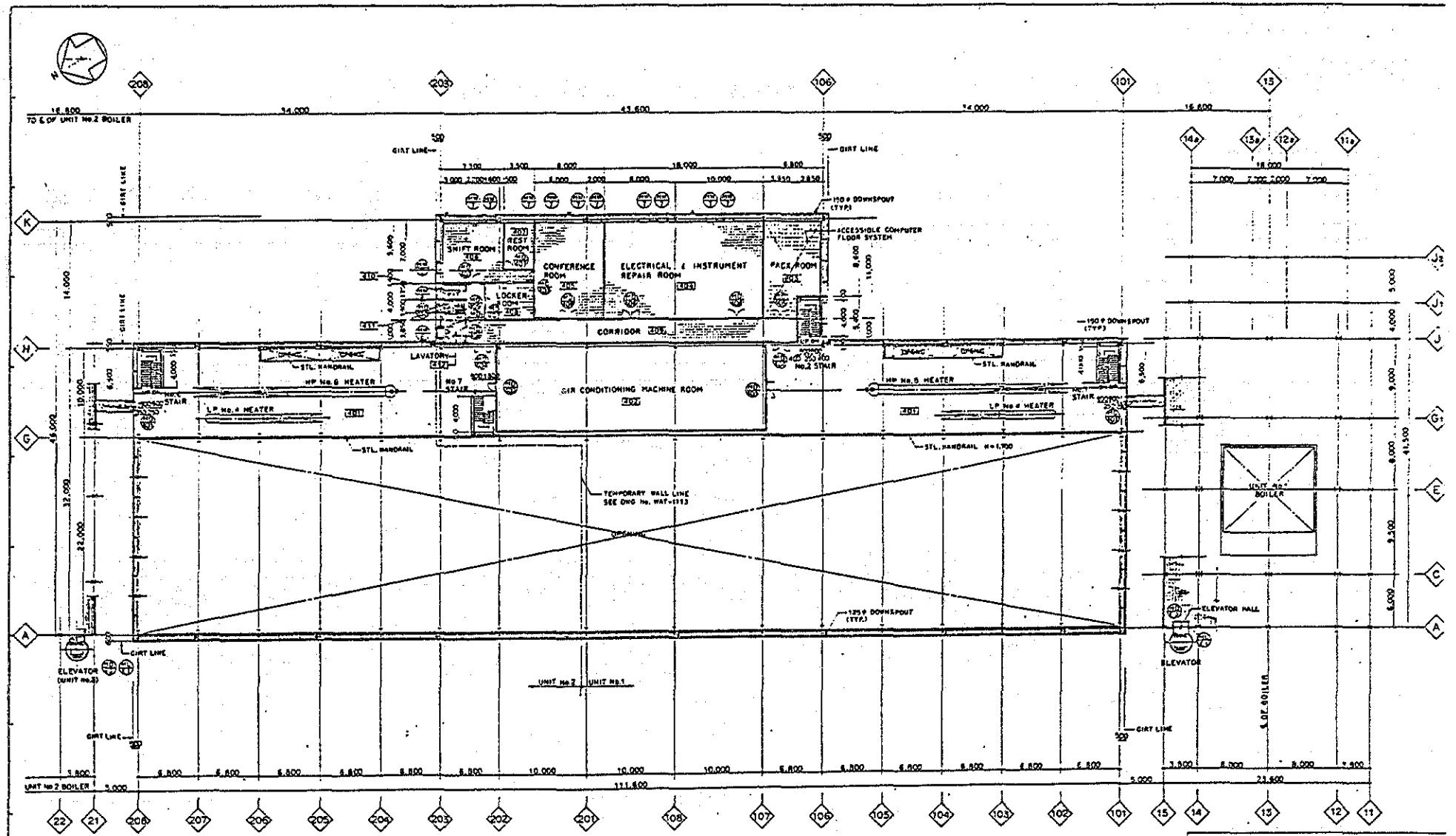

FORTH FLOOR PLAN (FL.+21,000)
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GRAPHIC SCALE
SCALE 1:200

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UNITS NO.1 AND NO.2
MAIN POWER HOUSE
FORTH FLOOR PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN

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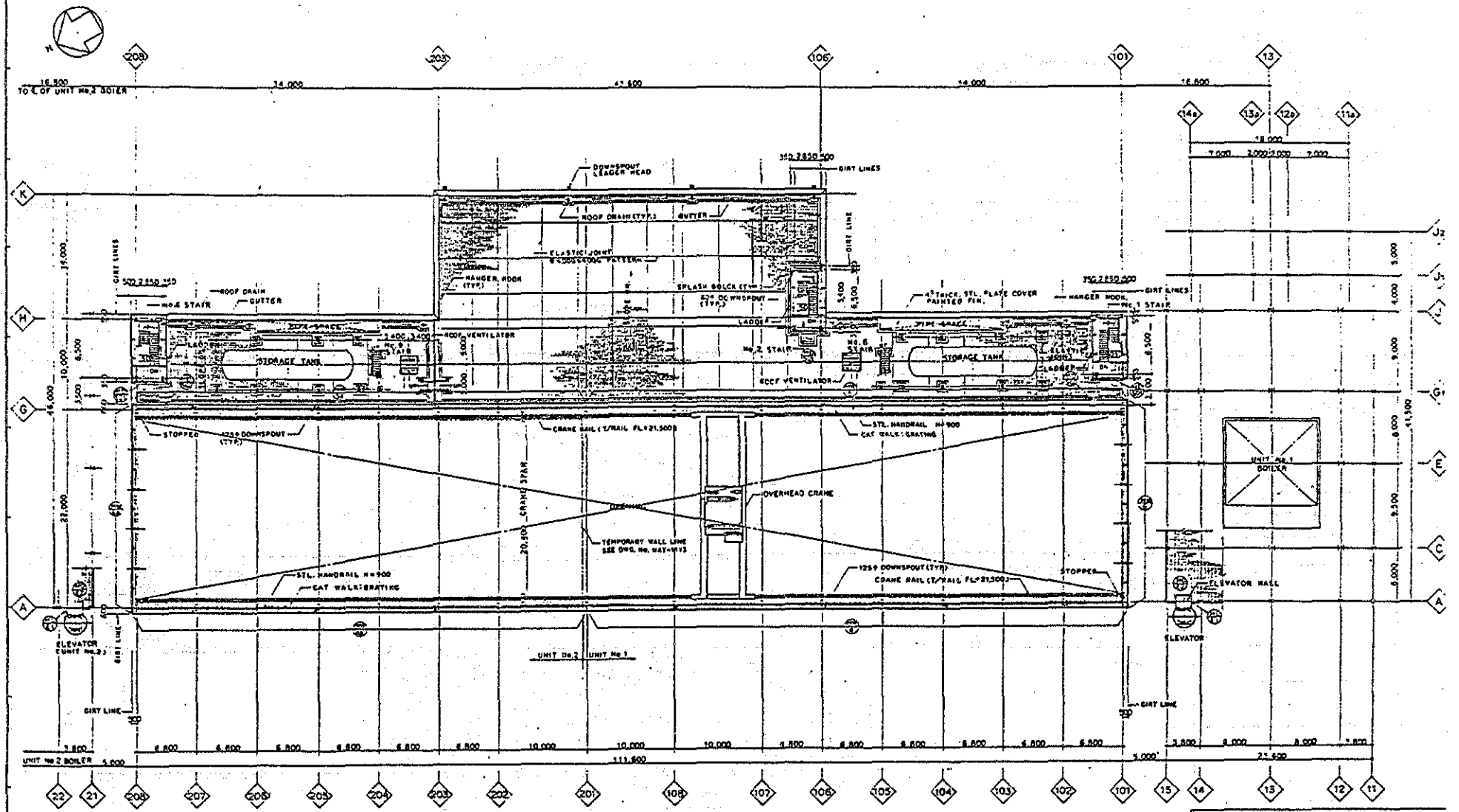

CRANE LEVEL (T/CRANE RAIL EL.+21,500) & LOW ROOF (T/STEEL L.P. EL.+21,000) PLAN

SCALE 1 : 200

GRAPHIC SCALE

0 1 2 3 4 5 10 15m

SCALE 1:200

PAKISTAN

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WEST WHARF THERMAL POWER PLANT PROJECT

UNITS NO.1 AND NO.2

MAIN POWER HOUSE

CRANE LEVEL & LOW ROOF PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY

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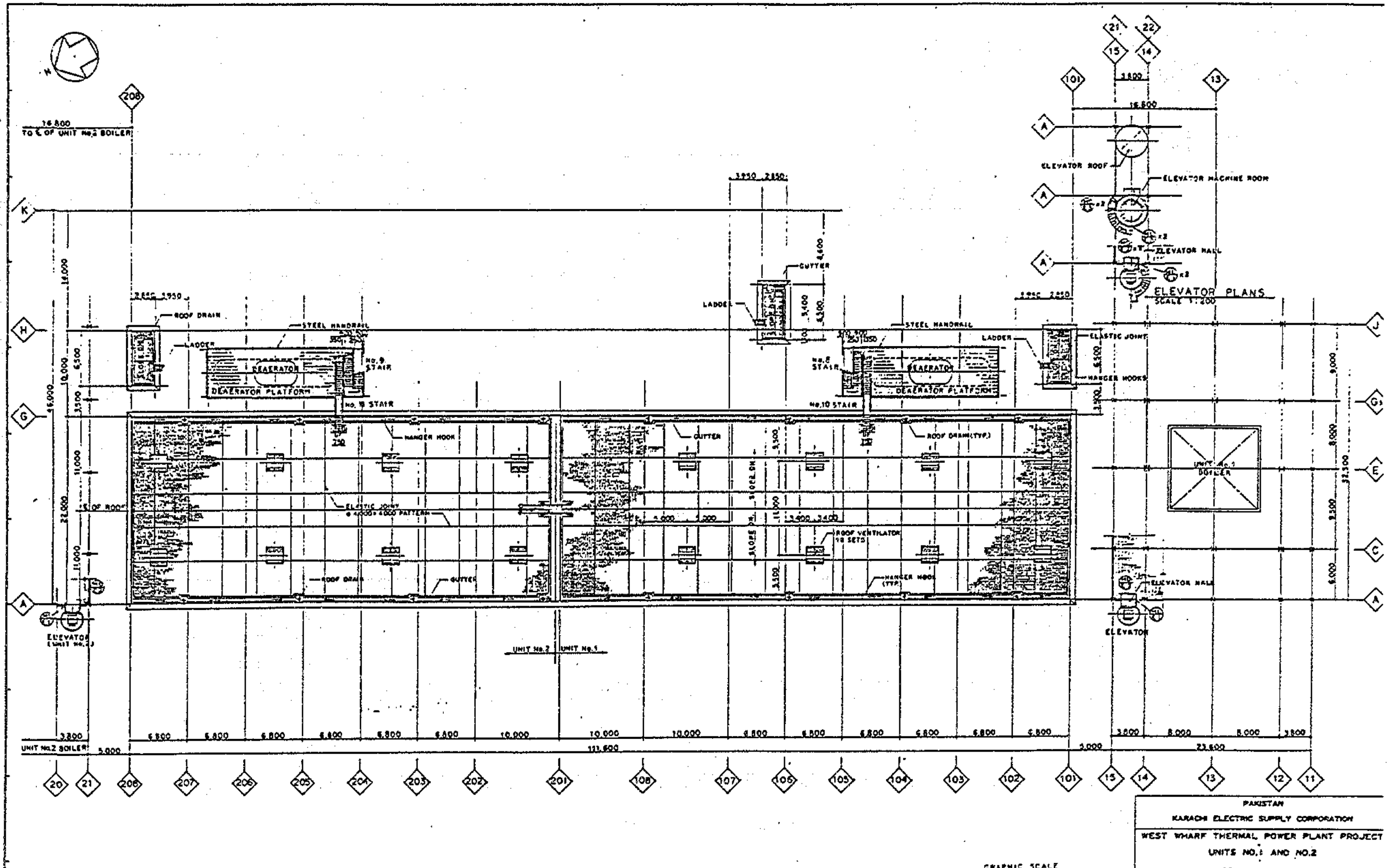

DEAERATOR PLATFORM & HIGH ROOF PLAN (T/STEEL LP. FL.+27.100)
SCALE 1:200

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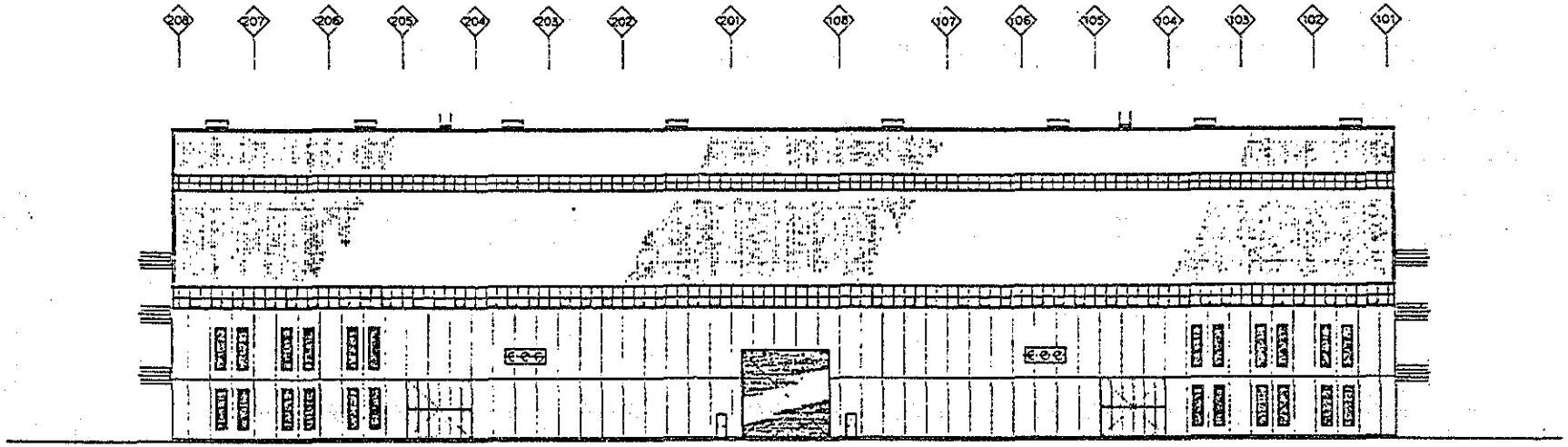
WEST WHARF THERMAL POWER PLANT PROJECT
UNITS NO.1 AND NO.2
MAIN POWER HOUSE
DEAERATOR PLATFORM & HIGH ROOF PLAN
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN



WEST ELEVATION
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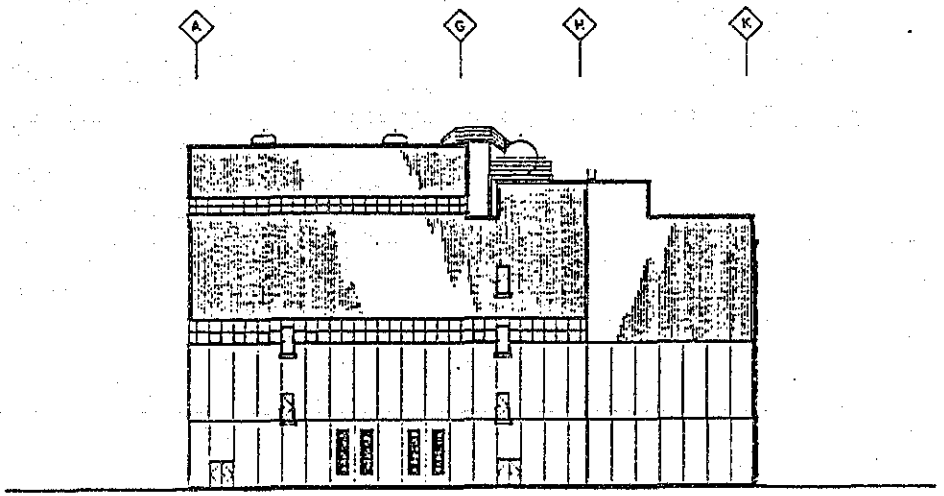

SOUTH ELEVATION
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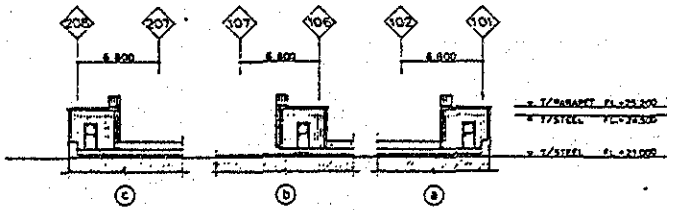

WEST ELEVATIONS (STAIR CASE)
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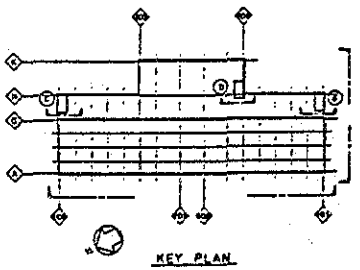

KEY PLAN

GRAPHIC SCALE
0 1 2 3 4 5 10 15 M
SCALE 1 : 200

PAKISTAN
KARACHI ELECTRIC SUPPLY CORPORATION
WEST WHARF THERMAL POWER PLANT PROJECT
UNITS NO. 1 AND NO. 2
MAIN POWER HOUSE
WEST & SOUTH ELEVATIONS
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN

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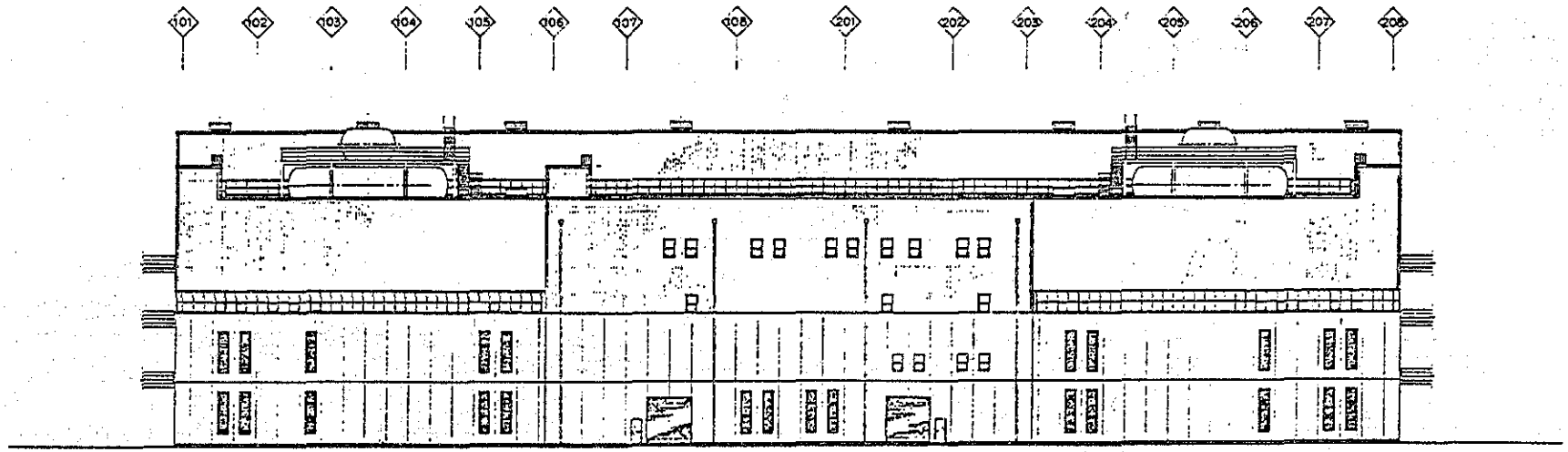

EAST ELEVATION
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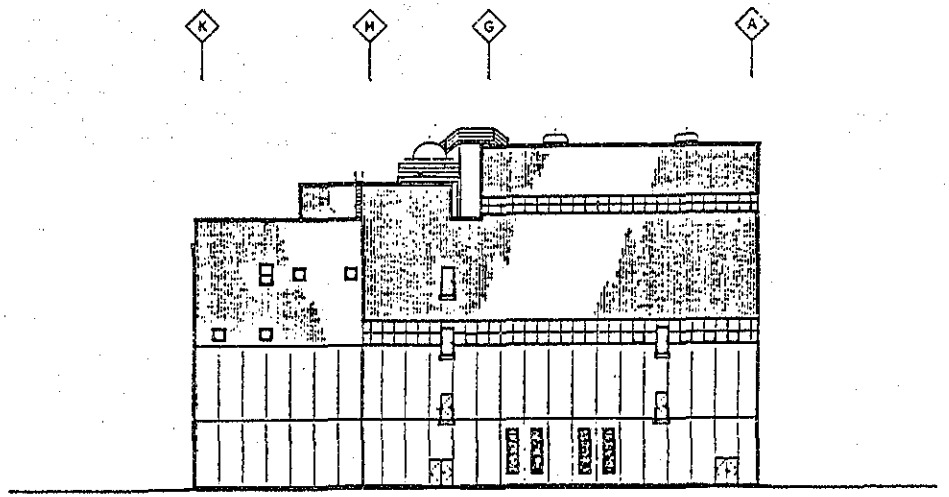

NORTH ELEVATION
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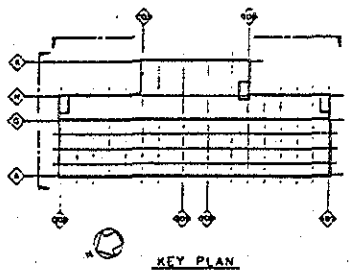
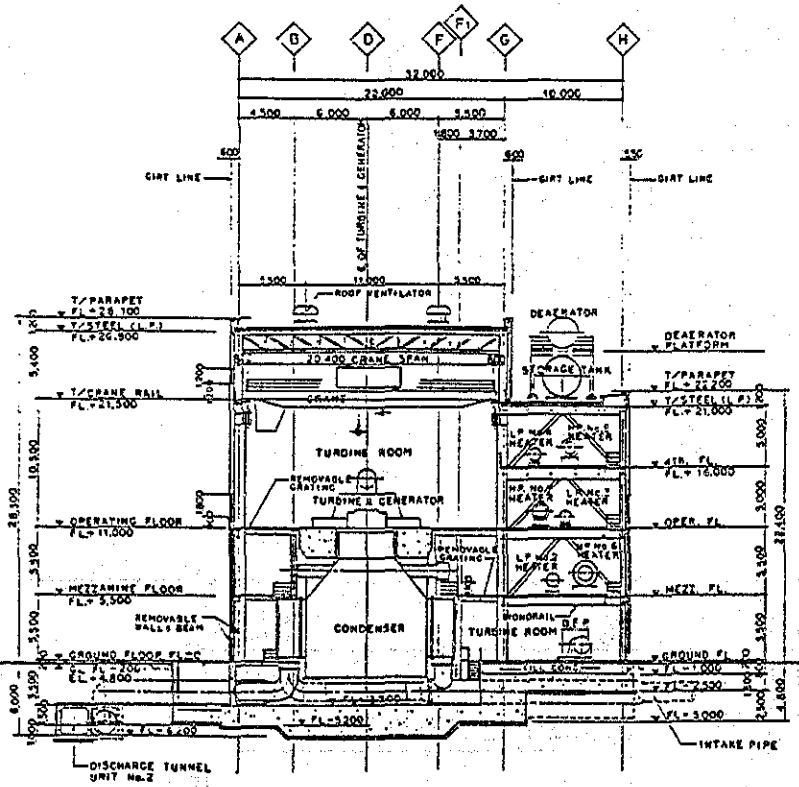


KEY PLAN

GRAPHIC SCALE
SCALE 1 : 200

PAKISTAN
KARACHI ELECTRIC SUPPLY CORPORATION
WEST WHARF THERMAL POWER PLANT PROJECT
UNITS NO.1 AND NO.2
MAIN POWER HOUSE
EAST & NORTH ELEVATIONS
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO JAPAN



a SECTION
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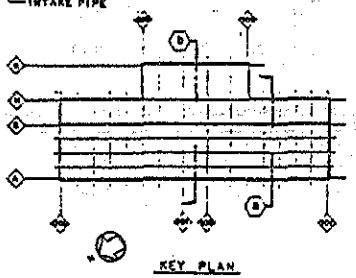
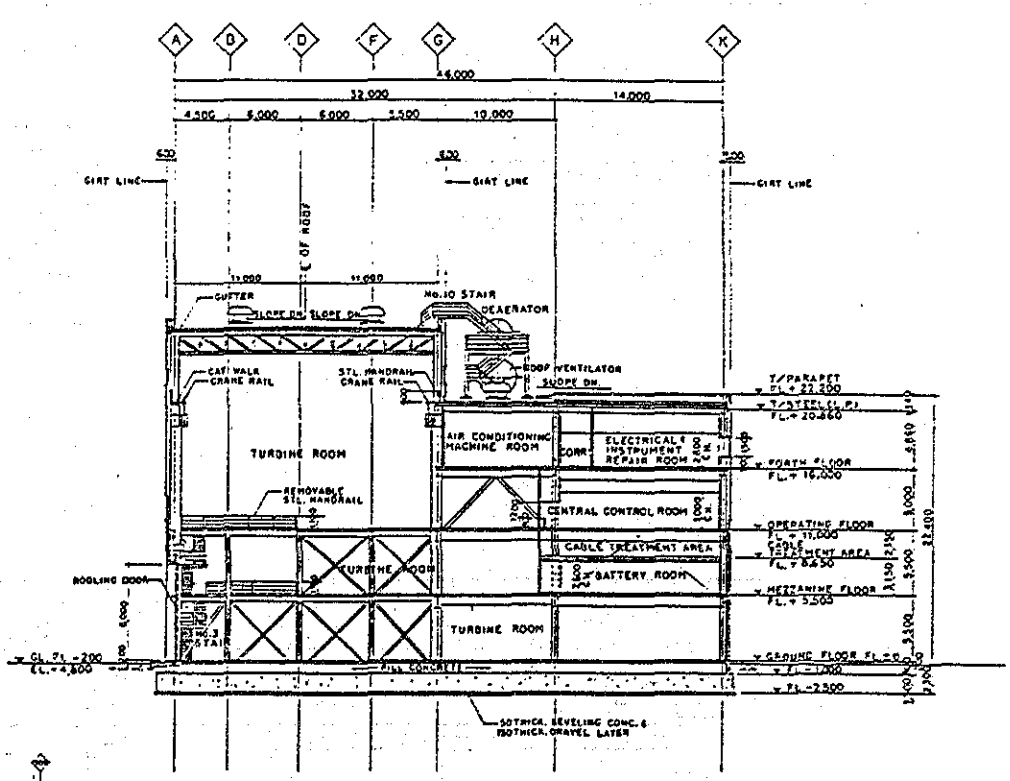


KEY PLAN



b SECTION
SCALE 1:200

GRAPHIC SCALE
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SCALE 1:200

PAKISTAN
KARACHI ELECTRIC SUPPLY CORPORATION
WEST WHARF THERMAL POWER PLANT PROJECT
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MAIN POWER HOUSE
SECTIONS
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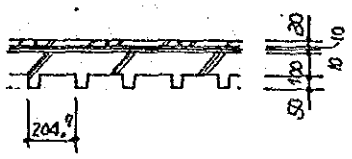
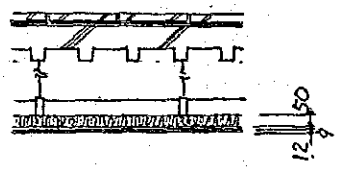
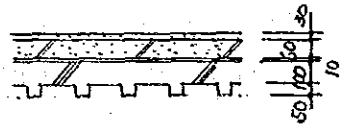
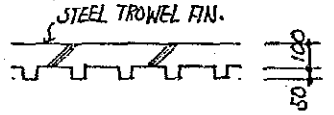
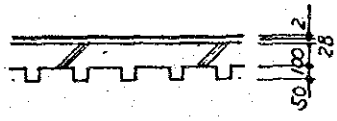
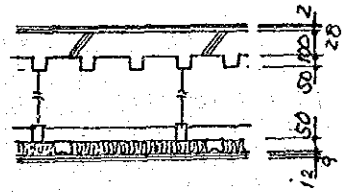
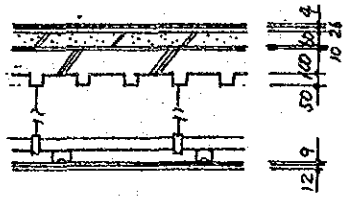
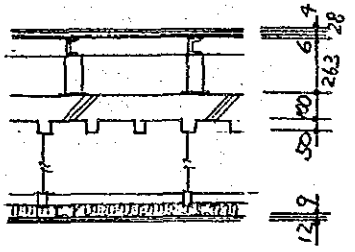
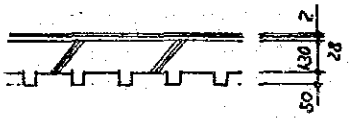
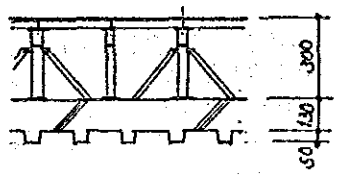
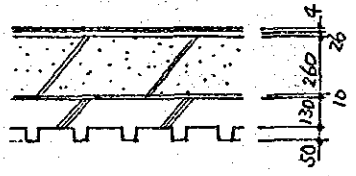
7. Design Load (設計荷重)

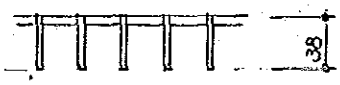
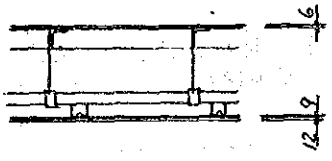
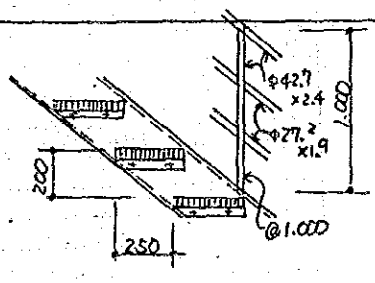
7.1 DEAD LOAD (1)
[固定荷重]

ROOM NAME OR LOCATION	FIGURE (mm)	MATERIALS (THICKNESS-mm)	WEIGHT (kg/m2)	TOTAL (kg/m2)
ROOF TURBINE ROOM A/C MACHINE ROOM		CONCRETE BLOCK (THK=30) SAND (" =10) ASPHALT ROOFING (" =10) CONCRETE SLAB (" =100) DECK PLATE V-50 (" =1.2)	60 20 15 275 13.9 383.5	→ 385
ROOF of ELECTORICAL & INST. REPAIR RM CONFERENCE ROOM		CONCRETE BLOCK SAND ASPHALT ROOFING CONCRETE SLAB DECK PLATE GLASS WOOL CEILING	383.5 2 25 410.5	→ 415
4TH. FL. A/C MACHINE ROOM		CEMENT MORTAL (" =30) CINDER CONCRETE (" =60) ASPHALT WATER PROOF (" =10) CONCRETE SLAB (" =100) DECK PLATE (" =1.2)	60 120 15 275 13.9 483.9	→ 485
4TH. FL. HP HEATER ROOM		CONCRETE SLAB (THK=100) DECK PLATE (" =1.2)	275 13.9 288.9	→ 290
~~LABORATORY ROOM~~		VINYL ASBESTOS TILE (THK=2.0) CEMENT MORTAL (" =28) CONCRETE SLAB (" =100) DECK PLATE (" =1.2)	4 56 275 13.9 348.9	→ 350
4TH. FL. ELECTORICAL & INST. REPAIR RM CORRIDOR		VINYL ASBESTOS TILE (THK=2.0) CEMENT MORTAL (" =28) CONCRETE SLAB (" =100) DECK PLATE (" =1.2) GLASS WOOL CEILING	398.9 2 25 375.9	→ 380

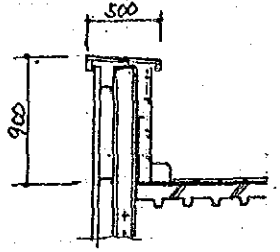
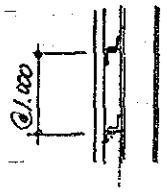
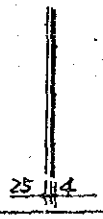
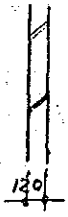
DEAD LOAD (2)
[固定荷重]

ROOM NAME OR LOCATION	FIGURE (mm)	MATERIALS (THICKNESS-mm)	WEIGHT (kg/m2)	TOTAL (kg/m2)
4TH. FL. LAVATORY		MOSAIC TILE (THK=4) CEMENT MORTAL (〃=26) CINDER CONCRETE (〃=60) ASPHALT WATER PROOF (〃=10) CONCRETE SLAB (〃=100) DECK PLATE (〃=1.2) CEILING	8 52 120 15 275 13.9 25 508.9	→ 510
~~LABORATORY ROOM~~ ~~PABX ROOM~~		VYNYL ASBESTOS TILE (THK=2.0) CEMENT MORTAL (〃=28) CONCRETE SLAB (〃=100) DECK PLATE (〃=1.2) GLASS WOOL CEILING STEEL PLATE (THK=6.0) STEEL FRAME FLOOR	375.9 47.1 40 463	→ 465
OPE. FL. TURBINE RM.		VINYL ASBESTOS TILE (THK=2.0) CEMENT MORTAL (〃=28) CONCRETE SLAB (〃=130) DECK PLATE (〃=1.2)	4 56 347 13.9 420.9	→ 425
OPE. FL. CENTRAL CONTROL ROOM	... Ditto.			425
OPE. FL. COMPUTER ROOM		FREE FLOOR CONCRETE SLAB (THK=130) DECK PLATE (〃=1.2)	60 347 13.9 420.9	→ 425
OPE. FL. LAVATORY		MOSAIC TILE (THK=4) CEMENT MORTAL (〃=26) CINDER CONCRETE (〃=260) ASPHALT WATER PROOF (〃=10) CONCRETE SLAB (〃=130) DECK PLATE (〃=1.2)	8 52 520 15 347 13.9 955.9	→ 960

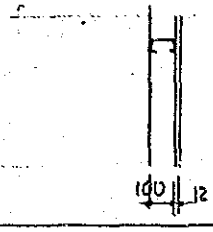
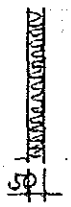
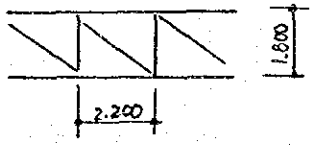
DEAD LOAD (3)
[固定荷重]

ROOM NAME OR LOCATION	FIGURE (mm)	MATERIALS (THICKNESS-mm)	WEIGHT (kg/m2)	TOTAL (kg/m2)
MEZ. FL. TURBINE RM	SAME AS OPE. FL. TURBINE FL.			425
MEZ. FL. CONTROL EQUIP. ROOM BATTERY ROOM LABORATORY ROOM	Ditto.			425
GRATING FLOOR		GRATING	44.4 → 45	
CHECKERED PLATE FLOOR		CHECKERED PLATE (THK=6) L-65x65x6 CEILING	48.8 20 25 93.8 → 95	
STAIR		L-250x90x9x13 x2 GRATING HAND RAIL φ42.7 (1.0+1.4)x2 φ27.2 1.4x2 x2	97.8 33 18.9 13.6 163.1 → 165 kg/m	

DEAD LOAD (4)
[固定荷重]

ROOM NAME OR LOCATION	FIGURE (mm)	MATERIALS (THICKNESS-mm)	WEIGHT (kg/m2)	TOTAL (kg/m2)
PARAPET		WEATHER PROOF METAL (THK=1.0) L-30x30x2 @500 GIRT. L-50x50x4 @500 VERTICAL GIRT. L-100x50 @2000 BEND PLATE t=6.7 (THK=6.0) ASPHALT ROOFING (t=5.0) WEATHER PROOF METAL (t=1.0) CONCRETE BLOCK 150x120	5 3 6.1 4.7 34.2 7.5 7 43 110.5	→ 120 kg/m
METAL SIDING		METAL SIDING (THK=1.0) FRAME (L-50x50x6, H=250)	18 25 43	→ 45
CONCRETE BLOCK WALL		CONCRETE BLOCK (THK=150)	300	→ 300
MORTAL FIN		MORTAL (THK=25)	50	→ 50
TILE FIN		MOSAIC TILE (THK=4) MORTAL (THK=25)	8 50 58	→ 60
PRECAST CONCRETE PANEL		PRECAST CONC. PANEL (THK=120)	288	→ 290

DEAD LOAD (5)
[固定荷重]

ROOM NAME OR LOCATION	FIGURE (mm)	MATERIALS (THICKNESS-mm)	WEIGHT (kg/m2)	TOTAL (kg/m2)
WALL (SINGLE SIDE)		FRAME C-100@450 PLASTER BOAD (THK=12)	15 10.2 25.2	→ 26
WALL (DOUBLE SIDE)		FRAME C-100@450 PLASTER BOAD (THK=12)	15 20.4 35.4	→ 36
GLASS WOOL		GLASS WOOL (THK=50)	2	→ 2
TRUSS		H-350 49.4×4.4 H-250 92.4×4.4 RECT.24×130×15 57.6×1.8×2 BRACE 57.6×2.85×2	243.6	→ 250 kg/m
FENCE				→ 110 kg/m

NOTE: DL --- DEAD LOAD PHL --- PIPE HANGER LOAD
LL --- LIVE LOAD TL --- TOTAL FLOOR LOAD

FLOOR LOAD
[設計用床荷重]

Unit: kg/m2

FLOOR	ROOM NAME	SLAB			GIRDER				BEAM				COLUMN & FOUND.				SEISMIC			
		DL	LL	TL	DL	LL	PHL	TL	DL	LL	PHL	TL	DL	LL	PHL	TL	DL	LL	PHL	TL
ROOF	T/G ROOM	385	90	475	535	60	—	595	535	60	—	595	535	60	—	595	535	—	—	535
5TH FL. & ROOF GL+21.0	COOLING TOWER ROOF	415	200	615	565	200	—	765	565	200	—	765	565	200	—	765	565	100	—	665
	A/C MACHINE ROOM ROOF	385	100	485	535	100	—	635	535	100	—	635	535	100	—	635	535	—	—	535
	DEAERATOR ROOF	385	500	885	535	500	250	1.285	535	500	250	1.285	535	350	150	1.035	535	80	75	690
4TH FL GL+16.0	CONFERENCE ROOM	380	300	680	530	180	—	710	530	180	—	710	530	180	—	710	530	80	—	610
	ELECTORICAL & INS. REPAIR ROOM	380	500	880	530	500	—	1.030	530	500	—	1.030	530	350	—	880	530	350	—	880
	HP HEATER ROOM	290	1000	1.290	440	1000	250	1.690	440	1000	250	1.690	440	700	150	1.290	440	*150	75	665
	LAVATORY	510	130	640	660	130	—	790	660	130	—	790	660	130	—	790	660	60	—	720
	A/C MACHINE ROOM	485	500	985	635	500	—	1.135	635	500	—	1.135	635	350	—	985	635	350	—	985
OPE FL GL+11.0	T/G ROOM (OVERHAUL)	425	2.000	2.425	575	2.000	250	2.825	575	2.000	250	2.825	575	1.500	150	2.225	575	150	75	800
	" (OTHER)	425	1.000	1.425	575	1.000	250	1.825	575	1.000	250	1.825	575	700	150	1.425	575	700	75	1.350
	CENTRAL CONTROL ROOM	425	300	725	575	180	250	1.005	575	180	250	1.005	575	180	150	905	575	80	75	730
	COMPUTER ROOM	425	500	925	575	500	—	1.075	575	500	—	1.075	575	350	—	925	575	350	—	925
	LAVATORY	960	130	1.090	1110	130	—	1.240	1110	130	—	1.240	1110	130	—	1.240	1110	60	—	1.170
MEZ. FL GL+5.5	T/G ROOM	425	800	1.225	575	800	250	1.625	575	800	250	1.625	575	500	150	1.225	575	500	75	1.150
	CONTROL EQUIPMENT ROOM	425	500	925	575	500	150	1.225	575	500	150	1.225	575	350	100	1.025	575	350	50	975
	BATTERY ROOM	425	500	925	575	500	150	1.225	575	500	150	1.225	575	350	100	1.025	575	350	50	975
	LABORATORY ROOM	425	300	725	575	180	150	905	575	180	150	905	575	180	100	855	575	80	50	705
COMMON	GRATING FLOOR	—	—		195	*130	—	*325	195	*130	—	*325	195	*130	—	*325	195	*60	—	*255
	STAIR	—	—		300	*130	—	*430	300	*130	—	*430	300	*130	—	*430	300	*60	—	*360
	CHECKERED PLATE FLOOR	95	100	195	95	100	—	195	95	100	—	195	95	100	—	195	95	100	—	195

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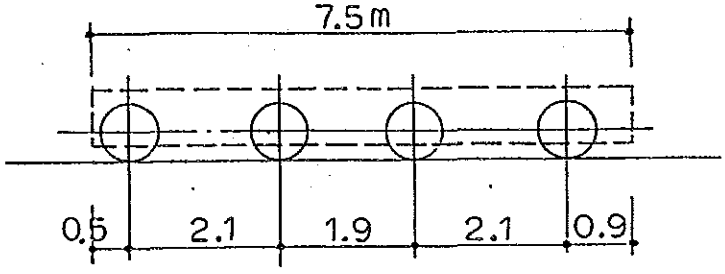
7.3 Crane Load

1. Design Condition

1.1 Overhead crane

Dead load : 45.0 ton (including 16.5 ton trolley)
Main hook : 60.0 ton
Auxiliary hook : 15.0 ton

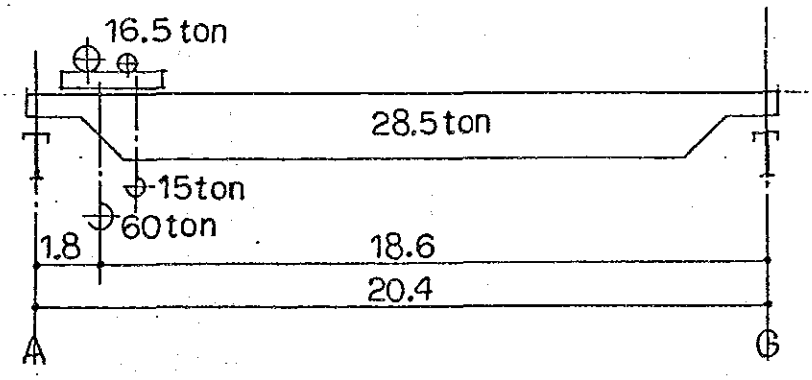
The wheel span is assumed to be as illustrated in the following diagram according to the experience.



1.2 The beam for the crane girder will be a simple beam each for 6.8 m span and 10.0 m span.

1.3 Maximum wheel load (P)

Crane span , $\ell = 20.4$ m



When

$$R_A = (60.0 + 16.5) \times \frac{18.6}{20.4} + \frac{1}{2} \times 28.5 = 84.0 \text{ ton}$$

$$R_B = (60.0 + 16.5) \times \frac{1.8}{20.4} + \frac{1}{2} \times 28.5 = 21.0 \text{ ton}$$

The maximum wheel load (A) per wheel becomes $84.0/4 = 21.0$ ton. Since the impact factor is 120%, the design wheel load is $2.1 \times 1.2 = 25.2$ ton / wheel.

7.2 WIND LOAD

$F_w = A \cdot C \cdot q$

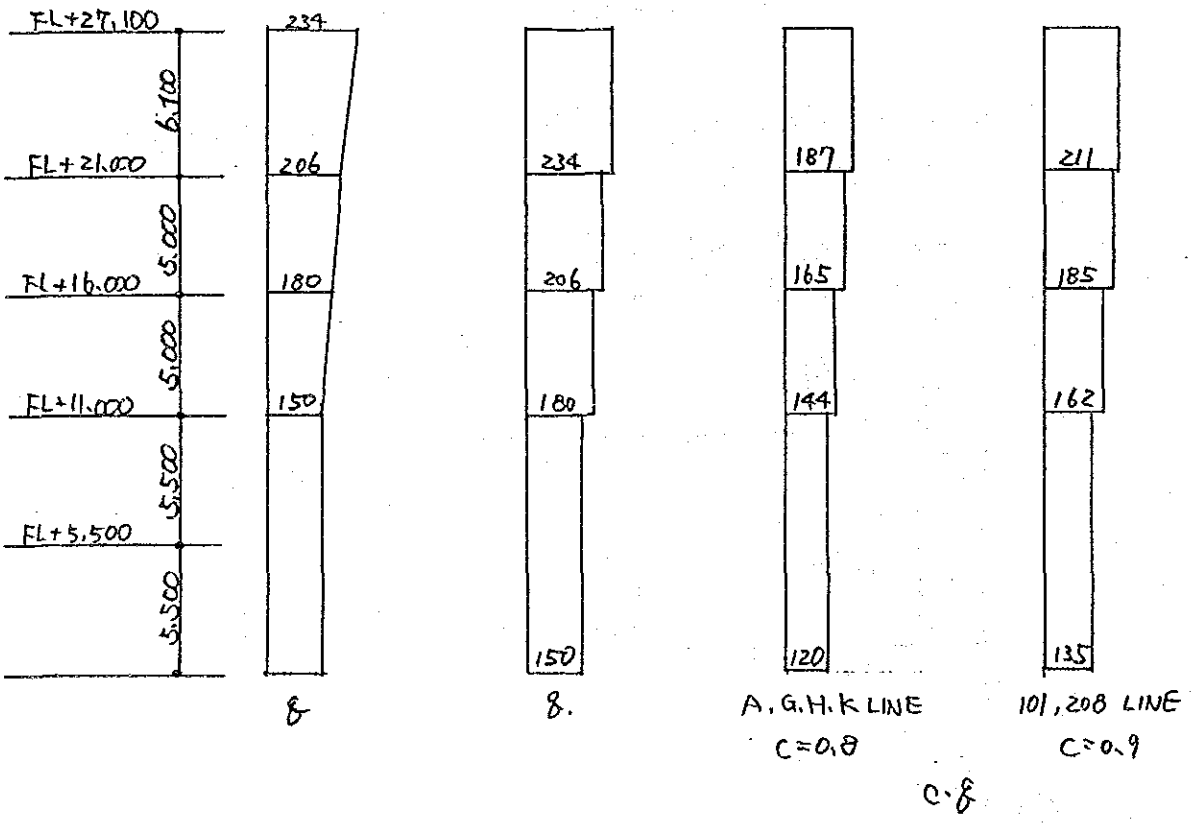
A: Projected area of structure (m^2)

C: Shape factor

H: Height (m)

$q = 150$ kg/m² $H \leq 10m$

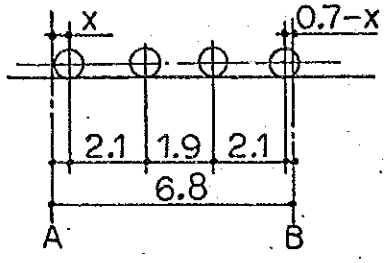
$q = 45\sqrt{H}$ $H > 10m$



2. Stress analysis

2.1 6.8m span

The stress becomes maximum in the case of the following diagram (four wheels are located on 6.8m span).



the stress of beam due to crane operation on simple beam "AB" becomes:

$$R_A = \frac{P}{6.8}(15.0 - 4X)$$

$$R_B = \frac{P}{6.8}(12.2 + 4X)$$

and the maximum bending moment becomes:

$$M_{max} = \left\{ \frac{15.0-4X}{6.8}(2.1+X) - 2.1 \right\} P$$

$$= -0.588(X^2 - 0.97X - 4.31)P$$

M becomes maximum when $X = 0.485$ and P is 25.2 ton. Then, the maximum bending moment of beam becomes 67.3 t·m (vertical) and 5.6 t·m (horizontal), respectively.

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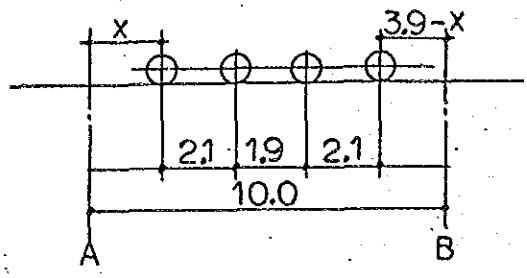
2.2 10.0 m span

The stress becomes maximum in the case of the following diagram (four wheels are located on 10.0m span).



The stress of beam due to crane operation on simple beam "AB" is:

$$R_A = \frac{P}{10}(27.8-4X) \quad , \quad R_B = \frac{P}{10}(12.2+4X)$$

$$M_{max} = \left\{ \frac{27.8-4X}{10.0}(2.1+X) - 2.1 \right\} P$$

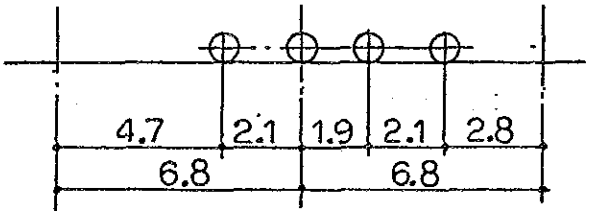
$$= -0.5(X^2 - 2.24X - 12.76)P$$

Therefore, the bending moment becomes maximum when $X = 2.425$, and the maximum vertical moment becomes 155.1 t·m (vertical) and 12.9 t·m (horizontal), respectively.

2.3 Maximum reaction against colum due to wheel load

(1) In case of 6.8 m span

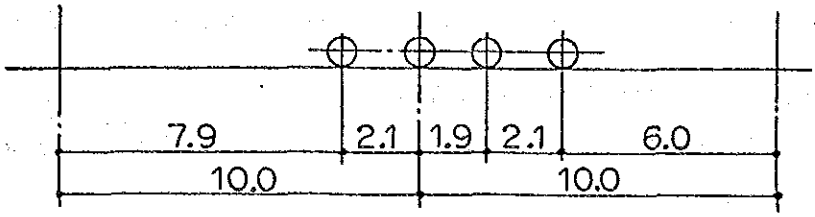
The reaction becomes maximum in the case of the following diagram:



$$N = \frac{P}{6.8} \times (4.7+6.8+4.9+2.8)$$

$$= 2.824 \cdot P$$

(2) In case of 10.0m span
The reaction becomes maximum in the case of the following diagram:



$$N = \frac{P}{10.0}(7.9 + 10.0 + 8.1 + 6.0)$$

$$= 3.2 \times P$$

2.4 Reaction against column due to dead load

$$R_A = 16.5 \times \frac{18.6}{20.4} + \frac{1}{2} \times 28.5 = 29.3 \text{ ton}$$

$$R_B = 16.5 \times \frac{1.8}{20.4} + \frac{1}{2} \times 28.5 = 15.7 \text{ ton}$$

(1) In case of 6.8m span
Reaction for foundation design:

$P_A = 2.824 \times \frac{29.3}{4} = 20.7$ ton, $P_B = 2.824 \times \frac{15.7}{4} = 11.1$ ton

Reaction for column design (vertical):

$20.7 \times 1.2 = 24.8$ ton, $11.1 \times 1.2 = 13.3$ ton

Reaction for column design (horizontal):

$20.7 \times 0.1 = 2.1$ ton, $11.1 \times 0.1 = 1.1$ ton

Force in travelling direction:

$20.7 \times 0.15 = 3.1$ ton $11.1 \times 0.15 = 1.7$ ton

(2) In case of 10.0m span

Reaction for foundation design:

$P_A = 3.2 \times \frac{29.3}{4} = 23.4$ ton, $P_B = 3.2 \times \frac{15.7}{4} = 12.6$ ton

Reaction for column design (vertical) :

$23.4 \times 1.2 = 28.1$ ton , $12.6 \times 1.2 = 15.1$ ton

Reaction for column design (horizontal) :

$23.4 \times 0.1 = 2.3$ ton , $12.6 \times 0.1 = 1.3$ ton

Force in travelling direction :

$23.4 \times 0.15 = 3.5$ ton , $12.6 \times 0.15 = 1.9$ ton

2.5 Reaction against column due to lifted load

(1) In case of 6.8 m span

Reaction for foundation design :

$P_A = 2.824 \times \frac{84.0}{4} = 59.3$ ton, $P_B = 2.824 \times \frac{21.0}{4} = 14.8$ ton

Reaction for column design (vertical) :

$59.3 \times 1.2 = 71.2$ ton, $14.8 \times 1.2 = 17.8$ ton

Reaction for column design (horizontal) :

$59.3 \times 0.1 = 5.9$ ton , $14.8 \times 0.1 = 1.5$ ton

Force in travelling direction :

$59.3 \times 0.15 = 8.9$ ton , $14.8 \times 0.15 = 2.2$ ton

(2) In case of 10.0 m span

Reaction for foundation design :

$P_A = 8.2 \times \frac{84.0}{4} = 67.2$ ton, $P_B = 3.2 \times \frac{21.0}{4} = 16.8$ ton

Reaction for column design (vertical) :

$67.2 \times 1.2 = 80.6$ ton , $16.8 \times 1.2 = 20.2$ ton

Reaction for column design (horizontal) :

$67.2 \times 0.1 = 6.7$ ton , $16.8 \times 0.1 = 1.7$ ton

Force in travelling direction :

$67.2 \times 0.15 = 10.1$ ton $16.8 \times 0.15 = 2.5$ ton

Ⅱ. Design of Main Building

本館設計

1. Calculation of Main Building (本館の荷重計算)　　SHEET 30 OF

NOTE : UW --- UNIT WEIGHT [単位荷重]
PA --- FOR PARMANENT CONDITION [長期]
SE --- FOR SEISMIC CONDITION [地震時]
ML --- MACHINE LOAD [機械荷重]

1.1 COLUMN AXIAL LOAD (1) [柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
A-101	ROOF	SLAB	A=11.6×4.0= 46.4	0.595	0.535		27.6	24.8
	FL+27.1	PARAPET	L=11.6+4.0= 15.6	0.12			1.9	1.9
	∫	SIDING	A=15.6×(1.8+0.9)+6.85×3= 71.6	0.045			3.2	3.2
	FL+21.0	COLUMN	L= 6.1	0.2			1.2	1.2
	h=6.1	TRUSS	L= 11.0	0.25			2.8	2.8
							36.7	33.9
	FL+21.0	SIDING	A=6.85×10.0= 68.5	0.045			3.1	3.1
	∫	COLUMN	L= 10.0	0.25			2.5	2.5
	FL+11.0	CRANE GIRDER	L= 4.0	0.35			1.4	1.4
	h=10.0						7.0	7.0
							(43.7)	(40.9)
	FL+11.0	SLAB	A=2.85×4.0= 11.4	2.225	0.8		25.4	9.1
	∫	COLUMN	L= 5.5	0.25			1.4	1.4
	FL+5.5						26.8	10.5
	h=5.5						(70.5)	(51.4)
	FL+5.5	SLAB	A= 11.4	1.225	1.15		14.0	13.1
	∫	P.C. PANEL	A=6.85×5.5= 37.7	0.29			10.9	10.9
	FL±0	COLUMN	L= 5.5	0.25			1.4	1.4
							26.3	25.4
							(96.8)	(76.8)
A-102	ROOF	SLAB	A=11.6×6.8= 78.9	0.595	0.535		46.9	42.2
	FL+27.1	PARAPET	L= 6.8	0.12			0.8	0.8
	∫	SIDING	A=6.8×(6.1+0.9)= 47.6	0.045			2.1	2.1
	FL+21.0	COLUMN	L= 6.1	0.2			1.2	1.2
	h=6.1	TRUSS	L= 11.0	0.25			2.8	2.8
							53.8	49.1
	FL+21.0	SIDING	A=6.8×10.0= 68.0	0.045			3.1	3.1
	∫	COLUMN	L= 10.0	0.25			2.5	2.5
	FL+11.0	CRANE GIRDER	L= 6.8	0.35			2.4	2.4
	h=10.0						8.0	8.0
							(61.8)	(57.1)
	FL+11.0	SLAB	A=2.85×6.8= 19.4	2.225	0.8		43.2	15.5
	∫	COLUMN	L= 5.5	0.25			1.4	1.4
	FL+5.5						44.6	16.9
	h=5.5						(106.4)	(74.0)
	FL+5.5	SLAB	A= 19.4	1.225	1.15		23.8	22.3
	∫	P.C. PANEL	A=6.6×5.5= 37.4	0.29			10.8	10.8
	FL±0	COLUMN	L= 5.5	0.25			1.4	1.4
							36.0	34.5
							(142.4)	(108.5)

NOTE : UW --- UNIT WEIGHT [単位荷重]
PA --- FOR PARMANENT CONDITION [長期]
SE --- FOR SEISMIC CONDITION [地震時]
ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (2)
[柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
A-103	FL+29.1 ~ FL+21.0		SAME AS A-102				53.8	49.1
	FL+21.0 ~ FL+11.0		SAME AS A-102				8.0 (61.8)	8.0 (57.1)
	FL+11.0 ~ FL+5.5		SAME AS A-102				44.6 (106.4)	16.9 (74.0)
	FL+5.5 ~ FL±0		SAME AS A-102				36.0 (142.4)	34.5 (108.5)
A-104	FL+27.1 ~ FL+21.0		SAME AS A-102				53.8	49.1
	FL+21.0 ~ FL+11.0		SAME AS A-102				8.0 (61.8)	8.0 (57.1)
	FL+11.0 ~ FL+5.5	SLAB	A= 2.85×3.4 = 9.7	2.225	0.8		21.6	7.8
		GRATING	A= 9.7	0.325	0.225		3.2	2.2
		COLUMN	L= 5.5	0.25			1.4	1.4
							26.2 (88.0)	11.4 (68.5)
	FL+5.5 ~ FL±0	GRATING	A= 2.85×6.8 = 19.4	0.325	0.225		6.3	4.4
		P.C. PANEL	A= 6.8×5.5 = 37.4	0.29			10.8	10.8
		COLUMN	L= 5.5	0.25			1.4	1.4
							18.5 (106.5)	16.6 (85.1)
A-105	FL+27.1 ~ FL+21.0		SAME AS A-102				53.8	49.1
	FL+21.0 ~ FL+11.0		SAME AS A-102				8.0 (61.8)	8.0 (57.1)
	FL+11.0 ~ FL+5.5	SLAB	A= 2.85×3.4 = 9.7	2.225	0.8		21.6	7.8
		GRATING	A= 9.7	0.325	0.225		3.2	2.2
		EXC. CUBICLE	1/4×4.0				1.0	1.0
		COLUMN	L= 5.5	0.25			1.4	1.4
							27.2 (89.0)	12.4 (69.5)
	FL+5.5 ~ FL±0		SAME AS A-104				18.5 (107.5)	16.6 (86.1)

3X

NOTE : UW --- UNIT WEIGHT [単位荷重]
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SE --- FOR SEISMIC CONDITION [地震時]
ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (3) [柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
A-106	FL+27.1 S FL+21.0		SAME AS A-102				53.8	49.1
	FL+21.0 S FL+11.0		SAME AS A-102				8.0 (61.8)	8.0 (57.1)
	FL+11.0 S FL+5.5	SLAB	A=2.85×6.8= 19.4	2.225	0.8		43.2	15.5
		EXC. CUBICLE	Y4×4.0				1.0	1.0
		COLUMN	L= 5.5	0.25			1.4	1.4
							45.6 (107.4)	17.9 (75.0)
	FL+5.5 S FL±0	SLAB	A= 19.4	2.225	1.15		23.8	22.3
		I.P.B.	L=2.3×3= 6.9	1.0			6.9	6.9
		P.C. PANEL	A=6.8×5.5= 37.4	0.29			10.8	10.8
		COLUMN	L= 5.5	0.25			1.4	1.4
							42.9 (150.3)	41.4 (116.4)
A-107	FL+27.1 S FL+21.0	SLAB	A=11.6×8.4= 97.4	0.295	0.535		58.0	52.1
		PARAPET	L= 8.4	0.12			1.0	1.0
		SIDING	A=8.4×(6.1+0.9)= 58.8	0.045			2.6	2.6
		COLUMN	L= 6.1	0.2			1.2	1.2
		TRUSS	L= 11.0	0.25			2.8	2.8
							65.6	59.7
	FL+21.0 S FL+11.0	SIDING	A=8.4×10.0= 84.0	0.045			3.8	3.8
		COLUMN	L= 10.0	0.25			2.5	2.5
		CRANE GIRDER	L= 8.4	0.35			2.9	2.9
							9.2 (74.8)	9.2 (68.9)
	FL+11.0 S FL+5.5	SLAB	A=2.85×8.4= 23.9	2.225	0.8		53.2	19.1
		COLUMN	L= 5.5	0.25			1.4	1.4
							54.6 (129.4)	20.5 (89.4)
	FL+5.5 S FL±0	SLAB	A= 23.9	2.225	1.15		29.3	27.5
		P.C. PANEL	A=8.4×5.5= 46.2	0.29			13.4	13.4
		COLUMN	L= 5.5	0.25			1.4	1.4
							44.1 (173.5)	42.3 (131.7)

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (4) [柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
A-108	FL+27.1 ~ FL+21.0	SLAB	A=11.6×10.0= 116.0	0.595	0.535		69.0	62.1
		PARAPET	L= 10.0	0.12			1.2	1.2
		SIDING	A=10.0×(6.1+0.9)= 70.0	0.045			3.2	3.2
		COLUMN	L= 6.1	0.2			1.2	1.2
		TRUSS	L= 11.0	0.25			2.8	2.8
							77.4	70.5
	FL+21.0 ~ FL+11.0	SIDING	A=10.0×10.0= 100.0	0.045			4.5	4.5
		COLUMN	L= 10.0	0.25			2.5	2.5
		CRANE GIRDER	L= 10.0	0.35			3.5	3.5
							10.5	10.5
							(87.9)	(81.0)
	FL+11.0 ~ FL+5.5	SLAB	A=2.85×5.5= 15.7	1.925	1.35		22.4	21.2
		HAND RAIL	L= 2.85	0.035			0.1	0.1
		COLUMN	L= 5.5	0.25			1.4	1.4
		SHUTTER	A=5.0×10.0= 50.0	0.1			5.0	5.0
							28.9	27.7
							(116.8)	(108.7)
	FL+5.5 ~ FL±0	STAIR	A= 15.7	0.43	0.36		6.8	5.7
		HAND RAIL	L= 2.85	0.035			0.1	0.1
		COLUMN	L= 5.5	0.25			1.4	1.4
		P.C. PANEL	A=5.0×5.5= 27.5	0.29			8.0	8.0
							16.8	15.2
							(133.1)	(123.9)
A-201		SAME AS A-108						
A-202		SAME AS A-107						
A-203		SAME AS A-106						
A-204		SAME AS A-105						
A-205		SAME AS A-104						
A-206		SAME AS A-103						
A-207		SAME AS A-102						
A-208		SAME AS A-101						

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (5) [柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
B-101	FL+11.0 ~ FL+5.5	SIDING	A=5.25×14.3= 75.1	0.045			3.4	3.4
		SLAB	A=5.25×4.0= 21.0	2.225	0.8		46.7	16.8
		COLUMN	L= 5.5	0.2			1.1	1.1
							51.2	21.3
	FL+5.5 ~ FL±0	SLAB	A= 21.0	1.225	1.15		25.7	24.2
		P.C.PANEL	A=5.25×5.5= 28.9	0.29			8.4	8.4
		COLUMN	L= 5.5	0.2			1.1	1.1
							35.2	33.7
							(86.4)	(55.0)
B-102	FL+11.0 ~ FL+5.5	SLAB	A=5.25×6.8= 35.7	2.225	0.8		79.4	28.6
		COLUMN	L= 5.5	0.2			1.1	1.1
							80.5	29.7
	FL+5.5 ~ FL±0	SLAB	A= 35.7	1.225	1.15		43.7	41.1
		COLUMN	L= 5.5	0.2			1.1	1.1
							44.8	42.2
							(125.3)	(71.9)
B-103	FL+11.0 ~ FL+5.5	SLAB	A=3.3×6.8= 22.4	2.225	0.8		49.8	17.9
		COLUMN					1.1	1.1
							50.9	19.0
	FL+5.5 ~ FL±0	SLAB	A= 22.4	1.225	1.15		27.4	25.8
		COLUMN					1.1	1.1
							28.5	26.9
							(79.4)	(45.9)
B-104	FL+11.0 ~ FL+5.5	SLAB	A=3.3×3.4= 11.2	2.225	0.8		29.9	9.0
		GRATING	A= 11.2	0.325	0.255		3.6	2.9
		COLUMN					1.1	1.1
							29.6	13.0
	FL+5.5 ~ FL±0	GRATING	A=2.0×6.8= 13.6	0.325	0.255		4.4	3.5
		COLUMN					1.1	1.1
							5.5	4.6
							(35.1)	(17.6)
B-105	FL+11.0 ~ FL+5.5	SLAB	A= 11.2	2.225	0.8		29.9	9.0
		GRATING	A= 11.2	0.325	0.255		3.6	2.9
		EXC.CUBICLE	V4×4.0				1.0	1.0
		COLUMN					1.1	1.1
							30.6	14.0
	FL+5.5 ~ FL±0							
			SAME AS B-104				5.5	4.6
							(36.1)	(18.6)

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (6)
[柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
B-106	FL+11.0 ~ FL+5.5	SLAB	A=3.3×6.8= 22.4	2.225	0.8		49.8	17.9
		ELEC. CUBICLE	1/4 × 4.0				1.0	1.0
		COLUMN					1.1	1.1
							51.9	20.0
	FL+5.5 ~ FL±0	SLAB	A= 22.4	1.225	1.15		27.4	25.8
		I.P.B	L=5.3×3= 15.9	1.0			15.9	15.9
		COLUMN					1.1	1.1
							44.4	42.8
							(96.3)	(62.8)
B-107	FL+11.0 ~ FL+5.5	SLAB	A=3.3×3.0+5.25×5.4= 38.3	2.225	0.8		85.2	30.6
		COLUMN					1.1	1.1
							86.3	31.7
	FL+5.5 ~ FL±0	SLAB	A= 38.3	1.225	1.15		46.9	44.0
		NO.1 M/C	1/2 × 18.5				9.3	9.3
		COLUMN					1.1	1.1
							57.3	54.4
							(143.6)	(86.1)
B-108	FL+11.0 ~ FL+5.5	SLAB	A=4.0×5.4= 21.6	2.225	0.8		48.1	17.3
		STAIR	A=1.2×5.9= 6.5	0.43	0.36		2.8	2.3
		HAND RAIL	L= 5.25	0.035			0.2	0.2
		COLUMN					1.1	1.1
							52.2	20.9
	FL+5.5 ~ FL±0	SLAB	A= 21.6	1.225	1.15		26.5	24.8
		STAIR	A= 6.5	0.43	0.36		2.8	2.3
		HANDRAIL	L= 5.25	0.035			0.2	0.2
		COMMON M/C	1/2 × 16				8.0	8.0
		COLUMN					1.1	1.1
							38.6	36.4
							(90.8)	(57.3)
B-201	FL+11.0 ~ FL+5.5		SAME AS B-108				52.2	20.9
	FL+5.5 ~ FL±0	SLAB	A= 21.6	1.225	1.15		26.5	24.8
		STAIR	A= 6.5	0.43	0.36		2.8	2.3
		HAND RAIL	L= 5.25	0.035			0.2	0.2
		COLUMN					1.1	1.1
							30.6	28.4
							(82.8)	(49.3)
B-202			SAME AS B-107					
B-203			SAME AS B-106					
B-204			SAME AS B-105					

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (7)
[柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
B-205			SAME AS B-104					
B-206			SAME AS B-103					
B-207			SAME AS B-102					
B-208			SAME AS B-101					
D-101	FL+11.0 ~ FL+5.5	SIDING	A=6.0x14.3= 85.8	0.045			3.9	3.9
		SLAB	A=6.0x4.0= 24.0	1.425	1.35		34.2	32.4
		M.S.P.	L= 5.0	1.0			5.0	5.0
		H.R.P.	L= 5.0	1.0			5.0	5.0
		COLUMN					1.1	1.1
							49.2	47.4
	FL+5.5 ~ FL±0	SLAB	A= 24.0	1.225	1.15		29.4	27.6
		P.C. PANEL	A=6.0x5.5= 33.0	0.29			9.6	9.6
		COLUMN					1.1	1.1
							90.1	38.3
							(89.3)	(85.7)
D-102	FL+11.0 ~ FL+5.5	SLAB (O.H)	A=6.0x2.3= 13.8	2.225	0.8		30.7	11.0
		SLAB (OTHERS)	A=6.0x3.4= 20.4	1.425	1.35		29.1	27.5
		GRATING	A=6.0x2.0= 12.0	0.325	0.255		3.9	3.1
		M.S.P.	L= 6.8	1.0			6.8	6.8
		H.R.P.	L= 6.8	1.0			6.8	6.8
		COLUMN					1.1	1.1
							78.4	56.3
	FL+5.5 ~ FL±0	SLAB	A=6.0x7.7= 46.2	1.225	1.15		56.6	53.1
		COLUMN					1.1	1.1
							57.7	54.2
							(136.1)	(110.5)
D-107	FL+11.0 ~ FL+5.5	SLAB	A=6.0x6.0= 36.0	2.225	0.8		80.1	28.8
		COLUMN					1.1	1.1
							81.2	29.9
	FL+5.5 ~ FL±0	SLAB	A= 36.0	1.225	1.15		44.1	41.4
		No.1 W/C	1/2 x 18.5				9.3	9.3
		COLUMN					1.1	1.1
							54.5	51.8
							(135.7)	(81.7)

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (8) [柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
D-108	FL+11.0 ~ FL+5.5	SLAB (O.H)	A=6.0×5.4= 32.4	2.225	0.8		72.1	25.9
		SLAB (OTHER)	A=6.0×4.6= 27.6	1.425	1.35		39.3	37.3
		COLUMN					1.1	1.1
		HAND RAIL	L=2.0+5.0= 8.0	0.035			0.3	0.3
							112.8	64.6
	FL+5.5 ~ FL±0	SLAB	A=32.4+27.6= 60.0	1.225	1.15		73.5	69.0
		COMMON M/C	1/2×16.0				8.0	8.0
		COMMON P/C	1/2×5.5				2.8	2.8
		HAND RAIL	L= 8.0	0.035			0.3	0.3
		COLUMN					1.1	1.1
							85.7	81.2
							(198.5)	(145.8)
D-201	FL+11.0 ~ FL+5.5		SAME AS D-108				112.8	64.6
	FL+5.5 ~ FL±0	SLAB	A= 60.0	1.225	1.15		73.5	69.0
		HAND RAIL	L= 8.0	0.035			0.3	0.3
		COLUMN					1.1	1.1
							74.9	70.4
							(187.7)	(135.0)
D-202			SAME AS D-107					
D-207			SAME AS D-102					
D-208			SAME AS D-101					
F-101	FL+11.0 ~ FL+5.5	SIDING	A=5.75×14.3= 82.2	0.045			3.7	3.7
		SLAB	A=5.75×4.0= 23.0	1.425	1.35		32.8	31.1
		C.R.P	L= 5.0	1.0			5.0	5.0
		COLUMN					1.1	1.1
							42.6	40.9
	FL+5.5 ~ FL±0	SLAB	A= 23.0	1.225	1.15		28.2	26.5
		P.C. PANEL	A=5.75×5.5= 31.6	0.29			9.2	9.2
		COLUMN					1.1	1.1
							38.5	36.8
							(81.1)	(77.7)
F-102	FL+11.0 ~ FL+5.5	SLAB (O.H)	A=5.75×3.4= 19.6	2.225	0.8		43.6	15.7
		SLAB (OTHER)	A= 19.6	1.425	1.35		27.9	26.5
		COLUMN					1.1	1.1
		C.R.P	L= 6.8	1.0			6.8	6.8
							79.4	50.1
	FL+5.5 ~ FL±0	SLAB	A=5.75×6.8= 39.1	1.225	1.15		47.9	45.0
		COLUMN					1.1	1.1
							49.0	56.1
							(128.4)	(106.2)

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (9) [柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
F-103	FL+11.0 ~ FL+5.5	SLAB	A=5.75×1.0+3.75×5.8= 27.5	2.225	0.8		61.2	22.0
		C.R.P	L= 6.8	1.0			6.8	6.8
		COLUMN					1.1	1.1
							69.1	29.9
	FL+5.5 ~ FL±0	SLAB	A= 27.5	1.225	1.15		33.7	31.6
		COLUMN					1.1	1.1
							34.8	32.7
							(103.9)	(62.6)
F-104	FL+11.0 ~ FL+5.5	SLAB	A=3.75×3.4= 12.8	2.225	0.8		28.5	10.2
		GRATING	A= 12.8	0.325	0.255		4.2	3.3
		COLUMN					1.1	1.1
							33.8	14.6
	FL+5.5 ~ FL±0	GRATING	A=0.75×6.8= 25.5	0.325	0.255		8.3	6.5
		COLUMN					1.1	1.1
							9.4	7.6
							(43.2)	(22.2)
F-105			SAME AS F-104					
F-106	FL+11.0 ~ FL+5.5	SLAB	A=0.75×3.4+1.25×3.4= 17.0	2.225	0.8		37.8	13.6
		GRATING	A=1.5×3.4= 5.1	0.325	0.255		1.7	1.3
		COLUMN					1.1	1.1
							40.6	16.0
	FL+5.5 ~ FL±0		SAME AS F-103				34.8	32.7
							(75.4)	(48.7)
F-107	FL+11.0 ~ FL+5.5	SLAB	A=3.75×2.4+5.75×6.0= 43.5	2.225	0.8		96.8	34.8
		COLUMN					1.1	1.1
							97.9	35.9
	FL+5.5 ~ FL±0	SLAB	A= 43.5	1.225	1.15		53.3	50.0
		NO.2 P/C	1/2×16.5				8.3	8.3
		COLUMN					1.1	1.1
							62.7	59.4
							(160.6)	(95.3)
F-108	FL+11.0 ~ FL+5.5	SLAB(O.H)	A=5.75×5.0= 28.8	2.225	0.8		64.1	23.0
		SLAB(OTHER)	A= 28.8	1.425	1.35		41.0	38.9
		COLUMN					1.1	1.1
							106.2	63.0
	FL+5.5 ~ FL±0	SLAB	A=5.75×10.0= 57.5	1.225	1.15		70.4	66.1
		COMMON P/C	1/2×(5.5+18.5)				12.0	12.0
		COLUMN					82.4	78.1
							(188.6)	(141.1)

NOTE : UW --- UNIT WEIGHT [単位荷重]
PA --- FOR PARMANENT CONDITION [長期]
SE --- FOR SEISMIC CONDITION [地震時]
ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (10)
[柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
F-201	FL+11.0 ~ FL+5.5		SAME AS F-108				106.2	63.0
	FL+5.5 ~ FL±0	SLAB	A=5.75×10.0= 57.5	1.225	1.15		70.4	66.1
		C/C	1/2×4.0				2.0	2.0
		COLUMN					1.1	1.1
							73.5	69.2
							(179.7)	(132.2)
F-202			SAME AS F-107					
F-203	FL+11.0 ~ FL+5.5	SLAB	A=3.75×6.8= 25.5	2.225	0.8		56.7	20.4
		COLUMN					1.1	1.1
							57.8	21.5
	FL+5.5 ~ FL±0		SAME AS F-106				34.8	32.7
							(92.6)	(54.2)
F-204			SAME AS F-104					
F-205			SAME AS F-105					
F-206	FL+11.0 ~ FL+5.5	SLAB	A=5.75×10+3.75×2.4+2.25×3.4= 22.4	2.225	0.8		49.8	17.9
		GRATING	A=1.5×3.4= 5.1	0.325	0.255		1.7	1.3
		C.R.P.	L= 6.8	1.0			6.8	6.8
		COLUMN					1.1	1.1
							59.4	27.1
	FL+5.5 ~ FL±0		SAME AS F-103				34.8	32.7
							(94.2)	(59.8)
F-207			SAME AS F-102					
F-208			SAME AS F-101					

NOTE : UW --- UNIT WEIGHT [単位荷重]
PA --- FOR PARMANENT CONDITION [長期]
SE --- FOR SEISMIC CONDITION [地震時]
ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (11) [柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
G-101	FL+27.1 ~ FL+21.0		SAME AS A-101				36.7	33.9
	FL+21.0 ~ FL+16.0	SLAB	A=5.0×4.0= 20.0	0.635	0.535		12.7	10.7
		PARAPET	L=5.0+4.0= 9.0	0.12			1.1	1.1
		SIDING	A=7.75×5.0= 38.8	0.045			1.7	1.7
		CRANE GIRDER	L= 9.0	0.35			1.4	1.4
		COLUMN	L= 5.0	0.25			1.3	1.3
							18.2	16.2
							(54.9)	(50.1)
	FL+16.0 ~ FL+11.0	SLAB	A= 20.0	1.29	0.665		25.8	13.3
		SIDING	A=7.75×5.0= 38.8	0.045			1.7	1.7
		COLUMN					1.3	1.3
							28.8	16.3
							(83.7)	(66.4)
	FL+11.0 ~ FL+5.5	SLAB	A=7.75×4.0= 31.0	1.425	1.35		44.2	41.9
		COLUMN					1.4	1.4
							45.6	43.3
							(129.3)	(109.7)
	FL+5.5 ~ FL±0	SLAB	A= 31.0	1.225	1.15		38.0	35.7
		P.C. PANEL	A=7.75×5.5= 42.6	0.29			12.4	12.4
		COLUMN	L= 5.5	0.25			1.4	1.4
							51.8	49.5
							(181.1)	(159.2)
G-102	FL+27.1 ~ FL+21.0		SAME AS A-102				53.8	49.1
	FL+21.0 ~ FL+16.0	SLAB	A=5.0×3.4= 17.0	0.635	0.535		10.8	9.1
		SLAB (PEAK)	A= 17.0	1.035	0.69		17.6	11.7
		PARAPET	L= 6.8	0.12			0.8	0.8
		CRANE GIRDER	L= 6.8	0.35			2.4	2.4
		COLUMN					1.3	1.3
							32.9	25.3
							(86.7)	(74.4)
	FL+16.0 ~ FL+11.0	SLAB	A=5.0×6.8= 34.0	1.29	0.665		43.9	22.6
		NO.4 L.P.	1/2×11				5.5	5.5
		COLUMN					1.3	1.3
							50.7	29.4
							(137.4)	(103.8)
	FL+11.0 ~ FL+5.5	SLAB (O.H.)	A=2.75×6.8= 18.7	2.225	0.8		41.6	15.0
		SLAB (OTHER)	A=5.0×6.8= 34.0	1.425	1.35		48.5	45.9
		NO.3 L.P.	1/4×12.0				3.0	3.0
		COLUMN					1.4	1.4
							94.5	65.3
							(231.9)	(169.1)

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (12)
[柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
(G-102)	FL+5.5 ~ FL±0	SLAB	A=2.75×6.8= 52.7	1.225	1.15		64.6	60.6
		No.2 LP	1/4×12.0				3.0	3.0
		COLUMN					1.4	1.4
							69.0	65.0
							(300.9)	(234.1)
G-103	FL+27.1 ~ FL+21.0		SAME AS A-103				53.8	49.1
	FL+21.0 ~ FL+16.0	SLAB	A=5.0×6.8= 39.0	1.035	0.69		35.2	23.5
		PARAPET	L= 6.8	0.12			0.8	0.8
		CRANE GIRDER	L= 6.8	0.35			2.4	2.4
		DEAERATOR	1/4×264.0				66.0	66.0
		COLUMN					1.3	1.3
							105.7	94.0
							(159.5)	(143.1)
	FL+16.0 ~ FL+11.0		SAME AS G-102				50.7	29.4
							(210.2)	(172.5)
	FL+11.0 ~ FL+5.5		SAME AS G-102				94.5	65.3
							(304.7)	(237.8)
	FL+5.5 ~ FL±0		SAME AS G-102				69.0	65.0
							(373.7)	(302.8)
G-104	FL+27.1 ~ FL+21.0		SAME AS A-104				53.8	49.1
	FL+21.0 ~ FL+16.0		SAME AS G-103				105.7	94.0
							(159.5)	(143.1)
	FL+16.0 ~ FL+11.0	SLAB	A=5.0×6.8= 34.0	1.29	0.665		43.9	22.6
		No.8 HP	1/4×50.0				12.5	12.5
		COLUMN					1.3	1.3
							57.7	36.4
							(217.2)	(179.5)
	FL+11.0 ~ FL+5.5	SLAB (O.H.)	A=2.75×3.4= 9.4	2.225	0.8		20.9	7.5
		SLAB (OTHER)	A=5.0×6.8= 34.0	1.925	1.35		65.5	45.9
		GRATING	A= 9.4	0.325	0.255		3.1	2.4
		No.7 HP	1/2×45				22.5	22.5
		COLUMN					1.4	1.4
							96.4	79.7
							(313.6)	(259.2)
	FL+5.5 ~ FL±0	SLAB	A=5.0×6.8+2.75×0.9= 36.5	1.225	1.15		44.7	42.0
		GRATING	A=2.75×5.9= 16.2	0.325	0.255		5.3	4.1
		COLUMN					1.4	1.4
							51.4	47.5
							(365.0)	(306.7)

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NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (13)
[柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
G-105	FL+27.1 ~ FL+21.0		SAME AS A-105				53.8	49.1
	FL+21.0 ~ FL+16.0		SAME AS G-102				32.9 (86.7)	25.3 (74.4)
	FL+16.0 ~ FL+11.0		SAME AS G-104				57.7 (144.4)	36.4 (110.8)
	FL+11.0 ~ FL+5.5		SAME AS G-104				96.4 (240.8)	79.7 (190.5)
	FL+5.5 ~ FL±0		SAME AS G-104				51.4	42.5
		No.1 C/C	1/2 x 7.0				3.5	3.5
							54.9 (295.7)	51.0 (241.5)
G-106	FL+27.1 ~ FL+21.0		SAME AS A-106				53.8	49.1
	FL+21.0 ~ FL+16.0	SLAB	A=5.0x6.8= 34.0	0.635	0.535		21.6	18.2
		PARAPET	L= 6.8	0.12			0.8	0.8
		CRANEGIRDER	L= 6.8	0.35			2.4	2.4
		COLUMN					1.3	1.3
							26.1 (79.9)	22.7 (71.8)
	FL+16.0 ~ FL+11.0	SLAB	A=5.0x6.8= 34.0	1.29	0.665		43.9	22.6
		COLUMN					1.3	1.3
							45.2 (125.1)	23.9 (95.7)
	FL+11.0 ~ FL+5.5	SLAB (O.H.)	A=2.75x3.4= 9.4	2.225	0.8		20.9	7.5
		SLAB (OTHER)	A=5.0x6.8+1.25x3.4= 38.3	1.925	1.35		59.6	51.7
		GRATING	A=1.5x3.4= 5.1	0.325	0.255		1.7	1.3
		COLUMN					1.4	1.4
							28.6 (203.7)	61.9 (157.6)
	FL+5.5 ~ FL±0	SLAB	A=2.75x6.8= 52.7	1.225	1.15		64.6	60.6
		No.1 C/C	1/2 x 7.0				3.5	3.5
		COLUMN					1.4	1.4
							69.5 (273.2)	65.5 (223.1)

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (14)
[柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
G-107	FL+27.1 ~ FL+21.0	SAME AS A-107					65.6	59.7
	FL+21.0 ~ FL+16.0	SLAB	A=5.0×8.4= 42.0	0.635	0.535		26.7	22.5
		PARAPET	L= 8.4	0.12			1.0	1.0
		CRANE GIRDER	L= 8.4	0.35			2.9	2.9
		COLUMN					1.3	1.3
							31.9	27.7
							(97.5)	(87.4)
	FL+16.0 ~ FL+11.0	SLAB	A=5.0×3.4= 17.0	0.71	0.61		12.1	10.4
		BLOCK WALL	A=5.0×(5.0+5.0)= 50.0	0.4			20.0	20.0
		COLUMN					1.3	1.3
		SLAB (N<)	A=5.0×5.0= 25.0	0.985			24.6	24.6
							58.0	56.3
							(155.5)	(143.7)
	FL+11.0 ~ FL+5.5	SLAB (O.H)	A=7.75×5.0+2.75×3.4= 48.1	2.225	0.8		107.0	38.5
		SLAB (OTHER)	A=5.0×3.4= 17.0	1.425	1.35		24.2	23.0
		COLUMN					1.4	1.4
							132.6	62.9
							(288.1)	(206.6)
	FL+5.5 ~ FL±0	SLAB	A=7.75×8.4= 65.1	1.225	1.15		79.7	74.9
		1-3 C/C & N1.2 P/C	9.0+1/2×18.5				12.3	12.3
		COLUMN					1.4	1.4
							93.4	88.6
							(381.5)	(295.2)
G-108	FL+27.1 ~ FL+21.0	SAME AS A-108					77.4	70.5
	FL+21.0 ~ FL+16.0	SLAB	A=5.0×10.0= 50.0	0.635	0.535		31.8	26.8
		PARAPET	L= 10.0	0.12			1.2	1.2
		CRANE GIRDER	L= 10.0	0.35			3.5	3.5
		COLUMN					1.3	1.3
							37.8	32.8
							(115.2)	(103.3)
	FL+16.0 ~ FL+11.0	SLAB	A= 50.0	0.985			49.3	49.3
		BLOCK WALL	A=5.0×10.0= 50.0	0.4			20.0	20.0
		COLUMN					1.3	1.3
							70.6	70.6
							(185.8)	(173.9)
	FL+11.0 ~ FL+5.5	SLAB	A=7.75×10.0= 77.5	2.225	0.8		172.4	62.0
		COLUMN					1.4	1.4
							173.8	63.4
							(359.6)	(237.3)
	FL+5.5 ~ FL±0	SLAB	A= 77.5	1.225	1.15		94.9	89.1
		COMMON P/C	1/2×18.5				9.3	9.3
		COLUMN					1.4	1.4
							105.6	99.8
							(465.2)	(337.1)

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (15)
[柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
G-201	FL+27.1 ~ FL+21.0		SAME AS G-108				77.4	70.5
	FL+21.0 ~ FL+16.0		SAME AS G-108				37.8 (115.2)	32.8 (103.3)
	FL+16.0 ~ FL+11.0		SAME AS G-108				70.6 (185.8)	70.6 (173.9)
	FL+11.0 ~ FL+5.5		SAME AS G-108				173.8 (359.6)	63.4 (237.3)
	FL+5.5 ~ FL±0	SLAB COLUMN	A= 77.5	1.225	1.15		94.9 1.4 96.3 (455.9)	89.1 1.4 90.5 (327.8)
G-202	FL+27.1 ~ FL+21.0		SAME AS G-107				65.6	59.7
	FL+21.0 ~ FL+16.0		SAME AS G-107				31.9 (97.5)	27.7 (87.4)
	FL+16.0 ~ FL+11.0	SLAB STAIR BLOCK WALL COLUMN	A=5.0×5.4= 27.0 A=5.0×3.0= 15.0 A=5.0×(5.0×2+5.0)= 75.0	0.985 0.43 0.4	0.36		26.6 6.5 30.0 1.3 64.4 (161.9)	26.6 5.4 30.0 1.3 63.3 (150.7)
	FL+11.0 ~ FL+5.5	SLAB (O.H) SLAB (OTHER) STAIR COLUMN	A=5.0×2.0+2.75×8.4= 33.1 A=5.0×3.4= 17.0 A=5.0×3.0= 15.0	2.225 1.425 0.43	0.8 1.35 0.36		73.6 24.2 6.5 1.4 105.7 (267.6)	26.5 23.0 5.4 1.4 56.3 (207.0)
	FL+5.5 ~ FL±0	SLAB STAIR NO.2 P/C COLUMN	A=7.75×8.4-5.0×3.0= 50.1 A=5.0×3.0= 15.0 1/2×16.5	1.225 0.43	1.15 0.36		61.4 6.5 8.3 1.4 77.6 (345.2)	57.6 5.4 8.3 1.4 72.7 (279.7)
G-203	FL+27.1 ~ FL+21.0		SAME AS G-106				53.8	49.1
	FL+21.0 ~ FL+16.0		SAME AS G-106				26.1 (79.9)	22.7 (71.8)
	FL+16.0 ~ FL+11.0		SAME AS G-106				45.2 (125.1)	23.9 (95.7)

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (16)
[柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
G-203	FL+11.0 ~ FL+5.5		SAME AS G-102				94.5 (219.6)	65.3 (161.0)
	FL+5.5 ~ FL±0		SAME AS G-106				69.5 (289.1)	65.5 (226.5)
G-204	FL+27.1 ~ FL+21.0		SAME AS G-203				53.8	49.1
	FL+21.0 ~ FL+16.0		SAME AS G-105				32.9 (86.7)	25.3 (74.4)
	FL+16.0 ~ FL+11.0		SAME AS G-105				57.7 (144.4)	36.4 (110.8)
	FL+11.0 ~ FL+5.5		SAME AS G-103				94.5 (238.9)	65.3 (176.1)
	FL+5.5 ~ FL±0		SAME AS G-105				54.9 (293.8)	54.0 (227.1)
G-205			SAME AS G-104					
G-206	FL+27.1 ~ FL+21.0		SAME AS G-103				53.8	49.1
	FL+21.0 ~ FL+16.0		SAME AS G-103				105.7 (159.5)	94.0 (143.1)
	FL+16.0 ~ FL+11.0		SAME AS G-103				50.7 (210.2)	29.4 (172.5)
	FL+11.0 ~ FL+5.5		SAME AS G-106 No.7 HP 1/2 x 45				78.6 22.5 101.1 (311.3)	61.9 22.5 84.4 (256.9)
	FL+5.5 ~ FL±0		SAME AS G-103				69.0 (380.3)	65.0 (321.9)
G-207	FL+27.1 ~ FL+21.0		SAME AS G-102				53.8	49.1
	FL+21.0 ~ FL+16.0		SAME AS G-102				32.9 (86.7)	25.3 (74.4)
	FL+16.0 ~ FL+11.0		SAME AS G-102				50.7 (137.4)	29.4 (103.8)

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (17)
[柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
(G-207)	FL+11.0 ~ FL+5.5	SLAB (O.H)	A=2.75×6.8= 18.7	2.225	0.18		41.6	15.0
		SLAB(OTHER)	A=5.0×6.8= 39.0	1.475	1.35		48.5	45.9
		COLUMN					1.4	1.4
							91.5	62.3
							(228.9)	(166.1)
	FL+5.5 ~ FL±0						69.0	65.0
			SAME AS G-102				(297.9)	(231.1)
G-208			SAME AS G-101					
H-101	FL+21.0 ~ FL+16.0	SLAB	A=5.6×4.0= 22.4	0.595	0.535		13.3	12.0
		PARAPET	L=5.6×2+4.0= 15.2	0.12			1.8	1.8
		SIDING	L=15.2×3.0= 45.6	0.045			2.1	2.1
		STAIR	A= 22.4	0.43	0.36		9.6	8.1
		SIDING	A=5.0×(4.0-5.6)= 48.0	0.045			2.2	2.2
		COLUMN	L= 5.0	0.2			1.0	1.0
							30.0	27.2
	FL+16.0 ~ FL+11.0	STAIR	A= 22.4	0.43	0.36		9.6	8.1
		SIDING	A= 48.0	0.045			2.2	2.2
		COLUMN					1.0	1.0
							12.8	11.3
							(42.8)	(38.5)
	FL+11.0 ~ FL+5.5	STAIR	A= 22.4	0.43	0.36		9.6	8.1
		COLUMN					1.1	1.1
							10.7	9.2
							(53.5)	(47.7)
	FL+5.5 ~ FL±0	STAIR	A= 22.4	0.43	0.36		9.6	8.1
		P.C. PANEL	A=5.5×(4.0+5.6)= 52.8	0.29			15.3	15.3
		COLUMN					1.1	1.1
							26.0	24.5
							(79.5)	(72.2)
H-102	FL+21.0 ~ FL+16.0	SLAB	A=5.6×3.4= 19.0	0.635	0.535		12.1	10.2
		SLAB (DEAD)	A= 19.0	1.035	0.69		19.7	13.1
		PARAPET	L= 6.8	0.12			0.8	0.8
		SIDING	A=5.9×6.8= 40.1	0.045			1.8	1.8
		COLUMN					1.0	1.0
							35.4	26.9
	FL+16.0 ~ FL+11.0	SLAB	A=5.6×6.8= 38.1	1.29	0.665		49.1	25.3
		SIDING	A= 40.1	0.045			1.8	1.8
		COLUMN					1.0	1.0
							51.9	28.1
							(87.3)	(55.0)
	FL+11.0 ~ FL+5.5	SLAB	A= 38.1	1.425	1.35		54.3	51.4
		NO.3 L.P.	1/4×12.0				3.0	3.0
		COLUMN					1.1	1.1
							58.4	55.5
							(145.7)	(110.5)

NOTE : UW --- UNIT WEIGHT [単位荷重]
PA --- FOR PARMANENT CONDITION [長期]
SE --- FOR SEISMIC CONDITION [地震時]
ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (18)
[柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
(H-102)	FL+5.5 ~ FL±0	SLAB	A= 38.1	1.225	1.15		46.7	43.8
		NO.2 L.P.	1/4 x 12.0				3.0	3.0
		R.C. PANEL	A= 5.5 x 6.8 = 37.4	0.29			10.8	10.8
		COLUMN					1.1	1.1
							61.6	58.7
							(207.3)	(169.2)
H-103	FL+21.0 ~ FL+16.0	SLAB	A= 38.1	1.035	0.69		39.9	26.3
		PARAPET	L= 6.8	0.12			0.8	0.8
		DEAERATOR	V4 x 264.0				66.0	66.0
		SIDING	A= 5.9 x 6.8 = 40.1	0.045			1.8	1.8
		COLUMN					1.0	1.0
							109.0	95.9
	FL+16.0 ~ FL+11.0		SAME AS H-102				51.9 (160.9)	28.1 (124.0)
	FL+11.0 ~ FL+5.5		SAME AS H-102				58.4 (219.3)	55.5 (179.5)
	FL+5.5 ~ FL±0		SAME AS H-102				61.6 (280.9)	58.7 (238.2)
H-104	FL+21.0 ~ FL+16.0		SAME AS H-103				109.0	95.9
	FL+16.0 ~ FL+11.0		SAME AS H-102				51.9	28.1
		NO.8 H.P.	1/4 x 50.0				12.5	12.5
							64.4 (173.4)	40.6 (136.5)
	FL+11.0 ~ FL+5.5	SLAB	A= 38.1	1.425	1.35		54.3	51.4
		COLUMN					1.1	1.1
							55.4 (228.8)	52.5 (189.0)
	FL+5.5 ~ FL±0	SLAB	A= 38.1	1.225	1.15		46.7	43.8
		NO.6 H.P.	1/2 x 36.0				18.0	18.0
		P.C. PANEL	A= 37.4	0.29			10.8	10.8
		COLUMN					1.1	1.1
							76.6 (305.4)	73.7 (262.7)
H-105	FL+21.0 ~ FL+16.0		SAME AS H-102				35.4	26.9
	FL+16.0 ~ FL+11.0		SAME AS H-104				64.4 (99.8)	40.6 (67.5)
	FL+11.0 ~ FL+5.5		SAME AS H-104				55.4 (155.2)	52.5 (120.0)
	FL+5.5 ~ FL±0		SAME AS H-104				76.6 (231.8)	73.7 (193.7)

NOTE : UW --- UNIT WEIGHT [単位荷重]
PA --- FOR PARMANENT CONDITION [長期]
SE --- FOR SEISMIC CONDITION [地震時]
ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (19) [柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
H-106	FL+21.0 ~ FL+16.0	SLAB	A= 7.0×4.0= 28.0	0.595	0.535		16.7	15.0
		PARAPET	L=(7.0+4.0)×2= 22.0	0.12			2.6	2.6
		SIDING	A= 22.0×3.0= 66.0	0.045			3.0	3.0
		SLAB	A= 5.0×6.8= 34.0	0.635	0.535		21.6	18.2
		STAIR	A= 7.0×3.0= 21.0	0.43	0.36		9.0	7.6
		SIDING	A= 5.0×(6.4+2.8)= 46.0	0.045			2.1	2.1
		PARAPET	L= 3.4×3+7.0= 17.2	0.12			2.1	2.1
		COLUMN					1.0	1.0
							58.1	51.6
	FL+16.0 ~ FL+11.0	SLAB	A= 34.0	1.29	0.665		43.9	22.6
		STAIR	A= 21.0	0.43	0.36		9.0	7.6
		BLOCK WALL	A=5.0×(8.0+4.0×2)= 80.0	0.4			32.0	32.0
		SIDING	A= 46.0	0.045			2.1	2.1
		COLUMN					1.0	1.0
							88.0	65.3
							(146.1)	(116.9)
	FL+11.0 ~ FL+5.5	SLAB	A= 34.0	1.325	1.35		48.5	45.9
		STAIR	A= 21.0	0.43	0.36		9.0	7.6
		BLOCK WALL	A=5.5×(8.0+4.0×2)= 88.0	0.4			35.2	35.2
		COLUMN					1.1	1.1
							93.8	89.8
							(239.9)	(206.7)
	FL+5.5 ~ FL±0	SLAB	A= 34.0	1.225	1.15		41.7	39.1
		STAIR	A= 21.0	0.43	0.36		9.0	7.6
		BLOCK WALL	A= 80.0	0.4			32.0	32.0
		P.C. PANEL	A=5.5×(6.4+2.8)= 50.6	0.29			14.7	14.7
		COLUMN					1.1	1.1
							98.5	94.5
							(338.4)	(301.2)
H-107	FL+21.0 ~ FL+16.0	SLAB (A/C)	A= 5.0×8.4= 42.0	0.635	0.535		26.7	22.5
		SLAB	A= 7.0×8.4= 58.8	0.765	0.665		45.0	39.1
		FENCE	L= 8.4	0.11			0.9	0.9
		COLUMN					1.0	1.0
							73.6	63.5

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (20) [柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
(H-107)	FL+16.0 s FL+11.0	SLAB (CON)	A= 5.0X1.4+3.0x8.4= 42.2	0.71	0.61		30.0	25.7
		SLAB (ELE)	A= 4.0 x 8.4 = 33.6	0.88			29.6	29.6
		BLOCK WALL	A=5.0x(8.4x2+5.0) = 109.0	0.4			43.6	43.6
		WALL	A=3.0x4.0= 12.0	0.036			0.4	0.4
		COLUMN					1.0	1.0
		SLAB (A/C)	A = 5.0 x 5.0 = 25.0	0.985			24.6	24.6
							129.2	124.9
							(202.8)	(188.4)
	FL+11.0 s FL+5.5	SLAB	A = 5.0 x 8.4 = 42.0	1.425	1.35		59.9	56.7
		COMPUTER	A = 7.0 x 6.9 = 98.3	0.925			44.7	44.7
		CENT. CONT.	A = 7.0 x 1.5 = 10.5	0.905	0.73		9.5	7.7
		BLOCK WALL	A = 5.0 x (8.4x2+2.0x2) = 104.0	0.35			36.4	36.4
		WALL (SING)	A = 3.0 x 8.4 = 25.2	0.026			0.7	0.7
		WALL (W)	A = 3.0 x 7.0 = 21.0	0.036			0.8	0.8
		COLUMN					1.1	1.1
		CHR. FLOOR	A = 7.0 x 8.4 = 58.8	0.195			11.5	11.5
							164.6	159.6
							(367.4)	(348.0)
	FL+5.5 s FL±0	SLAB	A = 42.0	1.225	1.15		51.5	48.3
		CONTROL RM	A = 7.0 x 8.4 = 58.8	1.025	0.975		60.3	57.3
		WALL	A = 3.0 x 8.4 = 25.2	0.026			0.7	0.7
		BLOCK WALL	A = 5.5 x (8.4x2+2.0x2) = 114.4	0.35			40.0	40.0
		COLUMN					1.1	1.1
							153.6	147.4
							(521.0)	(495.4)
H-108	FL+21.0 s FL+16.0							
		SLAB (A/C)	A = 5.0 x 10.0 = 50.0	0.635	0.535		31.8	26.8
		SLAB	A = 7.0 x 10.0 = 70.0	0.765	0.665		53.6	46.6
		FENCE	L = 10.0	0.11			1.1	1.1
		COLUMN					1.0	1.0
							87.5	75.5
	FL+16.0 s FL+11.0	SLAB	A = 7.0 x 10.0 = 70.0	0.88			61.6	61.6
		SLAB (A/C)	A = 5.0 x 10.0 = 50.0	0.985			49.3	49.3
		BLOCK WALL	A = 5.0 x (11.0 x 2) = 100.0	0.4			40.0	40.0
		COLUMN					1.0	1.0
							151.9	151.9
							(239.4)	(227.4)
	FL+11.0 s FL+5.5	SLAB	A = 5.0 x 10.0 = 50.0	1.425	1.35		71.3	67.5
		CENT. CONT.	A = 7.0 x 10.0 = 70.0	0.905	0.73		63.4	51.1
		CHR. FLOOR	A = 70.0	0.195			13.7	13.7
		BLOCK WALL	A = 5.0 x 10.0 x 2 = 100.0	0.35			35.0	35.0
		WALL	A = 3.0 x 10.0 = 30.0	0.028			0.8	0.8
		COLUMN					1.1	1.1
							185.3	169.2
							(424.7)	(396.6)

NOTE : UW --- UNIT WEIGHT [単位荷重]
PA --- FOR PARMANENT CONDITION [長期]
SE --- FOR SEISMIC CONDITION [地震時]
ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (2/) [柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
(H-108)	FL+5.5 ~ FL±0	SLAB	A=5.0×11.0= 55.0	1.225	1.15		61.3	57.5
		CONTROL RM	A=7.0×5.0= 35.0	1.025	0.975		35.9	34.1
		BATTERY RM	A= 35.0	1.025	0.975		35.9	34.1
		BLOCK WALL	A=5.5×10.1×1.5= 82.5	0.4			33.0	33.0
		WALL	A=3.0×(5.0×3)= 45.0	0.026			1.2	1.2
		COLUMN					1.1	1.1
							168.4	161.0
							(593.1)	(557.6)
H-201	FL+21.0 ~ FL+16.0	SAME AS H-108					87.5	75.5
	FL+16.0 ~ FL+11.0	SLAB (CON)	A=7.0×6.5= 45.5	0.71	0.61		32.3	27.8
		SLAB (A/C)	A=5.0×10.0= 50.0	0.985			49.3	49.3
		SLAB	A=7.0×3.5= 24.5	0.88			21.6	21.6
		BLOCK WALL	A=5.0×10.0×2= 100.0	0.4			40.0	40.0
		WALL	A=3.0×4.0= 12.0	0.036			0.4	0.4
		COLUMN					1.0	1.0
							144.6	140.1
							(232.1)	(215.6)
	FL+11.0 ~ FL+5.5	SAME AS H-108					157.9	150.0
							(389.5)	(365.6)
	FL+5.5 ~ FL±0	SLAB	A=5.0×10.0= 50.0	1.225	1.15		61.3	57.5
		LABO	A=7.0×5.0= 35.0	0.855	0.705		29.9	24.7
		BATTERY RM	A= 35.0	1.025	0.975		35.9	34.1
		BLOCK WALL	A=5.5×10.0×1.5+2.0×2)=104.5	0.4			41.8	41.8
		WALL	A=3.0×2.0×2= 12.0	0.026			1.1	1.1
		COLUMN					1.1	1.1
							171.1	160.3
							(560.6)	(525.9)
H-202	FL+21.0 ~ FL+16.0	SAME AS H-107					13.6	63.5
	FL+16.0 ~ FL+11.0	SLAB (A/C)	A=5.0×5.0= 25.0	0.985			24.6	24.6
		SLAB (CON)	A=5.0×3.4+7.0×8.4= 75.8	0.71	0.61		53.8	46.2
		BLOCK WALL	A=5.0×(8.4×2+4.0+5.0)= 129.0	0.4			51.6	51.6
		WALL	A=3.0×(5.0+4.0)= 27.0	0.36			9.7	9.7
		COLUMN					1.0	1.0
							140.7	133.1
							(219.3)	(196.6)

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (22)
[柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
(H-202)	FL+11.0 ~ FL+5.5		SAME AS H-107				164.6 (370.9)	159.6 (356.2)
	FL+5.5 ~ FL±0	SLAB	A=5.0×8.4= 42.0	1.225	1.15		51.5	48.3
		LABO	A=7.0×8.4= 58.8	0.855	0.705		50.3	41.5
		WALL	A=3.0×8.4= 25.2	0.026			0.7	0.7
		BLOCK WALL	A=5.5×(0.4×2+2.0×2)= 114.4	0.35			40.0	40.0
		COLUMN					1.1	1.1
							143.6 (522.5)	131.6 (487.8)
H-203	FL+21.0 ~ FL+16.0	SLAB (ROOF)	A=5.0×6.8= 34.0	0.635	0.535		21.6	18.2
		SLAB (TOWER)	A=7.0×4.0= 28.0	0.765	0.665		21.4	18.6
		FENCE	L=3.4+7.6= 11.0	0.11			1.2	1.2
		PARAPET	L=2.8+6.4= 9.2	0.12			1.1	1.1
		SIDING	A=5.9×9.2= 54.3	0.045			2.4	2.4
		COLUMN					1.0	1.0
							48.7	42.5
	FL+16.0 ~ FL+11.0	SLAB (CAV.)	A=7.0×3.4= 23.8	0.79	0.72		18.8	17.1
		SLAB	A=5.0×6.8= 34.0	1.29	0.665		43.9	22.6
		BLOCK WALL	A=5.0×(7.0×2+3.4×5)= 155.0	0.4			62.0	62.0
		COLUMN					1.0	1.0
		SIDING	A=5.9×9.2= 46.0	0.095			2.1	2.1
							127.8 (176.5)	109.8 (147.3)
	FL+11.0 ~ FL+5.5		SAME AS H-106				93.8	89.8
		NO.3 LP	1/4 × 12.0				3.0	3.0
							96.8 (273.3)	92.8 (240.12)
	FL+5.5 ~ FL±0		SAME AS H-106				98.5 (371.8)	94.5 (339.6)
H-204	FL+21.0 ~ FL+16.0		SAME AS H-105				35.9	27.4
	FL+16.0 ~ FL+11.0		SAME AS H-105				64.7 (100.3)	40.6 (68.0)
	FL+11.0 ~ FL+5.5		SAME AS H-105				55.4	32.5
		NO.3 LP	1/4 × 12.0				3.0	3.0
							58.4 (158.7)	55.5 (123.5)
	FL+5.5 ~ FL±0		SAME AS H-105				76.6 (235.3)	73.7 (197.2)

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NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (23)
[柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
H-205			SAME AS H-104					
H-206	FL+21.0 ~ FL+16.0		SAME AS H-103				109.0	95.9
	FL+16.0 ~ FL+11.0		SAME AS H-103				51.9 (160.9)	28.1 (124.0)
	FL+11.0 ~ FL+5.5		SAME AS H-104				55.4 (216.3)	52.5 (176.5)
	FL+5.5 ~ FL±0		SAME AS H-103				61.6 (277.9)	58.7 (235.2)
H-207	FL+21.0 ~ FL+16.0		SAME AS H-102				35.4	26.9
	FL+16.0 ~ FL+11.0		SAME AS H-102				51.8 (87.3)	28.1 (55.0)
	FL+11.0 ~ FL+5.5	SLAB COLUMN	A=5.6×6.8= 38.1	1.425	1.35		54.3 1.1 55.4 (142.7)	51.4 1.1 52.5 (107.5)
	FL+5.5 ~ FL±0		SAME AS H-102				61.6 (204.3)	58.7 (166.2)
H-208			SAME AS H-101					
K-106	FL+21.0 ~ FL+16.0	SLAB PARAPET SIDING COLUMN	A=7.6×4.0= 30.4 L=7.6+4.0= 11.6 A=5.9×11.6= 68.4	0.765 0.12 0.045	0.665		23.3 1.4 3.1 1.0 28.8	20.2 1.4 3.1 1.0 25.7
	FL+16.0 ~ FL+11.0	SLAB WALL SIDING COLUMN	A= 30.4 A=3.0×(3.9+7.0)= 31.2 A=5.0×11.6= 58.0	0.88 0.028 0.045			26.8 0.9 2.6 1.0 31.3 (60.1)	26.8 0.9 2.6 1.0 31.3 (57.0)

NOTE : UW --- UNIT WEIGHT [単位荷重]
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SE --- FOR SEISMIC CONDITION [地震時]
ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (24) [柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
(K-106)	FL+11.0 ~ FL+5.5	COMPUTER	A= 30.4	0.925			28.1	28.1
		WALL	A= 31.2	0.028			0.9	0.9
		COLUMN					1.1	1.1
		CHR FLOOR	A= 30.4	0.195			5.9	5.9
							36.0	36.0
							(96.1)	(93.0)
	FL+5.5 ~ FL±0	SLAB	A= 30.4	1.025	0.975		31.2	29.6
		WALL	A= 31.2	0.028			0.9	0.9
		P.C.PANEL	A=5.5×(4.0+2.6)= 63.8	0.29			18.5	18.5
		COLUMN					1.1	1.1
							51.7	50.1
							(147.8)	(143.1)
K-107	FL+21.0 ~ FL+16.0	SLAB	A=7.6×8.4= 66.1	0.765	0.665		50.6	44.0
		PARAPET	L= 8.4	0.12			1.0	1.0
		SIDING	A=5.9×8.4= 49.6	0.045			2.2	2.2
		COLUMN					1.0	1.0
							54.8	48.2
	FL+16.0 ~ FL+11.0	SLAB	A=7.6×3.4= 25.8	0.88			22.7	22.7
		SLAB	A=7.6×5.0= 38.0	0.88			33.4	33.4
		BLOCK WALL	A=5.0×7.6= 38.0	0.35			18.6	18.6
		WALL	A=3.0×(8.4+7.6)= 48.0	0.028			1.3	1.3
		SIDING	A=5.0×8.4= 42.0	0.045			1.9	1.9
		COLUMN					1.0	1.0
							78.9	78.9
							(133.7)	(127.1)
	FL+11.0 ~ FL+5.5	COMPUTER	A=7.6×6.9= 52.9	0.925			48.5	48.5
		CENT. CONT.	A=7.6×1.5= 11.4	0.915	0.73		10.3	8.3
		WALL (S)	A=3.0×8.4= 25.2	0.028			0.7	0.7
		WALL (W)	A=3.0×7.0= 21.0	0.038			0.8	0.8
		CHR FLOOR	A=7.6×8.4= 63.8	0.195			12.4	12.4
		COLUMN					1.1	1.1
							73.8	71.8
							(207.5)	(198.9)
	FL+5.5 ~ FL±0	SLAB	A= 63.8	1.025	0.975		65.4	62.2
		WALL	A=3.0×8.4= 25.2	0.028			0.7	0.7
		P.C.PANEL	A=5.5×8.4= 46.2	0.29			13.4	13.4
		COLUMN					1.1	1.1
							80.6	77.4
							(288.1)	(276.3)

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NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (25) [柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
K-108	FL+21.0	SLAB	A=7.6×10.0= 76.0	0.595	0.535		45.2	40.7
	FL+16.0	PARAPET	L= 10.0	0.12			1.2	1.2
		SIDING	A=5.9×10.0= 59.0	0.045			2.7	2.7
		COLUMN					1.0	1.0
							50.1	45.6
	FL+16.0	SLAB	A= 76.0	0.88			66.9	66.9
	∫	WALL	A=3.0×10.0= 30.0	0.028			0.8	0.8
	FL+11.0	SIDING	A=5.9×10.0= 59.0	0.045			2.3	2.3
		COLUMN					1.0	1.0
							71.0	71.0
							(121.7)	(116.6)
	FL+11.0	SLAB	A= 76.0	0.905	0.73		68.8	55.5
	∫	WALL	A= 30.0	0.028			0.8	0.8
	FL+5.5	CH.P. FLOOR	A= 76.0	0.195			14.8	14.8
		COLUMN					1.1	1.1
							85.5	72.2
							(206.6)	(188.8)
	FL+5.5	SLAB	A= 76.0	1.025	0.975		77.9	74.1
	∫	WALL	A=3.0×(7.0×2+10.0)= 72.0	0.028			2.0	2.0
	FL±0	P.C. PAVEL	A=5.5×10.0= 55.0	0.29			16.0	16.0
		COLUMN					1.1	1.1
							97.0	93.2
							(303.6)	(282.0)
K-201	FL+21.0							
	∫		SAME AS K-108				50.1	45.6
	FL+16.0							
	FL+16.0	SLAB(ON)	A=7.6×6.5= 49.4	0.71	0.61		35.1	30.1
	∫	SLAB	A=7.6×3.5= 26.6	0.88			23.4	23.4
	FL+11.0	WALL	A=3.0×(10.0+7.0)= 51.0	0.036			1.8	1.8
		SIDING	A=5.0×10.0= 50.0	0.045			2.3	2.3
		COLUMN					1.0	1.0
							63.6	58.6
							(113.7)	(104.2)
	FL+11.0							
	∫		SAME AS K-108				85.5	72.2
	FL+5.5						(199.2)	(176.9)

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (26)
[柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
(K-201)	FL+5.5 ~ FL±0	SLAB	A=7.6×5.0= 38.0	1.025	0.975		39.0	37.1
		LAB	A= 58.0	0.855	0.705		32.5	26.8
		WALL	A=3.0×(7.0×2+11.0)= 72.0	0.028			2.0	2.0
		P.C. PANEL	A=5.5×10.0= 55.0	0.29			16.0	16.0
		COLUMN					1.1	1.1
							90.6	83.0
							(289.8)	(259.4)
K-202	FL+21.0 ~ FL+16.0							
			SAME AS K-107				54.8	48.2
	FL+16.0 ~ FL+11.0	SLAB	A=7.6×8.4= 63.8	0.71	0.61		45.3	38.9
		WALL (S)	A=3.0×8.4= 25.2	0.028			0.7	0.7
		WALL (W)	A=3.0×(7.0+3.4×2)= 41.4	0.036			1.5	1.5
		SIDING	A=5.0×9.4= 92.0	0.045			1.9	1.9
		COLUMN					1.0	1.0
							50.4	49.0
							(105.2)	(92.2)
	FL+11.0 ~ FL+5.5						73.8	71.8
			SAME AS K-107				(179.0)	(164.0)
	FL+5.5 ~ FL±0	SLAB	A=7.6×8.4= 63.8	0.855	0.705		54.5	45.0
		WALL	A=3.0×8.4= 25.2	0.028			0.7	0.7
		P.C. PANEL	A=5.5×8.4= 46.2	0.29			13.4	13.4
		COLUMN					1.1	1.1
							69.7	60.2
							(248.7)	(224.2)
K-203	FL+21.0 ~ FL+16.0							
			SAME AS K-106				28.8	25.7
	FL+16.0 ~ FL+11.0	SLAB	A= 30.4	0.71	0.61		21.6	18.5
		WALL (S)	A=3.0×(3.4+7.0)= 31.2	0.028			0.9	0.9
		WALL (W)	A=3.0×3.4= 10.2	0.036			0.4	0.4
		SIDING	A=5.0×11.6= 58.0	0.045			2.6	2.6
		COLUMN					1.0	1.0
							26.5	23.9
							(55.3)	(49.1)
	FL+11.0 ~ FL+5.5	SLAB	A=7.6×4.0= 30.4	1.24	1.17		37.7	35.6
		BLOCK WALL	A=5.0×(7.0×2+3.5×2)= 105.0	0.36			37.8	37.8
		WALL	A=3.0×7.0= 21.0	0.026			0.5	0.5
		COLUMN					1.1	1.1
							77.1	75.0
							(132.4)	(124.1)
	FL+5.5 ~ FL±0	SLAB	A=7.6×4.0= 30.4	0.855	0.705		26.0	21.4
		WALL	A=3.0×(3.4+7.0)= 31.2	0.028			0.9	0.9
		P.C. PANEL	A=5.5×(4.0+7.6)= 63.8	0.29			18.5	18.5
		COLUMN					1.1	1.1
							46.5	41.9
							(178.9)	(166.0)

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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (/)
[柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
		In case of UNIT I only						
A-201	FL+27.1 ~ FL+21.0	SLAB	A=11.6×10.6= 123.0	0.595	0.535		73.2	65.8
		PARAPET	L=11.6+10.6= 22.2	0.12			2.7	2.7
		SIDING	A=22.2×(1.8+0.9)+8.5×4.3= 96.5	0.095			9.3	9.3
		COLUMN	L= 6.1	0.2			1.2	1.2
		TRUSS	L= 11.0	0.25			2.8	2.8
							84.2	76.8
	FL+21.0 ~ FL+11.0	SIDING	A=8.5×10.0= 85.0	0.095			8.8	8.8
		COLUMN	L= 10.0	0.25			2.5	2.5
		CRANE GIRDER	L= 5.0	0.35			1.8	1.8
							8.1	8.1
							(92.3)	(84.9)
	FL+11.0 ~ FL+5.5	COLUMN	L= 5.5	0.25			1.4	1.4
		SHUTTER	A=5.0×10.0= 50.0	0.1			5.0	5.0
		SIDING	A=2.9×5.5= 16.0	0.095			0.7	0.7
							7.1	7.1
							(99.4)	(92.0)
	FL+5.5 ~ FL±0	SIDING	A=2.9×5.5= 16.0	0.095			0.7	0.7
		COLUMN					1.4	1.4
							2.1	2.1
							(101.5)	(94.1)
B-201	FL+11.0 ~ FL+5.5	SIDING	A=5.25×14.3= 75.1	0.095			3.4	3.4
		COLUMN					1.1	1.1
							4.5	4.5
	FL+5.5 ~ FL±0	SIDING	A=5.25×5.5= 28.9	0.095			1.3	1.3
		COLUMN					1.1	1.1
							2.4	2.4
							(6.9)	(6.9)
D-201	FL+11.0 ~ FL+5.5	SIDING	A=6.0×14.3= 85.8	0.095			3.9	3.9
		SLAB	A=3.0×5.6= 16.8	1.425	1.35		23.9	22.7
		HAND RAIL	L= 5.0	0.035			0.2	0.2
		COLUMN	L= 5.5	0.2			1.1	1.1
							29.1	27.9
	FL+5.5 ~ FL±0	SLAB	A=5.6×3.6= 20.2	1.225	1.15		24.7	23.2
		HAND RAIL	L= 5.0	0.035			0.2	0.2
		COLUMN					1.1	1.1
							26.0	24.5
							(55.1)	(52.4)

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (2) [柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
F-201	FL+11.0 ~ FL+5.5	SIDING	A=5.75 x19.3 = 111.0	0.045			5.0	5.0
		SLAB	A=5.75 x 5.6 = 32.2	1.425	1.35		45.9	43.5
							1.1	1.1
							52.0	49.6
	FL+5.5 ~ FL±0	SLAB	A= 32.2	1.225	1.15		39.4	37.0
		SIDING	A=5.75 x 5.5 = 31.6	0.045			1.4	1.4
		COLUMN					1.1	1.1
							91.9	89.5
							(93.9)	(89.1)
G-201	FL+27.1 ~ FL-21.0		SAME AS A-201				84.2	76.8
	FL+21.0 ~ FL+16.0	SLAB	A=5.0 x 10.0 = 50.0	0.665	0.565		33.3	28.3
		PARAPET	L= 10.0	0.12			1.2	1.2
		SIDING	A=5.0 x (2.2+7.9) = 33.0	0.045			1.5	1.5
		CRANE GIRDER	L= 5.0	0.35			1.8	1.8
		COLUMN	L= 5.0	0.25			1.3	1.3
							39.1	34.1
							(123.3)	(110.9)
	FL+16.0 ~ FL+11.0	SLAB	A=5.0 x 10.0 = 50.0	0.85			42.5	42.5
		BLOCK WALL	A=5.0 x 10.0 = 50.0	0.4			20.0	20.0
		COLUMN					1.3	1.3
		SIDING	A= 33.0	0.045			1.5	1.5
							65.3	65.3
							(188.6)	(176.2)
	FL+11.0 ~ FL+5.5	SLAB	A=5.0x10.0+2.8x5.0 = 69.0	1.425	1.35		91.2	86.4
		SIDING	A=5.5x(2.2+7.9) = 36.3	0.045			1.6	1.6
		COLUMN	L= 5.5	0.25			1.4	1.4
							99.2	89.4
							(282.8)	(265.6)
	FL+5.5 ~ FL±0	SLAB	A= 69.0	1.225	1.15		78.4	73.6
		SIDING					1.6	1.6
		COLUMN					1.4	1.4
							81.4	76.6
							(364.2)	(342.2)

NOTE : UW --- UNIT WEIGHT [単位荷重]
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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (3) [柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
G-202	FL+21.0	SLAB	A=5.0x8.4= 42.0	0.665	0.565		27.9	23.7
	S	PARAPET	L= 8.4	0.12			1.0	1.0
		SIDING	A=5.9x8.4= 49.6	0.045			2.2	2.2
	FL+16.0	COLUMN	L= 5.0	0.25			1.3	1.3
							32.4	28.2
	FL+16.0	SLAB	A=5.0x8.4= 42.0	0.85			35.7	35.7
	S	BLOCK WALL	A=5.0x(5.0+5.0)= 50.0	0.4			20.0	20.0
	FL+11.0	COLUMN					1.3	1.3
		SIDING	A=5.0x8.4= 42.0	0.045			1.9	1.9
							58.9	58.9
							(91.3)	(87.1)
	FL+11.0	SLAB	A=5.6x8.4= 47.0	1.425	1.35		67.0	63.5
	C	COLUMN	L= 5.5	0.25			1.4	1.4
	FL+5.5	SIDING	A=5.5x8.4= 46.2	0.045			2.1	2.1
							70.5	67.0
							(161.8)	(154.1)
	FL+5.5	SLAB	A= 47.0	1.225	1.15		57.6	54.1
	C	COLUMN					1.4	1.4
	FL±0	SIDING					2.1	2.1
							61.1	57.6
							(222.9)	(211.7)

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ML --- MACHINE LOAD [機械荷重]

COLUMN AXIAL LOAD (4) [柱軸力]

LOCATION	LEVEL	NAME OF LOAD	AREA OR LENGTH (Unit:m2 or m)	UW PA	UW SE	ML	COLUMN AXIAL LOAD PA (ton)	COLUMN AXIAL LOAD SE (ton)
G-203	FL+21.0 ~ FL+16.0	SLAB	A=5.6×9.0= 22.4	0.665	0.565		14.9	12.7
		PARAPET	L=5.0+4.0= 9.6	0.12			1.2	1.2
		SIDING	A=9.6×(5.0+0.9)= 56.6	0.045			2.5	2.5
		COLUMN	L= 7.0	0.25			1.8	1.8
							20.4	18.2
	FL+16.0 ~ FL+11.0	SLAB	A= 22.4	1.29	0.665		28.9	14.9
		SIDING	A=9.6×5.0= 48.0	0.045			2.2	2.2
		COLUMN	L= 5.0	0.25			1.3	1.3
							32.4	18.4
							(61.3)	(45.1)
	FL+11.0 ~ FL+5.5	SLAB	A= 22.4	1.425	1.35		31.9	30.2
		SIDING	A= 48.0	0.045			2.2	2.2
		COLUMN					1.4	1.4
							35.5	33.8
							(96.8)	(78.9)
	FL+5.5 ~ FL±0	SLAB	A= 22.4	1.225	1.15		27.4	25.8
		SIDING	A=9.6×5.5= 52.8	0.045			2.4	2.4
		COLUMN	L= 5.5	0.25			1.4	1.4
							31.2	29.6
							(128.0)	(108.5)
H-203	FL+21.0 ~ FL+16.0	SLAB (ROOF)	A=5.0×9.0= 20.0	0.635	0.535		12.7	10.7
		SLAB (TOWER)	A=7.6×4.0= 30.4	0.765	0.665		23.3	20.2
		FENCE	L=3.4+7.6= 11.0	0.11			1.2	1.2
		PARAPET	L= 12.0	0.12			1.4	1.4
		SIDING	A=5.0×12.0= 60.0	0.045			2.7	2.7
		COLUMN	L= 5.0	0.2			1.0	1.0
							42.3	37.2
	FL+16.0 ~ FL+11.0	SLAB (CON)	A=5.0×3.4= 17.0	0.71	0.61		12.1	10.4
		SLAB (LAV)	A=7.0×3.4= 23.8	0.79	0.72		18.8	17.1
		BLOCK WALL	A=5.0×(7.0×2+3.0×5)= 155.0	0.4			62.0	62.0
		SIDING	A=5.0×12.0= 60.0	0.045			2.7	2.7
		COLUMN					1.0	1.0
							96.6	93.2
							(138.9)	(130.2)
	FL+11.0 ~ FL+5.5	SLAB	A=7.0×4.0= 28.0	0.905	0.73		25.3	20.4
		SLAB	A=5.0×4.0= 20.0	1.425	1.35		28.5	27.0
		BLOCK WALL	A=5.0×(3.4×2+9.0)= 79.0	0.35			27.7	27.7
		COLUMN					1.1	1.1
		SIDING	A=5.5×12.0= 66.0	0.045			3.0	3.0
							85.6	79.2
							(224.5)	(209.4)
	FL+5.5 ~ FL±0	SLAB	A=5.0×4.0 20.0	1.225	1.15		24.5	23.0
		STAIR	A=2.0×7.0= 14.0	0.43	0.36		6.0	5.0
		BLOCK WALL	A=5.0×(8.0+4.0×2)= 80.0	0.4			32.0	32.0
		SIDING	A=5.5×5.5= 30.3	0.045			1.4	1.4
		COLUMN	L= 5.5	0.2			1.1	1.1
		P.C PANEL	A=6.4×5.5= 35.2	0.29			10.2 / 75.2	10.2 / 72.7
							(299.7)	(282.1)

1.2 SEISMIC LOAD [地震荷重]

ITEM		CALCULATION									
ZONE FACTOR (Z)		Z = 1.0									
STANDARD SHEAR COEFFICIENT (Co)		Co = 0.1									
GROUND CONDITION (Tc)		Tc = 0.8									
	Hard	Tc = 0.4 ☐									
	Medium	Tc = 0.6 ☐									
	Soft	Tc = 0.8 ☑									
DIRECTION		X DIRECTION (LONG SPAN)					Y DIRECTION (SHORT SPAN)				
NATURAL PERIOD OF BUILDING (T)		T = 0.39					T = 0.57				
	Heigh h= 27.1 m	Length of Span D= m					Length of Span D= 32.0 m				
	T=0.03*h	=					=				
	T=0.05*h/4√D	=					= 0.57				
	T=h/70	= 0.39					=				
CHARACTERISTICS OF VIBRATION OF THE BUILDING (Rt)		Rt = 1.0					Rt = 1.0				
			T	Rt				T	Rt		
Rt=1		Tc	-	= -			Tc	-	= -		
Rt=1-0.2*(T/Tc-1)^2		2*Tc	-	= -			2*Tc	-	= -		
Rt=1.6*Tc/T				=					=		
2*T/(1+3*T)		= 0.359					= 0.421				
SEISMIC LOAD FOR EACH FLOOR (Qi)											
	STORY	Wi	α i	Ai	Ci	Qi	Wi	α i	Ai	Ci	Qi
	RF	1,638.4	0.11	2.04	0.20	327.7		0.11	2.22	0.22	360.4
	5TH	2605.6	0.25	1.63	0.16	576.9		0.25	1.74	0.17	612.0
	4TH	5539.1	0.38	1.45	0.15	830.1		0.38	1.52	0.15	830.1
	OPE	9779.7	0.67	1.20	0.12	1173.6		0.67	1.23	0.12	1173.6
	MEZ	14,581.5	1.00	1.00	0.1	1458.2		1.00	1.00	0.1	1458.2

NOTE: $\alpha i = Wi/\Sigma W$

$Ai = 1 + (1/\sqrt{\alpha i} - \alpha i)*2*T/(1 + 3*T)$

$Ci = Z*Rt*Ai*Co$

TABLE OF COLUMN LOAD FOR EACH FLOOR (SEISMIC CONDITION)

FL+27.1~21.0

	A	B	D	F	G	H	K	TOTAL
101	33.9				33.9			67.8
102	49.1				49.1			98.2
103	49.1				49.1			98.2
104	49.1				49.1			98.2
105	49.1				49.1			98.2
106	49.1				49.1			98.2
107	59.7				59.7			119.4
108	70.5				70.5			141.0
201	70.5				70.5			141.0
202	59.7				59.7			119.4
203	49.1				49.1			98.2
204	49.1				49.1			98.2
205	49.1				49.1			98.2
206	49.1				49.1			98.2
207	49.1				49.1			98.2
208	33.9				33.9			67.8
TOTAL	819.2				819.2			1,638.4

FL+21.0~16.0

	A	B	D	F	G	H	K	TOTAL
101	40.9				50.1	27.2		118.2
102	57.1				74.4	26.9		158.4
103	57.1				143.1	95.9		296.1
104	57.1				193.1	95.9		296.1
105	57.1				74.4	26.9		158.4
106	57.1				71.8	51.6	25.7	206.2
107	68.9				87.4	63.5	48.2	268.0
108	81.0				103.3	75.5	45.6	305.4
201	81.0				103.3	75.5	45.6	305.4
202	68.9				87.4	63.5	48.2	268.0
203	57.1				71.8	42.5	25.7	197.1
204	57.1				74.4	27.4		158.9
205	57.1				143.1	95.9		296.1
206	57.1				143.1	95.9		296.1
207	57.1				74.4	26.9		158.4
208	40.9				50.7	27.2		118.8
TOTAL	952.6				1,495.8	918.2	239.0	3,605.6

6X

TABLE OF COLUMN LOAD FOR EACH FLOOR (SEISMIC CONDITION)

FL+16.0 ~ 11.0

	A	B	D	F	G	H	K	TOTAL
101	40.9				66.4	38.5		145.8
102	57.1				103.8	55.0		215.9
103	57.1				172.5	124.0		353.6
104	57.1				179.5	136.5		373.1
105	57.1				110.8	67.5		235.4
106	57.1				95.7	116.9	57.0	326.7
107	68.9				143.7	188.4	127.1	528.1
108	81.0				173.9	227.4	116.6	598.9
201	81.0				173.9	215.6	104.2	574.7
202	68.9				150.7	196.6	92.2	508.4
203	57.1				95.7	147.3	49.1	349.2
204	57.1				110.8	68.0		235.9
205	57.1				179.5	136.5		373.1
206	57.1				172.5	124.0		353.6
207	57.1				103.8	55.0		215.9
208	40.9				66.4	38.5		145.8
TOTAL	952.6				2.099.6	1.935.7	546.2	5.534.1

FL+11.0 ~ 5.5

	A	B	D	F	G	H	K	TOTAL
101	51.4	21.3	47.4	40.9	109.9	47.7		318.4
102	74.0	29.7	56.3	50.1	169.1	110.5		489.7
103	74.0	19.0		29.9	237.8	179.5		540.2
104	68.5	13.0		14.6	259.2	189.0		544.3
105	69.5	14.0		14.6	190.5	120.0		408.6
106	75.0	20.0		16.0	157.6	206.7	93.0	568.3
107	89.4	31.7	29.9	35.9	206.6	348.0	198.9	940.4
108	108.7	20.9	64.6	63.0	237.3	396.6	188.8	1.079.9
201	108.7	20.9	64.6	63.0	237.3	365.6	176.4	1.036.5
202	89.4	31.7	29.9	35.9	207.0	356.2	164.0	914.1
203	75.0	20.0		21.5	161.0	240.1	129.1	641.7
204	69.5	14.0		14.6	176.1	123.5		397.7
205	68.5	13.0		14.6	259.2	189.0		544.3
206	74.0	19.0		27.1	256.9	176.5		553.5
207	74.0	29.7	56.3	50.1	166.1	107.5		483.7
208	51.4	21.3	47.4	40.9	109.7	47.7		318.4
TOTAL	1.221.0	339.2	396.4	532.7	3.141.1	3.204.1	945.2	9.779.7

FORM 04