3.11 Safety Against Buoyancy

Safety Against Uplift (Asin)

Name of Structure	weight of structures (t)			uplift (t)	safety factor
	civil structure	machien and others	total		
Front Structure	876.9	134	1010.9	594.6	1.70
Main Structure-A	906	57.2	963.2	683.3	1.41
Main Structure-B	781.2	292.3	1073.5	264.9	4.05
Main Structure-C	587.4	191	778.4	109.5	7.11

4. Reinforcing Bar Calculation

4.1 Moment Calculation of Members

4.1.1 Front Structure (Section B-B)

(1) Model

Fig. (3) shows the the calculation sections.

Names of the structures and the name of the sections are as follows:

Front Structure	-	Section B-B
Main Structure A	-	Section C-C
Main Structure B	-	Section D-D
Main Structure C-1	-	Section E-E
Main Structure C-2	-	Section F-F

Moment calculation was made by frame model shown in following figures.

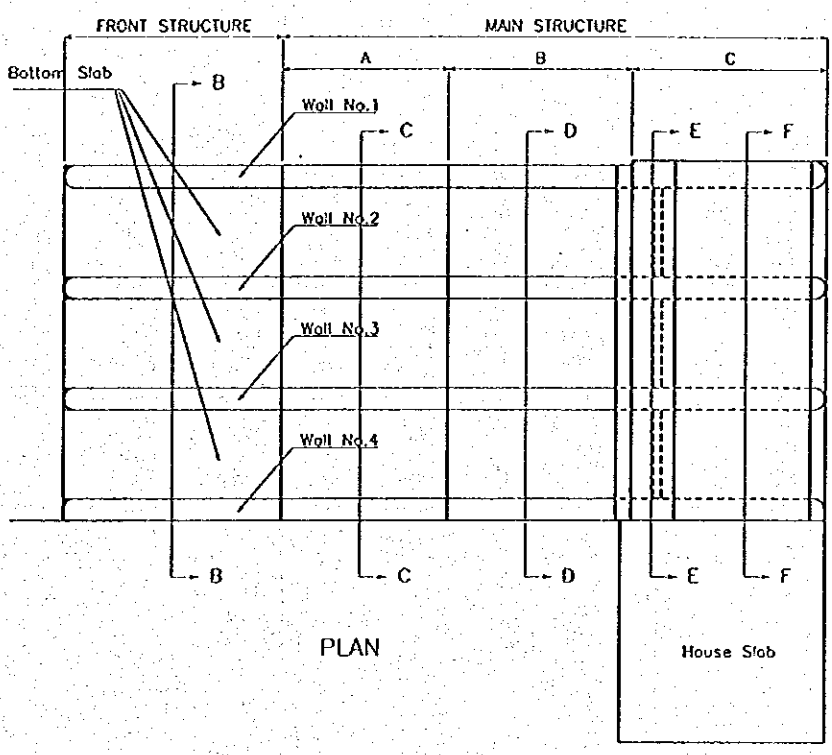
(2) Load

Load applied is shown in following figures.

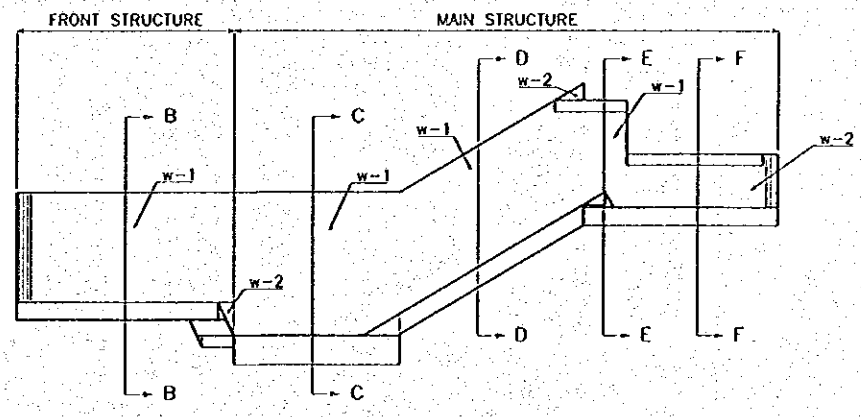
(3) Moment, Shear Stress, Axial Stress

Calculation bending moment, shear stress and axial stress are shown in following figures.

Fig. 3 Calculation Section of Moment



PLAN



LONGITUDINAL PROFILE

asin B-B

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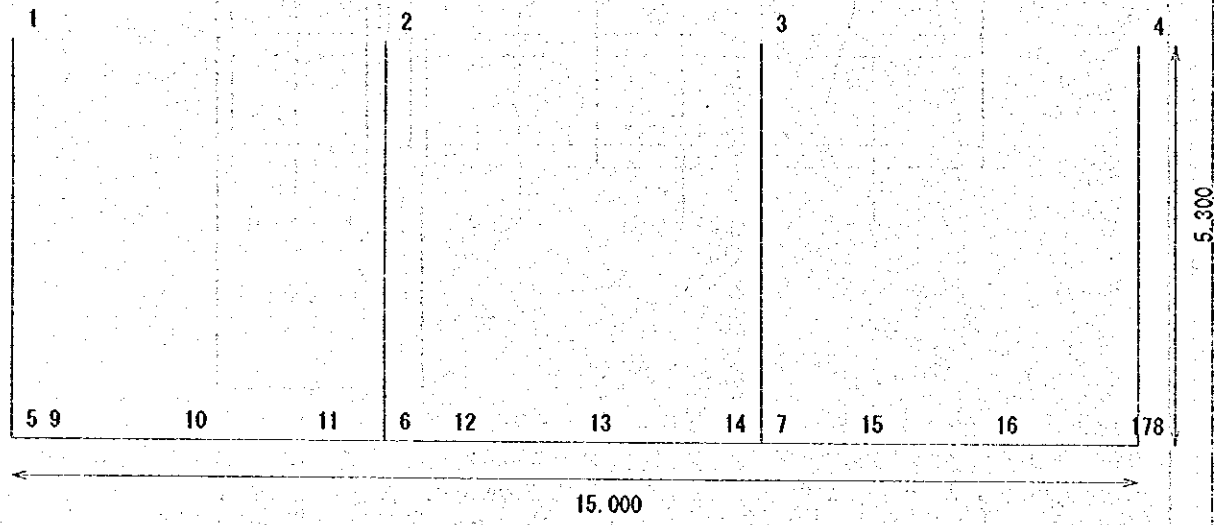
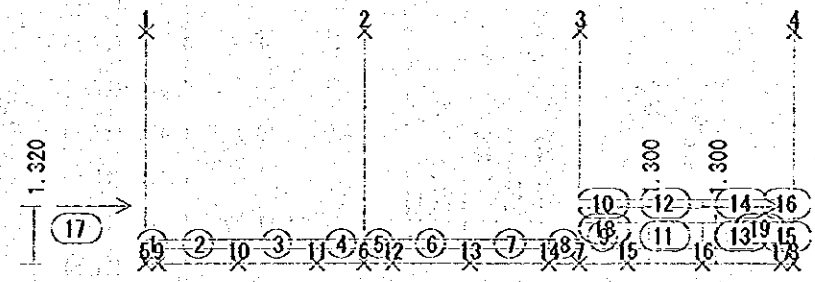
骨組図



asin B-B

Case 1 : Asin pump B-B normal

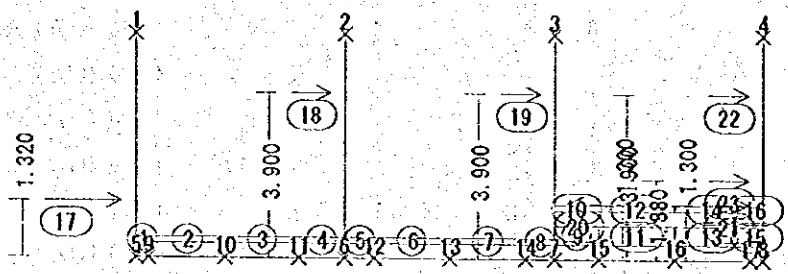


	Load
①	1.430 (tf/m)
	1.430 (tf/m)
②	1.430 (tf/m)
	1.430 (tf/m)
③	1.430 (tf/m)
	1.430 (tf/m)
④	1.430 (tf/m)
	1.430 (tf/m)
⑤	1.430 (tf/m)
	1.430 (tf/m)
⑥	1.430 (tf/m)
	1.430 (tf/m)
⑦	1.430 (tf/m)
	1.430 (tf/m)
⑧	1.430 (tf/m)
	1.430 (tf/m)
⑨	4.320 (tf/m)
	4.320 (tf/m)
⑩	1.430 (tf/m)
	1.430 (tf/m)
⑪	4.320 (tf/m)
	4.320 (tf/m)
⑫	1.430 (tf/m)
	1.430 (tf/m)
⑬	4.320 (tf/m)
	4.320 (tf/m)
⑭	1.430 (tf/m)
	1.430 (tf/m)
⑮	4.320 (tf/m)
	4.320 (tf/m)
⑯	1.430 (tf/m)
	1.430 (tf/m)
⑰	12.392 (tf)
⑱	-5.832 (tf)
⑲	5.832 (tf)

Self-weight included

asin B-B

Case 2 : Asin pump B-B seismic

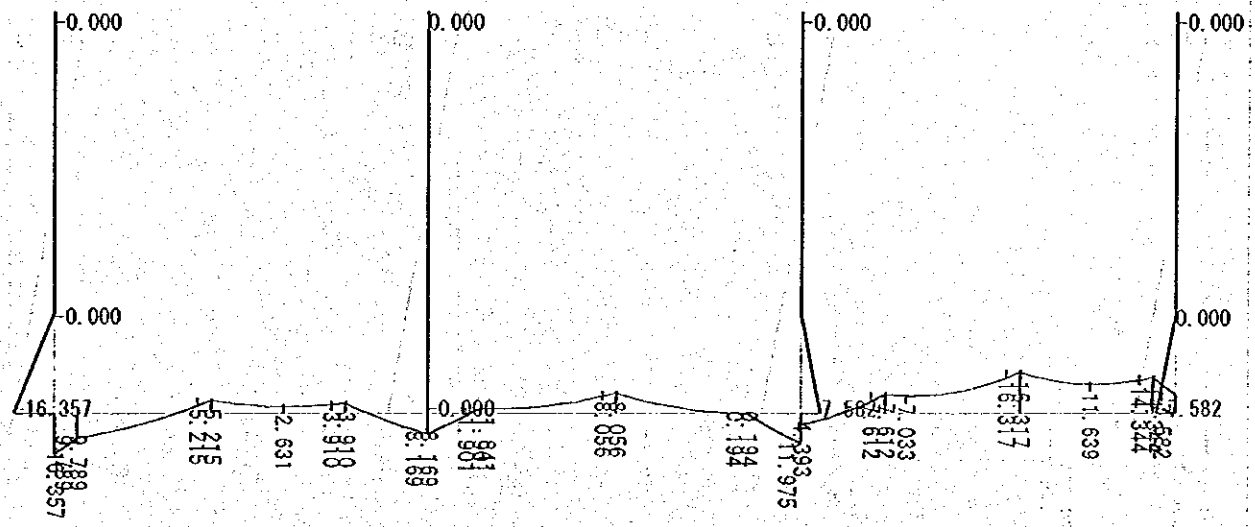


	Load
①	1.430 (tf/m)
	1.430 (tf/m)
②	1.430 (tf/m)
	1.430 (tf/m)
③	1.430 (tf/m)
	1.430 (tf/m)
④	1.430 (tf/m)
	1.430 (tf/m)
⑤	1.430 (tf/m)
	1.430 (tf/m)
⑥	1.430 (tf/m)
	1.430 (tf/m)
⑦	1.430 (tf/m)
	1.430 (tf/m)
⑧	1.430 (tf/m)
	1.430 (tf/m)
⑨	4.320 (tf/m)
	4.320 (tf/m)
⑩	1.430 (tf/m)
	1.430 (tf/m)
⑪	4.320 (tf/m)
	4.320 (tf/m)
⑫	1.430 (tf/m)
	1.430 (tf/m)
⑬	4.320 (tf/m)
	4.320 (tf/m)
⑭	1.430 (tf/m)
	1.430 (tf/m)
⑮	4.320 (tf/m)
	4.320 (tf/m)
⑯	1.430 (tf/m)
	1.430 (tf/m)
⑰	17.774 (tf)
⑱	0.786 (tf)
⑲	0.786 (tf)
⑳	-5.832 (tf)
㉑	5.832 (tf)
㉒	0.786 (tf)
( )	0.747 (tf)

asin B-B

Case 1: Asin pump B-B normal

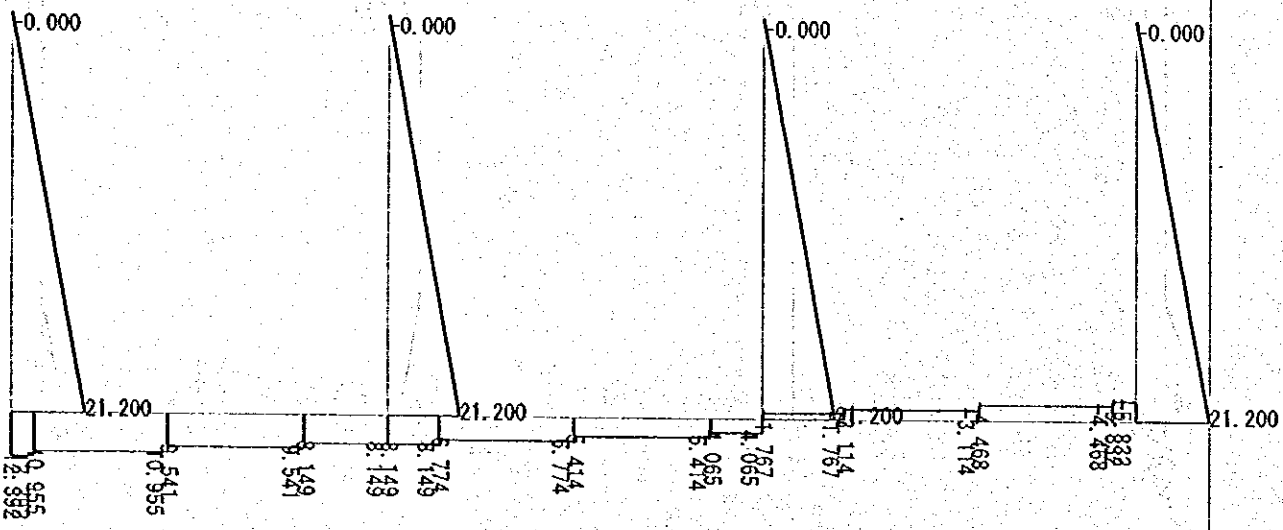
Bending Moment Scale ——— : 29.64tf·m max. : -16.36 tf·m



asin B-B

Case 1: Asin pump B-B normal

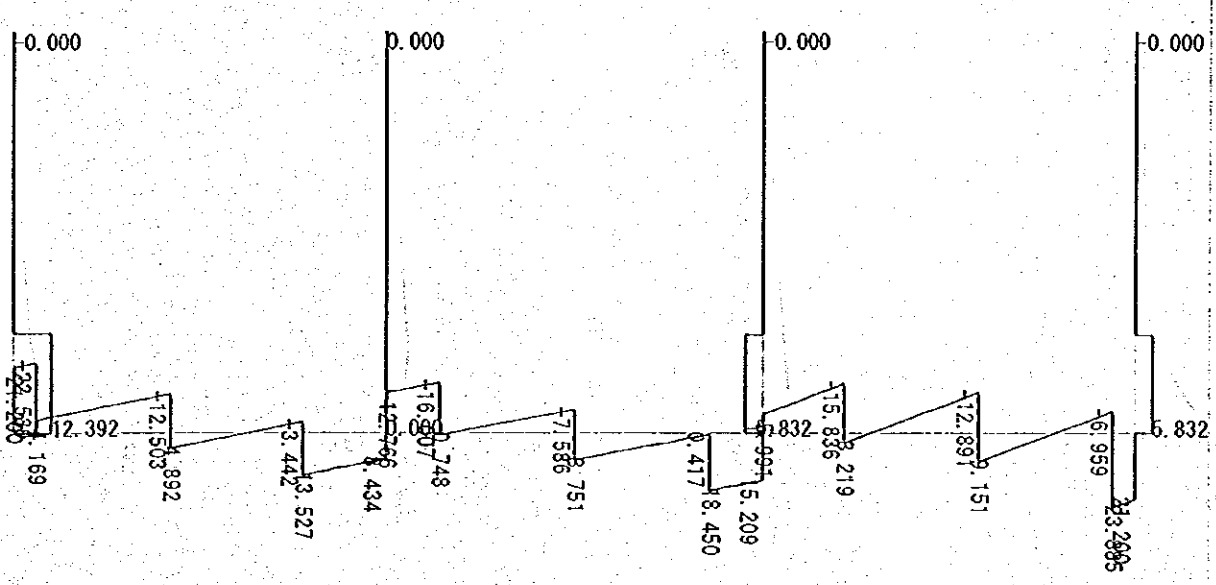
Axial Stress Scale ⊢——⊣ : 21.20tf max. : 21.20 tf



asin B-B

Case 1: Asin pump B-B normal

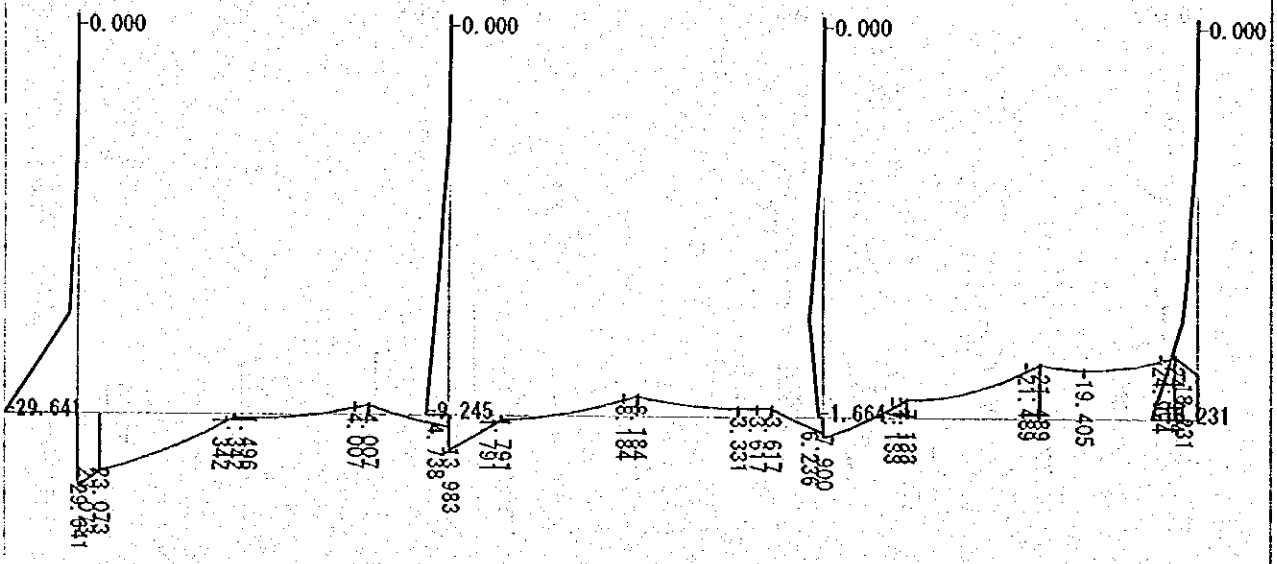
Shear Stress Scale ├──┤ : 23.89tf max. : 23.89 tf



asin B-B

Case 2: Asin pump B-B seismic

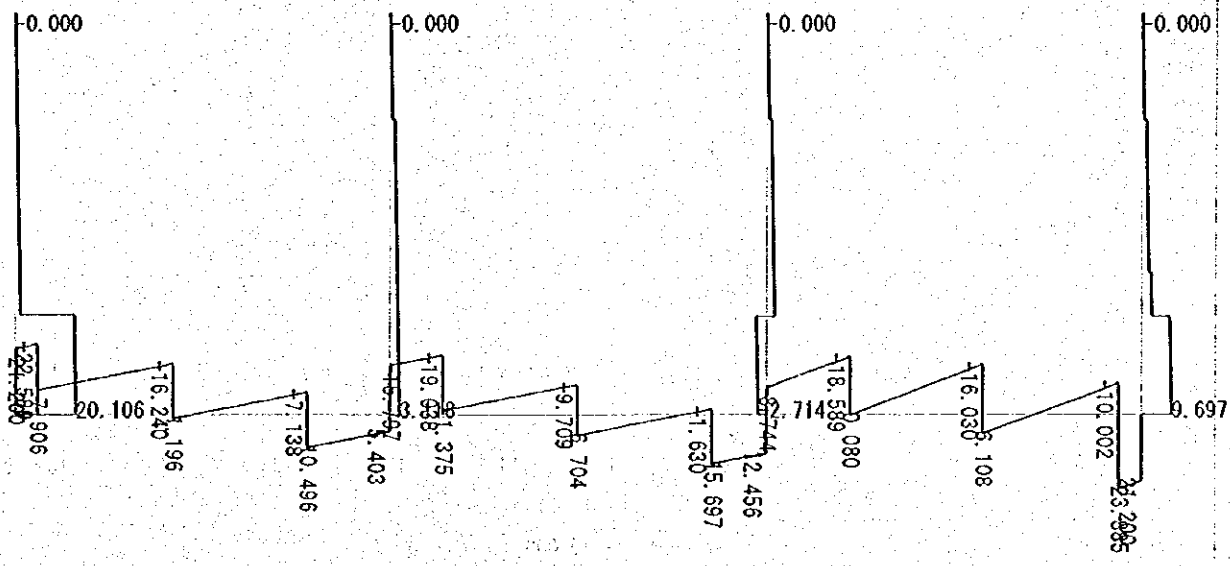
Bending Moment Scale |——| : 29.64tf·m max. : -29.64 tf·m



asin B-B

Case 2: Asin pump B-B seismic

Shear Stress Scale ——— : 23.89tf max. : 23.89 tf



asin C-C

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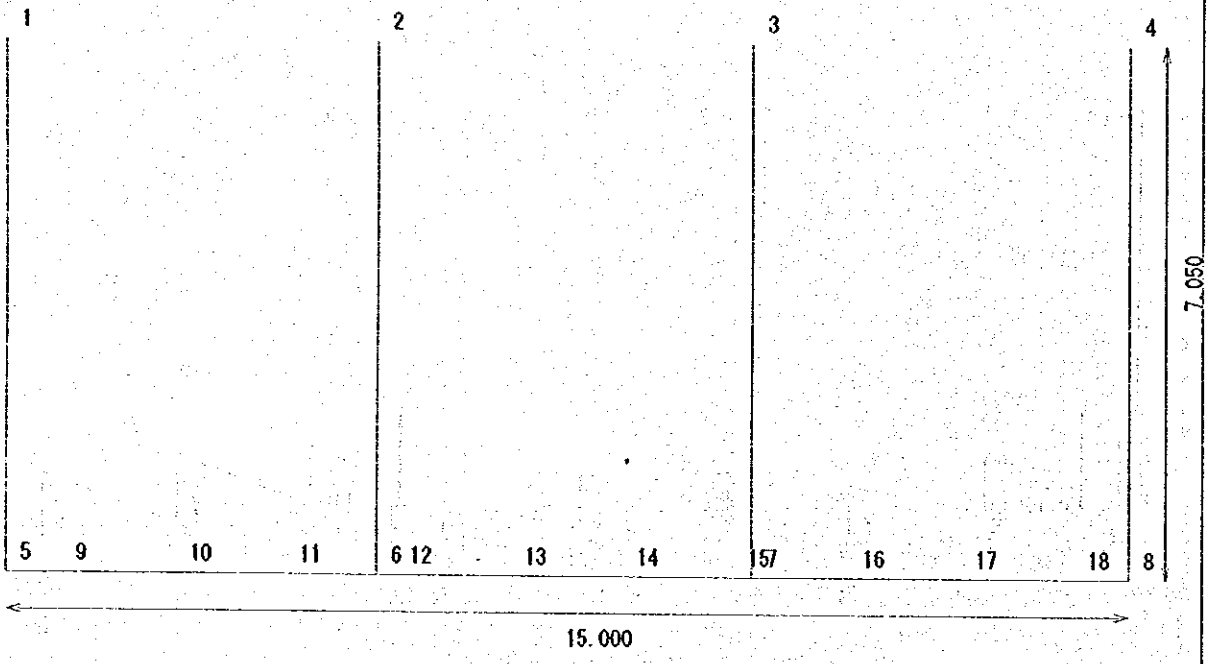
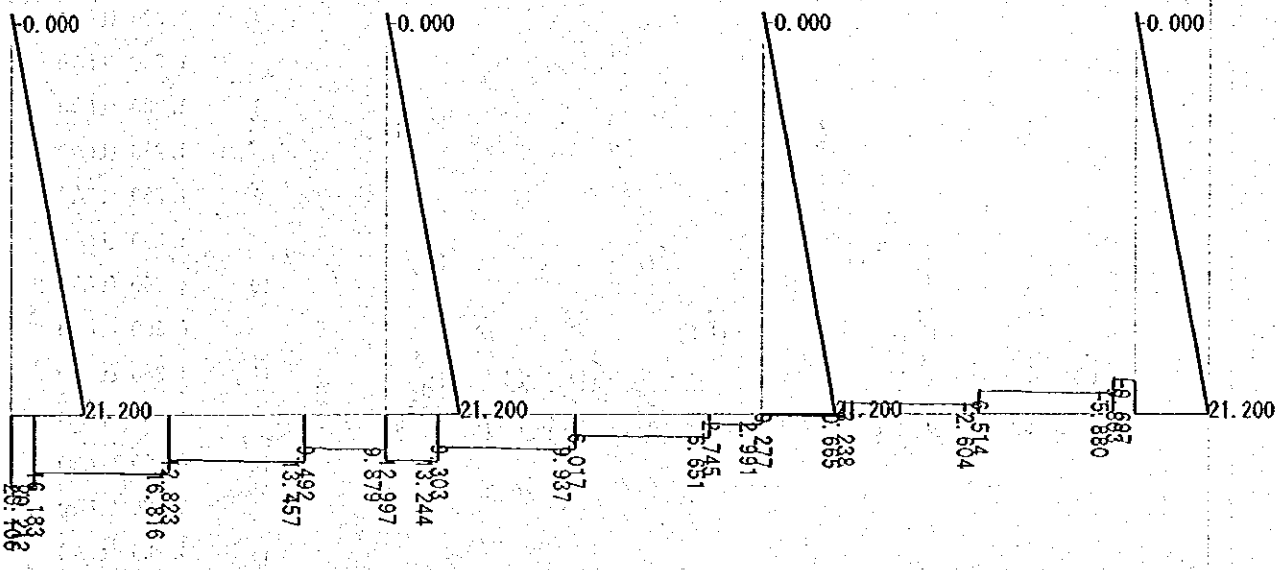


asin B-B

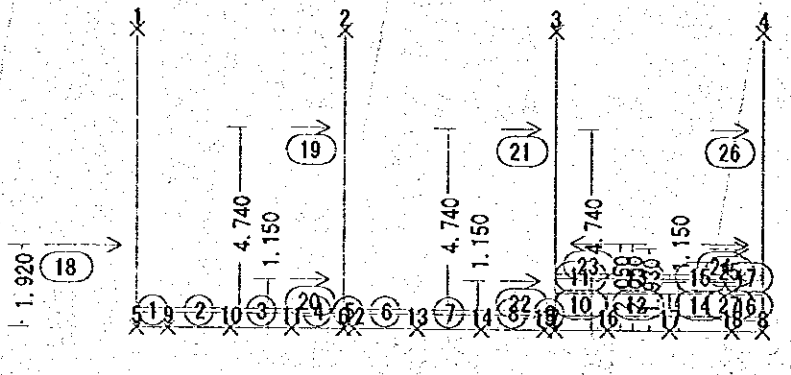
Case 2: Asin pump B-B seismic

Axial Stress Scale ⊢——⊣ : 21.20tf max. : 21.20 tf



asin C-C

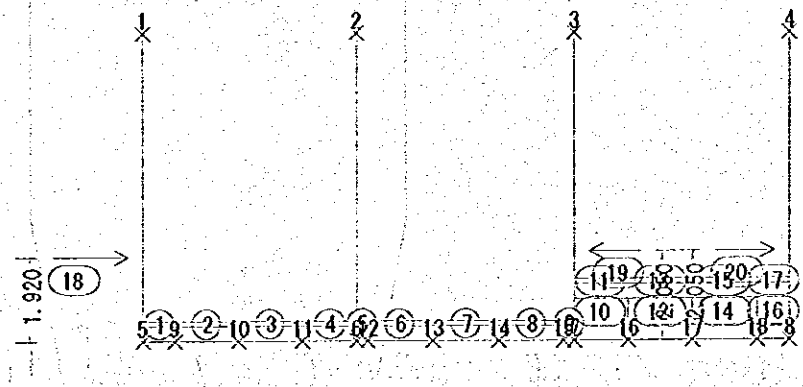
Case 2 : Asin pump C-C seismic



	Load
①	1.280 (tf/m)
	1.280 (tf/m)
②	1.280 (tf/m)
	1.280 (tf/m)
③	1.280 (tf/m)
	1.280 (tf/m)
④	1.280 (tf/m)
	1.280 (tf/m)
⑤	1.280 (tf/m)
	1.280 (tf/m)
⑥	1.280 (tf/m)
	1.280 (tf/m)
⑦	1.280 (tf/m)
	1.280 (tf/m)
⑧	1.280 (tf/m)
	1.280 (tf/m)
⑨	1.280 (tf/m)
	1.280 (tf/m)
⑩	6.300 (tf/m)
	6.300 (tf/m)
⑪	1.280 (tf/m)
	1.280 (tf/m)
⑫	6.300 (tf/m)
	6.300 (tf/m)
⑬	1.280 (tf/m)
	1.280 (tf/m)
⑭	6.300 (tf/m)
	6.300 (tf/m)
⑮	1.280 (tf/m)
	1.280 (tf/m)
⑯	6.300 (tf/m)
	6.300 (tf/m)
⑰	1.280 (tf/m)
	1.280 (tf/m)
⑱	21.456 (tf)
⑲	0.383 (tf)
⑳	0.321 (tf)
㉑	0.383 (tf)
( )	0.321 (tf)

asin C-C

Case 1 : Asin pump C-C normal

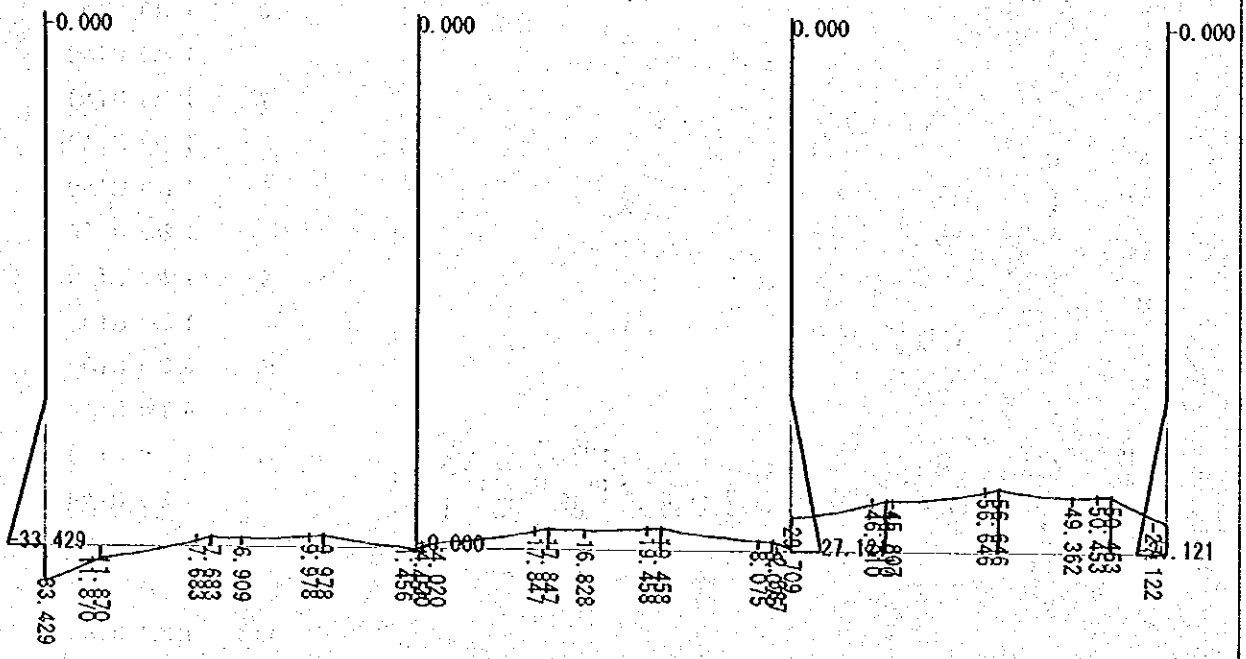


	Load
①	1.280 (tf/m)
	1.280 (tf/m)
②	1.280 (tf/m)
	1.280 (tf/m)
③	1.280 (tf/m)
	1.280 (tf/m)
④	1.280 (tf/m)
	1.280 (tf/m)
⑤	1.280 (tf/m)
	1.280 (tf/m)
⑥	1.280 (tf/m)
	1.280 (tf/m)
⑦	1.280 (tf/m)
	1.280 (tf/m)
⑧	1.280 (tf/m)
	1.280 (tf/m)
⑨	1.280 (tf/m)
	1.280 (tf/m)
⑩	6.300 (tf/m)
	6.300 (tf/m)
⑪	1.280 (tf/m)
	1.280 (tf/m)
⑫	6.300 (tf/m)
	6.300 (tf/m)
⑬	1.280 (tf/m)
	1.280 (tf/m)
⑭	6.300 (tf/m)
	6.300 (tf/m)
⑮	1.280 (tf/m)
	1.280 (tf/m)
⑯	6.300 (tf/m)
	6.300 (tf/m)
⑰	1.280 (tf/m)
	1.280 (tf/m)
⑱	17.411 (tf)
⑲	-13.230 (tf)
⑳	13.230 (tf)

asin C-C

Case 1: Asin pump C-C normal

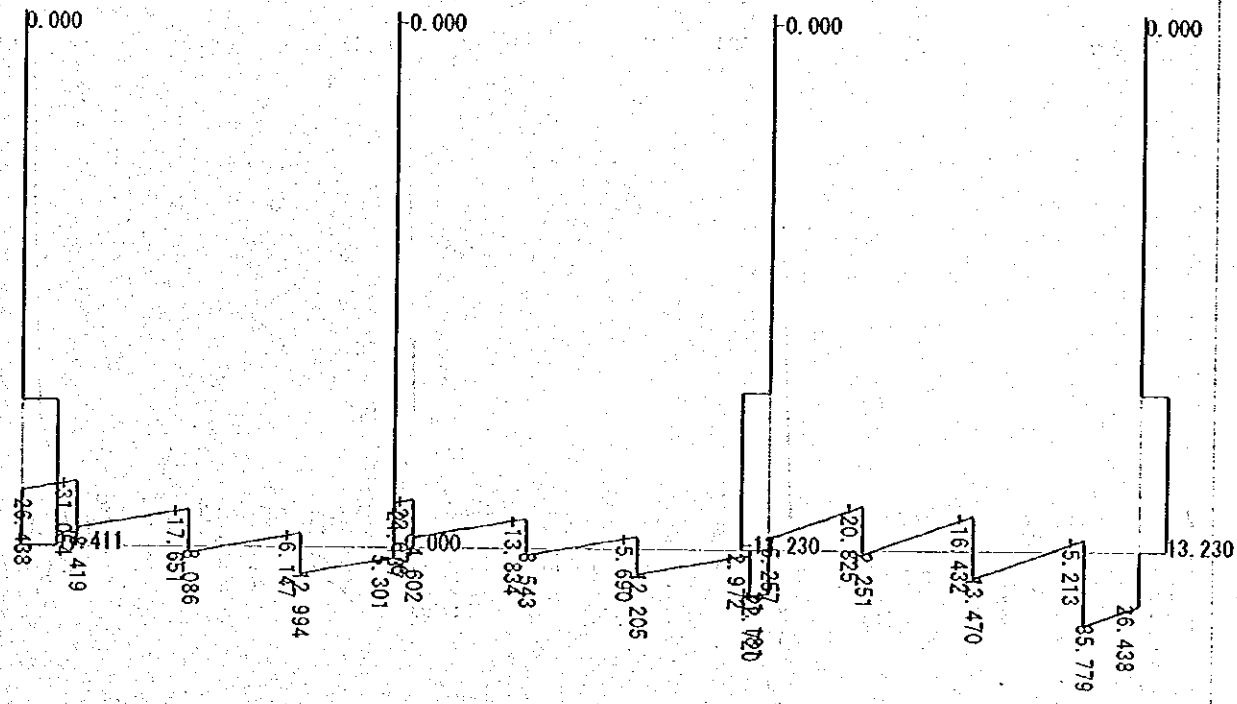
Bending Moment Scale ├------┤ : 67.22tf·m max. : -56.65 tf·m



asin C-C

Case 1: Asin pump C-C normal

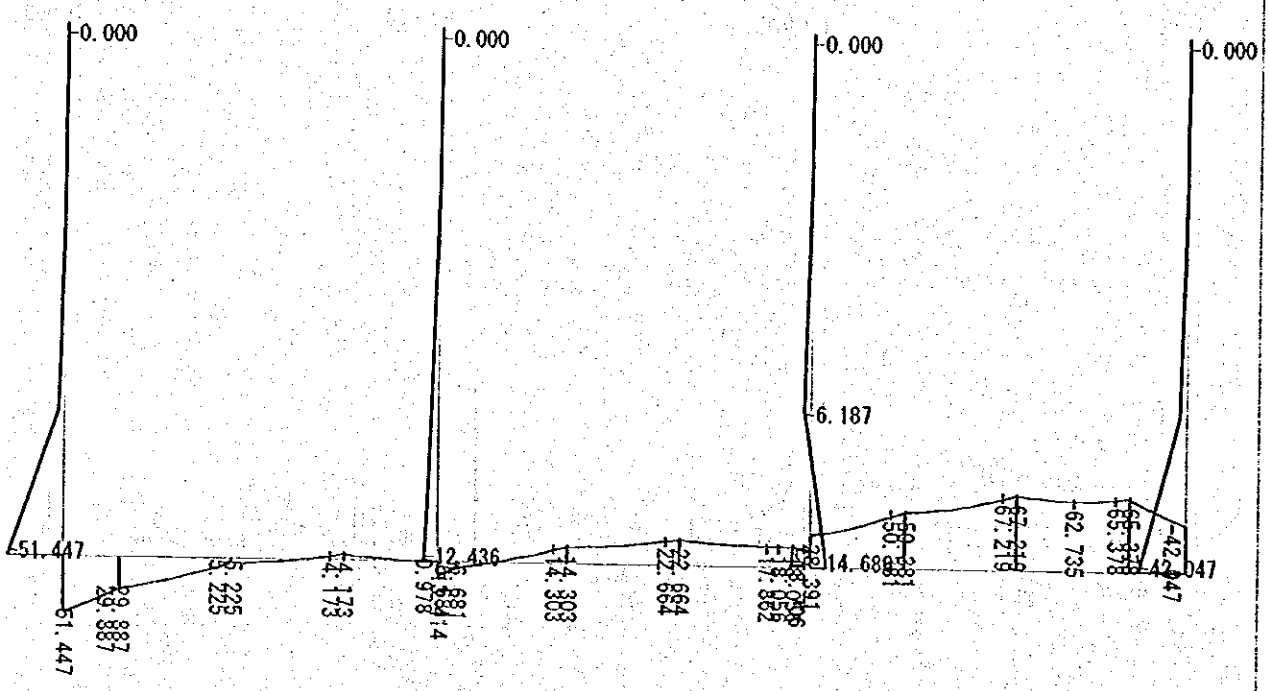
Shear Stress Scale ⊢——⊣ : 35.78tf max. : 35.78 tf



asin C-C

Case 2: Asin pump C-C seismic

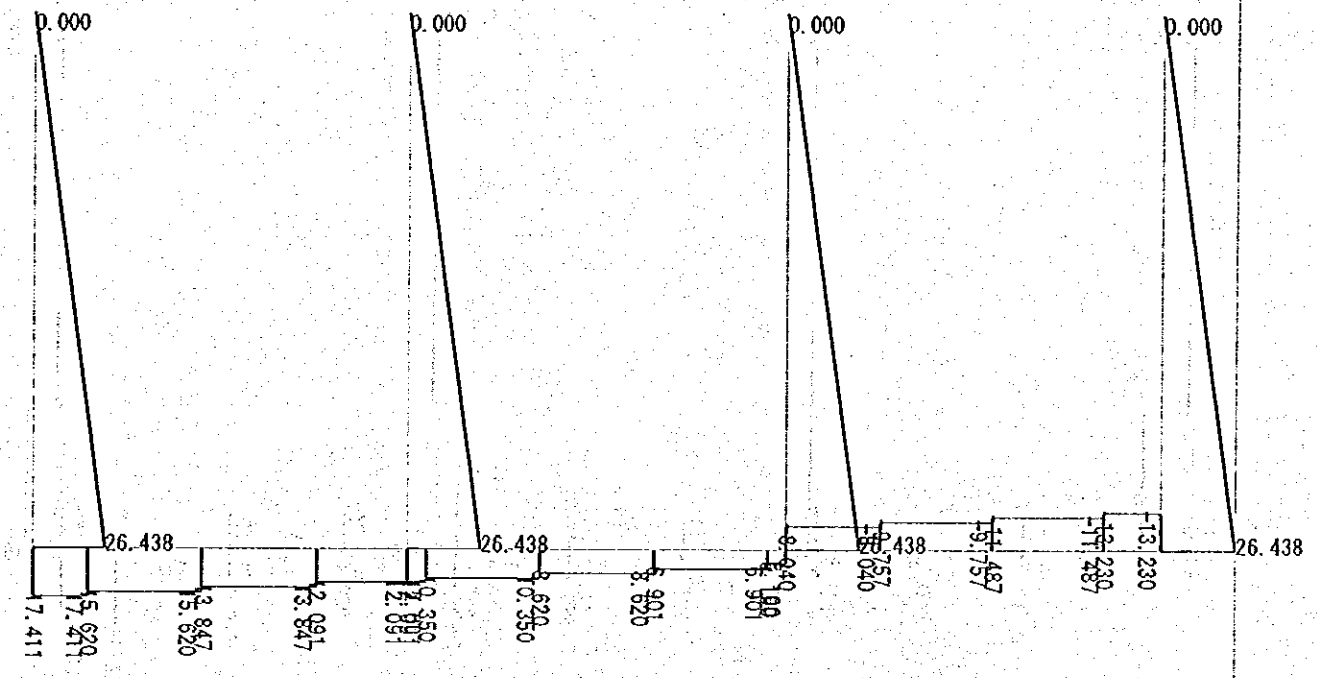
Bending Moment Scale ├──┤ : 67.22tf·m max. : -67.22 tf·m



asin C-C

Case 1: Asin pump C-C normal

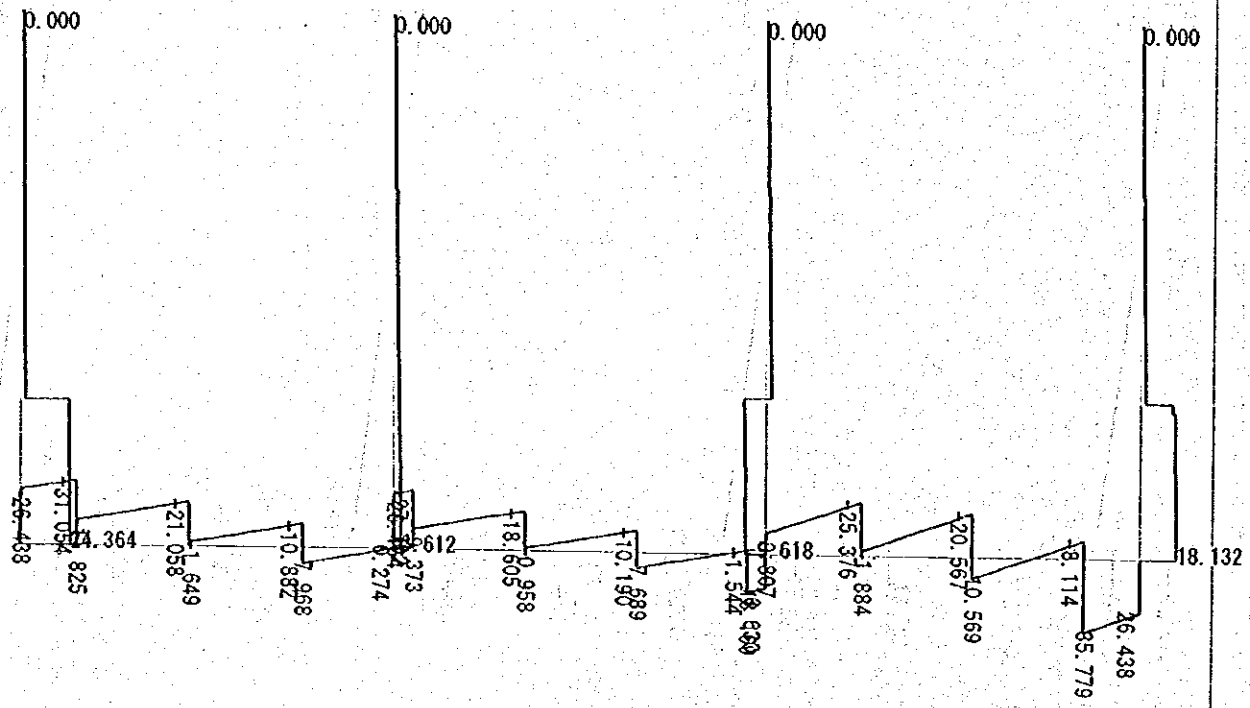
Axial Stress Scale ⊢——⊣ : 26.44tf max. : 26.44 tf



asin C-C

Case 2: Asin pump C-C seismic

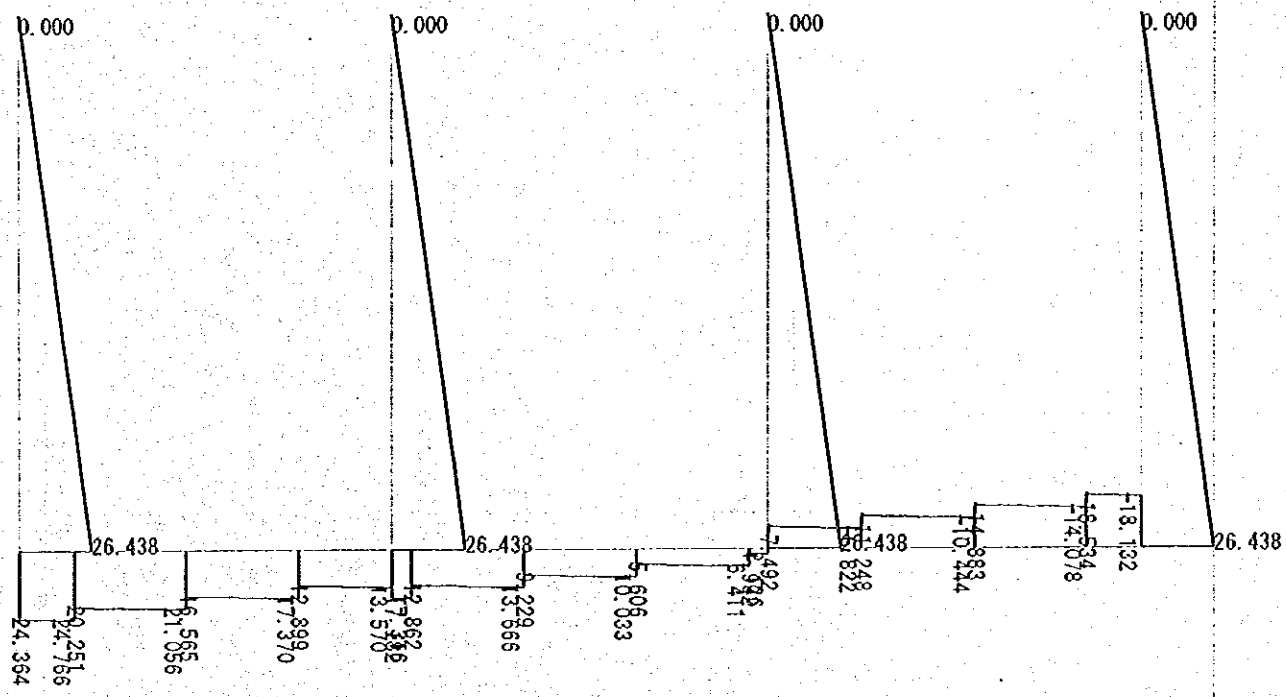
Shear Stress Scale ⊢——⊣ : 35.78tf max. : 35.78 tf



asin C-C

Case 2: Asin pump C-C seismic

Axial Stress Scale ├──┤ : 26.44tf max. : 26.44 tf



asin D-D

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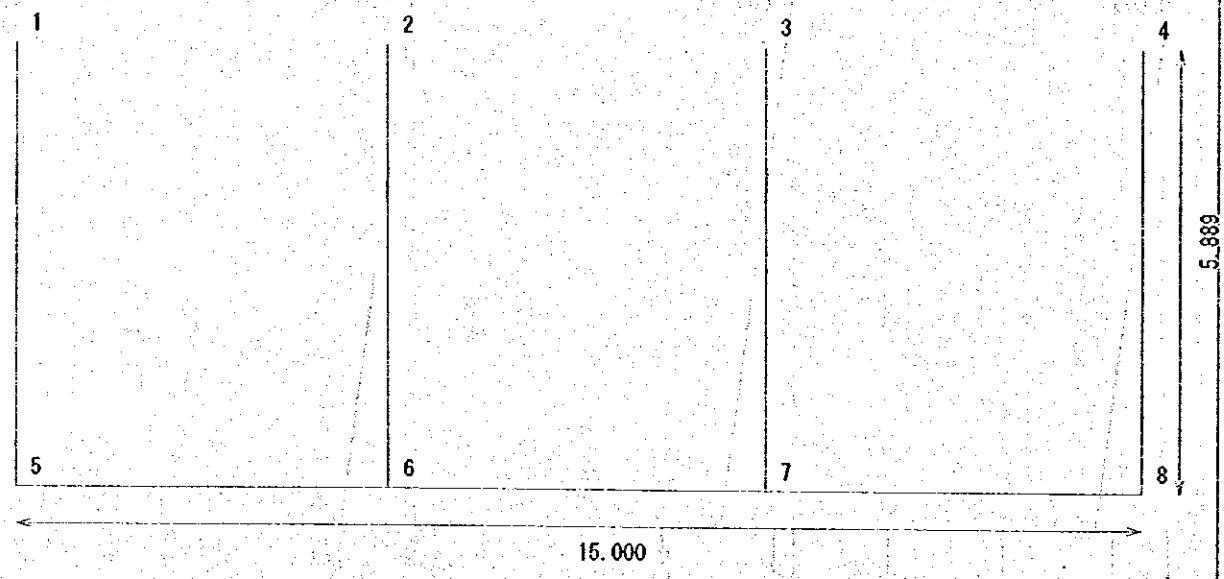
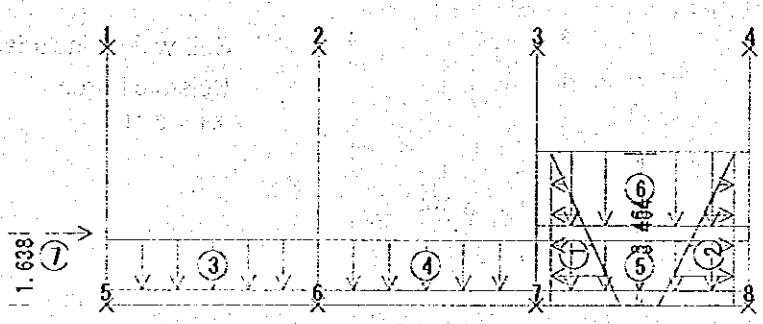


asin D-D

Case 1 : Asin pump D-D normal

	Load
①	-3.464 (tf/m)
	0.000 (tf/m)
②	3.464 (tf/m)
	0.000 (tf/m)
③	2.320 (tf/m)
	2.320 (tf/m)
④	2.320 (tf/m)
	2.320 (tf/m)
⑤	2.320 (tf/m)
	2.320 (tf/m)
⑥	3.464 (tf/m)
	3.464 (tf/m)
⑦	2.103 (tf)

Self-weight included



asin D-D

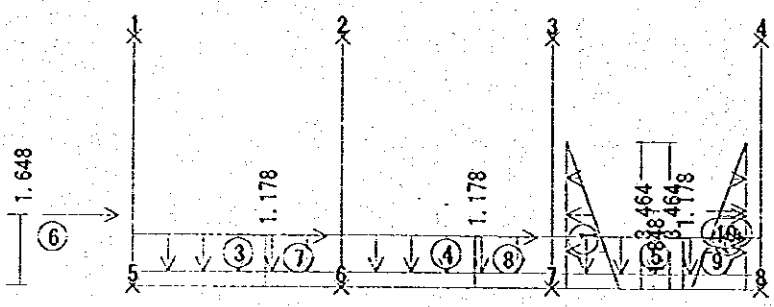
Case 2 : Asin pump D-D seismic

	Load
①	-3.464 (tf/m)
	0.000 (tf/m)
②	3.464 (tf/m)
	0.000 (tf/m)
③	2.320 (tf/m)
	2.320 (tf/m)
④	2.320 (tf/m)
	2.320 (tf/m)
⑤	2.320 (tf/m)
	2.320 (tf/m)
⑥	4.708 (tf)
⑦	1.276 (tf)
⑧	1.276 (tf)
⑨	1.276 (tf)
⑩	0.770 (tf)

Self-weight included

Seismic Force

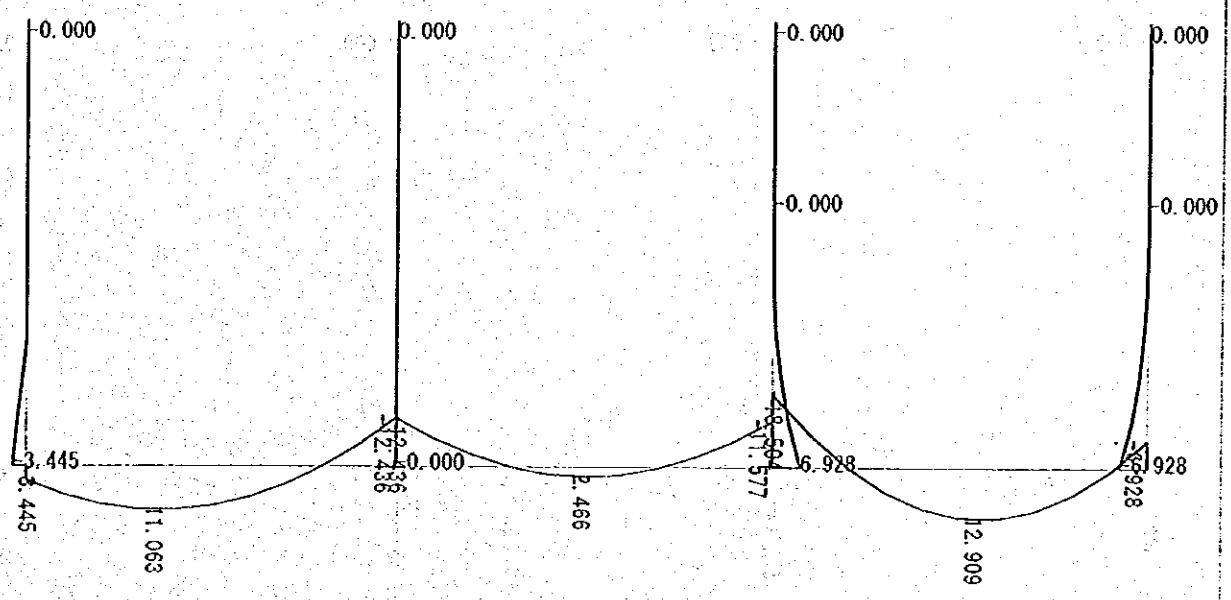
KH = 0.11



asin D-D

Case 1: Asin pump D-D normal

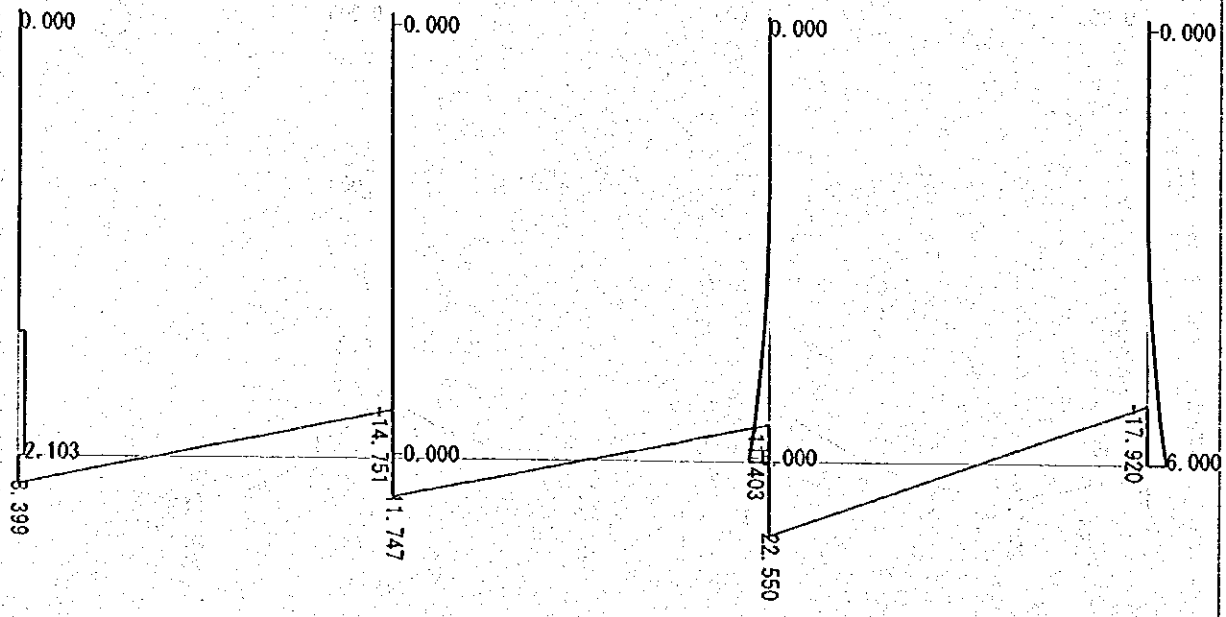
Bending Moment Scale ⊢——⊣ : 18.90tf·m max. : -18.50 tf·m



asin D-D

Case 1: Asin pump D-D normal

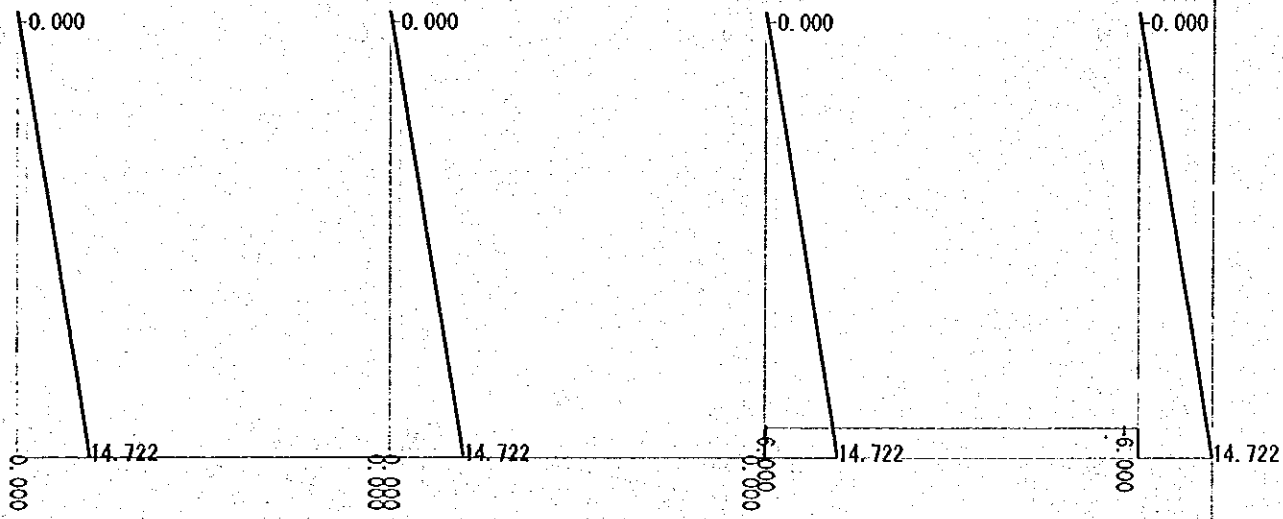
Shear Stress Scale ——— : 22.55tf max. : 22.55 tf



asin D-D

Case 1: Asin pump D-D normal

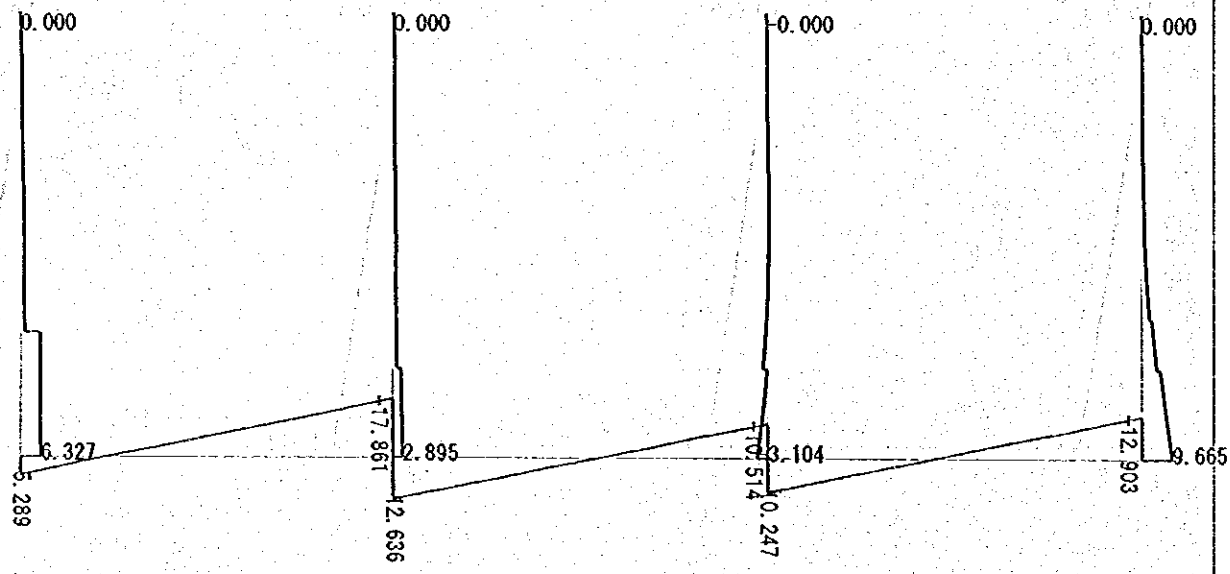
Axial Stress Scale ├──┤ : 14.72tf max. : 14.72 tf



asin D-D

Case 2: Asin pump D-D seismic

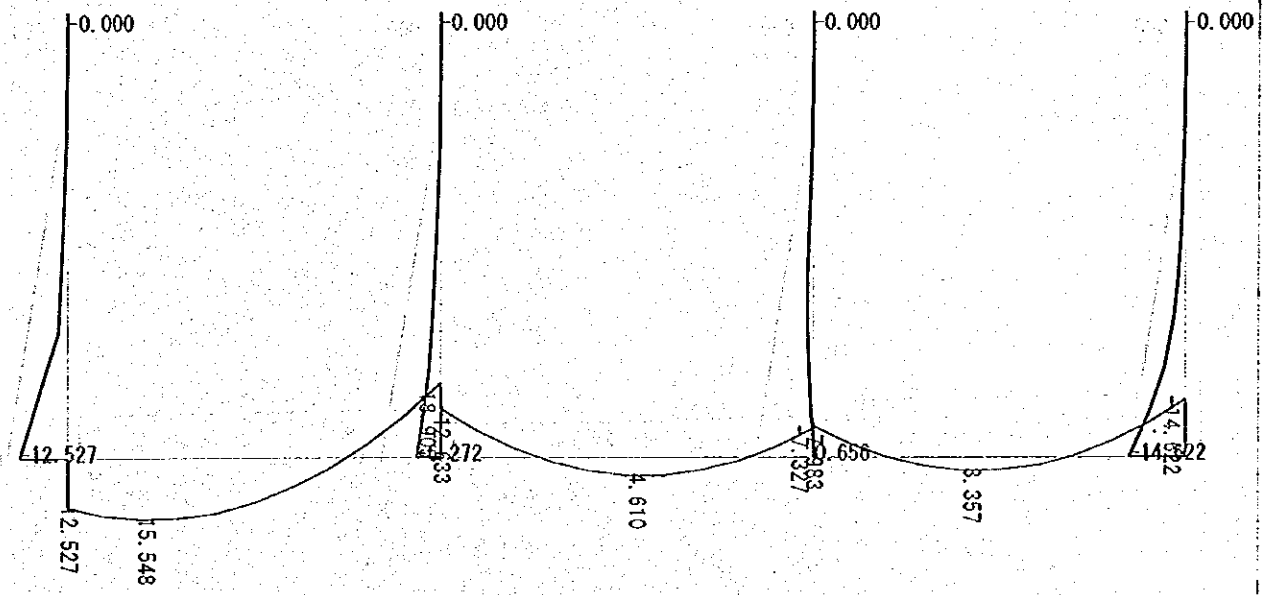
Shear Stress Scale |——| : 22.55tf max. : -17.86 tf



asin D-D

Case 2: Asin pump D-D seismic

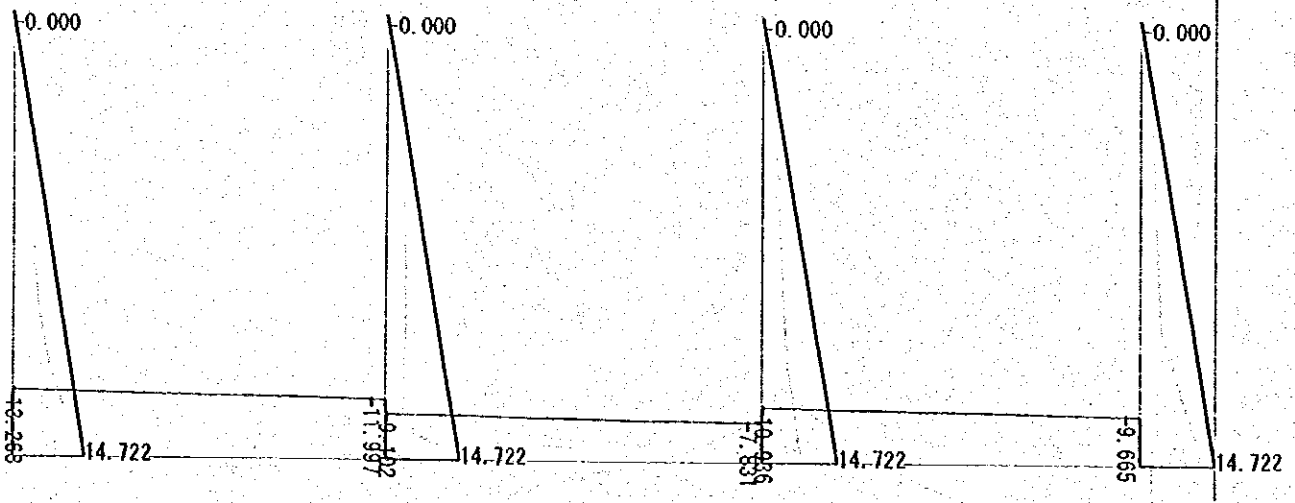
Bending Moment Scale ⊢——⊣ : 18.90tf·m max. : -18.90 tf·m



asin D-D

Case 2: Asin pump D-D seismic

Axial Stress Scale ⊢——⊣ : 14.72tf max. : 14.72 tf



asin E-E

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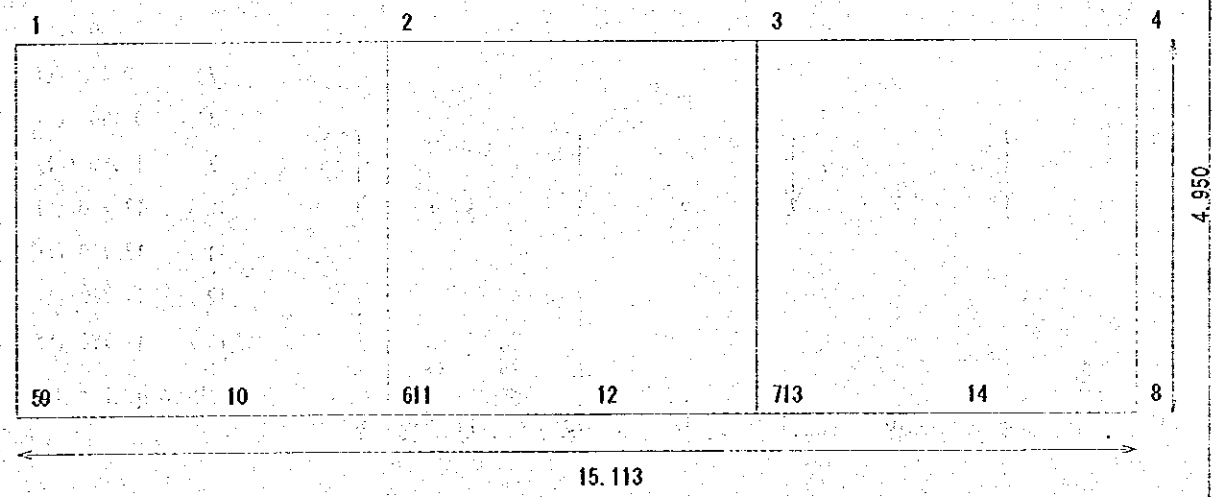
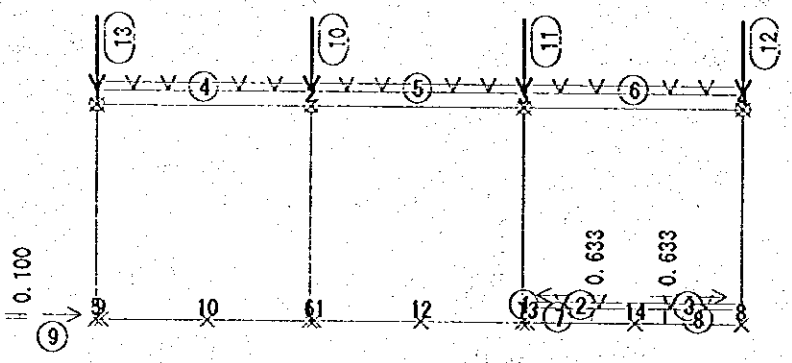


asin E-E

Case 1 : Asin pump E-E normal

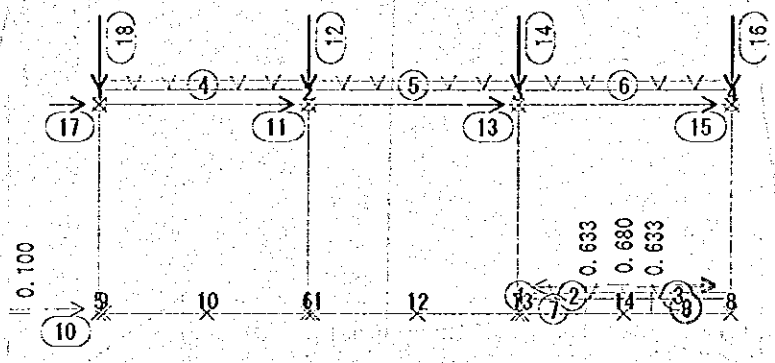


	Load
①	1.400 (tf/m)
	1.400 (tf/m)
②	1.400 (tf/m)
	1.400 (tf/m)
③	1.400 (tf/m)
	1.400 (tf/m)
④	2.000 (tf/m)
	2.000 (tf/m)
⑤	2.000 (tf/m)
	2.000 (tf/m)
⑥	2.000 (tf/m)
	2.000 (tf/m)
⑦	-0.490 (tf)
⑧	0.490 (tf)
⑨	1.550 (tf)
⑩	17.780 (tf)
⑪	17.780 (tf)
⑫	17.780 (tf)
⑬	17.780 (tf)

Self-weight included

asin E-E

Case 2 : Asin pump E-E seismic



	Load
①	1.400 (tf/m)
	1.400 (tf/m)
②	1.400 (tf/m)
	1.400 (tf/m)
③	1.400 (tf/m)
	1.400 (tf/m)
④	2.000 (tf/m)
	2.000 (tf/m)
⑤	2.000 (tf/m)
	2.000 (tf/m)
⑥	2.000 (tf/m)
	2.000 (tf/m)
⑦	-0.490 (tf)
⑧	0.490 (tf)
⑨	0.620 (tf)
⑩	1.810 (tf)
⑪	1.960 (tf)
⑫	17.780 (tf)
⑬	1.960 (tf)
⑭	17.780 (tf)
⑮	1.900 (tf)
⑯	17.780 (tf)
⑰	1.960 (tf)
⑱	17.780 (tf)

Self-weight included

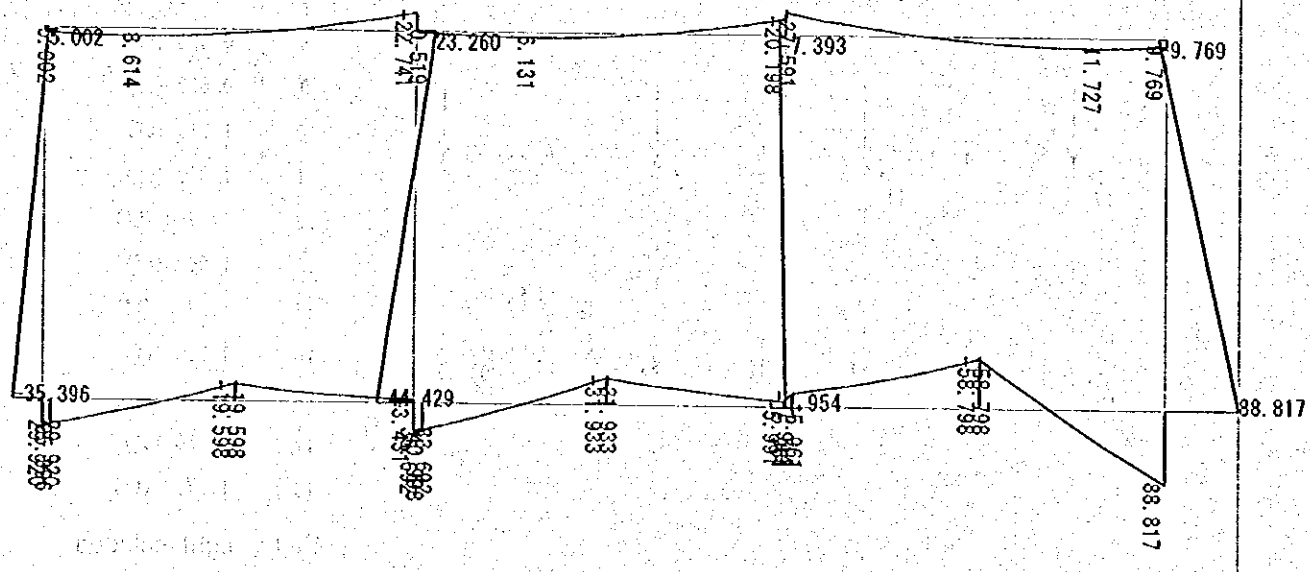
Seismic Force

KH = 0.11

asin E-E

Case 1: Asin pump E-E normal

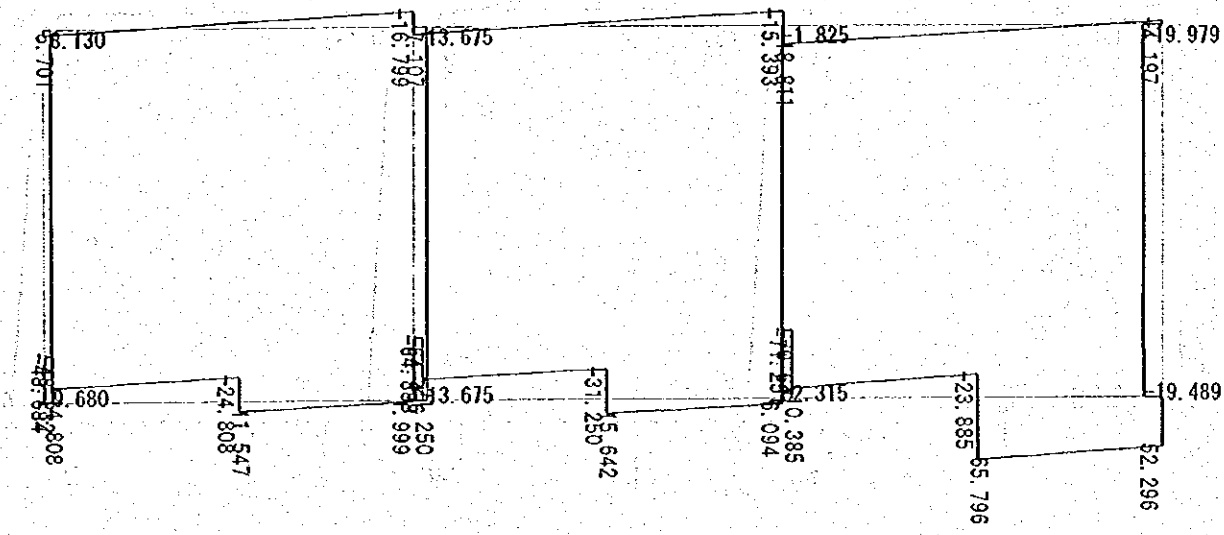
Bending Moment Scale ├──┤ : 88.82tf·m max. : 88.82 tf·m



asin E-E

Case 1: Asin pump E-E normal

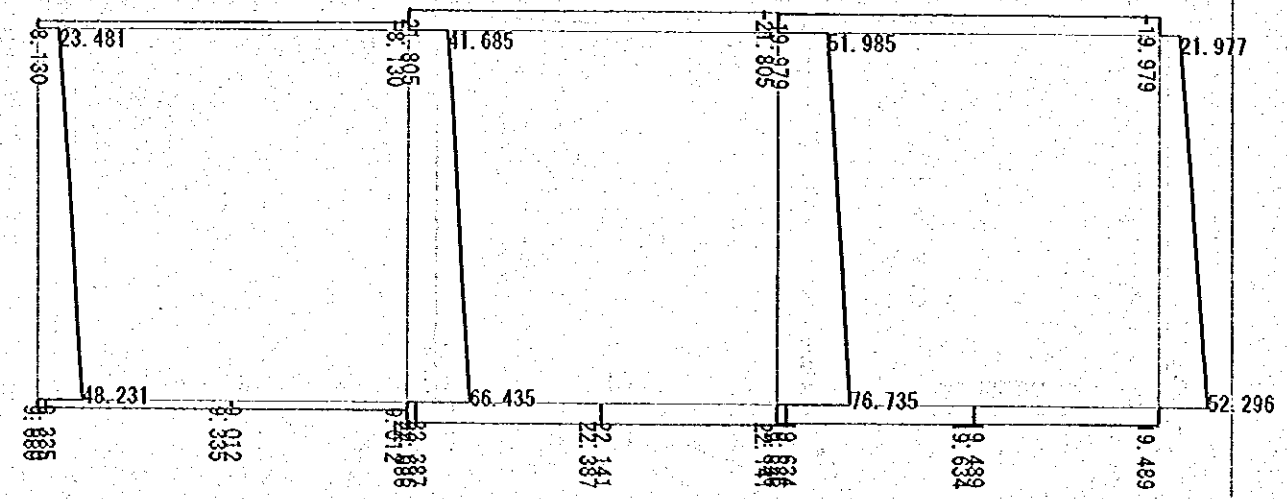
Shear Stress Scale ⊢——⊣ : 78.05tf max. : -71.25 tf



asin E-E

Case 1: Asin pump E-E normal

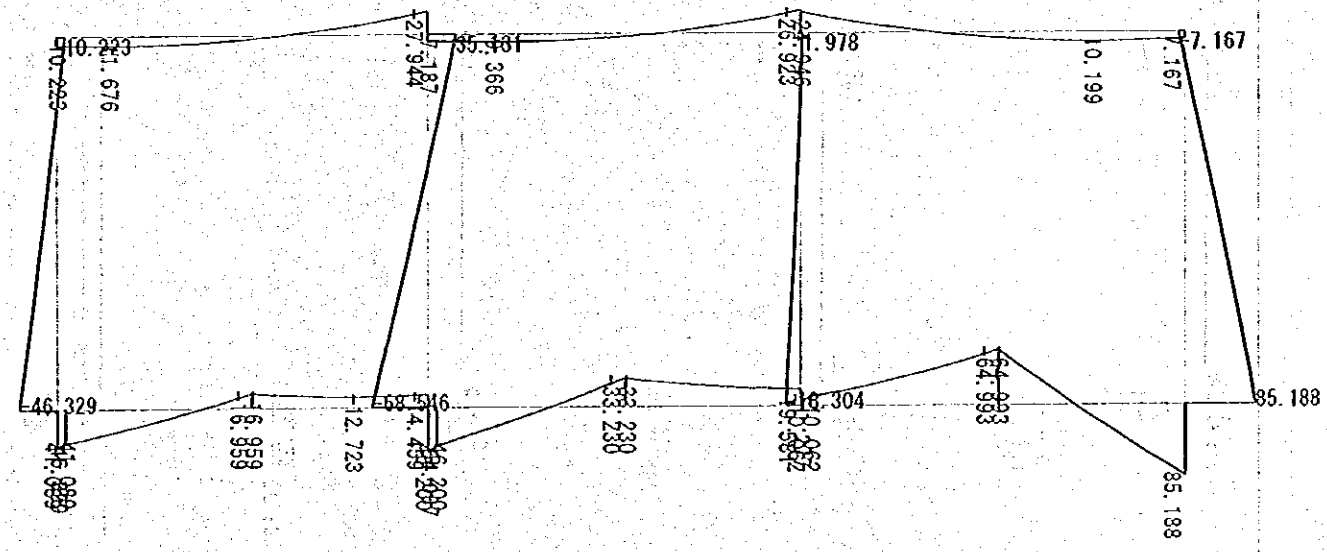
Axial Stress Scale ⊢——⊣ : 78.39tf max. : 76.73 tf



asin E-E

Case 2: Asin pump E-E seismic

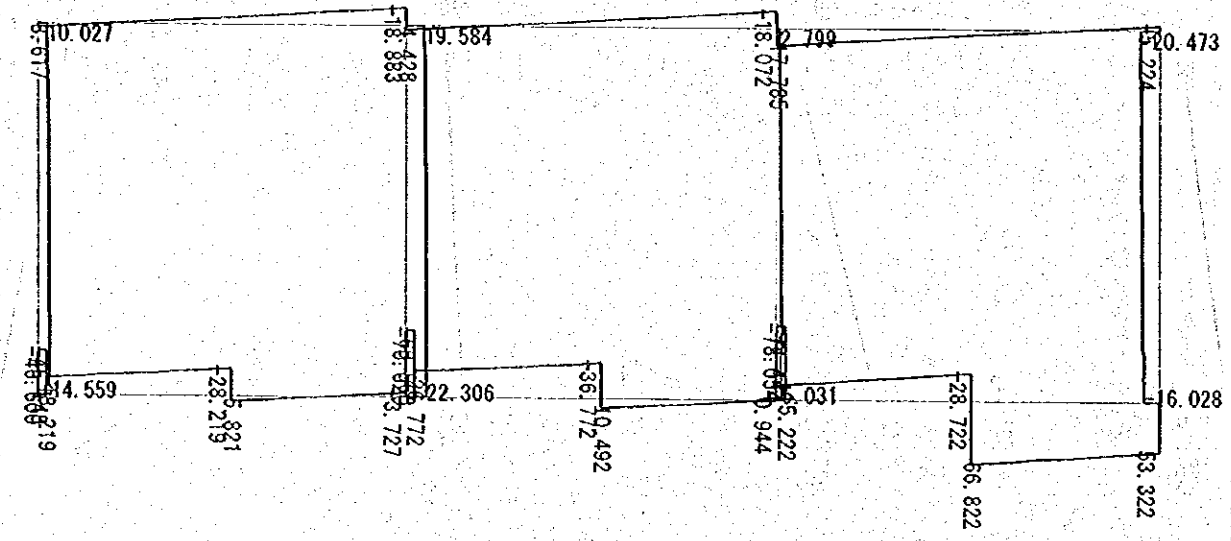
Bending Moment Scale ——— : 88.82tf·m max. : 85.19 tf·m



asin E-E

Case 2: Asin pump E-E seismic

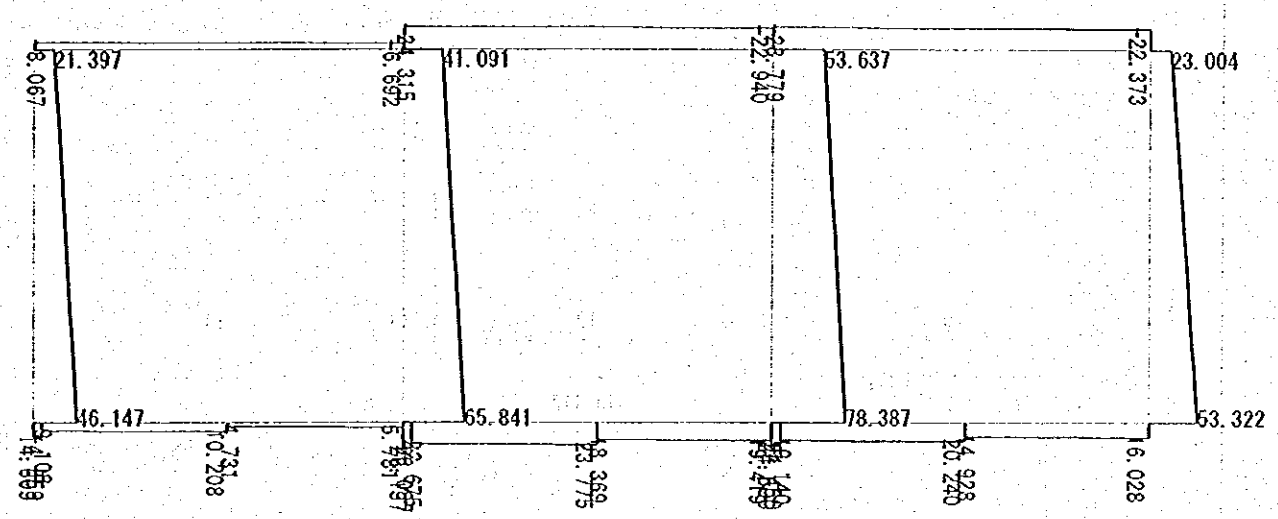
Shear Stress Scale ├---┤ : 78.05tf max. : -78.05 tf



asin E-E

Case 2: Asin pump E-E seismic

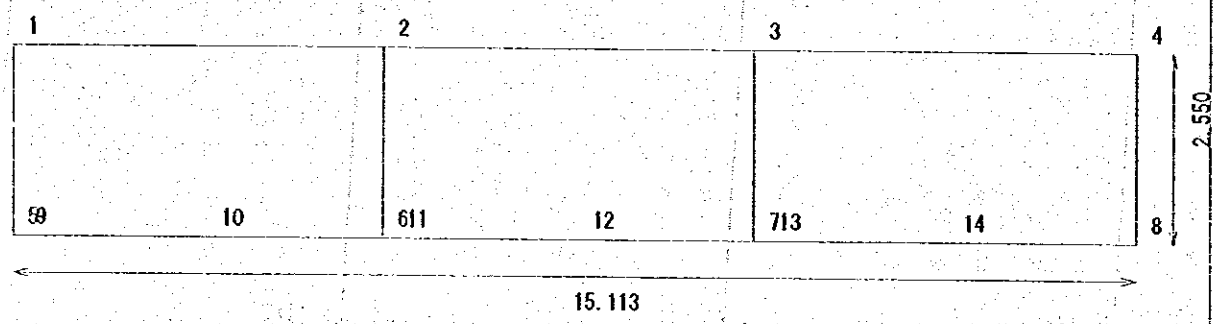
Axial Stress Scale ——— : 78.39tf max. : 78.39 tf



asin F-F

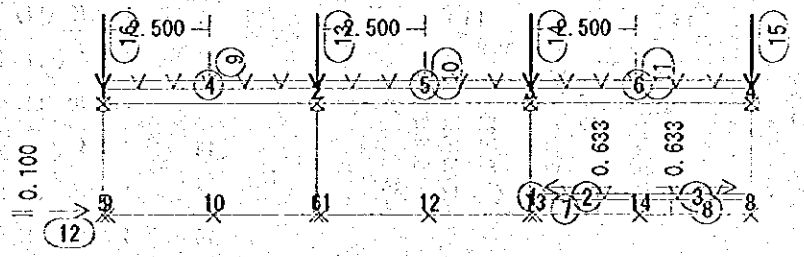
縮尺 1/ 98

骨組図



asin F-F

Case 1 : Asin pump F-F normal

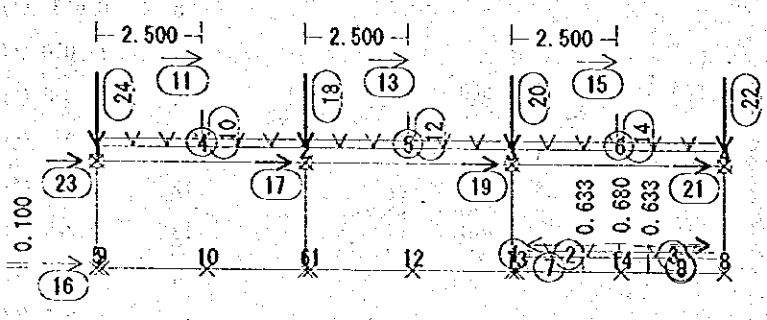


	Load
①	1.750 (tf/m)
	1.750 (tf/m)
②	1.750 (tf/m)
	1.750 (tf/m)
③	1.750 (tf/m)
	1.750 (tf/m)
④	2.500 (tf/m)
	2.500 (tf/m)
⑤	2.500 (tf/m)
	2.500 (tf/m)
⑥	2.500 (tf/m)
	2.500 (tf/m)
⑦	-0.613 (tf)
⑧	0.613 (tf)
⑨	11.070 (tf)
⑩	11.070 (tf)
⑪	11.070 (tf)
⑫	1.937 (tf)
⑬	22.225 (tf)
⑭	22.225 (tf)
⑮	22.225 (tf)
⑯	22.225 (tf)

Self-weight included

asin F-F

Case 2 : Asin pump F-F seismic



	Load
①	1.750 (tf/m)
	1.750 (tf/m)
②	1.750 (tf/m)
	1.750 (tf/m)
③	1.750 (tf/m)
	1.750 (tf/m)
④	2.500 (tf/m)
	2.500 (tf/m)
⑤	2.500 (tf/m)
	2.500 (tf/m)
⑥	2.500 (tf/m)
	2.500 (tf/m)
⑦	-0.613 (tf)
⑧	0.613 (tf)
⑨	0.078 (tf)
⑩	11.070 (tf)
⑪	4.474 (tf)
⑫	11.070 (tf)
⑬	4.474 (tf)
⑭	11.070 (tf)
⑮	4.474 (tf)
⑯	1.937 (tf)
⑰	2.450 (tf)
⑱	22.225 (tf)
⑲	2.450 (tf)
⑳	22.225 (tf)
㉑	2.450 (tf)
㉒	22.225 (tf)
㉓	2.450 (tf)
㉔	22.225 (tf)

Self-weight included

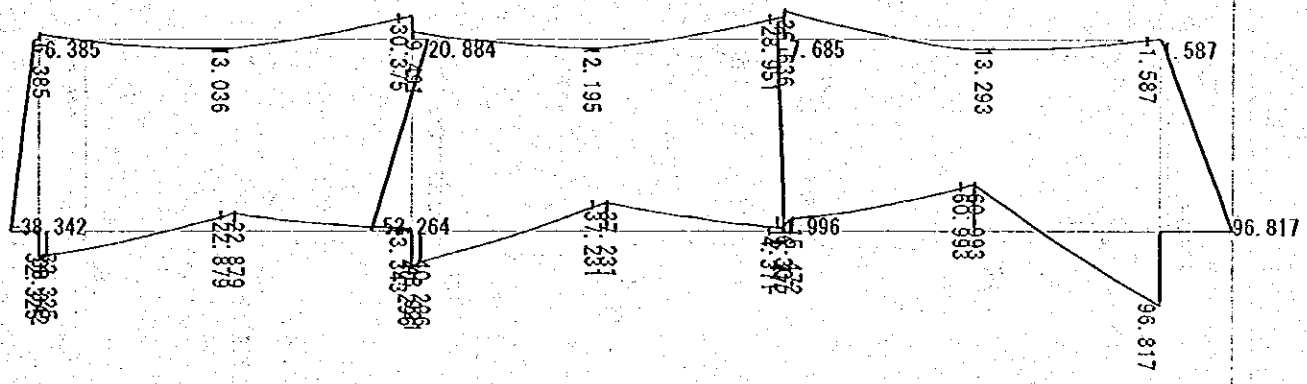
Seismic Force

KH = 0.11

asin F-F

Case 1: Asin pump F-F normal

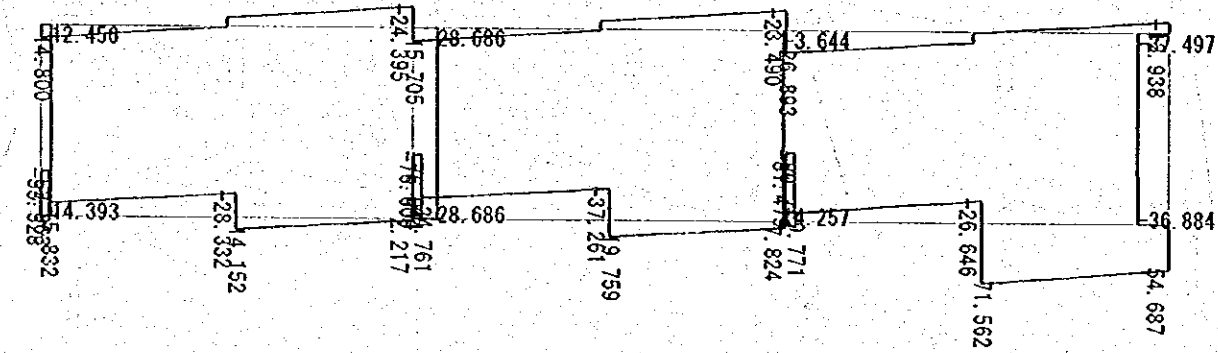
Bending Moment Scale ├——┤ : 96.82tf·m max. : 96.82 tf·m



asin F-F

Case 1: Asin pump F-F normal

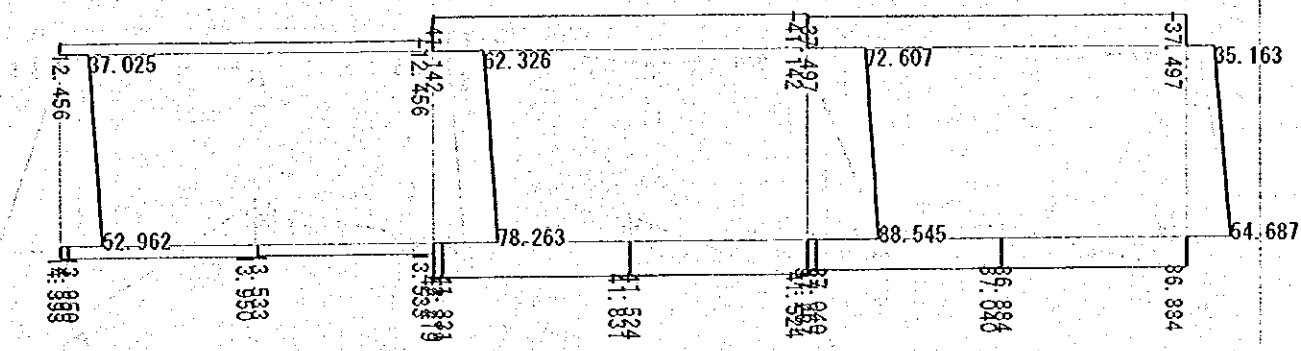
Shear Stress Scale ├------┤ : 87.98tf max. : -81.48 tf



asin F-F

Scale 1: Asin pump F-F normal

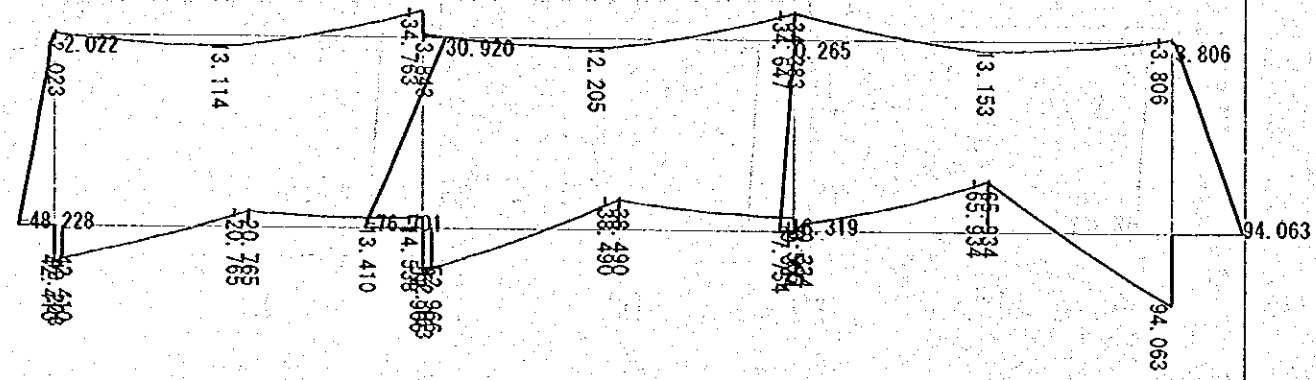
Axial Stress Scale ⊢——⊣ : 89.94tf max. : 88.54 tf



asin F-F

Case 2: Asin pump F-F seismic

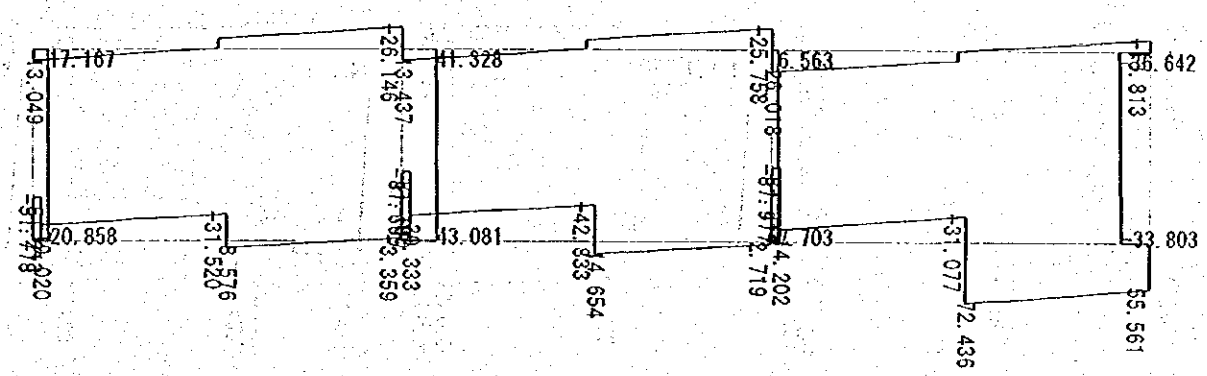
Bending Moment Scale ------| : 96.82tf·m max. : 94.06 tf·m



asin F-F

Case 2: Asin pump F-F seismic

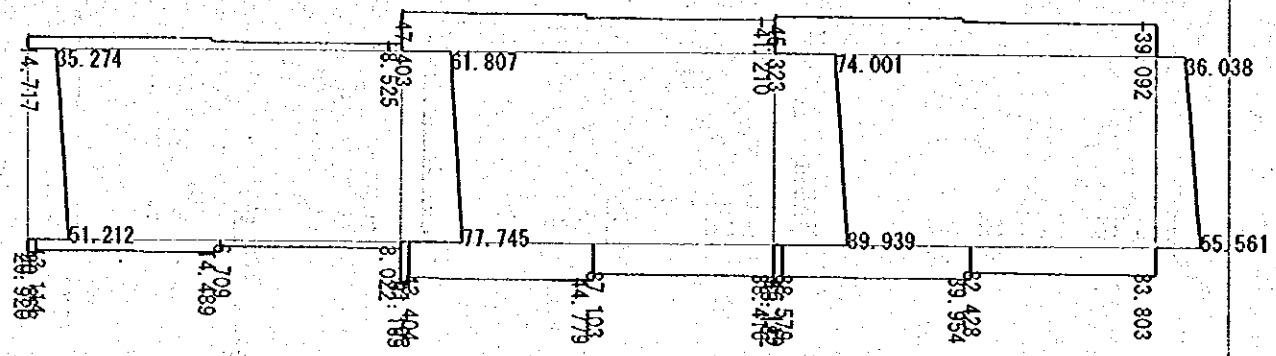
Shear Stress Scale ——— : 87.98tf max. : -87.98 tf



asin F-F

Case 2: Asin pump F-F seismic

Axial Stress Scale : 89.94tf max. : 89.94 tf



4.2 Reinforcing Bar Calculation

Reinforcing Bar calculation was made according to the calculated bending moment, shear stress and axial force.

The calculation result is show in Table 11.

Table 11 Reinforcing Bar Arrangement

Section Name	Member Name	direction	surface	type	cover	t	L	normal		earthquake		reinforcing bar(main)		reinforcing bar(distribution)		ratio	Normal		Earthquake	
								M	N	M	N	diameter	pitch	diameter	pitch		C	S	C	S
					(mm)	(m)	(m)	(tm)	(t)	(tm)	(t)	(mm)	(mm)	(mm)	(mm)	(%)	(kg/cm²)	(kg/cm²)	(kg/cm²)	(kg/cm²)
allowable stress																	225	600-1,800	338	400-2,700
B-B	wall no.1	-z	water	wall	100	0.975	10	4.74	13.25	11.39	13.25	D16	250	D13	500		6	71	19	917
		+z	water	wall	50	0.975	10	4.74	13.25	11.39	13.25	D16	250	D13	500		6	75	18	874
	wall no.2	-z	water	wall	50	0.975	10	4.74	13.25	5.78	13.25	D16	250	D13	500		6	75	18	874
		+z	water	wall	50	0.975	10	4.74	13.25	5.78	13.25	D16	250	D13	500		6	75	18	874
	wall no.3	-z	water	wall	50	0.975	10	4.74	13.25	5.78	13.25	D16	250	D13	500		6	75	18	874
		+z	water	wall	50	0.975	10	4.74	13.25	5.78	13.25	D16	250	D13	500		6	75	18	874
	wall no.4	-z	water	wall	50	0.975	10	0.00	13.25	0.00	13.25	D16	250	D13	500		-	-	-	-
		+z	soil	wall	100	0.975	10	10.22	13.25	18.53	13.25	D16	250	D13	500		17	747	33	1,981
	bottom s	+y	water	slab	50	0.8	10	8.38	0	18.50	0	D16	125	D16	125		14	760	32	1,677
		-y	pile	slab	150	0.8	10	10.22	0	18.53	0	D16	125	D16	125		22	1,075	40	1,948
C-C	wall no.1	-z	water	wall	100	1	8.2	18.08	17.63	28.03	17.63	D22	250	D19	500		24	859	37	1,614
		+z	water	wall	50	1	8.2	18.08	17.63	28.03	17.63	D22	250	D19	500		22	818	34	1,531
	wall no.2	-z	water	wall	50	1	8.2	18.08	17.63	28.03	17.63	D22	250	D19	500		22	818	34	1,531
		+z	water	wall	50	1	8.2	18.08	17.63	28.03	17.63	D22	250	D19	500		22	818	34	1,531
	wall no.3	-z	water	wall	50	1	8.2	18.08	17.63	28.03	17.63	D22	250	D19	500		22	818	34	1,531
		+z	water	wall	50	1	8.2	18.08	17.63	28.03	17.63	D22	250	D19	500		22	818	34	1,531
	wall no.4	-z	water	wall	50	1	8.2	0.00	17.63	0.00	17.63	D22	250	D19	500		-	-	-	-
		+z	soil	wall	100	1	8.2	22.29	17.63	34.30	17.63	D22	250	D19	500		29	1,177	45	2,093
	bottom s	+y	water	slab	50	1.3	8.2	26.99	0	43.69	0	D19	125	D19	125		18	1,012	32	1,826
		-y	pile	slab	150	1.3	8.2	22.29	0	34.30	0	D19	125	D19	125		17	911	26	1,402
D-D	wall no.1	-z	water	wall	100	1	7.8	6.93	14.7	18.90	14.72	D16	250	D13	500		9	213	32	1,870
		+z	water	wall	50	1	7.8	6.93	14.7	18.90	14.72	D16	250	D13	500		9	211	30	1,775
	wall no.2	-z	water	wall	50	1	7.8	6.93	14.7	18.90	14.72	D16	250	D13	500		9	211	30	1,775
		+z	water	wall	50	1	7.8	6.93	14.7	18.90	14.72	D16	250	D13	500		9	211	30	1,775
	wall no.3	-z	water	wall	50	1	7.8	6.93	14.7	18.90	14.72	D16	250	D13	500		9	211	30	1,775
		+z	water	wall	50	1	7.8	6.93	14.7	18.90	14.72	D16	250	D13	500		9	211	30	1,775
	wall no.4	-z	water	wall	50	1	7.8	6.93	14.7	18.90	14.72	D16	250	D13	500		9	211	30	1,775
		+z	soil	wall	100	1	7.8	6.93	14.7	12.50	14.72	D16	250	D13	500		9	213	32	1,870
	bottom s	+y	water	slab	50	0.92	7.8	18.50	0	18.90	0	D19	125	D19	125		22	1,010	22	1,032
		-y	soil	slab	100	0.92	7.8	12.90	0	15.50	0	D19	125	D19	125		17	749	20	900
E-E	wall no.1	-z	water	wall	100	1.225	2.7	35.53	20.92	34.08	21.32	D22	250	D19	500		47	2,083	45	1,565
		+z	water	wall	50	1.225	2.7	3.92	20.92	2.88	21.32	D22	250	D19	500		4	1	4	8
	wall no.2	-z	water	wall	50	1	2.7	17.76	30.68	27.40	26.32	D22	250	D19	500		8	28	34	1,250
		+z	water	wall	50	1	2.7	17.76	30.68	27.40	26.32	D22	250	D19	500		21	485	34	1,250
	wall no.3	-z	water	wall	50	1	2.7	17.76	30.68	27.40	26.32	D22	250	D19	500		21	485	34	1,250
		+z	water	wall	50	1	2.7	17.76	30.68	27.40	26.32	D22	250	D19	500		21	485	34	1,250
	wall no.4	-z	water	wall	50	1	2.7	14.16	20.92	4.08	18.48	D22	250	D19	500		17	455	4	7
		+z	soil	wall	100	1	2.7	14.16	20.92	18.52	18.48	D22	250	D19	500		18	483	34	868
	bottom s	+y	water	slab	50	0.8	2.7	23.52	3.72	26.00	1.88	D19	125	D19	125		36	1,426	39	1,619
		-y	pile	slab	150	0.8	2.7	13.48	3.72	34.08	1.88	D22	125	D22	125		23	696	58	1,864
	box culv	+y	air	bea	50	0.5	2.7	9.08	3.24	11.16	2.68	D19	250	D16	250		41	1,779	50	2,241
		-y	air	bea	50	0.5	2.7	4.68	3.24	4.68	2.68	D19	250	D16	250		21	853	21	876
reinforcing bar arrangement(Asir)																				
								normal		earthquake		reinforcing bar(main		reinforcing bar(distributio			Normal		Earthquake	
Section Name	Member	direction	surface	type	cover	t	L	M	N	M	N	diameter	pitch	diameter	pitch	ratio	C	S	C	S
					(mm)	(m)	(m)	(tm)	(t)	(tm)	(t)	(mm)	(mm)	(mm)	(mm)	(%)	(kg/cm2)	(kg/cm2)	(kg/cm2)	(kg/cm2)
F-F	wall no.1	-z	water	wall	100	1.225	7	38.72	21.88	37.64	22.24	D22	250	D16	250		36	1,702	35	1,627
		+z	water	wall	50	1.225	7	0.63	21.88	1.52	22.24	D19	250	D16	500		3	26	3	20
	wall no.2	-z	water	wall	50	1	7	20.92	35.42	30.68	35.96	D19	250	D16	500		26	741	41	1,606
		+z	water	wall	50	1	7	20.92	35.42	30.68	35.96	D19	250	D16	500		26	741	41	1,606
	wall no.3	-z	water	wall	50	1	7	20.92	35.42	30.68	35.96	D19	250	D16	500		26	741	41	1,606
		+z	water	wall	50	1	7	20.92	35.42	30.68	35.96	D19	250	D16	500		26	741	41	1,606
	wall no.4	-z	water	wall	50	1	7	2.56	21.20	0.80	20.48	D19	250	D16	500		4	10	3	23
		+z	soil	wall	100	1	7	15.32	21.20	19.28	20.48	D19	250	D16	500		21	721	28	1,138
	bottom s	+y	water	slab	50	0.8	7	24.40	5.40	26.36	2.68	D19	125	D19	125		25	1,111	27	1,261
		-y	pile	slab	150	0.8	7	38.80	5.40	37.64	2.68	D22	125	D22	125		66	2,062	64	2,043
	box culv	+y	air	bea	50	0.5	7	14.64	5.00	13.92	3.40	D19	125	D19	125		51	1,492	43	1,445
		-y	air	bea	50	0.5	7	5.32	5.00	5.28	3.40	D19	125	D19	125		19	482	19	507
H-H	bottom	+y	air	slab	50	0.5	10	26	0	26	0	D16	250	D16	250		13	781	13	781
		-y	pile	slab	150	0.5	10	12	0	12	0	D16	250	D16	250		9	460	9	467