

7.2.6

Dewatering and Centrifugal Thickener Building

PROJECT : WASTE WATER TREATMENT PLANT
ITEM : DEWATER BUILDING : 5

STRUCTURAL CALCULATION SHEET

STRUCTURAL ANALYSIS ITEMS :

- A. MAIN FRAME STRUCTURAL ANALYSIS
- B. ATTACHED RESULT SHEETS

STRUCTURAL CALCULATION SHEET

* Project : Wastewater Treatment Plant

* Item : Dewater Building

Part I : CALCULATION OF LOAD

A. DEAD LOAD :

• SECOND FLOOR :

1. AREA-1(GRIDLINE 10~6)

No.	Material	Calculation	Applying load(kg/m ²)
1	160 THK R.C slab	2500x0.16	400
2	60mm THK cement mortar	1800x0.06	108
3	Weight of machine	34.90/(4.90x8.40)	850
		TOTAL	g^{lc} = 1358 kg/m²

2. AREA-2(GRIDLINE 6'~1)

No.	Material	Calculation	Applying load(kg/m ²)
1	140 THK R.C slab	2500x0.14	350
2	60mm THK cement mortar	1800x0.06	108
3	Others	-	50
		TOTAL	g^{lc} = 558 kg/m²

• ROOF :

No.	Material	Calculation	Applying load(kg/m ²)
1	Steel purlin & roof sheet	-	40
2	Others	-	50
		TOTAL	g^{lc} = 90 kg/m²

B. LIVE LOAD :

- Live load to be taken based on Vietnamese Standard TCVN 2737-1995 :
 - * Second floor : p^{lc} = 400 kg/m²
 - * Roof : p^{lc} = 75 kg/m²
- Load safety factor was not mentioned on above calculation because it will be included in structural analysis progress (see attached calculation sheet)
- Uniform load applying to beam to be shown on attached calculation sheet

C. WIND LOAD :

- Wind load imposed on project to be calculated based on Vietnamese Standard TCVN 2737-1995
- Wind load is calculated as follows :

$$W^{tc} = n \times W_0^{tc} \times k \times C$$
 where :
 W_0^{tc} : standard wind pressure, area IIA, $W_0^{tc} = 83 \text{ kg/m}^2$
 k : factor due to affect of project height and topography
 C : factor of dynamic wind , $C=0.8$ for the area where wind load imposes directly, $C=0.6$ for the opposite side
 - Refer to calculation sheet for further informations

Part II : STRUCTURAL ANALYSIS PROGRESS

- The structure of Dewater Building to be calculated by structural analysis program SAP2000
- The structural diagram is modelled as a frame with rigid connection at first floor elevation
- All details about input load, beam and column section, static load case and load combination to be shown on calculation sheet
- Refer to attached result sheets for calculated value of stress, displacement, steel area for beam and column elements

Part III : LOAD COMBINATION

• STATIC LOAD CASES :

1. AREA-1

Load case mark	Description
DEAD	Roof dead load
LIVE	Roof live load
CRANE1	Crane force at GL A~C frame
CRANE2	Crane force at GL C~E frame
LWIND	Wind load (from left to right)

• LOAD COMBINATION

Load combination	Description
COMBO1	DEAD+LIVE
COMBO2	DEAD+LIVE+LWIND
COMBO3	DEAD+LIVE+LWIND+CRANE1+CRANE2
COMBO4	Envelop value of above combinations

• **STATIC LOAD CASES :**

2. AREA-2

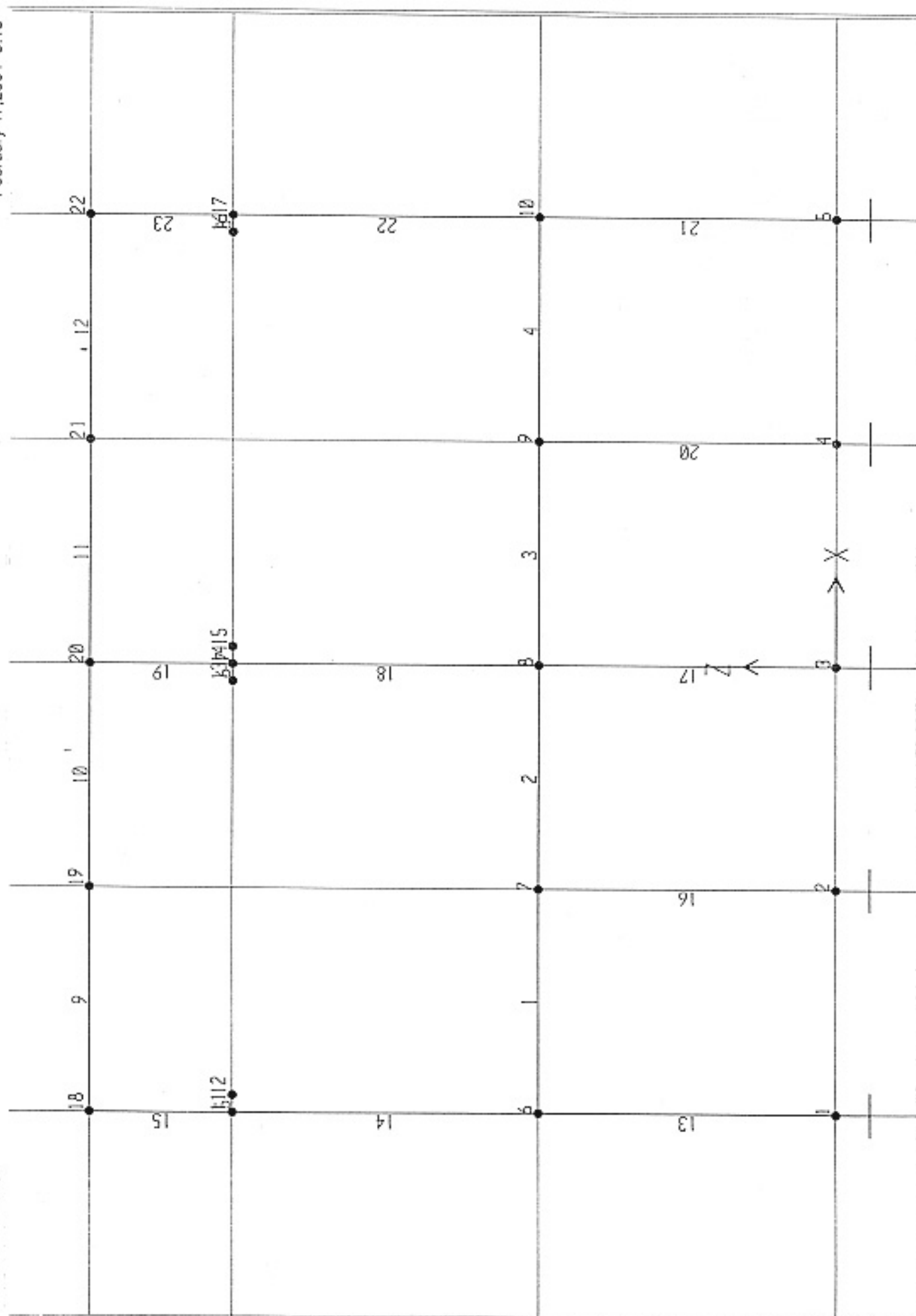
Load case mark	Description
DEAD	Roof dead load
LIVE	Roof live load
WEIGHT1,2,3	Hanging weight $P=1T$
LWIND	Wind load (from left to right)
RWIND	Wind load (from right to left)

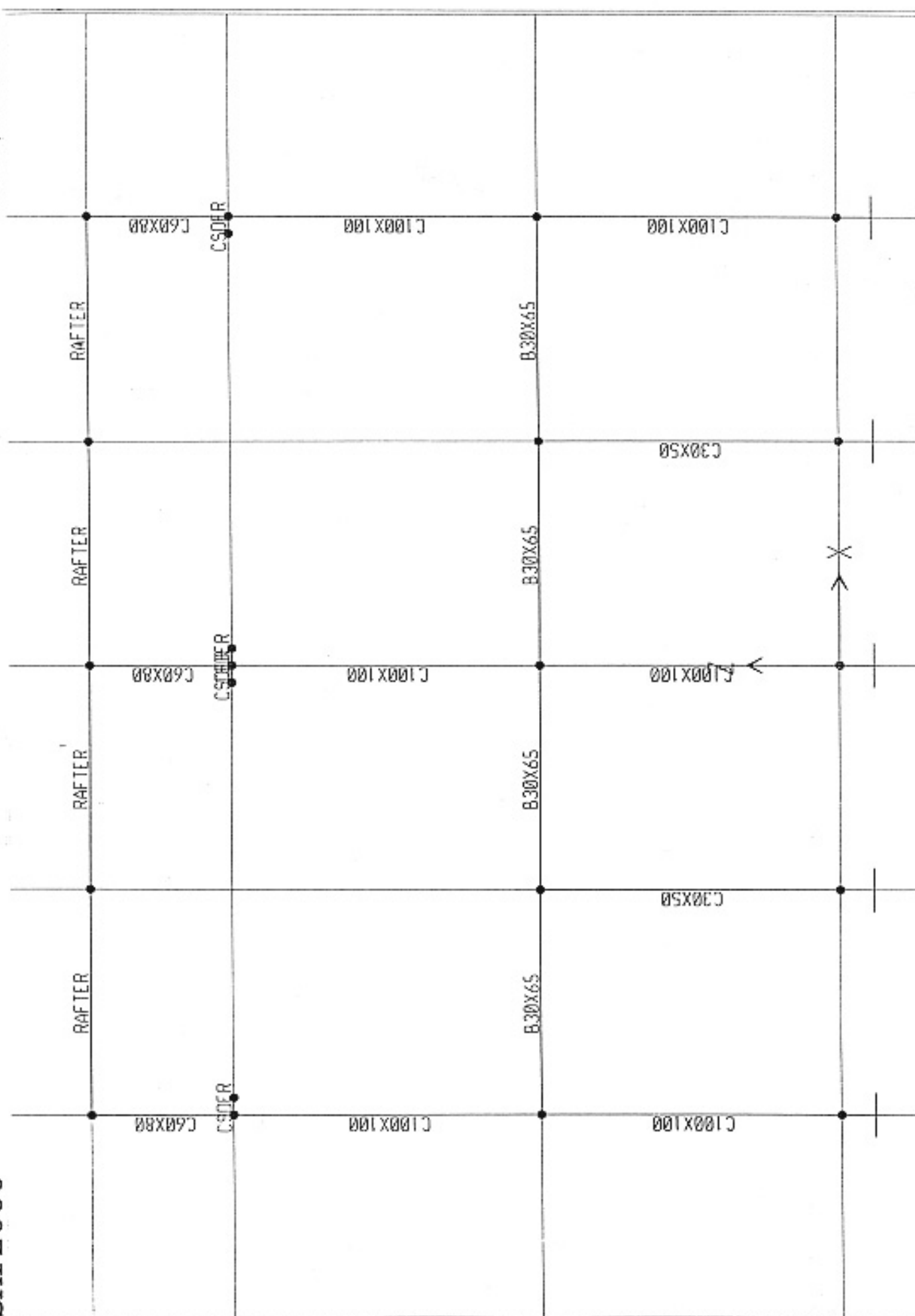
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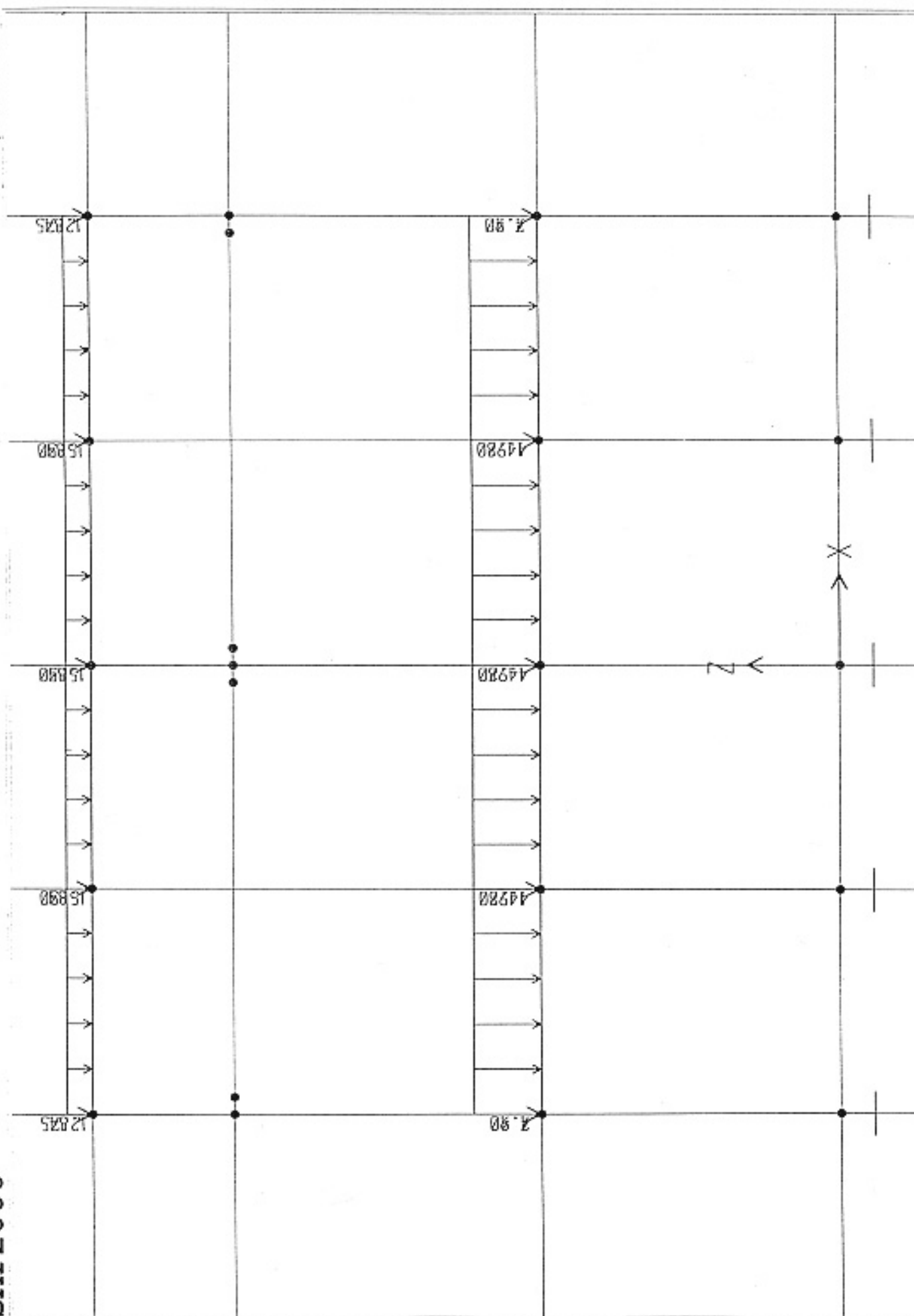
Load combination	Description
COMBO1	DEAD+LIVE
COMBO2	DEAD+LIVE+LWIND+WEIGHT1
COMBO3	DEAD+LIVE+LWIND+WEIGHT2
COMBO4	DEAD+LIVE+LWIND+WEIGHT3
COMBO5	DEAD+LIVE+LWIND+WEIGHT1,2,3
COMBO6	DEAD+LIVE+LWIND+WEIGHT1,2
COMBO7	DEAD+LIVE+LWIND+WEIGHT1,3
COMBO8	DEAD+LIVE+LWIND+WEIGHT2,3
COMBO9	DEAD+LIVE+RWIND
COMBO10	Envelop value of above combinations

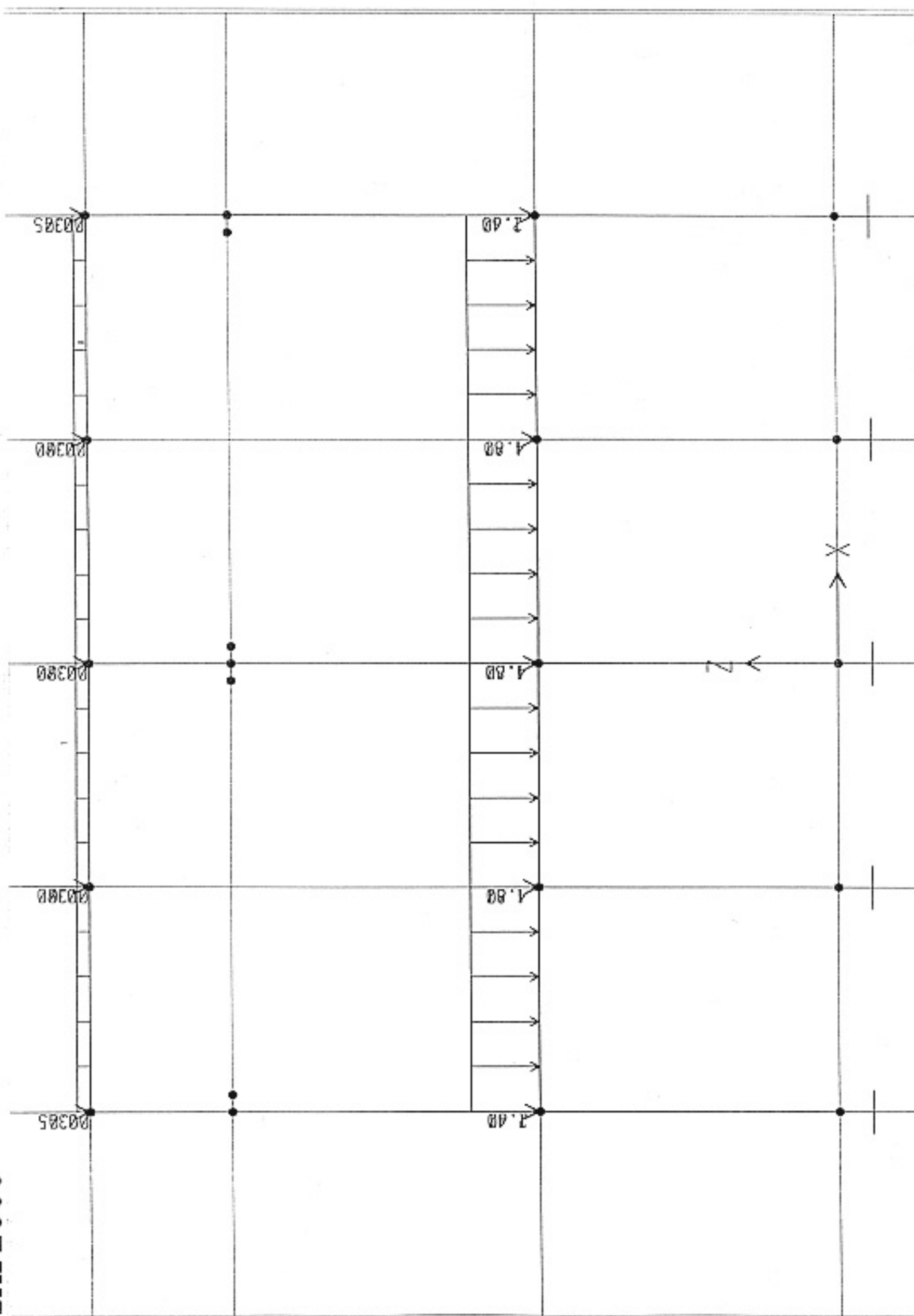
PROJECT : WASTE WATER TREATMENT PLANT
ITEM : DEWATER BUILDING
GRID LINE 10~6

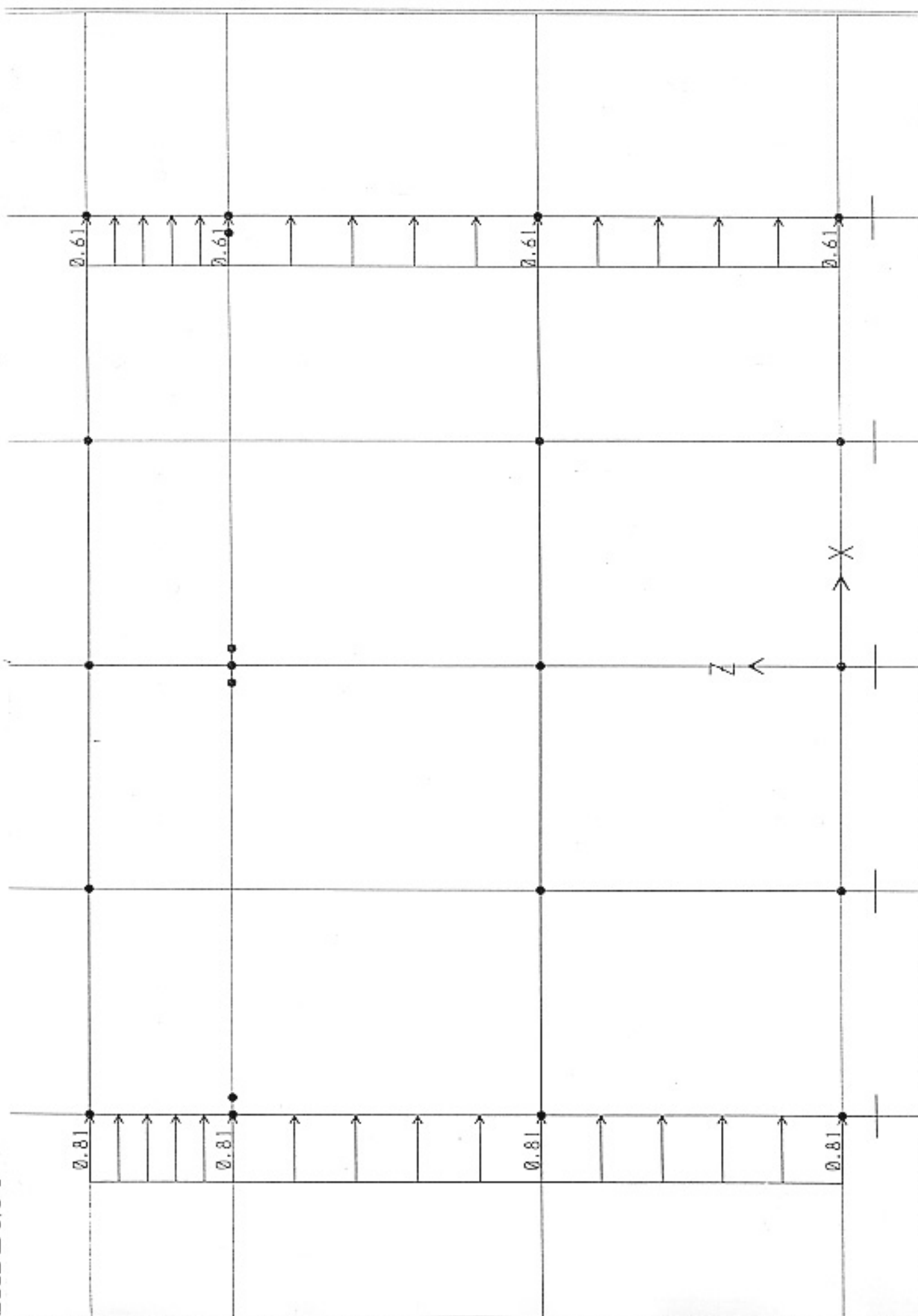
RESULT SHEETS



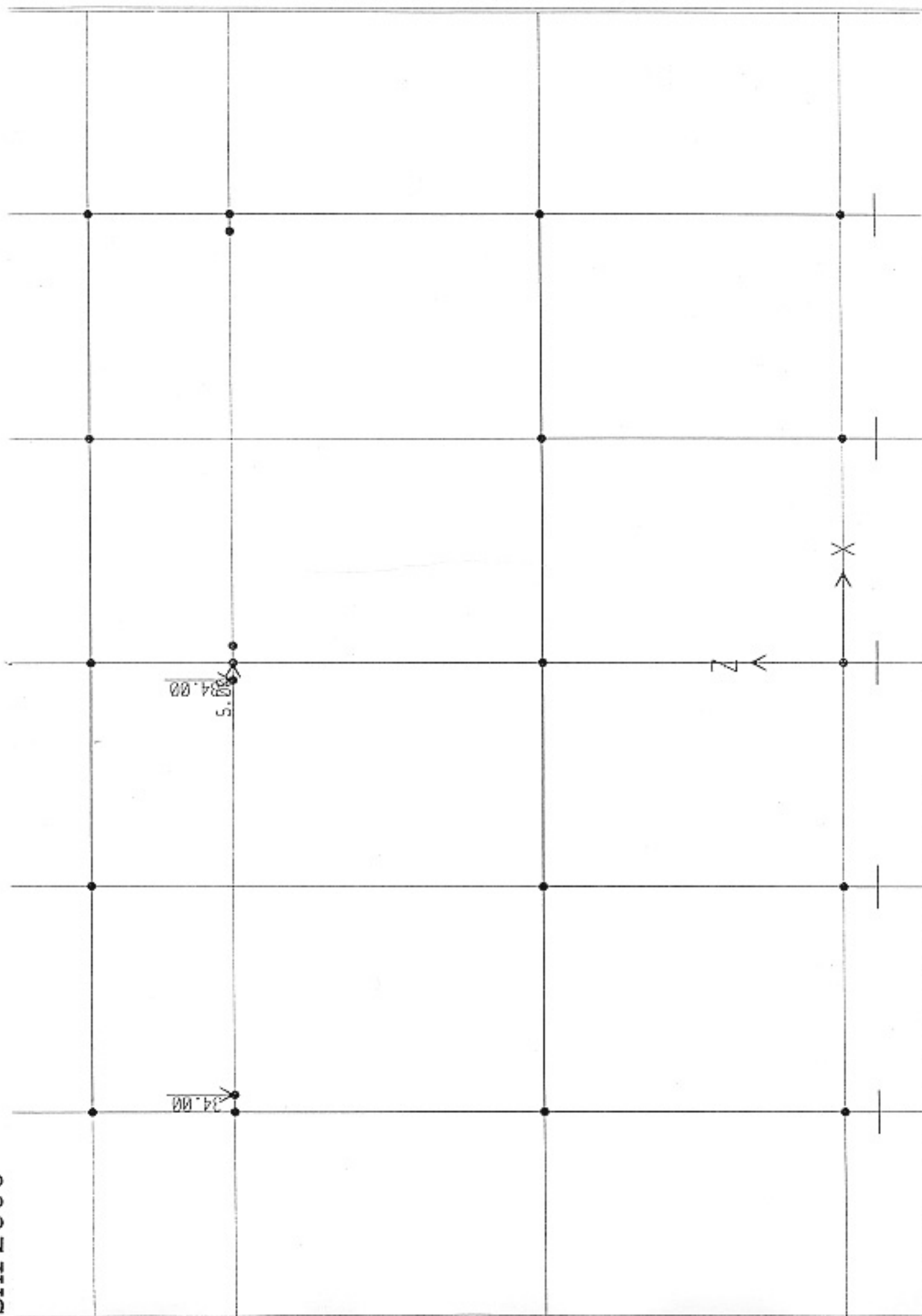


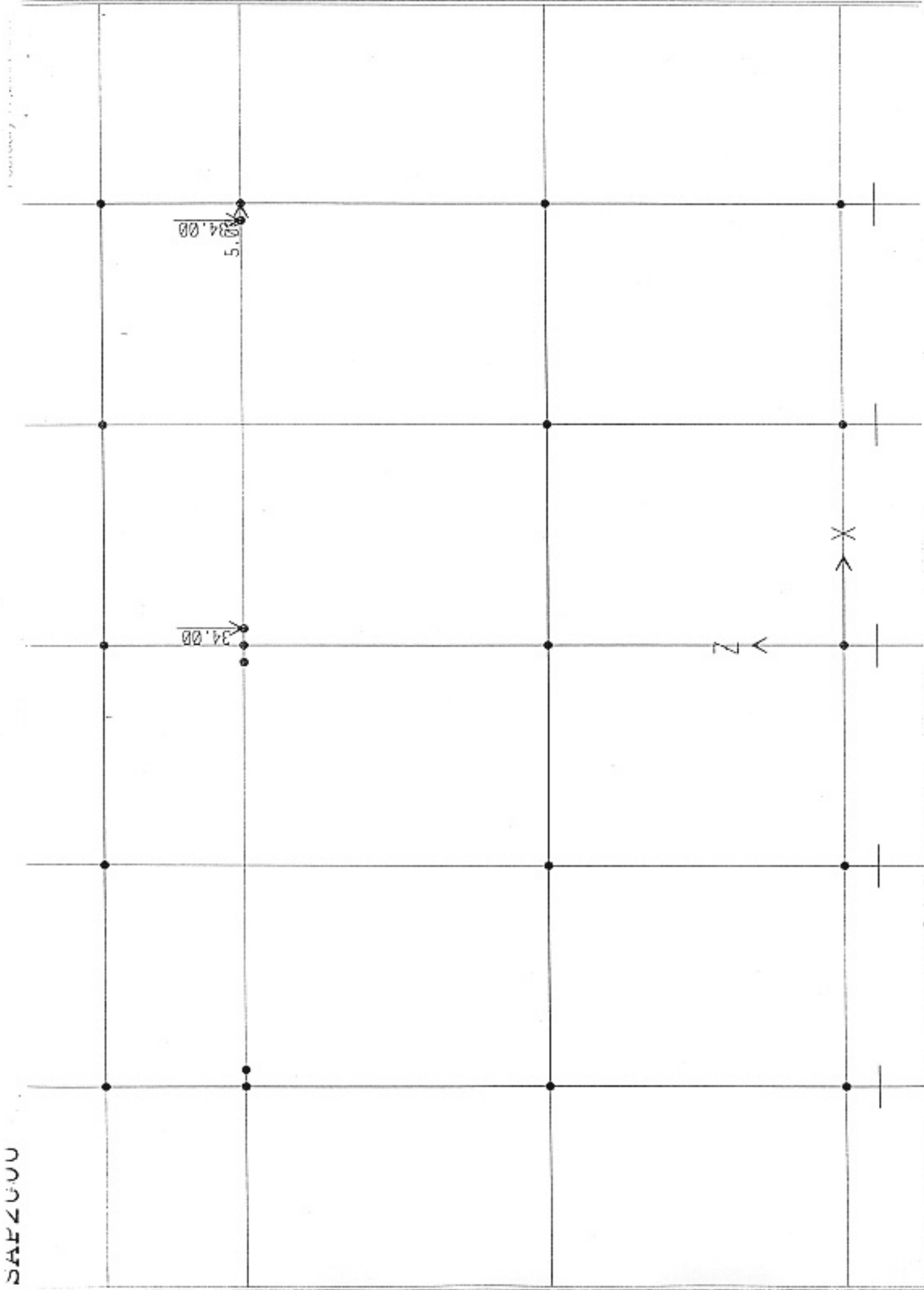




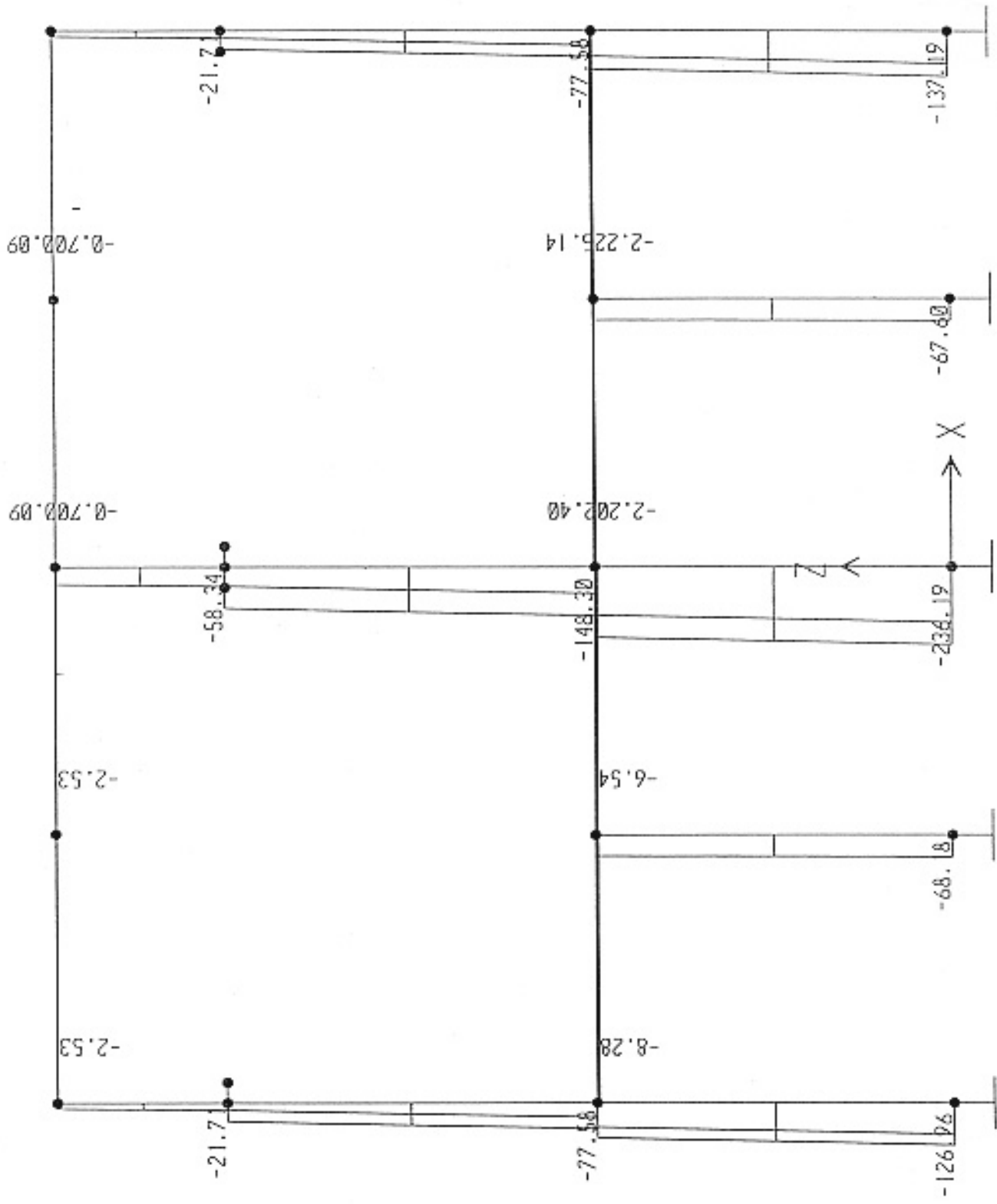


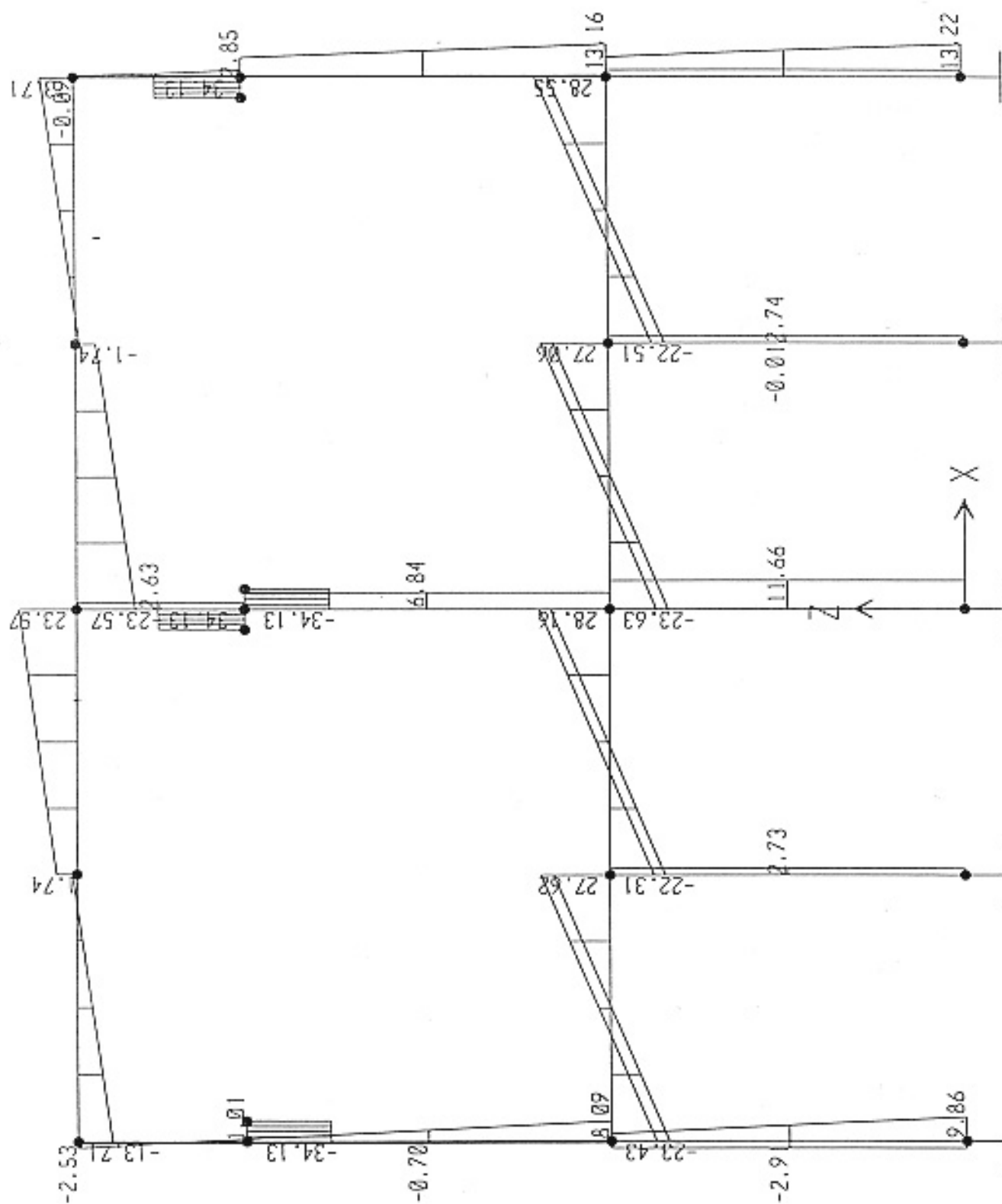
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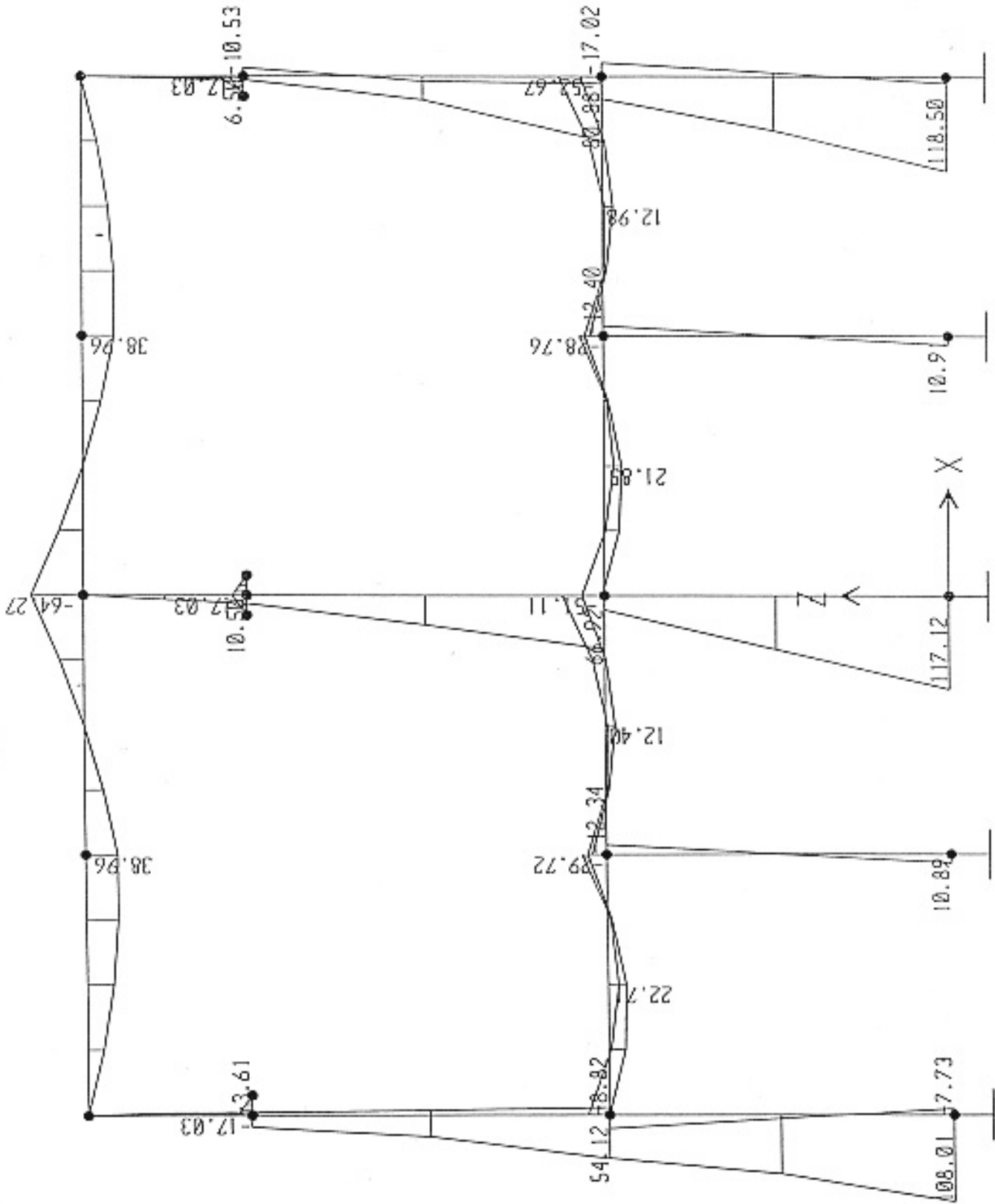




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SAPSTEEL V 1.2 - COPYRIGHT©2000 BY CIDECO
 WRITTEN BY NGUYEN TRUONG THANH

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 LENGTH UNIT : m
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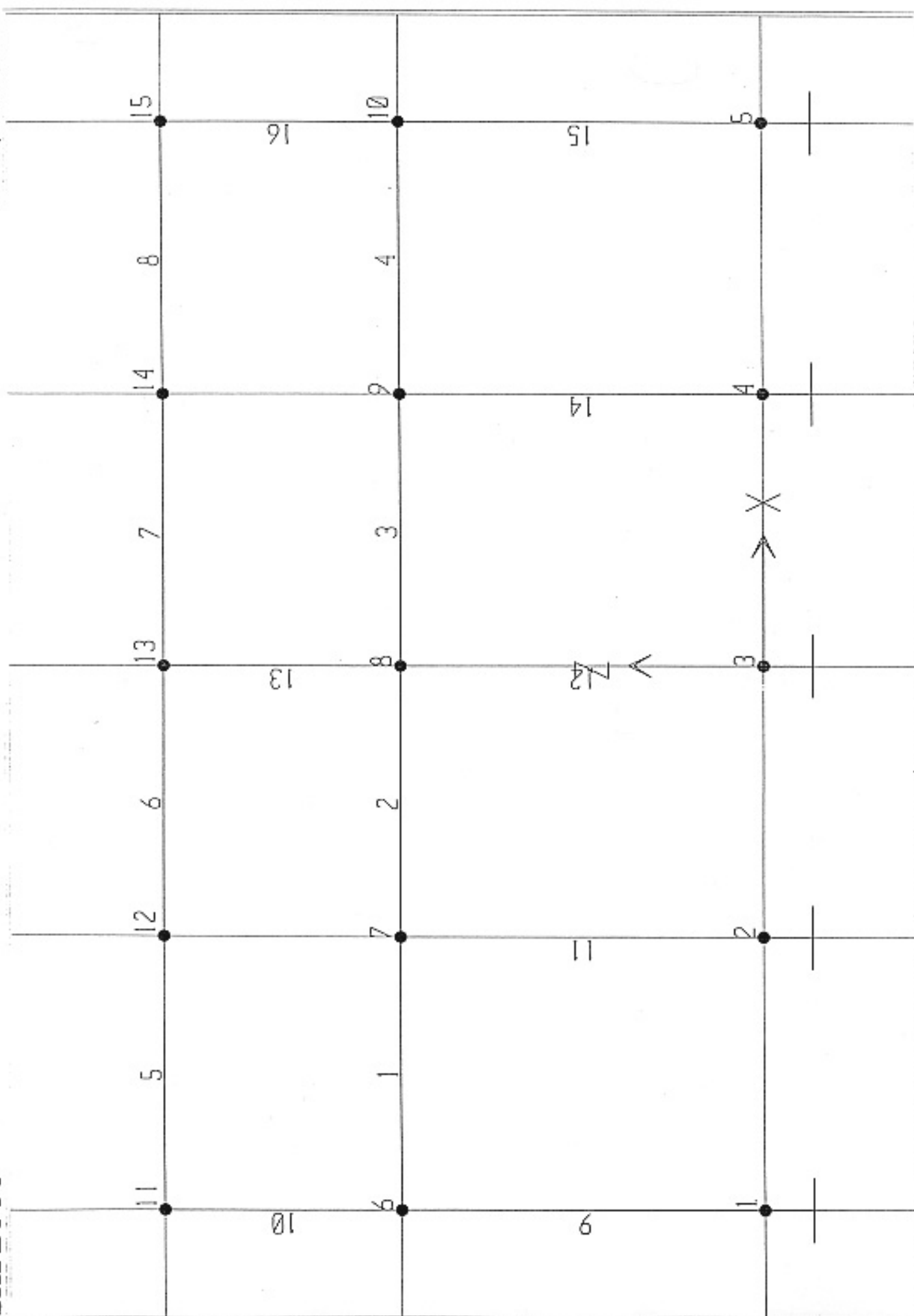
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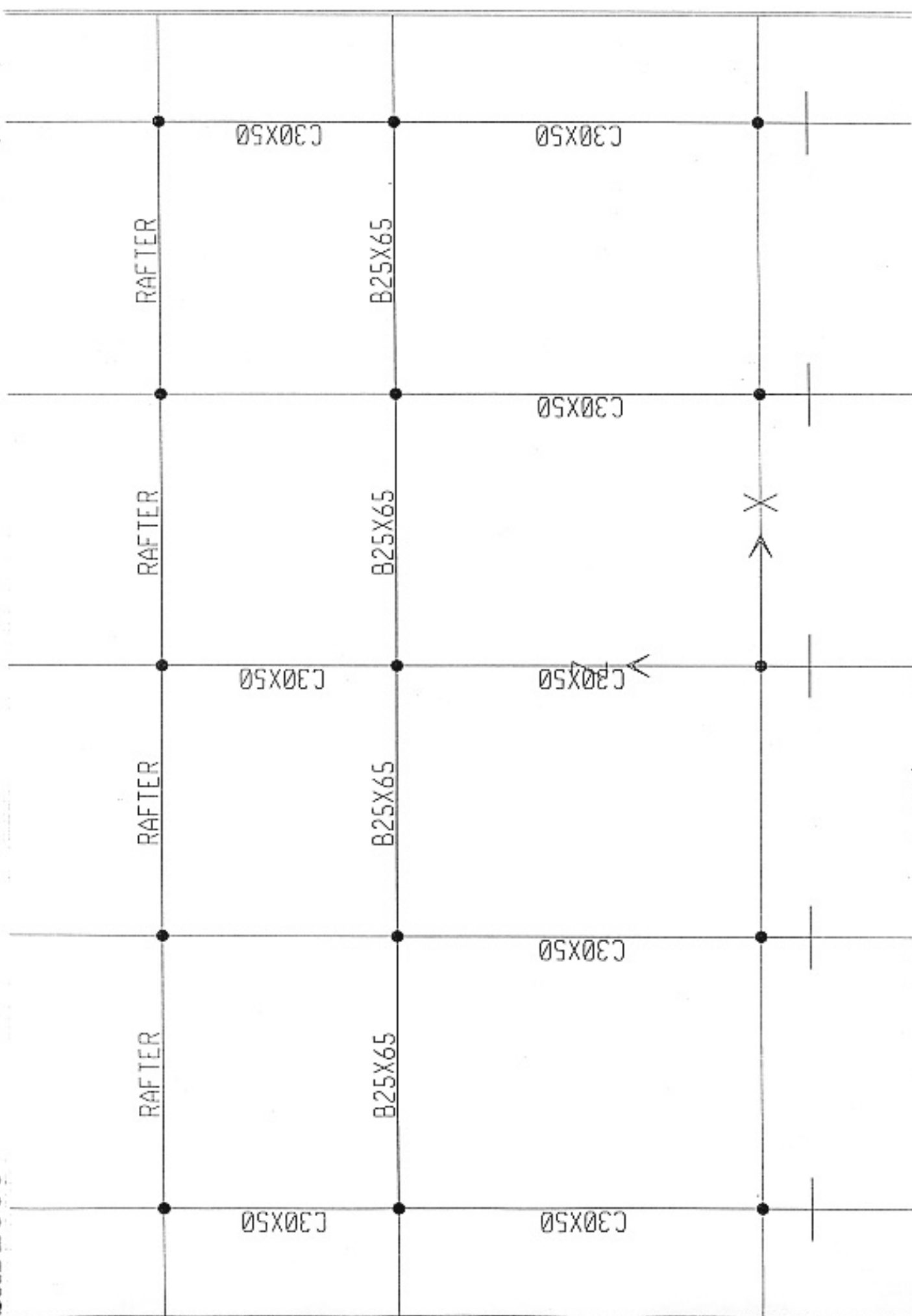
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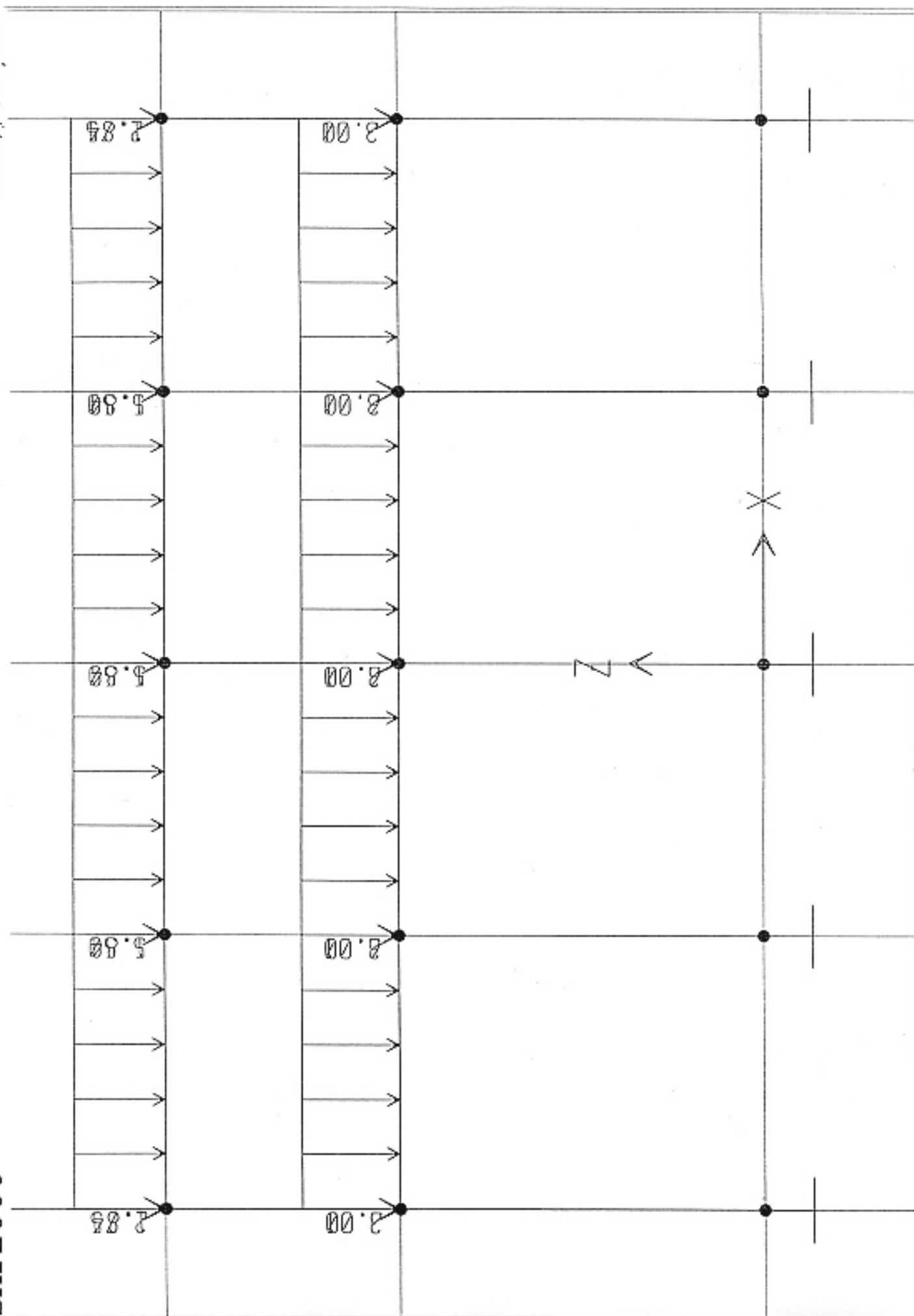
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19	4.00	8.64	0.40	*CHECKOK	8.64	0.40	*CHECKOK
20	0.00	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
20	0.00	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
20	4.25	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
20	4.25	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
20	8.50	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
20	8.50	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
21	0.00	18.00	0.40	*CHECKOK	18.00	0.40	*CHECKOK
21	0.00	18.00	0.40	*CHECKOK	24.10	0.54	*CHECKOK
21	4.25	18.00	0.40	*CHECKOK	18.00	0.40	*CHECKOK
21	4.25	18.00	0.40	*CHECKOK	18.00	0.40	*CHECKOK
21	8.50	18.00	0.40	*CHECKOK	18.00	0.40	*CHECKOK
21	8.50	18.00	0.40	*CHECKOK	18.00	0.40	*CHECKOK
22	0.00	18.00	0.40	*CHECKOK	18.00	0.40	*CHECKOK
22	0.00	18.00	0.40	*CHECKOK	32.58	0.72	*CHECKOK
22	4.35	18.00	0.40	*CHECKOK	18.00	0.40	*CHECKOK
22	4.35	18.00	0.40	*CHECKOK	18.00	0.40	*CHECKOK
22	8.70	18.00	0.40	*CHECKOK	18.00	0.40	*CHECKOK
22	8.70	18.00	0.40	*CHECKOK	18.00	0.40	*CHECKOK
23	0.00	8.64	0.40	*CHECKOK	8.64	0.40	*CHECKOK
23	0.00	8.64	0.40	*CHECKOK	8.64	0.40	*CHECKOK
23	2.00	8.64	0.40	*CHECKOK	8.64	0.40	*CHECKOK
23	2.00	8.64	0.40	*CHECKOK	8.64	0.40	*CHECKOK
23	4.00	8.64	0.40	*CHECKOK	8.64	0.40	*CHECKOK
23	4.00	8.64	0.40	*CHECKOK	8.64	0.40	*CHECKOK

PROJECT : WASTE WATER TREATMENT PLANT
ITEM : DEWATER BUILDING
GRID LINE 6'~1

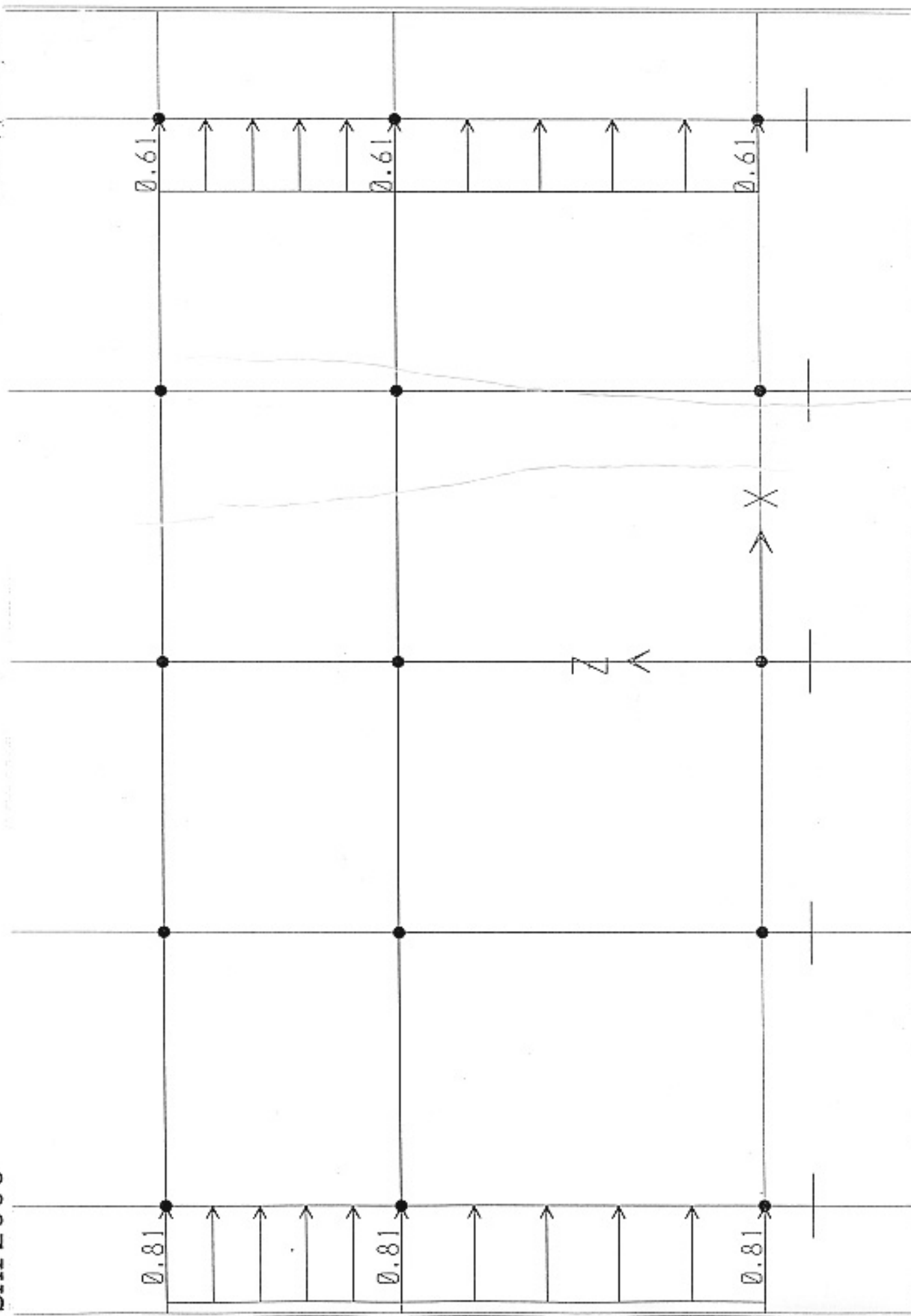
RESULT SHEETS

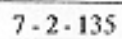


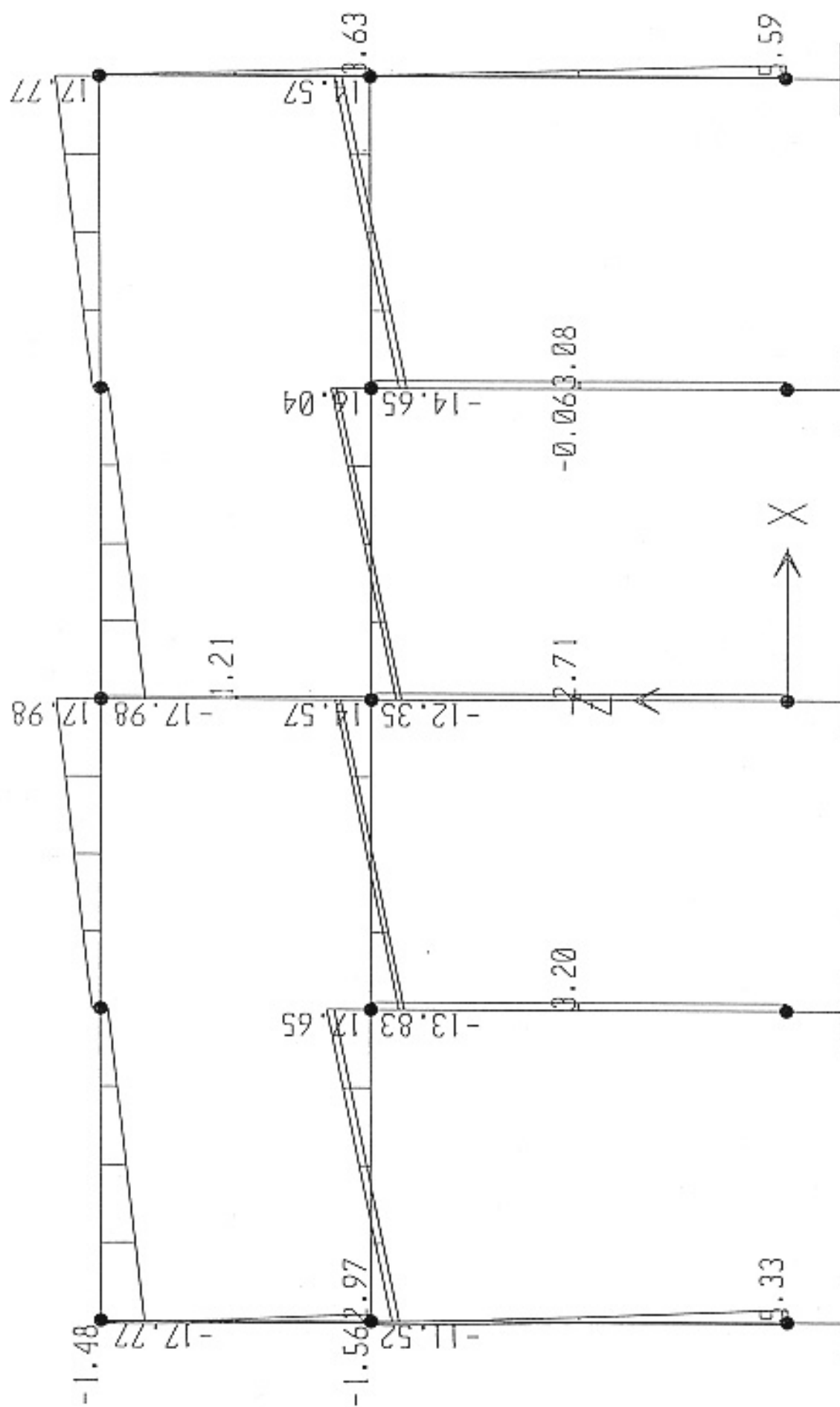


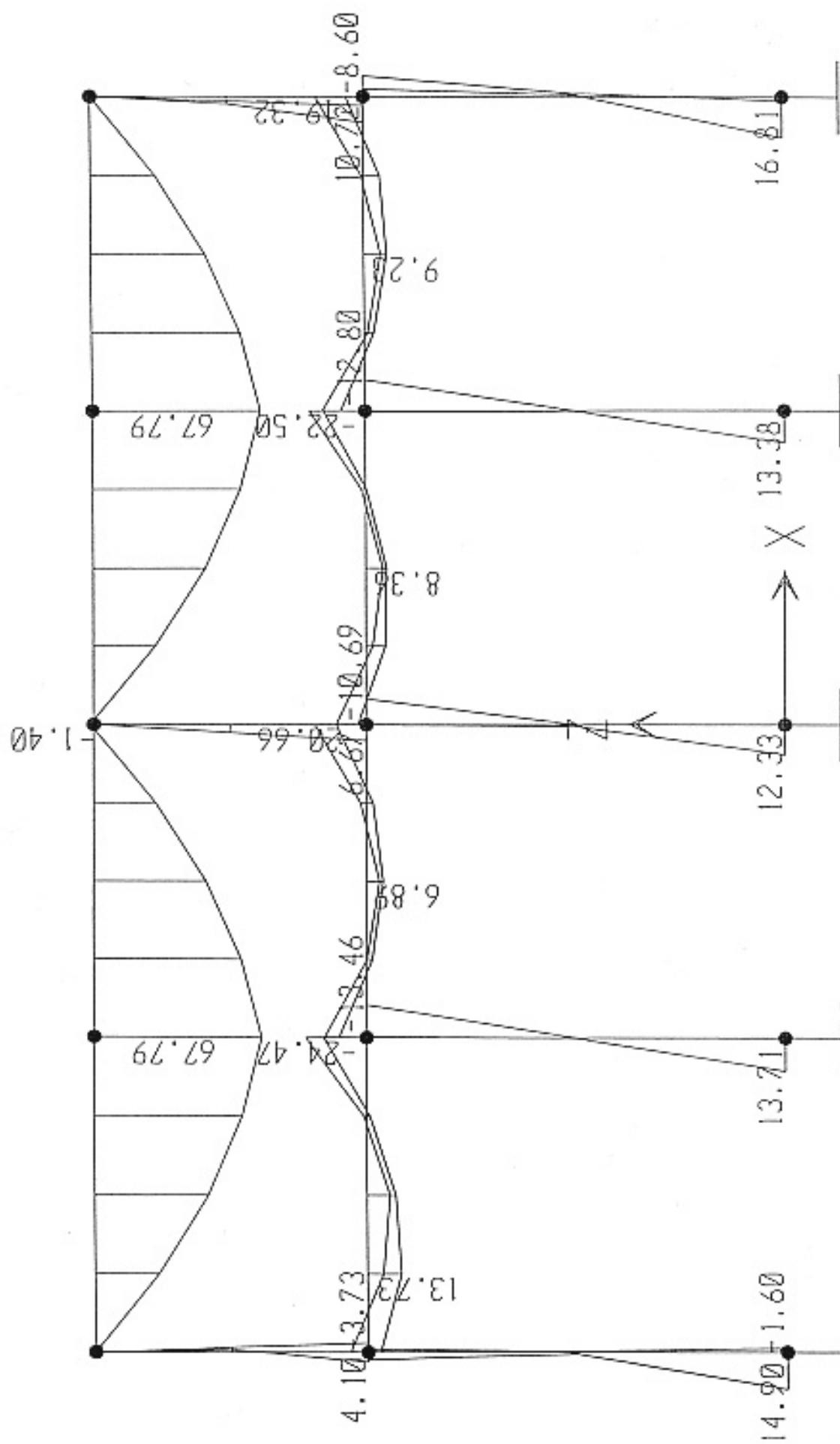












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 WRITTEN BY NGUYEN TRUONG THANH

REINFORCEMENT RESULT FOR FILE : D:\Watertreatment\cal\KETQUA\dewater2.txt

FORCE UNIT : Ton

LENGTH UNIT : m

Eb = 240000.00

Rb = 100.00

Rk = 8.00

Ra = 2000.00

ID	SEC	FA-2	MUY-2	STIRR-2	FA-3	MUY-3	STIRR-3
1	0.00	0.95	0.05	B6a150/3	-11.42	0.60	B6a230/2
1	0.00	0.95	0.05	B6a150/3	4.15	0.22	B6a230/2
1	0.81	0.95	0.05	B6a150/3	-3.38	0.18	B6a230/2
1	0.81	0.95	0.05	B6a150/3	3.59	0.19	B6a230/2
1	1.63	0.95	0.05	B6a150/3	-2.35	0.12	B6a230/2
1	1.63	0.95	0.05	B6a150/3	8.08	0.43	B6a230/2
1	2.44	0.95	0.05	B6a150/3	-1.32	0.07	B6a230/2
1	2.44	0.95	0.05	B6a150/3	10.42	0.55	B6a230/2
1	3.25	0.95	0.05	B6a150/3	-0.95	0.05	B6a230/2
1	3.25	0.95	0.05	B6a150/3	10.36	0.55	B6a230/2
2	0.00	0.95	0.05	B6a150/3	-0.95	0.05	B6a230/2
2	0.00	0.95	0.05	B6a150/3	10.36	0.55	B6a230/2
2	0.81	0.95	0.05	B6a150/3	-0.95	0.05	B6a230/2
2	0.81	0.95	0.05	B6a150/3	6.95	0.37	B6a230/2
2	1.63	0.95	0.05	B6a150/3	-1.73	0.09	B6a230/2
2	1.63	0.95	0.05	B6a150/3	3.73	0.20	B6a230/2
2	2.44	0.95	0.05	B6a150/3	-7.86	0.42	B6a230/2
2	2.44	0.95	0.05	B6a150/3	2.75	0.15	B6a230/2
2	3.25	0.95	0.05	B6a150/3	-19.65	1.04	B6a230/2
2	3.25	0.95	0.05	B6a150/3	3.80	0.20	B6a230/2
3	0.00	0.95	0.05	B6a150/3	-17.25	0.91	B6a230/2
3	0.00	0.95	0.05	B6a150/3	3.21	0.17	B6a230/2
3	0.81	0.95	0.05	B6a150/3	-7.40	0.39	B6a230/2
3	0.81	0.95	0.05	B6a150/3	2.43	0.13	B6a230/2
3	1.63	0.95	0.05	B6a150/3	-1.63	0.09	B6a230/2
3	1.63	0.95	0.05	B6a150/3	2.75	0.15	B6a230/2
3	2.44	0.95	0.05	B6a150/3	-0.95	0.05	B6a230/2
3	2.44	0.95	0.05	B6a150/3	5.94	0.31	B6a230/2
3	3.25	0.95	0.05	B6a150/3	-0.95	0.05	B6a230/2
3	3.25	0.95	0.05	B6a150/3	6.88	0.36	B6a230/2
4	0.00	0.95	0.05	B6a150/3	-0.95	0.05	B6a230/2
4	0.00	0.95	0.05	B6a150/3	6.88	0.36	B6a230/2
4	0.81	0.95	0.05	B6a150/3	-0.95	0.05	B6a230/2
4	0.81	0.95	0.05	B6a150/3	5.60	0.30	B6a230/2
4	1.63	0.95	0.05	B6a150/3	-1.38	0.07	B6a230/2
4	1.63	0.95	0.05	B6a150/3	3.21	0.17	B6a230/2
4	2.44	0.95	0.05	B6a150/3	-6.10	0.32	B6a230/2
4	2.44	0.95	0.05	B6a150/3	2.14	0.11	B6a230/2
4	3.25	0.95	0.05	B6a150/3	-15.70	0.83	B6a230/2
4	3.25	0.95	0.05	B6a150/3	2.90	0.15	B6a230/2
5	0.00	0.95	0.05	B6a150/3	-16.78	0.89	B6a230/2
5	0.00	0.95	0.05	B6a150/3	4.48	0.24	B6a230/2
5	0.81	0.95	0.05	B6a150/3	-6.77	0.36	B6a230/2
5	0.81	0.95	0.05	B6a150/3	3.09	0.16	B6a230/2
5	1.63	0.95	0.05	B6a150/3	-1.71	0.09	B6a230/2
5	1.63	0.95	0.05	B6a150/3	3.77	0.20	B6a230/2
5	2.44	0.95	0.05	B6a150/3	-0.95	0.05	B6a230/2
5	2.44	0.95	0.05	B6a150/3	5.92	0.31	B6a230/2
5	3.25	0.95	0.05	B6a150/3	-0.97	0.05	B6a230/2
5	3.25	0.95	0.05	B6a150/3	6.99	0.37	B6a230/2
6	0.00	0.95	0.05	B6a150/3	-0.97	0.05	B6a230/2
6	0.00	0.95	0.05	B6a150/3	6.99	0.37	B6a230/2
6	0.81	0.95	0.05	B6a150/3	-2.34	0.12	B6a230/2
6	0.81	0.95	0.05	B6a150/3	7.07	0.37	B6a230/2
6	1.63	0.95	0.05	B6a150/3	-3.90	0.21	B6a230/2
6	1.63	0.95	0.05	B6a150/3	4.84	0.26	B6a230/2
6	2.44	0.95	0.05	B6a150/3	-11.79	0.62	B6a230/2
6	2.44	0.95	0.05	B6a150/3	5.11	0.27	B6a230/2
6	3.25	0.95	0.05	B6a150/3	-23.35	1.24	B6a230/2
6	3.25	0.95	0.05	B6a150/3	6.54	0.35	B6a230/2
7	0.00	0.95	0.05	B6a150/3	-25.35	1.34	B6a230/2
7	0.00	0.95	0.05	B6a150/3	9.29	0.49	B6a230/2

7	0.81	0.95	0.05	b6a150/3	-12.24	0.65	b6a230/2
7	0.81	0.95	0.05	b6a150/3	6.76	0.36	b6a230/2
7	1.63	0.95	0.05	b6a150/3	-4.29	0.23	b6a230/2
7	1.63	0.95	0.05	b6a150/3	6.49	0.34	b6a230/2
7	2.44	0.95	0.05	b6a150/3	-1.92	0.10	b6a230/2
7	2.44	0.95	0.05	b6a150/3	8.35	0.44	b6a230/2
7	3.25	0.95	0.05	b6a150/3	-0.95	0.05	b6a230/2
7	3.25	0.95	0.05	b6a150/3	7.85	0.42	b6a230/2
8	0.00	0.95	0.05	b6a150/3	-0.95	0.05	b6a230/2
8	0.00	0.95	0.05	b6a150/3	7.85	0.42	b6a230/2
8	0.81	0.95	0.05	b6a150/3	-2.77	0.15	b6a230/2
8	0.81	0.95	0.05	b6a150/3	9.31	0.49	b6a230/2
8	1.63	0.95	0.05	b6a150/3	-5.18	0.27	b6a230/2
8	1.63	0.95	0.05	b6a150/3	8.92	0.47	b6a230/2
8	2.44	0.95	0.05	b6a150/3	-9.06	0.48	b6a230/2
8	2.44	0.95	0.05	b6a150/3	7.52	0.40	b6a230/2
8	3.25	0.95	0.05	b6a150/3	-20.06	1.06	b6a230/2
8	3.25	0.95	0.05	b6a150/3	10.04	0.53	b6a230/2
9	0.00	1.08	0.05	b6a150/3	-3.57	0.17	b6a270/2
9	0.00	1.08	0.05	b6a150/3	1.08	0.05	b6a270/2
9	1.63	1.08	0.05	b6a150/3	-1.08	0.05	b6a270/2
9	1.63	1.08	0.05	b6a150/3	2.79	0.13	b6a270/2
9	3.25	1.08	0.05	b6a150/3	-1.08	0.05	b6a270/2
9	3.25	1.08	0.05	b6a150/3	4.34	0.20	b6a270/2
9	4.88	1.08	0.05	b6a150/3	-1.08	0.05	b6a270/2
9	4.88	1.08	0.05	b6a150/3	1.86	0.09	b6a270/2
9	6.50	1.08	0.05	b6a150/3	-6.38	0.30	b6a270/2
9	6.50	1.08	0.05	b6a150/3	1.08	0.05	b6a270/2
10	0.00	1.08	0.05	b6a150/3	-6.92	0.32	b6a270/2
10	0.00	1.08	0.05	b6a150/3	1.08	0.05	b6a270/2
10	1.63	1.08	0.05	b6a150/3	-1.08	0.05	b6a270/2
10	1.63	1.08	0.05	b6a150/3	1.47	0.07	b6a270/2
10	3.25	1.08	0.05	b6a150/3	-1.08	0.05	b6a270/2
10	3.25	1.08	0.05	b6a150/3	3.30	0.15	b6a270/2
10	4.88	1.08	0.05	b6a150/3	-1.08	0.05	b6a270/2
10	4.88	1.08	0.05	b6a150/3	1.63	0.08	b6a270/2
10	6.50	1.08	0.05	b6a150/3	-6.06	0.28	b6a270/2
10	6.50	1.08	0.05	b6a150/3	1.08	0.05	b6a270/2
11	0.00	1.08	0.05	b6a150/3	-6.12	0.28	b6a270/2
11	0.00	1.08	0.05	b6a150/3	1.08	0.05	b6a270/2
11	1.63	1.08	0.05	b6a150/3	-1.08	0.05	b6a270/2
11	1.63	1.08	0.05	b6a150/3	1.48	0.07	b6a270/2
11	3.25	1.08	0.05	b6a150/3	-1.08	0.05	b6a270/2
11	3.25	1.08	0.05	b6a150/3	3.09	0.14	b6a270/2
11	4.88	1.08	0.05	b6a150/3	-1.08	0.05	b6a270/2
11	4.88	1.08	0.05	b6a150/3	1.26	0.06	b6a270/2
11	6.50	1.08	0.05	b6a150/3	-8.42	0.39	b6a270/2
11	6.50	1.08	0.05	b6a150/3	1.66	0.08	b6a270/2
12	0.00	1.08	0.05	b6a150/3	-0.90	0.41	b6a270/2
12	0.00	1.08	0.05	b6a150/3	1.84	0.09	b6a270/2
12	1.63	1.08	0.05	b6a150/3	-1.08	0.05	b6a270/2
12	1.63	1.08	0.05	b6a150/3	1.36	0.06	b6a270/2
12	3.25	1.08	0.05	b6a150/3	-1.08	0.05	b6a270/2
12	3.25	1.08	0.05	b6a150/3	3.47	0.16	b6a270/2
12	4.88	1.08	0.05	b6a150/3	-1.08	0.05	b6a270/2
12	4.88	1.08	0.05	b6a150/3	2.81	0.13	b6a270/2
12	6.50	1.08	0.05	b6a150/3	-5.78	0.27	b6a270/2
12	6.50	1.08	0.05	b6a150/3	1.52	0.07	b6a270/2
13	0.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
13	0.00	2.70	0.40	*CHECKOK	9.12	1.35	*CHECKOK
13	2.25	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
13	2.25	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
13	4.50	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
13	4.50	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
14	0.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
14	0.00	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
14	2.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
14	2.00	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
14	4.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
14	4.00	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
15	0.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
15	0.00	2.70	0.40	*CHECKOK	8.42	1.25	*CHECKOK
15	2.75	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
15	2.75	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
15	5.50	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH

15	5.50	2.70	0.40	*CHECKOK	4.75	0.70	*CHECKOK
16	0.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
16	0.00	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
16	2.25	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
16	2.25	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
16	4.50	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
16	4.50	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
17	0.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
17	0.00	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
17	2.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
17	2.00	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
17	4.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
17	4.00	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
18	0.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
18	0.00	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
18	2.75	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
18	2.75	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
18	5.50	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
18	5.50	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
19	0.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
19	0.00	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
19	2.25	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
19	2.25	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
19	4.50	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
19	4.50	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
20	0.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
20	0.00	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
20	2.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
20	2.00	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
20	4.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
20	4.00	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
21	0.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
21	0.00	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
21	2.75	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
21	2.75	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
21	5.50	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
21	5.50	2.70	0.40	*CHECKOK	2.70	0.40	*CHECKOK
22	0.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
22	0.00	6.48	0.40	*CHECKOK	9.25	0.57	*CHECKOK
22	2.25	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
22	2.25	6.48	0.40	*CHECKOK	6.48	0.40	*CHECKOK
22	4.50	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
22	4.50	6.48	0.40	*CHECKOK	6.48	0.40	*CHECKOK
23	0.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
23	0.00	6.48	0.40	*CHECKOK	6.48	0.40	*CHECKOK
23	2.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
23	2.00	6.48	0.40	*CHECKOK	6.48	0.40	*CHECKOK
23	4.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
23	4.00	6.48	0.40	*CHECKOK	14.31	0.88	*CHECKOK
24	0.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
24	0.00	6.48	0.40	*CHECKOK	6.48	0.40	*CHECKOK
24	2.75	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
24	2.75	6.48	0.40	*CHECKOK	6.48	0.40	*CHECKOK
24	5.50	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
24	5.50	6.48	0.40	*CHECKOK	6.48	0.40	*CHECKOK
25	0.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
25	0.00	6.48	0.40	*CHECKOK	51.79	3.20	**OVER**
25	2.25	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
25	2.25	6.48	0.40	*CHECKOK	6.48	0.40	*CHECKOK
25	4.50	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
25	4.50	6.48	0.40	*CHECKOK	6.48	0.40	*CHECKOK
26	0.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
26	0.00	6.48	0.40	*CHECKOK	6.48	0.40	*CHECKOK
26	2.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
26	2.00	6.48	0.40	*CHECKOK	6.48	0.40	*CHECKOK
26	4.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
26	4.00	6.48	0.40	*CHECKOK	10.32	0.64	*CHECKOK
27	0.00	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
27	0.00	6.48	0.40	*CHECKOK	7.80	0.48	*CHECKOK
27	2.75	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
27	2.75	6.48	0.40	*CHECKOK	6.48	0.40	*CHECKOK
27	5.50	0.00	0.00	*STRETCH	0.00	0.00	*STRETCH
27	5.50	6.48	0.40	*CHECKOK	6.48	0.41	*CHECKOK

7.2.7

First Fermentation Tank

PROJECT : WASTEWATER TREATMENT PLANT
ITEM : FIRST FERMENTATION TANK : 6
SUB-STORAGE VESSEL

STEEL STRUCTURE CALCULATION SHEET

JOB NO :				DATE : 13/01/2001			
DESIGNED BY :				CHECKED BY :			
REV NO :				REV. DATE :			
DESCRIPTION : Index							

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
1.	Building(s) Description	D2
2.	Design Criteria & Material Specifications	D3
3.	Design Loads	D4
4.	Main Frame Analysis & Design	D5
5.	Design Sketches	Bldg. "A" : S1 - S3 Bldg. "B" : S1 - S3
6.	Applicable Section Properties and Load Tables:	
	- Rib Sheeting	Page 21
	- Purlins & Girts	Pages 120 - 121
	- Eave Strut (1 : 10)	Page 123
	- Cee Section Properties	Page 124
	- Base & Cap Channel	Page 125
	- Hot-Rolled Section Properties	Page 126
7.	Computer Shell Output	
8.	Computer Frame Output	
9.	CONNECTION DETAILS	

JOB NO : Q - 25431				DATE : 13/01/2001			
DESIGNED BY :				CHECKED BY :			
REV NO :				REV. DATE :			
DESCRIPTION : Building's Description							

Building : FIRST FERMENTATION TANK

Type : BC - 2

Width : 45.80 Meters C/C

Length : 88.80 Meters C/C

Clear Height : 3.50 Meters

No. of Main Ends : Two

Roof Slope : 1 : 10

Roof Covering : Rib Sheeting 26 GA

Wall Covering : N/A as fully open for B/W by others

Building : SUB-STORAGE VESSEL

Type : R.F.

Width : 20.00 Meters C/C

Length : 15.00 Meters C/C

Clear Height : 3.00 Meters

No. of Main Ends : Two

Roof Slope : 1 : 10

Roof Covering : Rib Sheeting 26 GA

Wall Covering : N/A as fully open for B/W by others

JOB NO :				DATE : 13/01/2001			
DESIGNED BY :				CHECKED BY :			
REV NO :				REV. DATE :			
DESCRIPTION : Design Criteria and Material Specification							

Design Criteria :

- a) American Institute of Steel Construction Manual (AISC)
- b) American Iron & Steel Institute Specifications (AISI)
- c) Metal Building Manufacturers Association Manual (MBMA)
- d) American Welding Society Specifications (AWS)

Material Specifications :

(All materials conform to the following specifications or equivalent)

- a) Built-Up Sections - ASTM A 570 Gr 50 (Fy = 50 Ksi)
- b) Hot-Rolled Sections - ASTM A 572 Gr 50 (Fy = 50 Ksi)
- c) Rod-Bracing - ASTM A 36 (Fy = 36 Ksi)
- d) Tubes - ASTM A 500 Gr 'C' (Fy = 50 Ksi)
- e) Cold-Formed Sections - ASTM A 570 Gr 'D' (Fy = 50 Ksi)
- f) Roof & Wall Sheetings - ASTM A 792 50 'B' (Fy = 50 Ksi)
- g) High Strength Bolts - ASTM A 325 (Fy = 92 Ksi)
- h) Anchor Bolts - ASTM A 36 (Fy = 36 Ksi)

JOB NO :				DATE : 13/01/2001			
DESIGNED BY :				CHECKED BY :			
REV NO :				REV. DATE :			
DESCRIPTION : Design Loads							

Frame:

Dead Load : 0.10 KN/M² + Self weight of structure
for frame

Live Load : 0.57 KN/M²

Wind Speed : 31.0 M/Sec

JOB NO :				DATE : 13/01/2001			
DESIGNED BY :				CHECKED BY :			
REV NO :				REV. DATE :			
DESCRIPTION : Main Frame Analysis & Design							

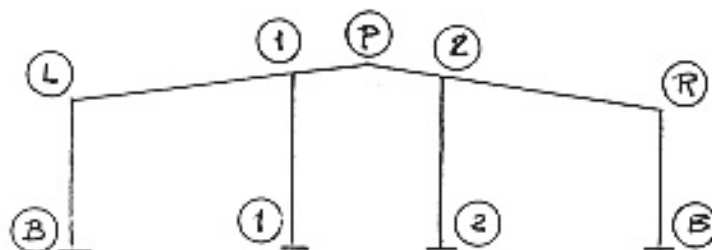
Design Assumptions (Main Frame)

- a) Exterior columns are pinned at base and rigid at haunch connection.
- b) Rafter is continuous throughout the length.
- c) Interior columns are pinned both ends, top & bottom.

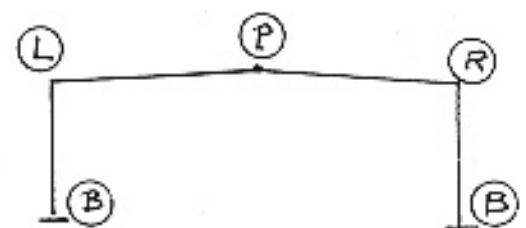
Design:

The primary structure was designed by input into Kirby Building Systems' Computers. Design program is PACE II Structural Analysis & Design & Synercom, in accordance with AISC and MBMA specifications. The results of the run are attached.

For Frame Joint numbering system as listed on computer print-out



**FIRST FERMENTATION TANK
BLDG "A"**



**SUBSTORAGE VESSEL
BLDG "B"**

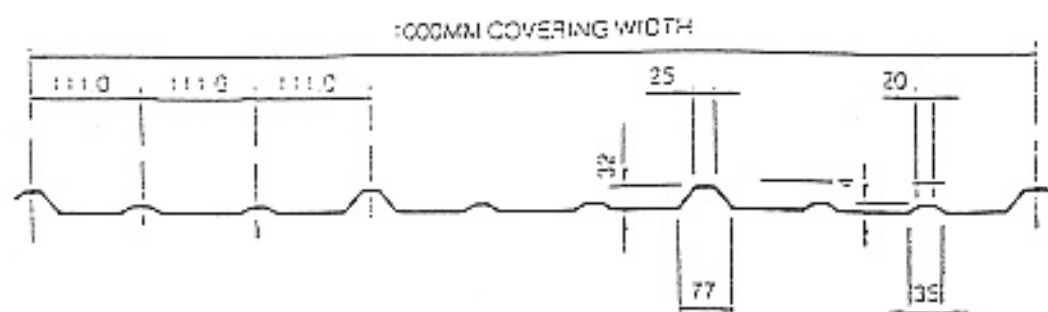
For Frame analysis, please refer to Computer output.

PROPERTIES AND ALLOWABLE LOADS

PAGE

DATE

RIB


 MINIMUM SPECIFIED YIELD STRESS (F_y) = 34.5 KNCM² (50 K.S.I.)

PANEL PROPERTIES

PANEL THICKNESS (NOMINAL) (mm)	GIRTH mm	WEIGHT kg/m	TOP FLAT IN COMP.		BOT. FLAT IN COMP.	
			Ix cm ⁴	Sx cm ³	Ix cm ⁴	Sx cm ³
0.50 (25 GA)	1146.71	4.767	5.205	1.982	4.850	2.170
0.64 (24 GA)	1146.71	5.942	9.642	3.375	4.850	3.530

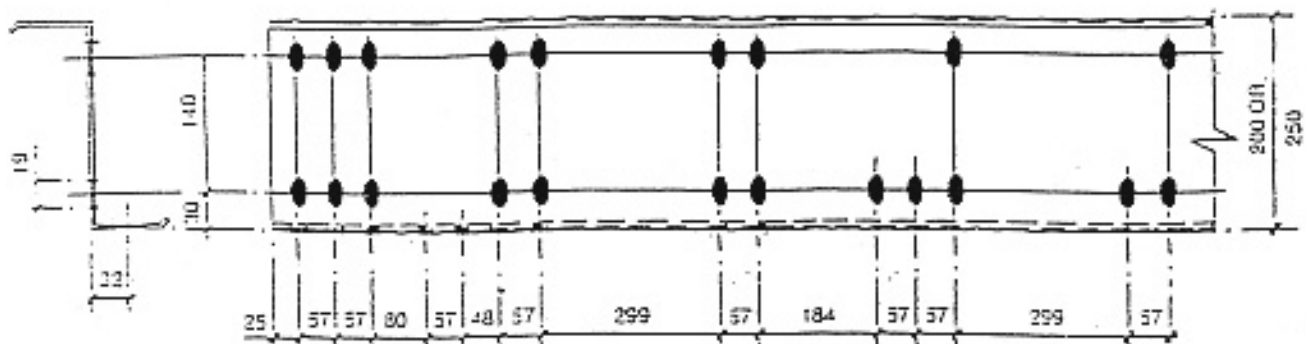
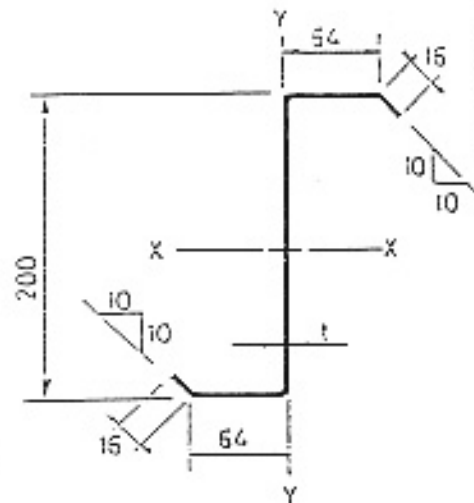
SECTION PROPERTIES ARE CALCULATED IN ACCORDANCE WITH THE 1977 EDITION OF THE AMERICAN IRON AND STEEL INSTITUTE SPECIFICATIONS (A.I.S.I.)

ALLOWABLE UNIFORM LOAD KN/m²

PANEL THICKNESS (NOMINAL)	TYPE OF SPAN	CLEAR SPAN (m)									
		0.70	0.90	1.10	1.20	1.50	1.70	1.90	2.10	2.30	2.50
0.50 (mm)	TWO SPANS	7.44	4.50	3.01	2.16	1.52	1.26	1.01	0.83	0.69	0.58
		31.66	14.90	8.16	4.34	3.22	2.21	1.58	1.17	0.89	0.70
	THREE OR MORE SPANS	9.31	5.63	3.77	2.70	2.03	1.58	1.29	1.03	0.86	0.73
		24.79	11.66	6.39	3.67	2.52	1.73	1.24	0.92	0.70	0.54
0.64 (mm)	TWO SPANS	11.92	9.12	4.82	3.46	2.59	2.02	1.62	1.33	1.10	0.94
		45.77	22.14	12.13	7.35	4.78	3.29	2.35	1.74	1.33	1.03
	THREE OR MORE SPANS	14.90	11.40	6.03	4.32	3.24	2.53	2.02	1.66	1.38	1.17
		36.82	17.33	9.49	5.75	3.74	2.57	1.84	1.36	1.04	0.81

TOP VALUES ARE BASED ON BENDING

BOTTOM VALUES ARE BASED ON DEFLECTION OF 1/180



ALL HOLES 14 x 19 SLOTS

STANDARD ZEE PUNCH - LEFT END.

MINIMUM SPECIFIED YIELD STRESS (F_y) = 34.5 kN/cm² (50 KSI)

TABLE OF PROPERTIES OF Z SECTIONS

MATERIAL	t mm	WEIGHT kg/m	AREA cm ²	I _x cm ⁴	S _x cm ³	r _x cm	I _y cm ⁴	S _y cm ³	r _y cm	I _{xy} cm ⁴	c min. cm
200 Z	1.50	4.07	5.18	309.4	30.94	7.73	46.48	5.23	3.00	28.21	1.95
200 Z	1.75	4.74	6.03	359.0	35.90	7.71	53.75	7.22	2.58	102.17	1.94
200 Z	2.00	5.41	6.88	407.9	40.79	7.70	60.38	9.19	2.98	115.95	1.93
200 Z	2.50	6.72	8.55	604.1	60.41	7.67	74.75	10.09	2.95	142.53	1.92
250 Z	2.50	7.71	9.81	858.4	88.67	9.35	74.75	10.09	2.76	179.57	1.90

ZEDS ALLOWABLE LOAD TABLES

DATE

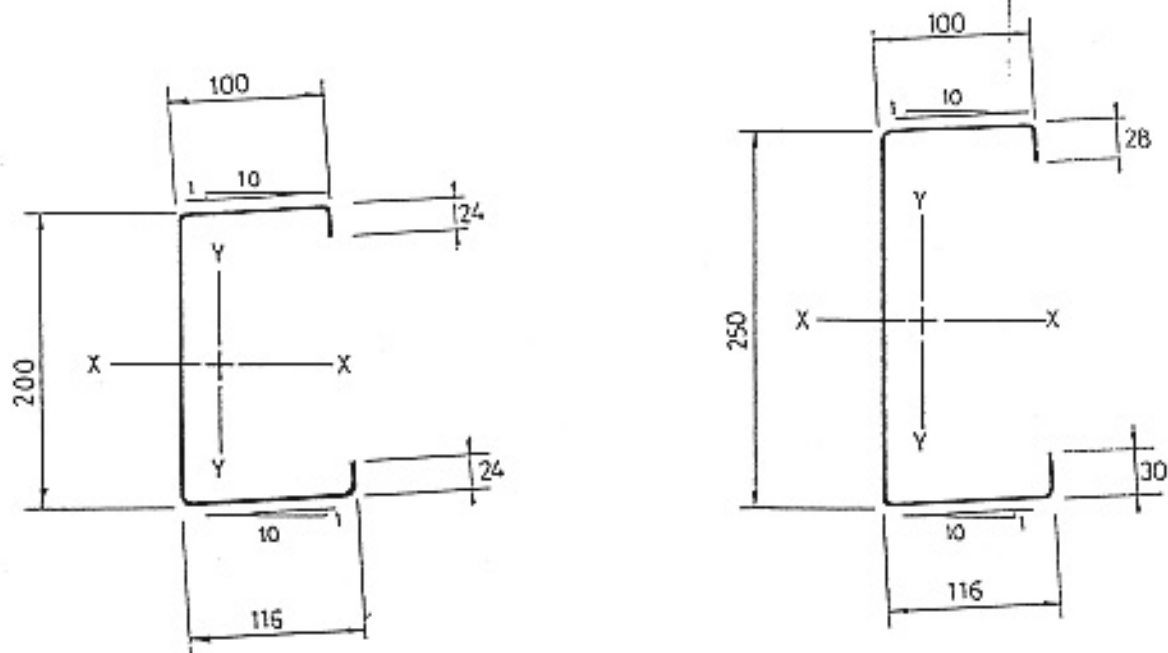
ALLOWABLE TOTAL LOAD (D.L. + LL) IN KILONEWTON/METER

SPAN m	BAY TYPE	200 Z 1.5			200 Z 1.75			200 Z 2.0			200 Z 2.5		
		SIMPLE SPAN	107mm LAP	706mm LAP	SIMPLE SPAN	107mm LAP	706mm LAP	SIMPLE SPAN	107mm LAP	706mm LAP	SIMPLE SPAN	607mm LAP	706mm LAP
5	END	2.178	2.240	2.809	2.502	2.788	3.318	2.957	3.384	4.756	3.579	4.310	6.344
	INTERIOR		2.325	4.110		2.907	5.719		3.508	7.274		4.551	9.998
5.5	END	1.800	1.818	2.358	2.150	2.345	3.146	2.452	2.807	3.860	2.858	3.449	5.046
	INTERIOR		1.982	3.345		2.502	4.538		2.972	5.845		3.740	7.513
6	END	1.512	1.563	2.001	1.807	1.998	2.829	2.090	2.375	3.188	2.465	2.588	4.107
	INTERIOR		1.576	2.763		2.118	3.671		2.501	4.490		3.128	5.846
6.5	END	1.289	1.357	1.715	1.539	1.721	2.225	1.758	2.034	2.873	2.116	2.544	3.405
	INTERIOR		1.446	2.311		1.814	3.020		2.132	3.648		2.852	4.878
7	END	1.111	1.188	1.484	1.327	1.486	1.905	1.514	1.781	2.271	1.828	2.192	2.868
	INTERIOR		1.259	1.957		1.571	2.523		1.838	3.018		2.277	3.824
7.5	END	0.968	1.048	1.295	1.158	1.312	1.647	1.319	1.539	1.952	1.590	1.908	2.448
	INTERIOR		1.106	1.874		1.372	2.135		1.601	2.535		1.976	3.188
8	END	0.851	0.931	1.138	1.018	1.160	1.437	1.159	1.355	1.695	1.398	1.675	2.114
	INTERIOR		0.978	1.446		1.228	1.529		1.406	2.158		1.731	2.694
8.5	END	0.753	0.812	1.007	0.900	1.032	1.284	1.027	1.203	1.485	1.228	1.462	1.844
	INTERIOR		0.871	1.251		1.072	1.582		1.245	1.858		1.529	2.308
9.0	END	0.672	0.747	0.897	0.803	0.924	1.130	0.916	1.074	1.311	1.105	1.321	1.622
	INTERIOR		0.780	1.108		0.957	1.382		1.109	1.617		1.380	2.000

250 Z 2.5

ALLOWABLE TOTAL LOAD (D.L. + LL) IN KILONEWTON/METER									
	SPAN m	706mm	1412mm	SPAN m	706mm	1412mm	SPAN m	706mm	1412mm
END BAY	9.0	2.178	2.859	10.5	1.562	1.963	12.0	1.173	1.427
	9.5	1.938	2.503	11.0	1.414	1.755	12.5	1.075	1.297
	10.0	1.735	2.209	11.5	1.285	1.579	13.0	0.989	1.183
INT. BAY	9.0	2.587	4.864	10.5	1.861	3.004	12.0	1.363	2.033
	9.5	2.350	4.090	11.0	1.669	2.615	12.5	1.241	1.812
	10.0	2.089	3.485	11.5	1.504	2.295	13.0	1.134	1.625

EAVE STRUT - 1:10 SLOPE SECTION PROPERTIES



1:10 EAVE STRUT

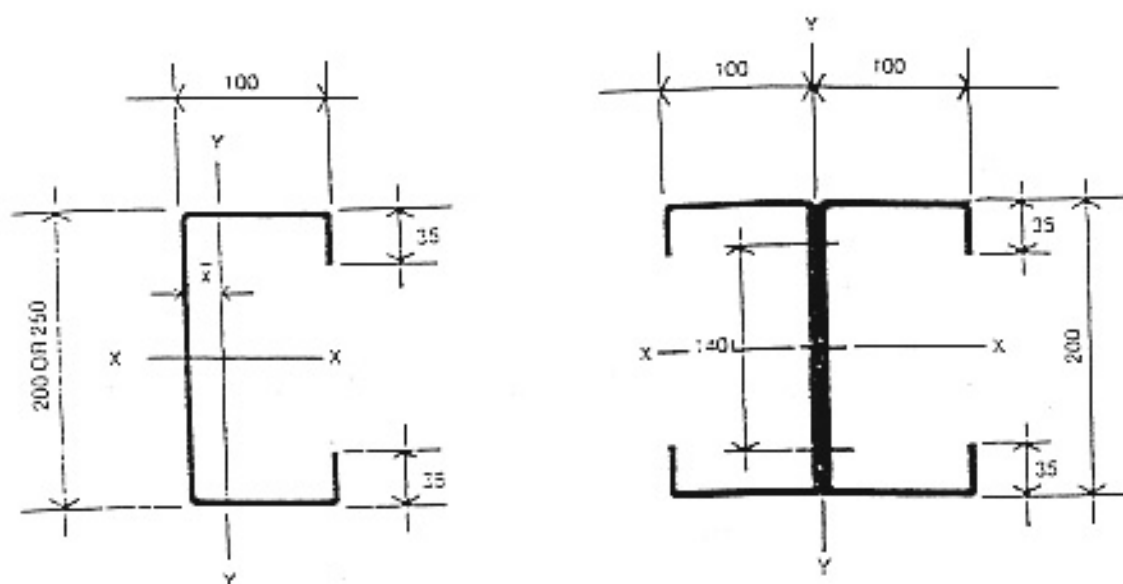
MINIMUM SPECIFIED YIELD STRESS (F_y) = 34.5 KN/cm² (50 K.S.I.)
SECTION IS COLD FORMED

TABLE OF PROPERTIES FOR 1:10 EAVE STRUT								
MATERIAL	WEIGHT kg/m	AREA cm ²	I_x cm ⁴	I_y cm ⁴	I_{xy} cm ⁴	I_{xx} cm ⁴	I_{yy} cm ⁴	I_{xy} cm ⁴
200x 1.8mm	6.31	8.04	490.08	44.81	8.00	129.41	16.27	4.01
200x 2.5mm	8.65	11.02	715.48	65.47	8.10	175.37	27.43	3.99
250x 3.5mm	13.68	17.44	1700	125.80	9.87	232.69	30.82	3.65

CEES SECTION PROPERTIES

PAGE

DATE



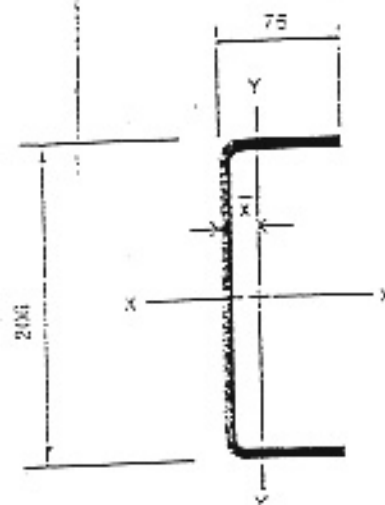
MINIMUM SPECIFIED YIELD STRESS (F_y) = 34.5 KNC/M² (50 K.S.I.)
SECTION IS COLD FORMED

TABLE OF PROPERTIES FOR C SECTION

MATERIAL	t mm	WEIGHT kg/m	AREA cm ²	I_x cm ⁴	S_x cm ³	r_x cm	I_y cm ⁴	LIP IN TEN. S_y cm ³	LIP IN COM. S_{yc} cm ³	r_y cm	\bar{x} cm
200 x 100 C	1.50	5.33	5.79	441.7	44.17	5.07	103.00	16.06	28.74	3.90	3.58
200 x 100 C	1.75	6.20	7.50	512.4	51.24	5.06	119.20	18.58	33.25	3.89	3.58
200 x 100 C	2.00	7.06	9.00	583.1	58.31	5.04	135.00	21.05	37.67	3.87	3.58
200 x 100 C	2.50	8.78	11.19	719.5	71.95	5.02	165.90	25.85	46.28	3.85	3.58
250 x 100 C	3.50	13.51	17.25	1557.7	155.77	3.80	242.40	35.85	74.90	3.75	3.24

TABLE OF PROPERTIES FOR Z SECTION

MATERIAL	t mm	WEIGHT kg/m	AREA cm ²	I_x cm ⁴	S_x cm ³	r_x cm	I_y cm ⁴	S_y cm ³	r_y cm
200 x 100 Z	1.50	10.65	13.57	383.4	58.34	5.07	380.50	38.05	5.30
200 x 100 Z	1.75	12.40	15.79	1024.6	102.48	5.06	441.20	44.12	5.29
200 x 100 Z	2.00	14.13	18.00	1164.6	116.45	5.04	501.30	50.13	5.28
200 x 100 Z	2.50	17.58	22.33	1439.2	143.92	5.02	619.10	61.91	5.25



MINIMUM SPECIFIED YIELD STRESS (F_y) = 34.3 KN/cm² (50 K.S.I)
SECTION IS COLD FORMED

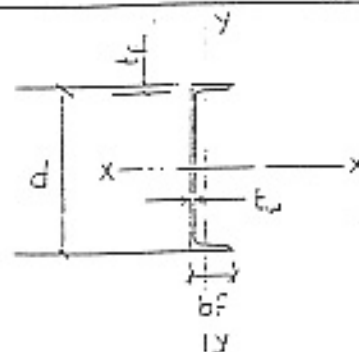
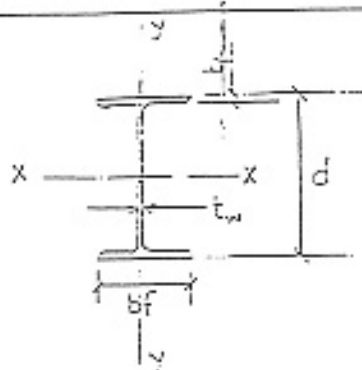
TABLE OF PROPERTIES OF CAP CHANNEL

MATERIAL	t mm	WEIGHT kg/m	AREA cm ²	I_x cm ⁴	S_x cm ³	r_x cm	I_y cm ⁴	LIP IN TEN. S_{yt} cm ³	LIP IN COM. S_{yc} cm ³	r_y cm	\bar{x} cm
206 x 75 C	1.50	4.12	5.24	333.7	12.40	7.98	28.81	4.68	16.95	2.35	1.70
206 x 75 C	1.75	4.79	6.10	397.6	17.63	7.87	33.44	5.86	19.57	2.34	1.71
206 x 75 C	2.00	5.47	6.95	440.9	22.31	7.96	38.02	6.46	22.12	2.34	1.72
206 x 75 C	2.50	6.31	8.67	546.1	33.02	7.94	47.04	8.03	27.06	2.33	1.74

- AVAILABLE IN 1.5, 1.75, 2.0 & 2.5 mm THICKNESSES
- PAINTED ONE COAT SHOP PRIMER
- NO PUNCHING
- MINIMUM LENGTH 1500
- MAXIMUM LENGTH 7500

I.D. NO	DESCRIPTION	WEIGHT kg/m
06-0010	C 206 x 1.5	4.12
06-0011	C 206 x 1.75	4.79
06-0012	C 206 x 2.0	5.47
06-0013	C 206 x 2.5	6.31

HOT-ROLLED SECTION PROPERTIES

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126

SIZE	d	tf	bf	tw	A	I-xx	S-xx	r-xx	I-yy	S-yy	r-yy
	in	in	in	in	in ²	in ⁴	in ³	in	in ⁴	in ³	in
W8x10	7.890	0.205	3.940	0.170	2.960	30.900	7.810	3.220	2.090	1.060	0.841
W8x18	8.140	0.330	5.250	0.230	5.260	61.900	15.200	3.430	7.970	3.040	1.230
W8x24	7.930	0.400	6.495	0.245	7.080	82.800	20.900	3.420	18.300	5.630	1.610
W8x31	8.000	0.435	7.995	0.285	9.130	110.000	27.500	3.470	37.100	9.270	2.020
W12x14	11.910	0.225	3.970	0.200	4.160	88.600	14.900	4.620	2.360	1.190	0.753
W12x22	12.310	0.425	4.030	0.260	6.480	156.000	25.400	4.910	4.660	2.310	0.847
[8x11.5]	8.000	0.390	2.260	0.220	3.360	32.600	8.140	3.110	1.320	0.781	0.625
[10x15.3]	10.000	0.438	2.600	0.240	4.490	67.400	13.500	3.870	2.280	1.160	0.713
[12x20.7]	12.000	0.501	2.942	0.282	6.090	129.000	21.500	4.610	3.880	1.730	0.799
[15x33.9]	15.000	0.650	3.400	0.400	9.960	315.000	42.000	5.620	8.130	3.110	0.904

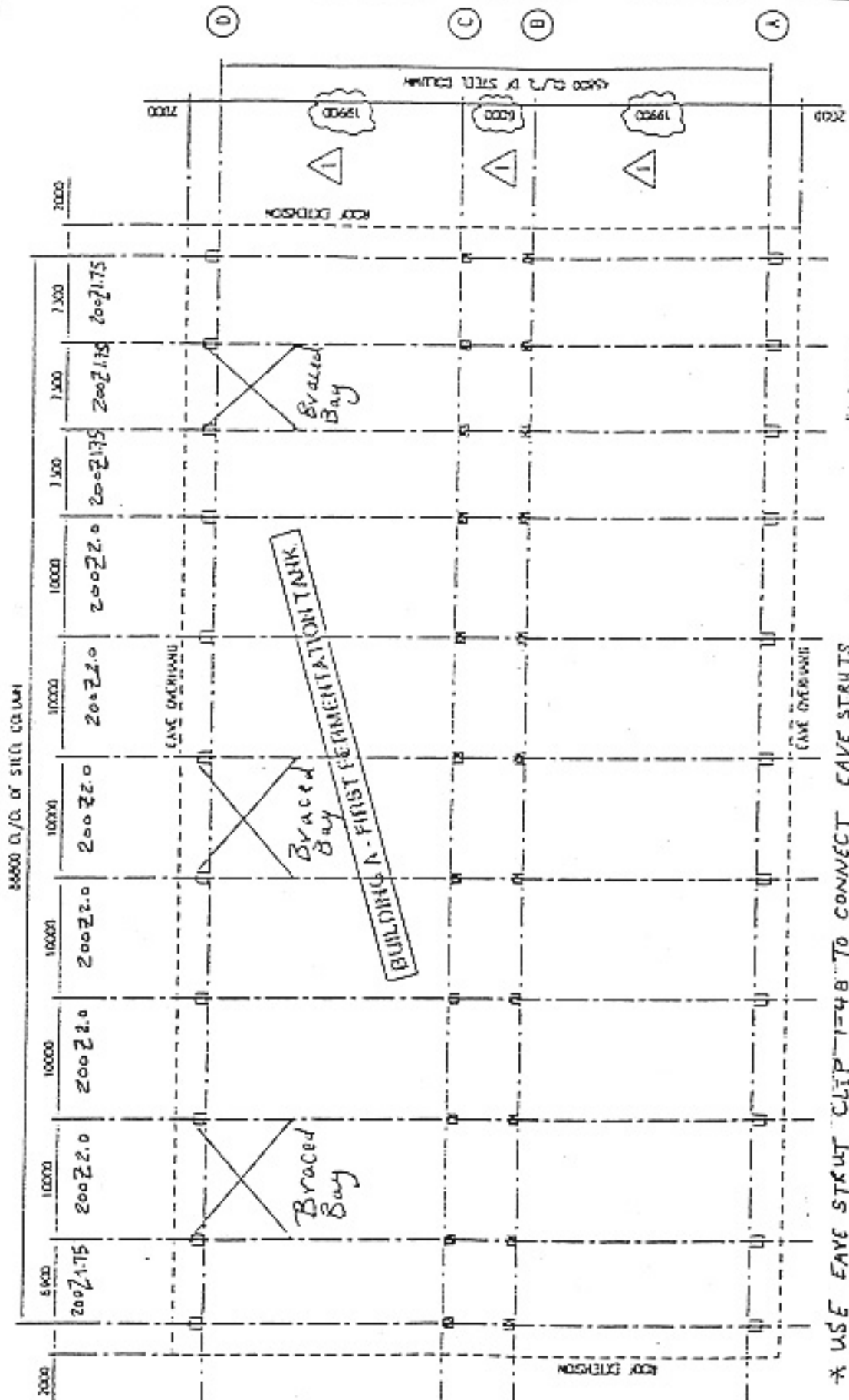
SIZE	d	tf	bf	tw	A	I-xx	S-xx	r-xx	I-yy	S-yy	r-yy
	mm	mm	mm	mm	cm ²	cm ⁴	cm ³	cm	cm ⁴	cm ³	cm
W8x10	200.406	5.207	100.076	4.318	19.097	1281.993	127.983	8.179	86.992	17.370	2.138
W8x18	206.756	8.382	133.350	5.842	33.935	2576.473	249.083	8.712	331.736	49.817	3.124
W8x24	201.422	10.160	164.973	6.223	45.877	3446.396	342.490	8.687	761.704	92.259	4.089
W8x31	203.200	11.049	203.073	7.239	58.903	4578.548	450.544	8.814	1544.219	151.908	5.131
W12x14	302.514	5.715	100.838	5.080	26.839	3687.810	244.167	11.735	98.231	19.501	1.913
W12x22	312.674	10.795	102.362	6.604	41.806	6493.210	416.231	12.471	193.964	37.854	2.151
[8x11.5]	203.200	9.906	57.404	5.588	21.906	1356.914	133.391	7.899	54.943	12.798	1.588
[10x15.3]	254.000	11.074	56.040	6.096	28.968	2805.400	221.225	9.830	94.901	19.009	1.811
[12x20.7]	304.800	12.725	74.727	7.163	39.290	5369.385	352.322	11.709	161.498	28.350	2.029
[15x33.9]	381.000	16.510	86.360	10.160	64.258	13111.290	688.257	14.275	338.396	50.964	2.296

JOB NO:		DATE:	10-1-1	1/3
DESIGNED BY:		CHECKED BY:		
REV NO:		REV DATE:		
DESCRIPTION	ROOF FRAMING PLAN			

* DL = 0.10 KN/M² LL = 0.57 KN/M² * ROOF PURLINS : SEE PLAN
 WIND SPEED = 31.0 M/SEC * EAVE STRUTS : 200E2.0 ALL BAYS

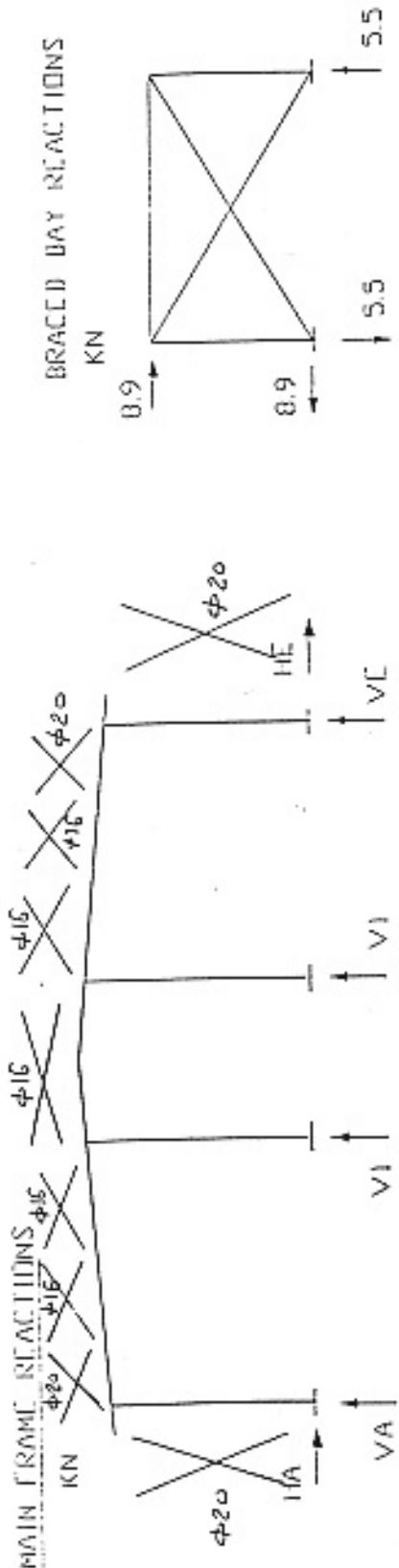
* USE PURLIN CLIPS 1-27 TO CONNECT PURLIN * PROVIDE SAG RODS ϕ 12 ONE ROW/BAY

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪



* COPY TO Drafting Dgn.

JOB NO:		DATE: 7 - 1 - 1	3/3
DESIGNED BY:		CHECKED BY:	
REV NO:		REV DATE:	
DESCRIPTION	COLUMN REACTIONS & BRACING		



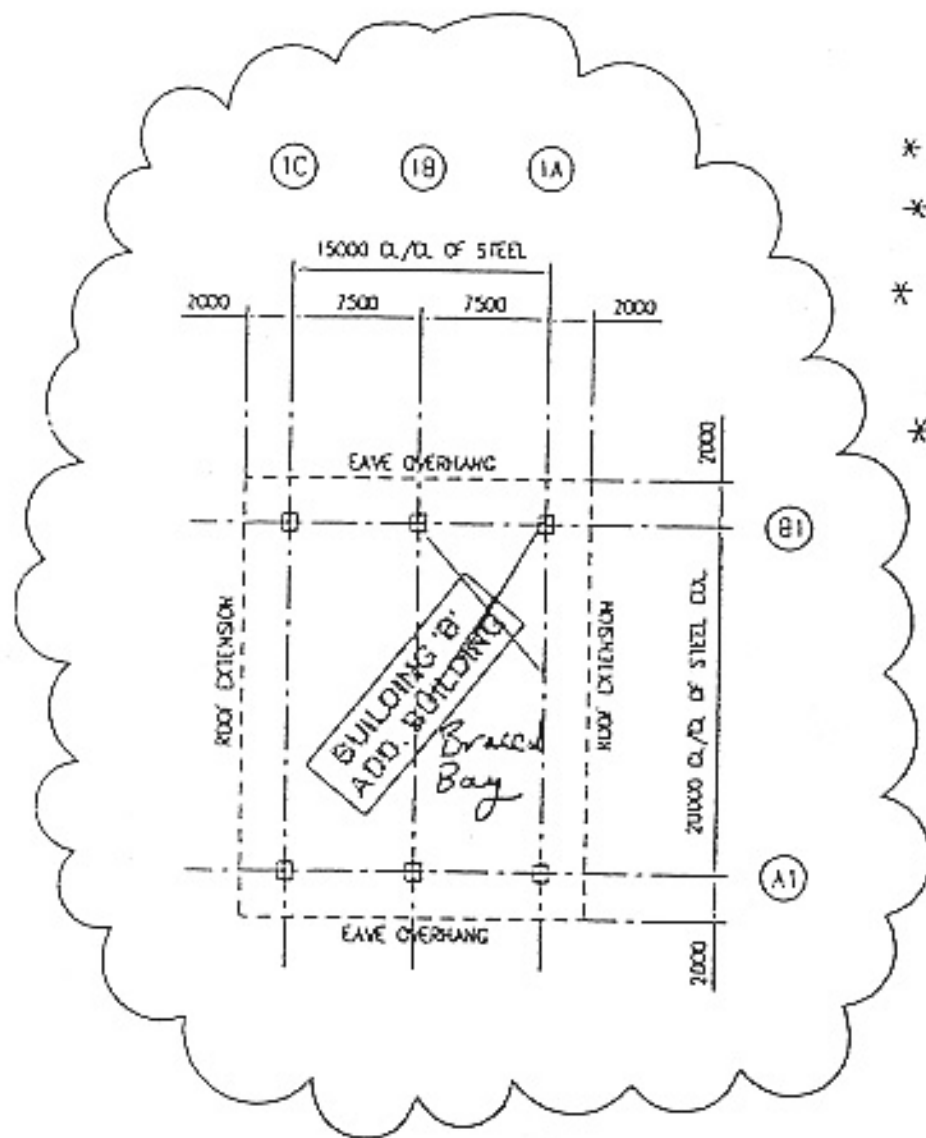
COLUMN BASE REACTIONS FOR LOAD COMBINATIONS

	HORZ KN	VERT KN	MDMT KN-M	LOAD COMBINATION
LEFT EXT. COLUMN	H_A 65.66 -29.08	V_A 02.49 -34.51	0.00 0.00	CASE 1--1.0DL + 1.0LL CASE 2--1.0DL + 1.0VLL
RIGHT EXT. COLUMN	H_E -65.66 16.29	V_E 02.49 -20.50	0.00 0.00	CASE 1--1.0DL + 1.0LL CASE 2--1.0DL + 1.0VLL
INT. COLUMN - 1	0.00 0.00	V_1 02.12 -49.36	0.00 0.00	CASE 1--1.0DL + 1.0LL CASE 2--1.0DL + 1.0VLL
INT. COLUMN - 2	0.00 0.00	V_2 02.12 -5.17	0.00 0.00	CASE 1--1.0DL + 1.0LL CASE 2--1.0DL + 1.0VLL

FIRST FERMENTATION TANK

DESIGN SKETCH SHEET

JOB NO:		DATE:	10-1-1	1/3
DESIGNED BY:	ASHRAF	CHECKED BY:		
REV NO:		REV DATE:		
DESCRIPTION	ROOF FRAMING PLAN			



$$* DL = 0.10 \text{ KN/M}^2 \quad SLL = 0.57 \text{ KN/M}^2$$

$$* WL = 31.0 \text{ M/SEC}$$

* ROOF PURLINS : 200 Z-1.75
PURLIN LAPS : 706%

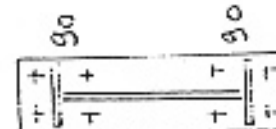
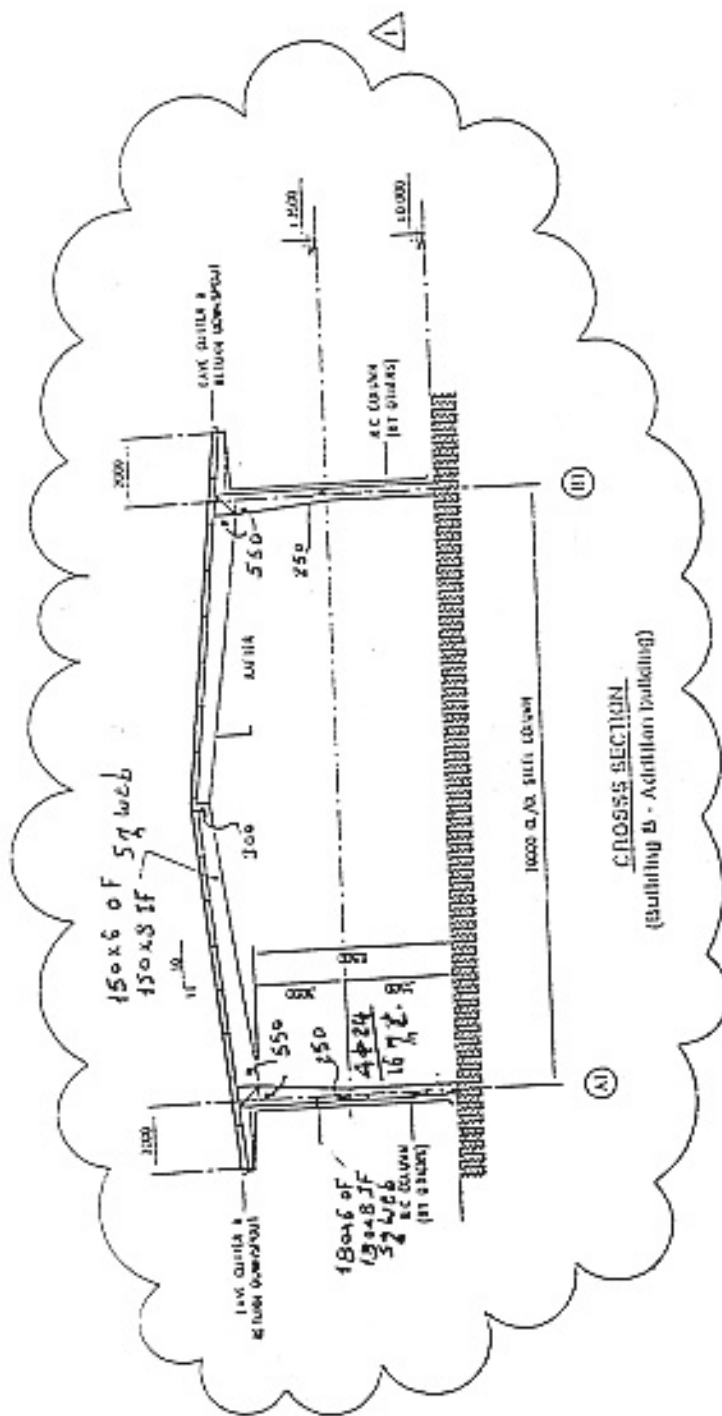
* EAVE STRUTS : 200 E 1.75

SUB-STORAGE VESSEL

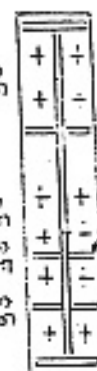
* Copy to drawing 201.

DESIGN SKETCH SHEET

JOB NO:		DATE:	10-1-1	2/3
DESIGNED BY:		CHECKED BY:		
REV NO:		REV DATE:	-	
DESCRIPTION MAIN TYPICAL FRAME X-SECTION				



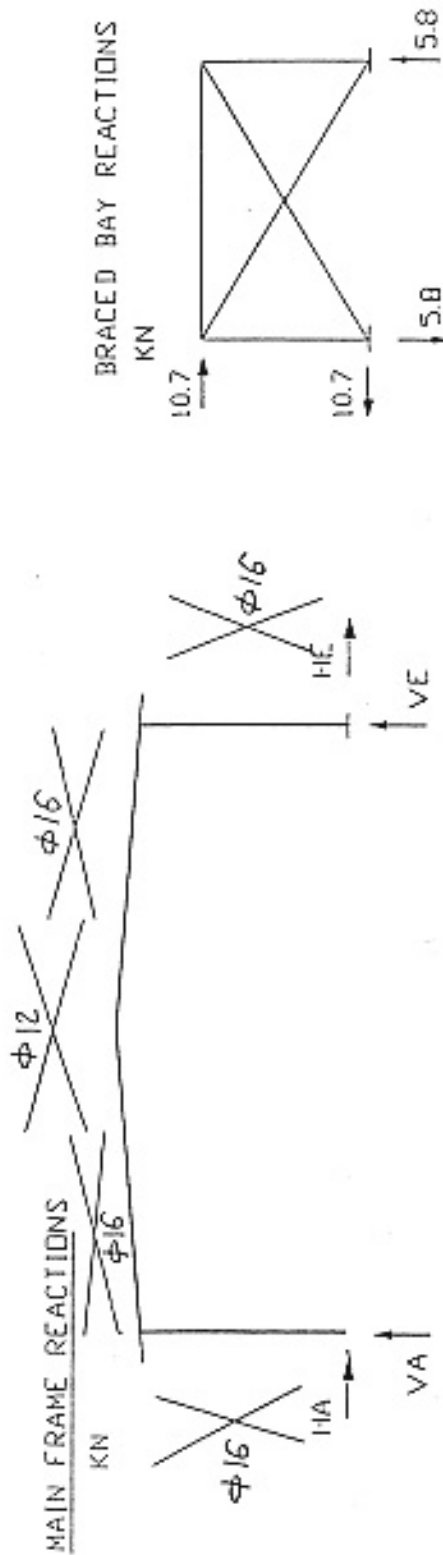
3M20/16% 12
RIDGE CONN.



12M20/16% 12
HAUNCH CONN.

SUB-STORAGE VESSEL

JOB NO:		DATE:	8 - 1 - 1	3/3
DESIGNED BY:		CHECKED BY:		
REV NO:		REV DATE:		
DESCRIPTION	COLUMN REACTIONS & BRACING			



COLUMN BASE REACTIONS FOR LOAD COMBINATIONS

	HORZ KN	VERT KN	MOMT KN-M	LOAD COMBINATION
LEFT EXT. COLUMN	H_A	V_A		
	46.91 -20.66	54.02 -21.78	0.00 0.00	CASE 1--1.0DL + 1.0LL CASE 2--1.0DL + 1.0VLL
RIGHT EXT. COLUMN	H_E	V_E		
	-46.91 11.09	54.02 -13.91	0.00 0.00	CASE 1--1.0DL + 1.0LL CASE 2--1.0DL + 1.0VLL

SUB-STORAGE VESSEL

2 25411 -- REV.1
 BLDG.A - FIRST FERMENTATION TANK
 SHELL ANALYSIS AND DESIGN

DATE OF ENTRY : 10-01-01
 END CLIENT NAME :
 BUYER'S NAME : SWR
 PROJECT NAME : BLDG.A -- REV.1
 SELLING DISTRICT : VIETNAM
 CO. NO. :
 DISTRICT CODE :

CRANE SYSTEM : N MEZZANINE SYSTEM : N
 STRUCTURAL PARTITION : N

---GEOMETRY---
 WIDTH (M) : 45.80 NUMBER OF BAYS : 10
 LENGTH(M) : 88.80 ROOF SLOPE (7:10) : 1.0
 EAVE HEIGHT (M) : 4.40
 BAY SPACING (M) : 1 @ 6.90 6 @ 10.00 3 @ 7.30

BUILDING TYPE : LO PROF GF
 UNSYMMETRICAL BLDG. : N
 NO. OF INT. COL. SPACI : 1
 UNED. INT. COL. SPACIN : Y

---LOADS---
 BUILDING CODE : 86 MBMA
 ROOF LIVE LOAD (kpa) : 0.57 WIND LOADS (kpa) :
 TRIBUTARY REDUCTION : 0 WIND VELOCITY (m/s) : 31.0
 COLLATERAL LOAD (kpa) : 0

---ENDWALL---
 LEFT ENDWALL : MAIN FR NO E PURLIN SPACING (M) : 1.500
 RIGHT ENDWALL : MAIN FR NO E FLUSH SIDEMALL GIRTS : N
 FLUSH ENDWALL GIRTS : Y

---FRAME COL. SPACINGS---
 SPAN 1 : 19.90
 SPAN 2 : 5.00
 SPAN 3 : 19.90

---OTHER OPTIONS---
 MIN. 6 MM PLATE THICK : N MIN. WEB PLATE THICK : 5 MM
 GALVANIZED PURLINS : N GALVANIZED GIRTS : N
 GALVANIZED ENDWALLS : N

SAGRODS # PURLINS : 1 PER BAY - SIZE : 12 MM
 SAGRODS # GIRTS : 0 PER BAY - SIZE : 12 MM

---ROOF PANEL---
 PANEL TYPE : KR GAUGE : 26
 COLOR : GALVALUME FASTENERS : STANDARD

---WALL PANEL---
 PANEL TYPE : KM GAUGE : 26
 COLOR : UNKNOWN FASTENERS : CLR MATCH

---EAVE OPTIONS---
 EAVE TRIM : N GUTTER : GU-502
 GUTTER END CAPS (pair) : 2 DOWNSPOUTS : 0
 RETURN FOR 1.0M CANOPY : 0 RETURN FOR 1.5M CANOPY : 0
 RETURN FOR 3.0M CANOPY : 0

---BASE OPTIONS---
 BASE ANGLE TYPE : ANGLE BASE FLASHINGS : N
 BASE CLOSURES : N BASE CLOSURES : Y
 TOUCH UP PAINT STRUCT. : N TOUCH UP PAINT PANEL : N

ACCESSORIES

BUILDING OPTIONS

---CANOPIES---

SIZE	BEGINNING BAY	ENDING BAY	ELEVATION
2.0 m	1	11	AT EAVE
2.0 m	1	11	AT EAVE

SOFFIT PANEL : YES BELOW EAVE

---GABLE EXTENSIONS---

LOCATION	SIZE	CORNER CANOPY 1	CORNER CANOPY 2
LEFT	2.0 m	2.0 m	2.0 m
RIGHT	2.0 m	2.0 m	2.0 m

SOFFIT PANEL : NO SOFFIT

END OF INPUT SCRD

 SIDEWALL GIRT TYPE : CONTINUOUS BY PASS
 ENDWALL GIRT TYPE : SIMPLE SPAN FLASH
 PURLIN TYPE : CONTINUOUS BY PASS
 REAR SIDEWALL PANEL OPENING HEIGHT (m) 5.00
 FRONT SIDEWALL PANEL OPENING HEIGHT (m) 5.00
 S.W. GIRT SPACING OPTION (BOTTOM TO TOP):
 5.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
 S.W. GIRT SPACING OPTION (BOTTOM TO TOP):
 5.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
 SECONDARY DESIGN OPTIONS:
 STRESS RATIOS:
 PURLIN= 1.00
 GIRT = 1.00
 COL./RAFT. = 1.00
 DEFLECTION:
 PURLIN=L/120
 GIRT =L/ 90
 SW COL. =L/ 60
 SW RAFT. =L/120

DESIGN CRITERIA:

 BUILDING CODE : 1984 MEMA
 VELOCITY PRESSURE (KPA) : 0.471
 WIND VELOCITY (M/S) : 11.000
 ROOF INCLINATION (DEGREE) : 5.711
 MAIN FRAME
 END ZONE COEFF. 1,2,3,4 : 0.50 -1.40 -0.80 -0.70
 INTERIOR ZONE COEFF. : 0.25 -1.00 -0.65 -0.55
 END ZONE (M) : 6.10
 Z STRIP WALLS AND ROOF (M) : 1.81
 NUMBER STRIPS ON ROOF PARALLEL TO LENGTH: 1
 LOAD COMBINATIONS:
 (D + W) X1.0
 (D + W) X1.0
 (D+S+SW) X1.0
 (D+SS+W) X1.0

 D : DEAD LOAD
 W : MAXIMUM OF LIVE LOAD AND SNOW LOAD
 S : SNOW LOAD
 W : WIND LOAD

***** ROOF PURLIN DESIGN *****

ANALYSIS / DESIGN SUMMARY

SPAN	SPAN LENGTH (M)	LAP LT SIDE (M)	LAP RT SIDE (M)	SECTION	FY (MPa)	FYA (MPa)	SK (CM-3)
1	6.547	0.000	0.353	200Z1.75	145.0	145.0	35.90
2	10.000	0.706	0.353	200Z2.00	145.0	145.0	40.79
3	10.000	0.353	0.353	100Z2.00	145.0	145.0	40.79
4	10.000	0.353	0.353	200Z2.00	145.0	145.0	40.79
5	10.000	0.353	0.353	200Z2.00	145.0	145.0	40.79
6	10.000	0.353	0.353	200Z2.00	145.0	145.0	40.79
7	10.000	0.353	0.353	200Z2.00	145.0	145.0	40.79
8	7.300	0.353	0.353	200Z1.75	145.0	145.0	35.90
9	7.300	0.353	0.706	200Z1.75	145.0	145.0	35.90
10	6.547	0.353	0.000	200Z1.75	145.0	145.0	35.90

* LOADING CRITERIA

LOAD COMBINATION	PROB	GROUP 1	GROUP 2	GROUP 3	GROUP 4
1. DEAD + LIVE	1.00	1.000 DL	1.000 LL	1.000 COL	0.000
2. DEAD + WIND	1.00	1.000 DL	1.000 WL	1.000 COL	0.000

LOAD GROUP NAME	LOAD TYPE	APPLIED ON SPAN	BEGIN LOAD		END LOAD	
			DISTANCE AND INTENSITY (M) (KN/ M/M)		DISTANCE AND INTENSITY (M) (KN/ M/M)	
DL	UNIF	1	0.000	73.78	6.547	73.78
DL	UNIF	2	0.000	73.78	10.000	73.78
DL	UNIF	3	0.000	73.78	10.000	73.78
DL	UNIF	4	0.000	73.78	10.000	73.78
DL	UNIF	5	0.000	73.78	10.000	73.78
DL	UNIF	6	0.000	73.78	10.000	73.78
DL	UNIF	7	0.000	73.78	7.300	73.78
DL	UNIF	8	0.000	73.78	7.300	73.78
DL	UNIF	9	0.000	73.78	6.547	73.78
DL	UNIF	10	0.000	73.78	6.547	73.78
LL	UNIF	1	0.000	850.71	6.547	850.71

LL	UNIF	2	0.000	850.71	10.000	850.71
LL	UNIF	3	0.000	850.71	10.000	850.71
LL	UNIF	4	0.000	850.71	10.000	850.71
LL	UNIF	5	0.000	850.71	10.000	850.71
LL	UNIF	6	0.000	850.71	10.000	850.71
LL	UNIF	7	0.000	850.71	10.000	850.71
LL	UNIF	8	0.000	850.71	7.100	850.71
LL	UNIF	9	0.000	850.71	7.100	850.71
LL	UNIF	10	0.000	850.71	6.947	850.71
WL	UNIF	1	0.000	-815.68	6.547	-815.68
WL	UNIF	2	0.000	-815.68	10.000	-815.68
WL	UNIF	3	0.000	-815.68	10.000	-815.68
WL	UNIF	4	0.000	-815.68	10.000	-815.68
WL	UNIF	5	0.000	-815.68	10.000	-815.68
WL	UNIF	6	0.000	-815.68	10.000	-815.68
WL	UNIF	7	0.000	-815.68	10.000	-815.68
WL	UNIF	8	0.000	-815.68	7.100	-815.68
WL	UNIF	9	0.000	-815.68	7.100	-815.68
WL	UNIF	10	0.000	-815.68	6.947	-815.68
DL	UNIF	1	0.000	46.25	6.547	46.25
DL	UNIF	2	0.000	52.79	10.000	52.79
DL	UNIF	3	0.000	52.79	10.000	52.79
DL	UNIF	4	0.000	52.79	10.000	52.79
DL	UNIF	5	0.000	52.79	10.000	52.79
DL	UNIF	6	0.000	52.79	10.000	52.79
DL	UNIF	7	0.000	52.79	10.000	52.79
DL	UNIF	8	0.000	46.25	7.100	46.25
DL	UNIF	9	0.000	46.25	7.100	46.25
DL	UNIF	10	0.000	46.25	6.947	46.25

MEMBER WEIGHT
MEMBER WEIGHT
MEMBER WEIGHT
MEMBER WEIGHT
MEMBER WEIGHT
MEMBER WEIGHT
MEMBER WEIGHT
MEMBER WEIGHT
MEMBER WEIGHT
MEMBER WEIGHT

DESIGN DATA

LOAD CASE : DEAD + LIVE
DESIGN SPACING (M) : 1.500
ROOF SLOPE : 1.000/10
ROOF LOAD (KPA) : 0.049
LIVE LOAD (KPA) : 0.570

DEFLECTION (MM)			MOMENTS (KN-M)					SHEAR (KN)					
SPAN	*	*	LEFT SUPPORT	LEFT LAP	MIDSPAN	X-CORD	RIGHT LAP	RIGHT SUPPORT	*	LEFT SUPPORT	LEFT LAP	RIGHT LAP	RIGHT SUPPORT
1	5.933	*	0.000		2.203	2.154	-5.810	-7.263	*	2.068		-3.944	-4.287
2	28.875	*	-7.263	-4.161	4.324	4.865	-7.026	-8.742	*	4.739	4.049	-4.639	-5.034
3	21.913	*	-8.742	-7.063	3.634	5.000	-6.554	-8.103	*	4.930	4.585	-4.497	-4.842
4	23.480	*	-8.303	-6.645	3.328	5.000	-5.802	-8.472	*	4.869	4.524	-4.558	-4.903
5	23.134	*	-8.472	-6.801	3.147	5.000	-5.609	-8.266	*	4.907	4.562	-4.521	-4.866
6	21.219	*	-8.266	-5.624	3.443	5.000	-7.197	-8.383	*	4.825	4.480	-4.603	-4.948
7	31.223	*	-8.383	-7.143	4.429	5.211	-5.150	-6.738	*	5.101	4.756	-4.327	-4.672
8	2.441	*	-5.738	-5.395	1.406	4.100	-2.533	-3.575	*	3.977	3.614	-2.757	-3.110
9	6.205	*	-3.575	-2.490	1.846	3.997	-1.284	-5.754	*	3.245	2.902	-3.156	-3.842
10	15.101	*	-5.754	-4.332	3.331	4.281		0.000	*	4.200	3.858		-2.544

SPAN	SECTION	DESIGN MOMENT	ACTUAL BENDING	ALLOW. BENDING	MAX. BENDING	LOCATION	MAX. SHEAR	MAX. SHEAR	ALLOW. SHEAR	MAX. SHEAR	LOCATION	COMBINE BENDING	LOCATION	WEB CRIPPLE
		(KN-M)	STRESS (MPA)	STRESS (MPA)	RATIO		(KN)	STRESS (MPA)	STRESS (MPA)	RATIO		SHEAR RATIO		RATIO LEFT RIG
1	20021.75	-5.810	-161.846	207.000	0.782	R	-1.944	-11.471	45.555	0.252	R	0.808	R	0.511 0.4
2	20022.00	-7.026	-172.250	207.000	0.832	R	-4.689	-11.963	59.804	0.200	R	0.811	R	0.411 0.4
3	20022.00	-7.063	-171.149	207.000	0.816	L	4.585	11.697	59.804	0.196	L	0.814	L	0.425 0.4
4	20022.00	-6.802	-166.768	207.000	0.806	R	-4.558	-11.519	59.804	0.194	R	0.785	R	0.415 0.4
5	20022.30	-6.901	-166.736	207.000	0.805	L	4.562	11.638	59.804	0.195	L	0.785	L	0.420 0.4
6	20022.00	-7.197	-176.448	207.000	0.852	R	-4.603	-11.743	59.804	0.196	R	0.829	R	0.415 0.4
7	20022.00	-7.143	-175.126	207.000	0.846	L	4.756	12.132	59.804	0.203	L	0.424	L	0.430 0.3
8	20021.75	-5.395	-150.278	207.000	0.726	L	3.634	10.547	45.555	0.232	L	0.749	L	0.450 0.3
9	20021.75	-3.254	-91.471	207.000	0.442	R	-3.156	-9.179	45.555	0.201	R	0.478	R	0.353 0.4
10	20021.75	-4.332	-120.669	207.000	0.583	L	3.858	11.218	45.555	0.246	L	0.523	L	0.447 0.5

LS = LEFT SUPPORT L = LEFT LAP M = MIDSPAN R = RIGHT LAP RS = RIGHT SUPPORT

DESIGN DATA

LOAD CASE : DEAD + WIND
DESIGN SPACING (M) : 1.500
ROOF SLOPE : 1.000/10
ROOF LOAD (KPA) : 0.049

WIND LOAD (KPA) : 0.471
WIND COEF. : -1.150

DEFLECTION (MM)		MOMENTS (KN-M)					SHEAR (KN)				
SPAN		LEFT SUPPORT	LEFT LAP	MIDSPAN	X-CORD	RIGHT LAP	RIGHT SUPPORT	LEFT SUPPORT	LEFT LAP	RIGHT LAP	RIGHT SUPPORT
1	-4.944	0.000		-1.596	2.154	4.113	5.152	-1.490		2.819	3.054
2	-23.294	5.152	2.962	-2.767	4.865	4.947	4.156	-3.145	-2.859	3.303	3.546
3	-17.777	4.156	4.972	-2.607	5.000	4.694	5.857	-3.475	-3.232	3.172	3.416
4	-19.151	5.857	4.638	-2.599	5.000	4.795	5.973	-3.434	-3.191	3.214	3.457
5	-19.351	5.973	4.795	-2.712	5.000	4.562	5.830	-3.460	-3.217	3.188	3.431
6	-17.217	5.830	4.672	-2.570	5.000	5.068	6.257	-3.403	-3.160	3.245	3.488
7	-25.214	6.257	5.031	-3.114	5.211	3.654	4.775	-2.594	-2.350	3.054	3.297
8	-2.101	4.775	3.816	-1.023	4.100	1.831	2.577	-2.840	-2.595	1.992	2.238
9	-5.043	2.577	1.759	-1.317	3.397	2.351	4.119	-2.328	-2.082	2.259	2.750
10	-12.158	4.119	3.100	-2.389	4.281		0.000	-3.009	-2.764		1.823

SPAN	SECTION	DESIGN MOMENT	ACTUAL BENDING	ALLOW. BENDING	MAX. BENDING	LOCATION	MAX. SHEAR	MAX. SHEAR	ALLOW. SHEAR	MAX. SHEAR	LOCATION	COMBINE BENDING	LOCATION	WEB CRIPPLIN
		(KN-M)	STRESS (MPA)	STRESS (MPA)	RATIO		(KN)	STRESS (MPA)	STRESS (MPA)	RATIO		SHEAR RATIO		RATIO LEFT RIG
1	20021.75	4.113	114.582	276.000	0.415	R	2.819	8.196	60.740	0.135	R	0.429	R	0.000 0.0
2	20022.00	4.947	121.279	276.000	0.439	R	3.303	8.425	79.739	0.106	R	0.428	R	0.000 0.0
3	20022.00	4.972	121.890	276.000	0.442	L	-3.232	-8.245	79.739	0.103	L	0.430	L	0.000 0.0
4	20022.00	4.795	117.565	276.000	0.426	R	3.214	8.199	79.739	0.103	R	0.415	R	0.000 0.0
5	20022.00	4.795	117.542	276.000	0.425	L	-3.217	-8.205	79.739	0.103	L	0.415	L	0.000 0.0
6	20022.00	5.068	124.257	276.000	0.450	R	3.245	8.278	79.739	0.104	R	0.438	R	0.000 0.0
7	20022.00	5.031	123.344	276.000	0.447	L	-3.350	-8.547	79.739	0.107	L	0.435	L	0.000 0.0
8	20021.75	3.816	106.294	276.000	0.385	L	-2.595	-7.545	60.740	0.124	L	0.398	L	0.000 0.0
9	20021.75	2.351	65.481	276.000	0.237	R	2.259	6.570	60.740	0.108	R	0.257	R	0.000 0.0
10	20021.75	3.100	86.358	276.000	0.313	L	-2.764	-8.037	60.740	0.132	L	0.334	L	0.000 0.0

LS = LEFT SUPPORT L = LEFT LAP P = MIDSPAN R = RIGHT LAP RS = RIGHT SUPPO

***** ROOF PURLIN DESIGN *****
(EDGE STRIP)

ANALYSIS / DESIGN SUMMARY

SPAN	SPAN LENGTH (M)	LAP LT SIDE (M)	LAP RT SIDE (M)	SECTION	FY (MPA)	FYA (MPA)	SX (CM ³)
1	6.547	0.000	0.353	20021.75	345.0	345.0	35.90
2	10.000	0.706	0.353	20022.00	345.0	345.0	40.79
3	10.000	0.353	0.353	20022.00	345.0	345.0	40.79
4	10.000	0.353	0.353	20022.00	345.0	345.0	40.79
5	10.000	0.353	0.353	20022.00	345.0	345.0	40.79
6	10.000	0.353	0.353	20022.00	345.0	345.0	40.79
7	10.000	0.353	0.353	20022.00	345.0	345.0	40.79
8	7.300	0.353	0.353	20021.75	345.0	345.0	35.90
9	7.300	0.353	0.706	20021.75	345.0	345.0	35.90
10	6.547	0.353	0.000	20021.75	345.0	345.0	35.90

LOADING CRITERIA

LOAD COMBINATION		PROB	GROUP 1	GROUP 2	GROUP 3	GROUP 4
1. DEAD + WIND		1.00	1.000 DL	1.000 WL	1.000 COL	0.000
LOAD GROUP NAME	LOAD TYPE	APPLIED ON SPAN	BEGIN LOAD DISTANCE AND INTENSITY (M) (KN) N/M		END LOAD DISTANCE AND INTENSITY (M) (KN) N/M	
DL	UNIF	1	0.000	46.75	6.547	46.75
DL	UNIF	2	0.000	46.75	10.000	46.75
DL	UNIF	3	0.000	46.75	10.000	46.75
DL	UNIF	4	0.000	46.75	10.000	46.75
DL	UNIF	5	0.000	46.75	10.000	46.75
DL	UNIF	6	0.000	46.75	10.000	46.75
DL	UNIF	7	0.000	46.75	10.000	46.75
DL	UNIF	8	0.000	46.75	7.300	46.75

WIND PRESSURE COEF. : 0.900 0.650
WIND SUCTION COEF. : -0.300 -0.150

NUMBER OF BRACED BAYS REQD : 3
BRACED AT BAY # : 2 5 9

STRUT PURLIN SPACINGS (M) : 4.901 5.000 5.000 5.660

ENDWALL COLUMN NO.	LOAD (KN) ON COLUMNS	AXIAL FORCES IN STRUTS (KN)									
		BAY NO.									
		1	2	3	4	5	6	7	8	9	10
(REAR S.W.)											
1	3.128	2.346	10.152	1.303	1.303	9.109	0.261	0.261	0.261	8.066	-0.782
2	6.731	5.153	10.715	2.909	2.909	8.471	0.665	0.665	0.665	6.227	-1.579
3	6.200	5.037	9.532	2.971	2.971	6.466	0.904	0.904	0.904	4.399	-1.162
4	6.877	5.588	6.790	3.295	3.295	4.498	1.003	1.003	1.003	2.206	-1.289
5	7.216	5.863	5.863	3.458	3.458	3.458	1.052	1.052	1.052	1.052	-1.353
(BRIDGE)											

IF LOAD FROM OPPOSITE DIRECTION:

ENDWALL COLUMN NO.	LOAD (KN) ON COLUMNS	AXIAL FORCES IN STRUTS (KN)									
		BAY NO.									
		1	2	3	4	5	6	7	8	9	10
(REAR S.W.)											
1	3.128	-0.782	8.066	0.261	0.261	9.109	1.303	1.303	1.303	10.152	2.346
2	6.731	-1.579	4.227	0.665	0.665	8.471	2.909	2.909	2.909	10.715	5.153
3	6.200	-1.162	4.399	0.904	0.904	6.466	2.971	2.971	2.971	8.532	5.037
4	6.877	-1.289	2.206	1.003	1.003	4.498	3.295	3.295	3.295	6.790	5.588
5	7.216	-1.353	1.052	1.052	1.052	3.458	3.458	3.458	3.458	5.863	5.863
(BRIDGE)											

WIND LOAD (KPA) : 0.471

WIND PRESSURE COEF. : 0.900 0.650
WIND SUCTION COEF. : -0.300 -0.150

NUMBER OF BRACED BAYS REQD : 3
BRACED AT BAY # : 2 5 9
CORRESPOND. BAY SPAC. (M) : 10.000 10.000 7.300

STRUT PURLIN SPACINGS (M) : 4.901 5.000 5.000 5.660

BRACED BAY # 1 AT BAY 2

ENDWALL COLUMN NO. (STRUT LINE)	AXIAL LOAD ON COLUMNS (KN)	LOAD FOR BRACE (KN)	TENSION (KN)	BRACE SIZE REQUIRED (MM)	CONTROLLING LOAD TYPE
(REAR S.W.)					
1	3.128	8.848	9.502	12 MM ROD	WIND
2	6.731	7.805	8.551	12 MM ROD	WIND
3	6.200	5.562	6.380	12 MM ROD	WIND
4	6.877	3.495	4.009	12 MM ROD	WIND
5	7.216	1.293	1.380	12 MM ROD	WIND
(BRIDGE)					

WIND LOAD (KPA) : 0.471

WIND PRESSURE COEF. : 0.900 0.650
WIND SUCTION COEF. : -0.300 -0.150

NUMBER OF BRACED BAYS REQD : 3
BRACED AT BAY # : 2 5 9
CORRESPOND. BAY SPAC. (M) : 10.000 10.000 7.300

STRUT PURLIN SPACINGS (M) : 4.901 5.000 5.000 5.660

BRACED BAY # 2 AT BAY 5

ENDWALL COLUMN NO.	AXIAL LOAD ON COLUMNS	LOAD FOR BRACE	TENSION	BRACE SIZE REQUIRED	CONTROLLING LOAD TYPE
-----------------------	--------------------------	-------------------	---------	------------------------	--------------------------

(STRUT LINE)	(KN)	(KN)	(KN)	(MM)	
(REAR S.M.)					
1	3.128	8.848	9.502	12 MM ROD	WIND
2	6.711	7.806	8.551	12 MM ROD	WIND
3	6.200	5.562	6.380	12 MM ROD	WIND
4	6.877	3.495	4.809	12 MM ROD	WIND
5	7.216	1.203	1.380	12 MM ROD	WIND
(RIDGE)					

WIND LOAD (KPA) : 0.471

END ZONE INTERIOR ZONE

WIND PRESSURE COEF. : 0.900 0.950

WIND SUCTION COEF. : -0.300 -0.150

NUMBER OF BRACED BAYS REOD : 3

BRACED AT BAY # : 2 5 9

CORRESPOND. BAY SPAC. (M) : 10.000 10.000 7.100

STRUT PURLIN SPACINGS (M) : 4.901 5.000 5.000 5.650

BRACED BAY # 3 AT BAY 9

ENDWALL COLUMN NO. (STRUT LINE)	AXIAL LOAD ON COLUMNS (KN)	LOAD FOR BRACE (KN)	TENSION (KN)	BRACE SIZE REQUIRED (MM)	CONTROLLING LOAD TYPE
(REAR S.M.)					
1	3.128	8.848	10.340	12 MM ROD	WIND
2	6.711	7.806	9.155	12 MM ROD	WIND
3	6.200	5.562	7.020	12 MM ROD	WIND
4	6.877	3.495	4.411	12 MM ROD	WIND
5	7.216	1.203	1.518	12 MM ROD	WIND
(RIDGE)					

***** ROOF PURLIN ANALYSIS *****

COMBINED BENDING & WIND BRACING STRUT FORCES

DESIGN DATA

LOAD CASE : DEAD + WIND

DESIGN SPACING (M) : 1.500

ROOF SLOPE : 1.000/10

ROOF LOAD (KPA) : 0.049

WIND LOAD (KPA) : 0.471

WIND COEF. : -1.150

SPAN SECTION	DESIGN MOMENT (KN-M)	ACTUAL BENDING STRESS (MPA)	ALLOW. BENDING STRESS (MPA)	BENDING RATIO	MAX. AXIAL (KN)	MAX. AXIAL STRESS (MPA)	ALLOW. AXIAL STRESS (MPA)	MAX. AXIAL RATIO	COMBINE BENDING AXIAL RATIO	LOCATION
1 20021.75	4.112	114.551	276.000	0.415	5.363	4.362	193.823	0.025	0.440	R
2 20022.00	4.947	121.298	276.000	0.439	10.715	7.787	167.356	0.047	0.486	R
3 20022.00	4.972	121.899	276.000	0.442	3.458	2.513	167.356	0.015	0.457	L
4 20022.00	4.795	117.565	276.000	0.426	3.458	2.513	167.356	0.015	0.441	R
5 20022.00	4.795	117.542	276.000	0.426	9.471	6.156	167.356	0.037	0.463	L
6 20022.00	5.068	124.253	276.000	0.450	3.458	2.513	167.356	0.015	0.465	R
7 20022.00	5.031	121.345	276.000	0.447	3.458	2.513	167.356	0.015	0.462	L
8 20021.75	3.816	106.291	276.000	0.385	3.458	2.867	201.743	0.014	0.399	L
9 20021.75	2.213	66.375	276.000	0.203	10.715	17.769	201.743	0.088	0.291	P
10 20021.75	3.098	86.308	276.000	0.313	5.363	4.362	184.661	0.026	0.319	C

LS = LEFT SUPPORT L = LEFT LAP P = MIDSPAN R = RIGHT LAP RS = RIGHT SUPPORT

NUMBER OF 12 MM A-307 PURLIN BOLTS : 2

MAX. SHEAR (KN) : 7.41

ALLOWABLE SHEAR (KN) : 29.79

ALLOWABLE BEARING (KN) : 57.90

***** RAVE STRUT DESIGN *****

DESIGN DATA

LOAD CASE 1 : DL+LL
 LOAD CASE 2 : DL+WL
 ROOF LOAD (KPA) : 0.049
 LIVE LOAD (KPA) : 0.573
 WIND LOAD (KPA) : 0.471
 WIND COEF. : -1.700

PURLIN SPACING (M) : 0.401

SPAN	SECTION	LENGTH (M)	BENDING MOMENT (KJ-M)	BENDING STRESS (MPa)	BENDING ALLOW. (MPa)	AXIAL FORCE (KN)	AXIAL STRESS (MPa)	AXIAL ALLOW. (MPa)	BENDING RATIO	AXIAL RATIO	BENDING + AXIAL RATIO	DEFLECTION (MM)	LOAD CASE
1L	200E1.50	5.900	1.042	25.759	207.000	0.000	0.000	207.000	0.124	0.000	0.124	5.729	1
2L	200E1.50	10.000	2.189	54.105	207.000	0.000	0.000	207.000	0.261	0.000	0.261	25.273	1
3L	200E1.50	10.000	2.189	54.105	207.000	0.000	0.000	207.000	0.261	0.000	0.261	25.273	1
4L	200E1.50	10.000	2.189	54.105	207.000	0.000	0.000	207.000	0.261	0.000	0.261	25.273	1
5L	200E1.50	10.000	2.189	54.105	207.000	0.000	0.000	207.000	0.261	0.000	0.261	25.273	1
6L	200E1.50	10.000	2.189	54.105	207.000	0.000	0.000	207.000	0.261	0.000	0.261	25.273	1
7L	200E1.50	10.000	2.189	54.105	207.000	0.000	0.000	207.000	0.261	0.000	0.261	25.273	1
8L	200E1.50	7.300	1.146	28.833	207.000	0.000	0.000	207.000	0.139	0.000	0.139	7.177	1
9L	200E1.50	7.300	-0.655	-15.195	276.000	10.152	15.174	164.084	0.059	0.099	0.149	-4.031	2
10L	200E1.50	7.300	1.156	28.833	207.000	0.000	0.000	207.000	0.139	0.000	0.139	7.177	1

SECTION	AREA (CM ²)	SMI (CM ⁴)	SXL (CM ⁴)	FY (MPa)
200E1.50	5.690	40.450	40.450	345.00

SPAN	SECTION	WEB CRIPPLING RATIO LEFT	RIGHT	LOAD CASE
1L	200E1.50	0.190	0.190	1
2L	200E1.50	0.262	0.262	1
3L	200E1.50	0.262	0.262	1
4L	200E1.50	0.262	0.262	1
5L	200E1.50	0.262	0.262	1
6L	200E1.50	0.262	0.262	1
7L	200E1.50	0.262	0.262	1
8L	200E1.50	0.191	0.191	1
9L	200E1.50	0.191	0.191	1
10L	200E1.50	0.191	0.191	1

NUMBER OF A-325 M12 X 40 MM BOLTS : 2
 MAX. SHEAR (KN) : 9.85
 ALLOWABLE SHEAR (KN) : 31.19
 ALLOWABLE BEARING (KN) : 24.52

Q 25431 -- REV.1
 BLOC.B : SUB-STORAGE VESSEL
 SHELL ANALYSIS AND DESIGN

DATE OF ENTRY : 10-1-1
 END CLIENT NAME :
 BUYER'S NAME : SMR
 PROJECT NAME : BLOC.B
 SELLING DISTRICT : VIETNAM
 QO. NO. :
 DISTRICT CODE :

CRANE SYSTEM : N MEZZANINE SYSTEM : N
 STRUCTURAL PARTITION : N

---GEOMETRY---
 WIDTH (M) : 20.00 NUMBER OF BAYS : 2
 LENGTH (M) : 15.00 ROOF SLOPE (?:10) : 1.0
 EAVE HEIGHT (M) : 3.90
 BAY SPACING (M) : 2 @ 7.50

BUILDING TYPE : LO PROF GF
 UNSYMMETRICAL BLOC. : N

---LOADS---
 BUILDING CODE : 86 MSMA
 ROOF LIVE LOAD (kpa) : 0.57 WIND LOADS (kpa) :
 TRIBUTARY REDUCTION : N WIND VELOCITY (m/s) : 31.0
 COLLATERAL LOAD (kpa) : 0.00

---ENDWALL---
 LEFT ENDWALL : MAIN FR NO E PURLIN SPACING (m) : 1.500
 RIGHT ENDWALL : MAIN FR NO E FLUSH SIDEWALL GIRTS : N
 FLUSH ENDWALL GIRTS : Y

---OTHER OPTIONS---
 MIN. 4 MM PLATE THICK : N MIN. WEB PLATE THICK : 5 MM
 GALVANIZED PURLINS : N GALVANIZED GIRTS : N
 GALVANIZED ENDWALLS : N

SAGRODS & PURLINS : 1 PER BAY - SIZE : 12 MM
 SAGRODS & GIRTS : 0 PER BAY - SIZE : 12 MM

---ROOF PANEL---
 PANEL TYPE : KR GAUGE : 26
 COLOR : GALVALUME FASTENERS : STANDARD

---WALL PANEL---
 PANEL TYPE : KM GAUGE : 15
 COLOR : UNKNOWN FASTENERS : CLR MATCH

---EAVE OPTIONS---
 EAVE TRIM : N GUTTER : GU-501
 GUTTER END CAPS (pairs) : 2 DOWNSPOUTS : 0
 RETURN FOR 1.0M CANOPY : 0 RETURN FOR 1.5M CANOPY : 0
 RETURN FOR 3.0M CANOPY : 0

---BASE OPTIONS---
 BASE ANGLE TYPE : ANGLE BASE FLASHINGS : N
 BASE CLOSURES : N BASE CLOSURES : Y
 TOUCH UP PAINT STRUCT : N TOUCH UP PAINT PANEL : N

ACCESSORIES

BUILDING OPTIONS

---CANOPIES---

SIZE	BEGINNING BAY	ENDING BAY	ELEVATION
2.0 m	1	2	AT EAVE
2.0 m	1	2	AT EAVE

SOFFIT PANEL : VE BELOW EAVE

---GABLE EXTENSIONS---

LOCATION	SIZE	CORNER CANOPY 1	CORNER CANOPY 2
LEFT	2.0 m	2.0 m	2.0 m
RIGHT	2.0 m	2.0 m	2.0 m

SOFFIT PANEL : NO SOFFIT

END OF INPUT BLOC

SIDEWALL GIRT TYPE CONTINUOUS BY PASS

ENDWALL GIRT TYPE
PURLIN TYPE

SIMPLE SPAN FLUSH
CONTINUOUS BY PASS

REAR SIDEWALL PANEL OPENING HEIGHT (m) 4.00
FRONT SIDEWALL PANEL OPENING HEIGHT (m) 4.00
S.W. GIRT SPACING OPTION (BOTTOM TO TOP):
4.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
S.W. GIRT SPACING OPTION (BOTTOM TO TOP):
4.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00

SECONDARY DESIGN OPTIONS:

STRESS RATIOS:

PURLIN = 1.00

GIRT = 1.00

COL./RAFT = 1.00

DEFLECTION:

PURLIN = L/120

GIRT = L/ 90

EW COL. = L/ 60

EW RAFT. = L/120

DESIGN CRITERIA:

BUILDING CODE : 1985 MUMA
VELOCITY PRESSURE (KPA) : 0.471
WIND VELOCITY (M/S) : 31.000
ROOF INCLINATION (DEGREE) : 5.711
MAIN FRAME
END ZONE COEFF. 1,2,3,4 : 0.50 -1.40 -0.40 -0.70
INTERIOR ZONE COEFF. : 0.25 -1.00 -0.45 -0.55
END ZONE (M) : 5.10
2 STRIP WALLS AND ROOF (M) : 1.50
NUMBER STRIPS ON ROOF PARALLEL TO LENGTH: 1
LOAD COMBINATIONS:
1 D + M (X1.0)
1 D + W (X1.0)
1 D + S + W (X1.0)
1 D + S + W (X1.0)

D : DEAD LOAD
M : MAXIMUM OF LIVE LOAD AND SNOW LOAD
S : SNOW LOAD
W : WIND LOAD

***** ROOF PURLIN DESIGN *****

ANALYSIS / DESIGN SUMMARY

SPAN	SPAN LENGTH (M)	LAP LT SIDE (M)	LAP RT SIDE (M)	SECTION	FY (MPa)	FYA (MPa)	SX (CM-3)
1	7.147	0.000	0.353	20021.75	345.0	345.0	35.90
2	7.147	0.353	0.000	20021.75	345.0	345.0	35.90

LOADING CRITERIA

LOAD COMBINATION	PROB	GROUP 1	GROUP 2	GROUP 3	GROUP 4
1. DEAD + LIVE	1.00	1.000 DL	1.000 LL	1.000 COL	0.000
2. DEAD + WIND	1.00	1.000 DL	1.000 WL	1.000 COL	0.000

LOAD GROUP NAME	LOAD TYPE	APPLIED ON SPAN	BEGIN LOAD		END LOAD		
			DISTANCE (M)	INTENSITY (KN: N/M)	DISTANCE (M)	INTENSITY (KN: N/M)	
DL	UNIF	1	0.000	76.98	7.147	76.98	
DL	UNIF	2	0.000	76.98	7.147	76.98	
LL	UNIF	1	0.000	950.71	7.147	950.71	
LL	UNIF	2	0.000	950.71	7.147	950.71	
WL	UNIF	1	0.000	-815.68	7.147	-815.68	MEMBER WEIGHT
WL	UNIF	2	0.000	-815.68	7.147	-815.68	MEMBER WEIGHT
DL	UNIF	1	0.000	46.25	7.147	46.25	
DL	UNIF	2	0.000	46.25	7.147	46.25	

DESIGN DATA

LOAD CASE : DEAD + LIVE
DESIGN SPACING (M) : 1.500
ROOF SLOPE : 1.000/10
ROOF LOAD (KPA) : 0.051
LIVE LOAD (KPA) : 0.570

DEFLECTION (MM)

MOMENTS (KN-M)

SHEAR (KN)

SPAN	DEFLECTION (MM)	LEFT SUPPORT	LEFT LAP	MIDSPAN	X-CORD	RIGHT LAP	RIGHT SUPPORT	LEFT SUPPORT	LEFT LAP	RIGHT LAP	RIGHT SUPPORT

2	15.014	-	-6.642	-5.147	3.141	4.545	0.000	4.410	4.066	-2.551				
SPAN	SECTION	DESIGN MOMENT	ACTUAL BENDING	ALLOW. BENDING	MAX. BENDING	LOCATION	MAX. SHEAR	MAX. SHEAR	ALLOW. SHEAR	MAX. SHEAR	LOCATION	COMBINE BENDING	LOCATION	WEB CRIPPLING
		(KN-M)	STRESS (MPA)	STRESS (MPA)	RATIO		(KN)	(MPA)	(MPA)	RATIO		SHEAR RATIO		RATIO LEFT RIG
HT														
1	20021.75	-5.147	-143.357	207.000	0.693	R	-4.066	-11.824	45.555	0.260	R	0.728	R	0.610 0.4
2	20021.75	-5.147	-143.357	207.000	0.593	L	-4.066	11.824	45.555	0.260	L	0.728	L	0.490 0.4
LS = LEFT SUPPORT														

DESIGN DATA

LOAD CASE	DEAD + WIND
DESIGN SPACING (M)	1.500
ROOF SLOPE	1.000/10
ROOF LOAD (KPA)	0.051
WIND LOAD (KPA)	0.471
WIND COEF.	-1.150

MOMENTS (KN-M)

SPAN	DEFLECTION (MM)	LEFT SUPPORT	LEFT LAP	MIDSPAN	X-CORD	RIGHT LAP	RIGHT SUPPORT	LEFT SUPPORT	LEFT LAP	RIGHT LAP	RIGHT SUPPORT
1	-12.237	0.000	3.659	-2.375	2.502	3.659	4.723	-1.814	-2.891	2.391	3.135
2	-12.237	4.723	3.659	-2.375	4.545	0.000	-1.135	-2.891			1.814

SPAN	SECTION	DESIGN MOMENT (KN-M)	ACTUAL BENDING STRESS (MPA)	ALLOW. BENDING STRESS (MPA)	MAX. BENDING RATIO	MAX. SHEAR (KN)	MAX. SHEAR STRESS (MPA)	ALLOW. SHEAR STRESS (MPA)	MAX. SHEAR RATIO	LOCATION	COMBINE BENDING RATIO	LOCATION	WEB CRIPPLE RATIO LEFT RIG
HT													
1	20021.75	3.659	101.922	275.000	0.369	R	2.391	3.407	60.740	0.130	R	0.388	R 0.000 0.4
2	20021.75	3.659	101.922	275.000	0.369	L	-2.391	-3.407	60.740	0.130	L	0.388	L 0.000 0.4
LS = LEFT SUPPORT													
RT													

ROOF PURLIN DESIGN EDGE STRIP

ANALYSIS / DESIGN SUMMARY

SPAN	SPAN LENGTH (M)	LAP LT SIDE (M)	LAP RT SIDE (M)	SECTION	FY (MPA)	FYA (MPA)	SK (CM-3)
1	7.147	0.000	0.353	20021.75	345.0	345.0	35.90
2	7.147	0.353	0.000	20021.75	345.0	345.0	35.90

LOADING CRITERIA

LOAD COMBINATION	PROB	GROUP 1	GROUP 2	GROUP 3	GROUP 4
1. DEAD + WIND	1.00	1.000 DL	1.000 WL	1.000 COL	0.000
LOAD GROUP NAME	LOAD TYPE	APPLIED ON SPAN	BEGIN LOAD DISTANCE AND INTENSITY (M)	END LOAD DISTANCE AND INTENSITY (M)	MEMBER WEIGHT MEMBER WEIGHT
DL	UNIF	1	0.000 54.17	7.147 54.17	
DL	UNIF	2	0.000 54.17	7.147 54.17	
DL	UNIF	1	0.000 327.67	7.147 327.67	
DL	UNIF	2	0.000 327.67	7.147 327.67	
DL	UNIF	1	0.000 46.25	7.147 46.25	
DL	UNIF	2	0.000 46.25	7.147 46.25	

DESIGN DATA

LOAD CASE	DEAD + WIND
DESIGN SPACING (M)	1.250
ROOF SLOPE	1.000/10
ROOF LOAD (KPA)	0.051
WIND LOAD (KPA)	0.471
WIND COEF.	-1.400

DEFLECTION (MM)			MOMENTS (KN-M)				S H E A R (KN)									
SPAN			LEFT SUPPORT	LEFT LAP	MIDSPAN	X-CORD	RIGHT LAP	RIGHT SUPPORT	LEFT SUPPORT	LEFT LAP	RIGHT LAP	RIGHT SUPPORT				
1	+12.575		0.000		-2.460	2.602	3.790	4.892	-1.879		2.994	1.249				
2	+12.475		4.892	3.790	-2.460	4.545		0.000	-3.248	-2.994		1.879				
SPAN	SECTION	DESIGN MOMENT	ACTUAL BENDING	ALLOW. BENDING	MAX. LOCATION BENDING	MAX. SHEAR	MAX. SHEAR	ALLOW. SHEAR	MAX. SHEAR	LOCATION COMBINE BENDING	LOCATION	WEB CRIPPLED				
		(KN-M)	STRESS (MPA)	STRESS (MPA)	RATIO	(KN)	STRESS (MPA)	STRESS (MPA)	RATIO	SHEAR RATIO		RATIO LEFT RI				
HT																
1	20021.75	1.790	105.574	276.000	0.383	2	2.994	3.708	40.740	0.143	R	0.402	R	0.000	0	
2	20021.75	3.790	105.574	276.000	0.383	6	-2.994	-8.708	60.740	0.143	L	0.402	L	0.000	0	
HT																
P = MIDSPAN													R = RIGHT LAP		RS = RIGHT SUPP	
LS = LEFT SUPPORT													L = LEFT LAP			

PURLIN SPACINGS : 1 @ 1.000 5 @ 1.500 1 @ 1.150 1 @ 0.340

***** LONGITUDINAL BRACING DESIGN *****
(ROOF & SIDEWALLS)

WIND LOAD (KPA) : 0.471
 WIND PRESSURE COEF. : 0.900 END ZONE INTERIOR ZONE
 WIND SUCTION COEF. : -0.100 -0.150
 NUMBER OF BRACED BAYS REQD : 1
 BRACED AT BAY # : 2
 STRUT PURLIN SPACINGS (M) : 7.000

ENDWALL COLUMN NO.		AXIAL FORCES IN STRUTS (KN)			
		LOAD (KN) ON COLUMNS	BAY NO.		
			1	2	
(BEAR S.W.)					
1	4.027	3.928	9.735		
2	6.715	5.246	5.246		
(BRIDGE)					

IF LOAD FROM OPPOSITE DIRECTION:

ENDWALL COLUMN NO.		AXIAL FORCES IN STRUTS (KN)			
		LOAD (KN) ON COLUMNS	BAY NO.		
			1	2	
(BEAR S.W.)					
1	4.027	-1.007	9.735		
2	6.715	-1.459	5.246		
(BRIDGE)					

WIND LOAD (KPA) : 0.471
 WIND PRESSURE COEF. : 0.900 END ZONE INTERIOR ZONE
 WIND SUCTION COEF. : -0.100 -0.150
 NUMBER OF BRACED BAYS REQD : 1
 BRACED AT BAY # : 2
 CORRESPOND. BAY SPAC. (M) : 7.000
 STRUT PURLIN SPACINGS (M) : 7.000
 BRACED BAY # 1 AT BAY # 2

ENDWALL COLUMN NO.	AXIAL LOAD ON COLUMNS (KN)	LOAD FOR BRACE (KN)	TENSION (KN)	BRACE SIZE REQUIRED (MM)	CONTROLLING LOAD TYPE
(BEAR S.W.)					
1	4.027	10.741	11.904	12 MM ROD	WIND
2	6.715	6.715	9.131	12 MM ROD	WIND

***** SAVE STRUT DESIGN *****

DESIGN DATA

LOAD CASE 1 : DL+LL
 LOAD CASE 2 : DL+WL
 ROOF LOAD (KPA) : 0.051
 LIVE LOAD (KPA) : 0.570
 WIND LOAD (KPA) : 0.471
 WIND COEF. : -1.700
 PURLIN SPACING (M) : 1.000

SPAN	SECTION	LENGTH (M)	BENDING MOMENT (KN-M)	BENDING STRESS (MPA)	BENDING ALLOW. (MPA)	AXIAL FORCE (KN)	AXIAL STRESS (MPA)	AXIAL ALLOW. (MPA)	BENDING RATIO	AXIAL RATIO	BENDING + AXIAL RATIO	DEFLECTION (MM)	LOAD CASE
1L	200E1.50	7.500	2.537	52.710	207.000	0.000	0.000	207.000	0.101	0.000	0.101	15.477	1
2L	200E1.50	7.500	2.537	52.710	207.000	0.000	0.000	207.000	0.101	0.000	0.101	15.477	1

SECTION	AREA(CM-2)	SX(CM-3)	SXL(CM-3)	FY(MPA)
200E1.50	5.590	40.450	40.450	245.00

SPAN	SECTION	WEB CRIPPLING RATIO LEFT	WEB CRIPPLING RATIO RIGHT	LOAD CASE
1L	200E1.50	0.404	0.404	1
2L	200E1.50	0.404	0.404	1

NUMBER OF A-325 M12 X 40 MM BOLTS : 2
 MAX. SHEAR (KN) : 10.74
 ALLOWABLE SHEAR (KN) : 11.19
 ALLOWABLE BEARING (KN) : 24.92

Q 75431 -- REV. 2
91.02.A -- MAIN TYPICAL FRAME ANALYSIS AND DESIGN

WT = 2715.24 2MAX = 0.89

BLDG PR TYPE	SPAN (M)	NO. OF MODULES	RAVE HT. (M)	BAY SPACING (M)	LIVE LOAD (KPA)	WIND LOAD (KPA)	SUPERIMPOSED DEAD LD (KPA)	TOTAL DEAD LOAD (KPA)	COLLATERAL LOAD (KPA)	ROOF SL YM/CM
LP	45.800	3	4.400	10.000	0.570	0.471	0.084	0.143	0.000	1.000

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BUILDING CODE      : 1986 MBMA
WIND VELOCITY(M/S) : 31.00
NUMBER OF CYCLE    : 1
SYMMETRICAL FRAME? : YES
PRINT OPTION       :

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MODULE SPACING	19.000	6.000	19.000
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	LEFT SIDE	RIGHT SIDE
COL. TO STEEL LINE DISTANCE:(MM)	0.	0.
GIRT SPACINGS(MM)	4.400	4.400
FLANGE BRACING AT GIRT NO.	(LEFT):	
DOUBLE F.B. AT		
FLANGE BRACING AT GIRT NO.	(RIGHT):	
DOUBLE F.B. AT		

RAFTER TO STEEL LINE AT ROOF: (MM)	200	300
BURLIN SPACINGS: (MM)	100	150

FORLIN SPACINGS: (M)	1	0.401	1	0.401
	14	1.500	14	1.500
	1	1.150	1	1.150
	1	0.340	1	0.340

[illegible]

WIND FROM LEFT: C1 = 0.2500 C2 = -1.0000 C3 = -0.6500 C4 = -0.3500

MEMBER	TYPE	END COND.	D1	D2	D3	D4	D5	WEIGHT(KG)
31	BUILT-UP	P-7	250.	701.	0.	0.	0.	155.90

SECT NAME	LENGTH (IN)	OUTER FLANGE (MM) WIDTH THK.	WEB THK. (MM)	INNER FLANGE (MM) WIDTH THK.	FL YIELD (MPA)	WEB YIELD (MPA)
1A	1.553	200.	9.0	4.0	200.	10.0

7-2-173

EL	BUILT-UP	F-F	700.	500.	-700.	0.	0.	916.31
SECT NAME	LENGTH (M)	OUTER FLANGE WIDTH (MM)	FL THK. (MM)	WEB THK. (MM)	INNER FLANGE WIDTH (MM)	FL YIELD (MPA)	WEB YIELD (MPA)	
1A	11.491	150.	6.0	6.0	150.	344.70	344.70	
2A	3.508	150.	6.0	6.0	150.	344.70	344.70	

MEMBER	TYPE	END COND.	D1	D2	D3	D4	D5	WEIGHT (KG)
1P	BUILT-UP	F-F	-700.	700.	0.	0.	0.	149.09

SECT NAME	LENGTH (M)	OUTER FLANGE WIDTH (MM)	FL THK. (MM)	WEB THK. (MM)	INNER FLANGE WIDTH (MM)	FL YIELD (MPA)	WEB YIELD (MPA)	
1A	3.015	150.	6.0	6.0	150.	344.70	344.70	

MEMBER	TYPE	END COND.	D1	D2	D3	D4	D5	WEIGHT (KG)
11	PIPE	P-P	159.	159.	0.	0.	0.	106.34

SECT NAME	LENGTH (M)	DIAMETER (MM)	THK. (MM)	YIELD STRENGTH (MPA)
1A	5.4714	159.0000	4.3000	344.7379

LOAD COMBINATION:

CASE 1--1.0DL + 1.0LL
CASE 2--1.0DL + 1.0WLL

DESIGN SUMMARY

SECTION NAME	INTERNAL FORCES			ALLOWABLES				STRESS RATIO				BENDING		LOAD CASE	DIST. (M)
	SHEAR (KN)	AXIAL (KN)	BENDING MOMENT (KN-M)	SHEAR (KN)	AXIAL (MPA)	OUTER BENDING (MPA)	INNER BENDING (MPA)	SHEAR	AXIAL	OUTER	INNER	OUTER	INNER		
211A	-55.56	-30.46	-214.29	181.45	100.72	206.82	184.45	0.36	0.13	0.53	0.54	0.74	0.81	1	1.55
211A	65.79	-72.88	-213.33	150.44	98.85	206.82	206.82	0.18	0.11	0.80	0.72	0.81	0.81	1	0.45
211A	-4.79	-55.32	115.97	254.60	109.23	206.82	206.82	0.03	0.12	0.77	0.59	0.83	0.81	1	11.49
211A	14.60	-67.45	-137.58	180.44	113.73	206.82	206.82	0.08	0.09	0.73	0.72	0.81	0.81	1	0.00
211A	55.56	-80.46	-214.29	181.45	100.72	206.82	184.45	0.36	0.13	0.53	0.54	0.74	0.81	1	0.45
211A	-65.79	-72.88	-213.33	150.44	98.85	206.82	206.82	0.03	0.12	0.77	0.59	0.83	0.81	1	11.49
211A	65.79	-55.32	115.97	254.60	109.23	206.82	206.82	0.03	0.09	0.73	0.72	0.81	0.81	1	0.00
211A	-4.79	-67.45	-137.58	180.44	113.73	206.82	206.82	0.08	0.09	0.73	0.72	0.81	0.81	1	0.00
211A	14.60	-82.12	0.00	180.44	110.44	206.84	206.84	0.00	0.10	0.00	0.00	0.30	0.30	1	0.00
211A	0.00	-82.12	0.00	180.44	110.44	206.84	206.84	0.00	0.10	0.00	0.00	0.30	0.30	1	0.00
211A	1.00	-82.12	0.00	180.44	110.44	206.84	206.84	0.00	0.10	0.00	0.00	0.30	0.30	1	0.00

GENERAL INFORMATION

REACTIONS (KN/KN-M)		DL	LL	WLL
LEFT COL. HOR.		12.6	53.1	-41.6
LEFT COL. VER.		17.4	55.1	-51.9
RIGHT COL. HOR.		-12.6	-53.1	25.8
RIGHT COL. VER.		17.4	55.1	-33.0
INT. COL. 1 HOR.		0.0	0.0	0.0
INT. COL. 1 VER.		16.7	55.5	-56.0
INT. COL. 2 HOR.		0.0	0.0	0.0
INT. COL. 2 VER.		16.7	55.5	-21.3

SIGN CONVENTIONS

POSITIVE HORIZ. REACTION : to the right
POSITIVE VERT. REACTION : upward
POSITIVE MOMENT : counter clockwise

COLUMN BASE REACTIONS FOR LOAD COMBINATIONS

	HORZ KN	VERT KN	MOMT KN-M	LOAD COMBINATION
LEFT EXT. COLUMN	65.66	82.49	0.00	CASE 1--1.0DL + 1.0LL
	-29.38	-14.51	0.00	CASE 2--1.0DL + 1.0WLL

RIGT EXT. COLUMN

-65.66	37.49	0.00	CASE 1--1.00L	- 1.0LL
16.29	-20.58	0.00	CASE 2--1.00L	+ 1.0WLL

INT. COLUMN - 1

0.00	82.12	0.00	CASE 1--1.00L	- 1.0LL
0.00	-49.38	0.00	CASE 2--1.00L	+ 1.0WLL

INT. COLUMN - 2

0.00	82.12	0.00	CASE 1--1.00L	- 1.0LL
0.00	-5.17	0.00	CASE 2--1.00L	+ 1.0WLL

JOINT	B	L	1	P	2	R	3
CORD.							
X-M	0.14	0.38	19.90	22.30	25.90	45.42	45.66
Y-M	0.00	3.86	5.81	4.11	5.81	3.86	0.00

MAXIMUM BENDING PLUS AXIAL STRESS RATIO = 0.89
 MAXIMUM SHEAR STRESS RATIO = 0.38

DEFLECTIONS (MM)

LOADING CONDITION	HORIZONTAL		VERTICAL
	LEFT KNEE	RIGHT KNEE	AT PEAK
DEAD LOAD	0.4	-0.4	1.6
LIVE LOAD	1.7	-1.7	6.6
WIND LEFT	-5.3	-3.7	-4.7

ALLOWED STRESS RATIO = 1.650

VERTICAL CLEARANCE AT KNEE LEFT = 3.55 M

WEIGHT OF FRAME MEMBERS	=	3735.34 KG
WEIGHT OF MISC. ITEMS	=	273.52 KG (10.0%)
TOTAL		4008.76 KG

MIDSPAN DEFLECTION FOR CL-LL

MEMBER LL = 64.8654 MM

Q 25431
BDDG.3 -- MAIN TYPICAL FRAME ANALYSIS AND DESIGN

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BLOG.B      MAIN TYPICAL FRAME MEMBERS
          15.00  0.00  1.1.2.0.0.0
ED.254312      7-1-1      -A... 75.200, 1.00, 1
154312      254312      75.0, 0.570, -31.0, 0.003, 0.000, 0.000, 1.013, 1
LP      20.00, 1, 1.30, 7.50, 0.570, -31.0, 0.003, 0.000, 0.000, 0.000,
GP, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 144.7, 144.7
          1.1.1.1.0
          0.0, 1.300, 0.000, 0.000, 0.000, 0.000, 0.000, 0.000, 0.000, 0.000,
200.0, 1, 1.300, 5, 1.500, 1, 1.150, 1, 0.140, 0, 0.000, 0, 0.000,
          1, 2.550, 1, 0.340, 0, 0.000, 0, 0.000, 0, 0.000, 0, 0.000, 0, 0.000
SL.B, 250.0, 550.0, 0.0, 0.0, 0.0
LA, 3.000, 130.0, 4.0, 180.0, 10.0, 5.0,
LP.B, 550.0, 300.0, 0.0, 0.0, 0.0
LA, 3.000, 150.0, 6.0, 150.0, 8.0, 5.0,
          WT.= 311.0% RMAX= 0.39

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[illegible]

BLOG TYPE	SPAN (IN)	NO. OF MODULES	RAVE HT. (IN)	BAY SPACING (IN)	LIVE LOAD (KPA)	WIND LOAD (KPA)	SUPERIMPOSED DEAD LG (KPA)	TOTAL DEAD LOAD (KPA)	COLLATERAL LOAD (KPA)	ROOF SLO MM/CM
LP	20.000	1	1.900	7.500	0.510	0.471	0.083	0.143	0.000	1.0330

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BUILDING CODE          : 1986 MBMA
WIND VELOCITY M/S     : 31.00
NUMBER OF CYCLE        : 1
SYMMETRICAL FRAME?    : YES
PRINT OPTION           :

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2000 年 10 月 10 日 星期四 晴

	LEFT SIDE	RIGHT SIDE
COL. TO STEEL LINE DISTANCE: (MM)	0.	0.
GIRT SPACINGS (MM)	1,900	1,900
FLANGE BRACING AT GIRT NO. (LEFT):		
DOUBLE F.B. AT		
FLANGE BRACING AT GIRT NO. (RIGHT):		
DOUBLE F.B. AT		
RAFTER TO STEEL LINE AT ROOF: (MM)	200.	200.
PURLIN SPACINGS: (MM)		
1 @	1,000	1 @ 1,000
2 @	1,500	2 @ 1,500
3 @	1,160	3 @ 1,160
1 @	0.340	1 @ 0.340
FLANGE BRACING AT PURLIN NO. (LEFT):	1 2 4 5 7	
DOUBLE F.B. AT		
FLANGE BRACING AT PURLIN NO. (RIGHT):		1 2 4 5 7
DOUBLE F.B. AT		

WIND COEFFICIENTS:

WIND FROM LEFT: C1= 0.1500 C2= -1.0000 C3= +0.4500 C4= -0.3500

WINTER PROPERTIES:

MEMBER	TYPE	END COND.	D1	D2	D3	D4	D5	WEIGHT (LBS)
BL	31000-UD	2-7	250.	550.	0.	0.	0.	132.46

SECT NAME	LENGTH IN	OUTER FLANGE (MM) WIDTH	THK. (MM)	WEB THK. (MM)	INNER FLANGE (MM) WIDTH	FL YIELD (MPa)	WEB YIELD (MPa)
15	1.130	191	6.0	6.0	190	144.70	144.70

MEMBER	TYPE	END COND.	01	02	03	04	05	WEIGHT (KG)
13	BUCKET-UP	F-F	550.	100.	0.	0.	0.	121.57

2020	LENGTH	OUTER FLANGE (MM)	WEB THK.	INNER FLANGE (MM)	FL YIELD	WEB YIELD
NAME	"	WIDTH	(MM)	WIDTH	(MPa)	(MPa)

1A	10.053	150.	4.0	5.0	150.	4.0	144.70	144.70
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LOAD COMBINATION:

CASE 1--1.0DL + 1.0LL
CASE 2--1.0DL + 1.0WLL

DESIGN SUMMARY

SECTION NAME	INTERNAL FORCES			ALLOWABLES			STRESS RATIO				BENDING		LOAD CASE	DIS (M)
	SHEAR (KN)	AXIAL (KN)	MOMENT (KN-M)	SHEAR (KN)	AXIAL (MPA)	OUTER (MPA)	INNER (MPA)	SHEAR	AXIAL	OUTER	INNER	RATIO		
BL1A	-46.91	-52.62	-140.94	134.08	103.99	206.82	189.95	0.35	0.09	0.75	0.64	0.75	1	3.1
LP1A	44.70	-51.78	-142.61	133.61	146.77	206.82	206.82	0.33	0.07	0.89	0.79	0.89	1	0.5
BR1A	46.91	-52.62	-140.95	134.08	103.99	206.82	189.95	0.35	0.09	0.75	0.64	0.75	1	3.1
RP1A	-44.70	-51.78	-142.62	133.61	146.77	206.82	206.82	0.33	0.07	0.89	0.79	0.89	1	0.5

GENERAL INFORMATION

REACTIONS (KN/KN-M)		DL	LL	WLL
LEFT COL. HOR.		4.8	38.1	-29.5
LEFT COL. VER.		11.3	42.7	-33.1
RIGHT COL. HOR.		-0.9	-38.1	19.9
RIGHT COL. VER.		11.3	42.8	-25.2

SIGN CONVENTIONS:

POSITIVE HORIZ. REACTION : to the right
POSITIVE VERT. REACTION : upward
POSITIVE MOMENT : counter clockwise

COLUMN BASE REACTIONS FOR LOAD COMBINATIONS

	HORZ KN	VERT KN	MOMT KN-M	LOAD COMBINATION
LEFT EXT. COLUMN				
	46.91	54.03	0.00	CASE 1--1.0DL + 1.0LL
	-20.66	-21.78	0.00	CASE 1--1.0DL + 1.0WLL
RIGHT EXT. COLUMN				
	-46.91	54.02	0.00	CASE 1--1.0DL + 1.0LL
	11.09	-13.91	0.00	CASE 2--1.0DL + 1.0WLL

JOINT	B	L	P	R	S
COORD.					
X-M	0.15	0.32	10.80	19.68	19.35
Y-M	0.00	3.43	4.56	3.43	0.00

MAXIMUM BENDING PLUS AXIAL STRESS RATIO = 0.89
MAXIMUM SHEAR STRESS RATIO = 0.35

DISPLACEMENTS (MM)

LOADING CONDITION	HORIZONTAL		VERTICAL
	LEFT KNEE	RIGHT KNEE	AT PEAK
DEAD LOAD	-1.3	1.3	-12.4
LIVE LOAD	-5.8	5.8	-54.0
WIND LEFT	4.4	-1.3	35.7

ALLOWED STRESS RATIO = 1.000

VERTICAL CLEARANCE AT KNEE LEFT = 3.19 M
HORIZONTAL CLEARANCE AT KNEE = 18.87 M
VERTICAL CLEARANCE AT RIDGE = 4.42 M

WT OF FRAME MEMBERS	=	911.05 KG	
WT OF MISC. ITEMS	=	109.31 KG	(12.0%)

TOTAL		1020.37 KG	

MAIN FRAME CONNECTIONS DESIGN

BLDG. A : FIRST FERMENTATION TANK

EXTERIOR COLUMN BASE PLATE DESIGN:

MEMBER: 3L

CONN. ID= 1

INPUT ECHO:

DESIGN LOAD CASES= 4 ACTUAL LOAD CASES= 2
 YIELD STRESS OF COL. WEB: 344.70 MPA
 YIELD STRESS OF BASE PL: 344.70 MPA

COLUMN SECTION AT BASE:

WEB (MM): 250. X 8.0
 OUTER FL (MM): 200. X 8.0
 INNER FL (MM): 200. X 10.0

LOAD CASE	MOM-KN-M	SHEAR-KN	AXIAL-KN	
1	0.00	45.66	82.41	
2	0.00	28.94	-34.53	WIND
3	0.00	45.66	82.41	
4	0.00	16.60	-20.58	WIND

BASE PLATE DETAILS:

BASE PLATE TYPE: PINNED

BASE PLATE SIZE (MM): 250. X 12.0 X 275.

BASE PL YIELD: 344.70 MPA

WELDS:	SIZE (MM)	LENGTH (MM)
BASE PL TO FLANGE WELD	5.0	FULL 1 SIDE
BASE PL TO WEB WELD	5.0	250. 2 SIDES

ANCHOR BOLT DETAILS:

NUMBER OF A-107 BOLTS : 4 DIAMETER: 24. MM
 ANCHOR BOLT TO STEEL : 53. MM GAGE: 100. MM
 ANCHOR BOLT PITCH : 75. MM
 BOLT TENSILE ALLOWABLE : 137.90 MPA
 BOLT SHEAR ALLOWABLE : 68.95 MPA
 CONCRETE STRENGTH : 15.79 MPA
 WEB TENSILE ALLOWABLE : 174.19 KN

4 #24 / 102 Base Pl. is used

HAUNCH CONNECTION DESIGN:

INPUT ECHO:

DESIGN LOAD CASES= 4 ACTUAL LOAD CASES= 2
 ROOF SLOPE (7/101): 1.000
 YIELD STRESS FOR FLANGE (MPA): 344.70
 YIELD STRESS FOR WEB (MPA): 344.70
 YIELD STRESS FOR CONNECTION PL (MPA): 344.70

SECTION DATA	COLUMN	HAFTER	
WEB (MM)	200. X 8.0	200. X 8.0	
OUTER FL (MM)	200. X 8.0	130. X 8.0	
INNER FL (MM)	200. X 10.0	130. X 10.0	

LOAD CASE	MOM. (KN-M)	SHEAR (KN)	AXIAL (KN)	# COLUMN
1	-214.28	65.66	-90.46	
2	87.09	24.79	16.54	WIND
3	-214.28	65.66	-90.46	
4	70.25	25.80	22.53	WIND

HAUNCH CONNECTION DESIGN:

	WIDTH (MM)	THICKNESS (MM)	LENGTH (MM)	YIELD (MPA)
SEAT PLATE	200.	12.0	743.	344.70
CAP PLATE	200.	12.0	713.	344.70
BEARING STP	87.	10.0	700.	344.70
LONG STP	75.	6.0	648.	344.70
STIFFENER	75.	6.0	300.	344.70
HEEL PLATE	200.	8.0	631.	344.70

WELDS:	SIZE (MM)	LENGTH (MM)	
CAP/SEAT PL TO WEB WELD	5.0	FULL	2 SIDES
BEARING STIFFENER WELD	5.0	153-306	2 SIDES
STIFFENER TO CAP PL WELD	5.0	FULL	2 SIDES
STIFFENER TO WEB WELD	5.0	305.	TOTAL LENGTH/STIFFENER
HEEL PL TO CAP PL WELD	5.0	FULL	1 SIDE
OTHERS			

MIN. REQUIREMENT PER AISC TABLE 1.17.2A

BOLTS:

HOLE SPACINGS (MM):

NO. OF A-325 BOLTS	: 14	OUTER HOLE TO OUTER FLANGE	: 48				
BOLT DIAMETER (MM)	: 16	INNER HOLE TO INNER FLANGE	: 50				
ALLOWABLE BOLT SHEAR (KN)	: 41.50	TYPICAL HOLE SPACING	: 90				
ALLOWABLE BOLT TENSION (KN)	: 61.01	HOLE GAGE	: 75				
BOLT SPACING (MM) = 48.0	90.0	90.0	90.0	90.0	170.0	90.0	50.0

ALLOWABLE WEB TENSION (KN) : 139.58

FORCE DISTRIBUTION ANALYSIS

BOLT	LEVER ARM (MM)		STIFFENER OR BOLT FORCE (KN)			ANALYSIS DISTANCES			FORCE DISTRIBUTION (KN)		
	M-	M+	M-	M+	MAX	L-STFNR	WEB	R-STFNR	L-STFNR	WEB	R-STFNR
OUTER FL					51.04				51.04	61.96	0.00
B 1	660.	40.	55.50	3.16	55.50	40.	38.	0.	0.00	61.81	15.79
B 2	570.	130.	48.86	5.88	48.90	0.	38.	45.			
B 2					65.92						
B 3	480.	220.	41.09	8.59	41.09	45.	38.	0.	30.14	62.05	0.00
B 4	370.	310.	33.39	11.10	33.39	0.	38.	0.	0.00	64.78	0.00
B 5	100.	480.	25.68	14.01	25.68	0.	38.	0.	0.00	51.17	0.00
B 6	130.	570.	11.13	17.14	11.14	0.	38.	0.	0.00	38.28	0.00
B 7	40.	660.	3.42	21.95	21.95	0.	38.	40.	0.00	23.96	19.74
INNER FL					19.74						

14M20 / 16% R. used. which is more than required.

BUTT CONNECTION DESIGN:

INPUT DATA:

DESIGN LOAD CASES: 4	ACTUAL LOAD CASES: 2
ROOF SLOPE (7/10)	: 1.000
YIELD STRESS FOR FLANGE (MPA)	: 344.70
YIELD STRESS FOR WEB (MPA)	: 344.70
YIELD STRESS FOR CONNECTION PL (MPA)	: 344.70

SECTION DATA:	LEFT	RIGHT
WEB (MM)	500. X 6.0	500. X 6.0
OUTER FL (MM)	180. X 6.0	150. X 6.0
INNER FL (MM)	180. X 8.0	150. X 8.0
INNER FL SLOPE (7/10)	1.421	0.918

LOAD CASE	NEM. (KN-M)	SHEAR (KN)	AXIAL (KN)	
1	115.97	5.79	-55.32	
2	-57.58	4.82	23.96	WIND
3	115.97	5.79	-55.32	
4	-57.58	4.82	23.96	WIND

INTERMEDIATE BUTT CONNECTION DESIGN:

	WIDTH (MM)	THICKNESS (MM)	LENGTH (MM)	YIELD (MPA)
BUTT PLATE	180.	16.0	694.	344.70

WELDS:	SIZE (MM)	LENGTH (MM)	
WEB TO BUTT PL WELD	6.0	FULL	2 SIDES
OUTER FL. TO BUTT PL	6.0	FULL	2 SIDES
INNER FL. TO BUTT PL	6.0	FULL	2 SIDES

HOLE SPACINGS (MM):

BOLTS:

NO. OF A-125 BOLTS	:	10	OUTER HOLE TO OUTER FLANGE	:	48		
BOLT DIAMETER (MM)	:	16.	INNER HOLE TO INNER FLANGE	:	90		
ALLOWABLE BOLT SHEAR (KN)	:	41.50	TYPICAL HOLE SPACING	:	75		
ALLOWABLE BOLT TENSION (KN)	:	61.01	HOLE GAGE	:			
BOLT SPACING (MM) =		40.0	96.0	130.0	90.0	98.0	40.0

ALLOWABLE WEB TENSION (KN) : 139.58

FORCE DISTRIBUTION ANALYSIS

BOLT	LEVER ARM (MM)		STIFFENER OR BOLT FORCE (KN)			ANALYSIS DISTANCES			FORCE DISTRIBUTION (KN)		
	M-	M+	M-	M+	MAX	L.STFNR	WEB	R.STFNR	L.STFNR	WEB	R.STFNR
B 1	536.	-58.	24.48	0.00	24.48	0.	18.	50.	0.00	0.00	48.95
OUTER FL					67.58						
B 2	460.	40.	20.62	1.51	20.62	40.	38.	0.	10.63	22.62	0.00
B 3	130.	170.	7.39	32.44	12.44	0.	18.	0.	0.00	64.87	0.00
B 4	40.	460.	3.78	40.33	40.33	0.	38.	40.	0.00	44.22	15.43
INNER FL					134.26						
B 5	-58.	558.	0.00	48.92	48.92	50.	0.	0.	97.83	0.00	0.00

use 12 M20/16 % FL. which more than Required

BUTT CONNECTION DESIGN:

INPUT DATA:

DESIGN LOAD CASES:	4	ACTUAL LOAD CASES:	2
ROOF SLOPE (7/10)			1.000
YIELD STRESS FOR FLANGE (MPa)			344.70
YIELD STRESS FOR WEB (MPa)			144.70
YIELD STRESS FOR CONNECTION PL (MPa)			144.70

SECTION DATA:	LEFT	RIGHT
WEB (MM)	700. X 6.0	700. X 6.0
OUTER FL (MM)	150. X 6.0	150. X 6.0
INNER FL (MM)	150. X 6.0	150. X 6.0
INNER FL SLOPE (7/10)	1.200	1.200

LOAD CASE	MOM. (KN-M)	SHEAR (KN)	AXIAL (KN)
1	-175.42	6.53	-65.33
2	67.24	6.70	15.53
3	-175.42	6.53	-65.33
4	67.24	13.60	13.50

BUTT CONNECTION DESIGN AT RIDGE:

MEMBER=19

CONN. ID= 4

	WIDTH (MM)	THICKNESS (MM)	LENGTH (MM)	YIELD (MPa)
BUTT PLATE	150.	16.0	894.	344.70

WELDS:	SIZE (MM)	LENGTH (MM)	
WEB TO BUTT PL WELD	6.0	FULL	2 SIDES
OUTER FL. TO BUTT PL	6.0	FULL	2 SIDES
INNER FL. TO BUTT PL	6.0	FULL	2 SIDES

HOLE SPACINGS (MM):

BOLTS:										-----																																																											

NO. OF A-125 BOLTS										: 10										OUTER HOLE TO OUTER FLANGE										: 45.																																							
BOLT DIAMETER (MM)										: 16.										INNER HOLE TO INNER FLANGE										: 48.																																							
ALLOWABLE BOLT SHEAR (KN)										: 41.50										TYPICAL HOLE SPACING										: 90.																																							
ALLOWABLE BOLT TENSION (KN)										: 61.01										HOLE GAGE										: 75.																																							
BOLT SPACING (MM) =										40.0										96.0										90.0										513.5										98.0										40.0									

ALLOWABLE WEB TENSION (KN) : 139.58

FORCE DISTRIBUTION ANALYSIS

BOLT	LEVER ARM (MM)		STIFFENER OR BOLT FORCE (KN)			ANALYSIS DISTANCES			FORCE DISTRIBUTION (KN)		
	M-	M+	M-	M+	MAX	L.STFNR	WEB	R.STFNR	L.STFNR	WEB	R.STFNR
B 1	759.	-56.	49.43	0.00	49.43	0.	38.	50.	0.00	0.00	98.87
OUTER FL					119.89						
B 2	663.	40.	43.17	3.64	43.19	40.	38.	0.	39.02	47.36	0.00
B 3	573.	130.	17.33	5.82	17.33	0.	38.	0.	0.00	74.66	0.00
B 4	40.	663.	2.60	18.77	18.77	0.	13.	40.	0.00	20.59	16.96
INNER FL					-59.26						
B 5	-58.	761.	0.00	21.15	21.15	50.	0.	0.	42.30	0.00	0.00

use 12M20/162 # which more than Required.

INTERIOR PIPE COLUMN DESIGN:

INPUT ECHO:

DESIGN LOAD CASES : 4 ACTUAL LOAD CASES : 2
YIELD STRESS OF BASE PL (MPA) : 344.70

INTERIOR COLUMN SECTION:

PIPE COLUMN OUTSIDE DIA (MM) : 169.0

LOAD CASE	FORCES AT BASE			FORCES AT CAP			
	AXIAL KN	SHEAR KN	MOMENT KN-M	AXIAL KN	SHEAR KN	MOMENT KN-M	
1	82.12	0.00	0.00	82.12	0.00	0.00	WIND
2	-49.36	0.00	0.00	-49.36	0.00	0.00	
3	82.12	0.00	0.00	82.12	0.00	0.00	WIND
4	-5.17	0.00	0.00	-5.17	0.00	0.00	

INTERIOR COLUMN CONNECTION DESIGN:

MEMBER=11 CONN. ID= 9

LOAD CASE	FORCES AT BASE			FORCES AT CAP			
	AXIAL KN	SHEAR KN	MOMENT KN-M	AXIAL KN	SHEAR KN	MOMENT KN-M	
1	82.12	0.00	0.00	82.12	0.00	0.00	WIND
2	-49.36	0.00	0.00	-49.36	0.00	0.00	
3	82.12	0.00	0.00	82.12	0.00	0.00	WIND
4	-5.17	0.00	0.00	-5.17	0.00	0.00	

INTERIOR COLUMN BASE PLATE DETAILS:

BASE PLATE SIZE (MM) : 300. X 12.0 X 300.
BASE PL YIELD (MPA) : 344.70
WELD THICKNESS (MM) : 5.0
WELD LENGTH (MM) : 4 @ 133.

ANCHOR BOLT DETAILS:

NUMBER OF A-107 BOLTS : 4
DIAMETER (MM) : 20.
GAGE (MM) : 230.
PITCH (MM) : 230.
TENSILE ALLOWABLE (MPA) : 137.9
CONCRETE STRENGTH (MPA) : 13.9

4 # 20 / 162 # more than Required.

INTERIOR COLUMN TOP PLATE DETAILS:

CAP PLATE SIZE (MM) : 250. X 12.0 X 100.
CAP PL YIELD (MPA) : 344.70
WELD THICKNESS (MM) : 5.0
WELD LENGTH (MM) : 4 @ 133.

TOP PL BOLT DETAILS:

NUMBER OF A-325 BOLTS : 4
DIAMETER (MM) : 20.
GAGE (MM) : 75.
PITCH (MM) : 230.
TENSILE ALLOWABLE (MPa) : 301.4

use 4M20/16% Fe.

EXTERIOR COLUMN BASE PLATE DESIGN:

MEMBER: BL CORR. ID= 1

INPUT ECHO:

DESIGN LOAD CASES 4 ACTUAL LOAD CASES: 2
 YIELD STRESS OF COL. WEB: 344.70 MPA
 YIELD STRESS OF BASE PL: 344.70 MPA

COLUMN SECTION AT BASE:

WEB (MM): 250. X 5.0
 OUTER FL (MM): 180. X 6.0
 INNER FL (MM): 180. X 10.0

LOAD CASE	BM-KN.M	SHR-KN	AXIAL-KN	
1	0.00	46.91	53.97	
2	0.00	20.58	-21.83	WIND
3	0.00	46.91	53.97	
4	0.00	11.27	-13.96	WIND

EXTERIOR COLUMN BASE PLATE DESIGN:

MEMBER: BL CORR. ID= 1

LOAD CASE	BM-KN.M	SHR-KN	AXIAL-KN	
1	0.00	46.91	53.97	
2	0.00	20.58	-21.83	WIND
3	0.00	46.91	53.97	
4	0.00	11.27	-13.96	WIND

BASE PLATE DETAILS:

BASE PLATE TYPE: PINNED
 BASE PLATE SIZE (MM): 250. X 12.0 X 275.

BASE PL YIELD: 344.70 MPA

WELDS:	SIZE (MM)	LENGTH (MM)	
BASE PL TO FLANGE WELD	5.0	FULL	1 SIDE
BASE PL TO WEB WELD	5.0	250.	2 SIDES

ANCHOR BOLT DETAILS:

NUMBER OF A-307 BOLTS : 4
 ANCHOR BOLT TO STEEL : 53. MM
 ANCHOR BOLT PITCH : 75. MM
 BOLT TENSILE ALLOWABLE : 137.90 MPA
 BOLT SHEAR ALLOWABLE : 58.95 MPA
 CONCRETE STRENGTH : 13.79 MPA
 WEB TENSILE ALLOWABLE : 103.51 KN
 DIAMETER: 24. MM
 GAGE: 100. MM

Use 4φ24/16 #

HAUNCH CONNECTION DESIGN:

INPUT ECHO:

DESIGN LOAD CASES= 4 ACTUAL LOAD CASES= 2
 ROOF SLOPE (1/101): 1.033
 YIELD STRESS FOR FLANGE (MPa): 344.70
 YIELD STRESS FOR WEB (MPa): 344.70
 YIELD STRESS FOR CONNECTION PL (MPa): 344.70

SECTION DATA:	COLUMN	RAFTER
WEB (MM)	550. X 5.0	550. X 5.0

OUTER FL (MM)	100. X	6.0	150. X	6.0
INNER FL (MM)	180. X	10.0	150. X	8.0

LOAD CASE	MOM. (KN-M)	SHEAR (KN)	AXIAL (KN)	@ COLUMN
1	-140.94	46.91	-52.62	
2	57.48	17.76	21.10	WIND
3	-140.95	46.91	-52.62	
4	43.44	17.47	15.31	WIND

HAUNCH CONNECTION DESIGN:

	WIDTH (MM)	THICKNESS (MM)	LENGTH (MM)	YIELD (MPA)
SEAT PLATE	180.	14.0	591.	344.70
CAP PLATE	180.	14.0	566.	344.70
BEARING STIF	50.	10.0	549.	344.70
LONG STIF	75.	6.0	511.	344.70
STIFFENER	75.	6.0	300.	344.70
HEEL PLATE	180.	6.0	494.	344.70

WELDS:	SIZE (MM)	LENGTH (MM)
CAP/SEAT PL TO WEB WELD	6.0	FULL 2 SIDES
BEARING STIFFENER WELD	5.0	153-104 2 SIDES
STIFFENER TO CAP PL WELD	6.0	FULL 2 SIDES
STIFFENER TO WEB WELD	5.0	305. TOTAL LENGTH/STIFFENER
HEEL PL TO CAP PL WELD	6.0	FULL 1 SIDE
OTHERS		MIN. REQUIREMENT PER AISC TABLE 1.17.3A

BOLTS:

HOLE SPACINGS (MM):

NO. OF A-125 BOLTS	= 12	OUTER HOLE TO OUTER FLANGE	= 46.
BOLT DIAMETER (MM)	= 16.	INNER HOLE TO INNER FLANGE	= 50.
ALLOWABLE BOLT SHEAR (KN)	= 41.50	TYPICAL HOLE SPACING	= 90.
ALLOWABLE BOLT TENSION (KN)	= 41.01	HOLE GAGE	= 75.
BOLT SPACING (MM) = 46.0	90.0	90.0	90.0
ALLOWABLE WEB TENSION (KN) = 116.16			

FORCE DISTRIBUTION ANALYSIS

BOLT	LEVER ARM (MM)		STIFFENER OR BOLT FORCE (KN)			ANALYSIS DISTANCES			FORCE DISTRIBUTION (KN)		
	M-	M+	M-	M+	MAX	L.STFNR	WEB	R.STFNR	L.STFNR	WEB	R.STFNR
OUTER FL					52.24						
B 1	510.	40.	57.93	2.89	57.93	40.	18.	0.	52.24	63.41	0.00
B 2	420.	130.	47.62	6.12	47.62	0.	16.	45.	0.00	60.32	34.93
S 2					42.37						
B 3	330.	220.	37.42	9.36	37.42	45.	19.	0.	27.44	47.40	0.00
B 4	240.	310.	27.22	12.59	27.22	0.	18.	0.	0.00	54.43	0.00
B 5	130.	420.	14.74	15.55	15.55	0.	18.	0.	0.00	33.10	0.00
B 6	40.	510.	4.54	19.79	19.79	0.	18.	40.	0.00	21.70	17.87
INNER FL					17.87						

USE 12M20 / 16 % \bar{F}_t WHICH IS MORE THAN REQUIRED

BUTT CONNECTION DESIGN:

INPUT DATA:

DESIGN LOAD CASES:	4	ACTUAL LOAD CASES:	3
ROOF SLOPE (7/10)			1.031
YIELD STRESS FOR FLANGE (MPA)			344.70
YIELD STRESS FOR WEB (MPA)			344.70
YIELD STRESS FOR CONNECTION PL (MPA)			344.70

SECTION DATA:	LEFT	RIGHT
WEB (MM)	100. X 6.0	100. X 6.0
OUTER FL (MM)	150. X 6.0	150. X 6.0
INNER FL (MM)	150. X 8.0	150. X 8.0
INNER FL SLOPE (7/10)	1.554	1.554

LOAD CASE	MOM. (KN-M)	SHEAR (KN)	AXIAL (KN)
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1	41.22	4.87	-46.66	
2	-13.71	4.44	20.98	WIND
3	41.22	4.87	-46.66	
4	-13.68	0.02	21.44	WIND

BUTT CONNECTION DESIGN AT RIDGE: *****

MEMBER=CP

CONN. ID= 3

	WIDTH (MM)	THICKNESS (MM)	LENGTH (MM)	YIELD (MPa)
BUTT PLATE	150.	14.0	494.	344.70

WELDS: *****	SIZE (MM)	LENGTH (MM)	
WEB TO BUTT PL WELD	6.0	FULL	2 SIDES
OUTER FL. TO BUTT PL	6.0	FULL	2 SIDES
INNER FL. TO BUTT PL	6.0	FULL	2 SIDES

BOLTS: *****	HOLE SPACINGS (MM)				
NO. OF A-325 BOLTS	:	4	OUTER HOLE TO OUTER FLANGE	:	46.
BOLT DIAMETER (MM)	:	13.	INNER HOLE TO INNER FLANGE	:	43.
ALLOWABLE BOLT SHEAR (KN)	:	41.50	TYPICAL HOLE SPACING	:	99.
ALLOWABLE BOLT TENSION (KN)	:	61.01	HOLE GAGE	:	75.
BOLT SPACING (MM) =	40.0	96.0	221.6	98.0	40.0

ALLOWABLE WEB TENSION (KN) : 116.16

FORCE DISTRIBUTION ANALYSIS *****

BOLT	LEVER ARM (MM)		STIFFENER OR BOLT FORCE (KN)			ANALYSIS DISTANCES			FORCE DISTRIBUTION (KN)		
	M-	M+	M-	M+	MAX	L.STFNR	WEB	R.STFNR	L.STFNR	WEB	R.STFNR
B 1	153.	-54.	11.25	0.00	11.25	0.	19.	50.	0.00	0.00	23.51
OUTER FL					30.42						
B 2	142.	40.	9.76	4.14	9.76	40.	38.	0.	7.92	9.51	0.00
B 3	40.	262.	1.01	27.05	27.05	0.	34.	49.	0.00	29.56	24.44
INNER FL					98.30						
B 4	-58.	160.	0.00	17.13	17.13	50.	0.	0.	74.37	0.00	0.00

- Use 8M20/16 % which is more than required.