CODE : BS8110

Concrete Grade,	fcu=	25.00	MPa
Steel Grade,	fy =	420.00	MPa
Joist Breadth,	b =	170	mm
Joist Depth,	h =	475	mm
Cover,Tension Steel,	c =	42	mm
Ultimate Load,	u =	10.92	kN/m'

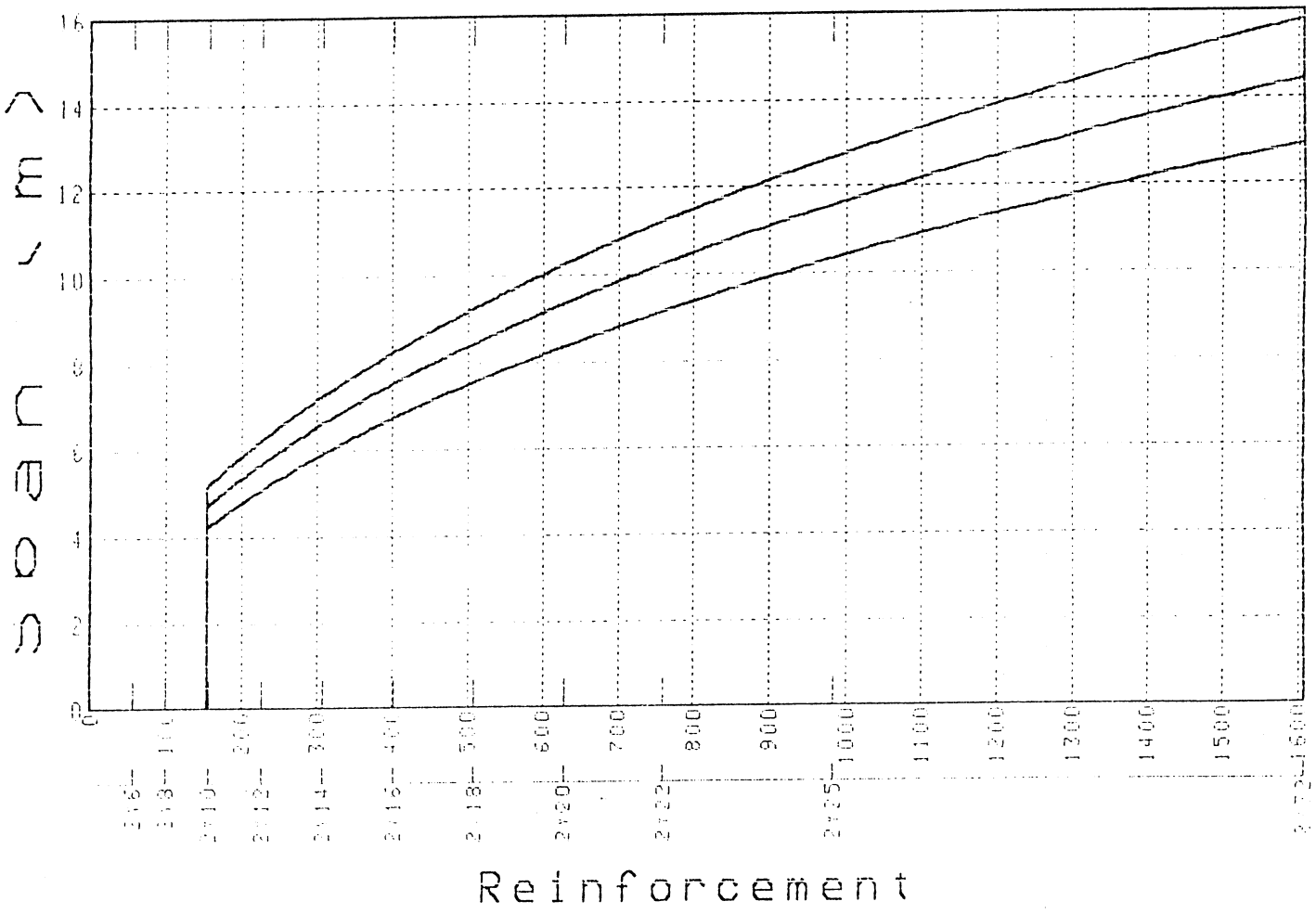
T Section

Flange Breadth, bf = 600 mm

Max. Permissible Spans for deflection control:

factor	Free Span	Continuous
(1/ 8)	9.80 m	10.88
(1/10)	10.14 m	11.20
(1/12)	10.38 m	11.46

Moment Factors = 1/12 , 1/10 , 1/8



CODE : BS8110

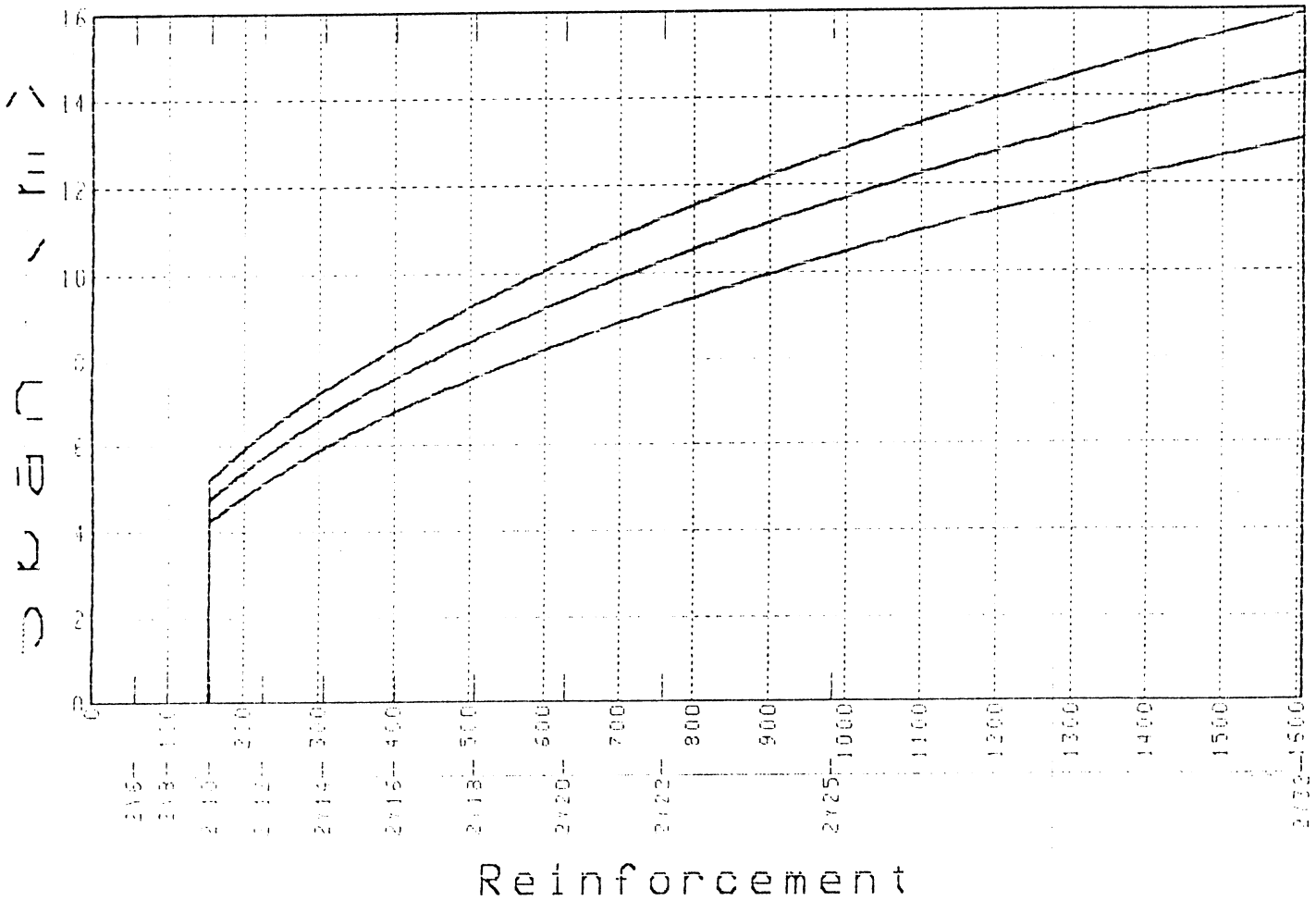
Concrete Grade, fcu= 25.00 MPa
Steel Grade, fy = 420.00 MPa
Joist Breadth, b = 170 mm
Joist Depth, h = 475 mm
Cover,Tension Steel, c = 42 mm

T Section
Flange Breadth, bf = 600 mm

Ultimate Load, u = 10.81 kN/m'

ax. Permissible Spans: .or deflection control:	factor	Free Span	Continuous
	(1/ 8)	9.82 m	10.88
	(1/10)	10.16 m	11.20
	(1/12)	10.40 m	11.48

Moment Factors = 1/12 , 1/10 , 1/8



Design Code: BS8110
Frame Type: Solid Slab
Load Pattern for Span Mom: Alternate Spans Loaded.
Load Pattern for Supp Mom: All Spans Loaded.
Load Factors: Code Standard

BEAMS

MARK	PROPERTIES			UNIFORM LOADS			
	Span	b	(I) h	DEAD	LIVE	X1	X2
(1) Slab	8.00	1.00	0.30	9.20	5.00	0.00	8.00

SUPPORTS

Support #	BREADTH
1	0.50
2	0.50

ELASTIC BEAM SUPPORT MOMENTS

MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Left	Right	Left	Right	Left	Right
(1) Slab	0.00	0.00	0.00	0.00	0.00	0.00

MAXIMUM ELASTIC BEAM SPAN MOMENTS (X to nearest 0.01 L)

MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Moment	X	Moment	X	Moment	X
(1) Slab	+167.04	4.00	+73.60	4.00	+167.04	4.00

ELASTIC BEAM SHEARS

MARK	AT LEFT SUPPORT	AT 0.10 OF SPAN	AT 0.20 OF SPAN	AT 0.80 OF SPAN	AT 0.90 OF SPAN	AT RIGHT SUPPORT
(1) Slab	+83.52	+66.82	+50.11	-50.11	-66.82	-83.52

ASTIC SUPPORT REACTIONS

MARK	ODD SPANS L'D	EVEN SPANS L'D	ALL SPANS LOADED		
SUPPORT	Design Load	Design Load	Dead Load	Live Load	Design Load
#1	83.52	36.80	36.80	20.00	83.52
#2	83.52	36.80	36.80	20.00	83.52

EAM DESIGN FOR FLEXURE

fcu= 25MPa fy= 420MPa CODE: BS8110

	b (mm)	h (mm)	c (mm)	d' (mm)	
(1) Slab	1000	300	35	40	mm

hf= 0 mm(Rectangular)

MARK	pos.	d (mm)	bf (mm)	M (kN.m)	R (MPa)	x/d	p (%)	p' (%)		As (mm^2)	As' (mm^2)
	L supp	260	1000	0.0	0.00	0.00	0.16	0.00	*	429	0
	L sup F	260	1000	+8.9	0.13	0.01	0.16	0.00	*	429	0
(1) Slab	span	265	1000	+167.0	2.38	0.27	0.74	0.00		1964	0
	R sup F	260	1000	+8.9	0.13	0.01	0.16	0.00	*	429	0
	R supp	260	1000	0.0	0.00	0.00	0.16	0.00	*	429	0

* = Nominal Reinforcement

CHOICE OF BARS FOR FLEXURE

Support Bars Chosen for Reinforcement Calculated at: SUPPORT CENTERLINES

MARK	pos.	As_B	As_T	Bottom Bars	Top Bars
	L supp	0	429	- - -	1Y10 @200(97%)
(1) Slab	span	1964	0	1Y22 @222(97%) 1Y20 @180(100%) 1Y18 @148(99%) 1Y16 @116(102%)	- - - - - - - - - - - -
	R supp	0	429	- - -	1Y10 @200(97%)

BEAM DESIGN FOR SHEAR

Value of vc Near Supports Based on Tension Steel Calculated at:
SUPPORT CENTERLINES.

fcu= 25MPa fyv= 420MPa CODE: BS8110

MARK	X1 (metres)	X2 (metres)	Vu (kN)	v (MPa)	vc (MPa)	Asv/Sv (mm)		Stirrups		
L	0.25	0.52	72.77	0.275	0.386	0.000		--	--	--
(1) Slab	0.25	7.75				0.000	*			
R	7.49	7.75	72.77	0.275	0.386	0.000		--	--	--

* = Nominal Stirrups

Design Code: BS8110
Frame Type: Continuous Beam
Load Pattern for Span Mom: Alternate Spans Loaded.
Load Pattern for Supp Mom: All Spans Loaded.
Load Factors: Code Standard

BEAMS

MARK	PROPERTIES			UNIFORM LOADS			
	Span	b	(I) h	DEAD	LIVE	X1	X2
L. Cant.				34.38	7.50	0.00	0.40
(1) N10	3.26	0.35	1.25	34.38	7.50	0.00	3.26
(2) N11	3.26	0.35	1.25	61.06	22.00	0.00	3.26
(3) N12	3.26	0.35	1.25	61.06	22.00	0.00	3.26
(4) N13	3.26	0.35	1.25	61.06	22.00	0.00	3.26
(5) N14	3.26	0.35	1.25	20.70	7.50	0.00	3.26
(6) N15	3.26	0.35	1.25	20.70	7.50	0.00	3.26
(7) N16	3.26	0.35	1.25	20.70	7.50	0.00	3.26
(8) N17	3.26	0.35	1.25	20.70	7.50	0.00	3.26
(9) N18	3.26	0.35	1.25	20.70	7.50	0.00	3.26
R. Cant.				34.38	7.50	0.00	0.40

SUPPORTS

Support #	BREADTH
1	0.30
2	0.30
3	0.30
4	0.30
5	0.30
6	0.30
7	0.30
8	0.30
9	0.30
10	0.30

E STIC BEAM SUPPORT MOMENTS

MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Left	Right	Left	Right	Left	Right
L. Cant.		-2.75		-4.81		-4.81
(1) N10	-2.75	-58.94	-4.81	-81.97	-4.81	-92.31
(2) N11	-58.94	-83.48	-81.97	-79.32	-92.31	-108.59
(3) N12	-83.48	-90.03	-79.32	-83.64	-108.59	-115.23
(4) N13	-90.03	-39.27	-83.64	-68.99	-115.23	-71.94
(5) N14	-39.27	-23.99	-68.99	-16.04	-71.94	-26.59
(6) N15	-23.99	-28.64	-16.04	-30.73	-26.59	-39.49
(7) N16	-28.64	-25.32	-30.73	-24.90	-39.49	-33.35
(8) N17	-25.32	-33.95	-24.90	-33.54	-33.35	-45.45
(9) N18	-33.95	-2.75	-33.54	-4.81	-45.45	-4.81
R. Cant.	-2.75		-4.81		-4.81	

MAXIMUM ELASTIC BEAM SPAN MOMENTS (X to nearest 0.01 L)

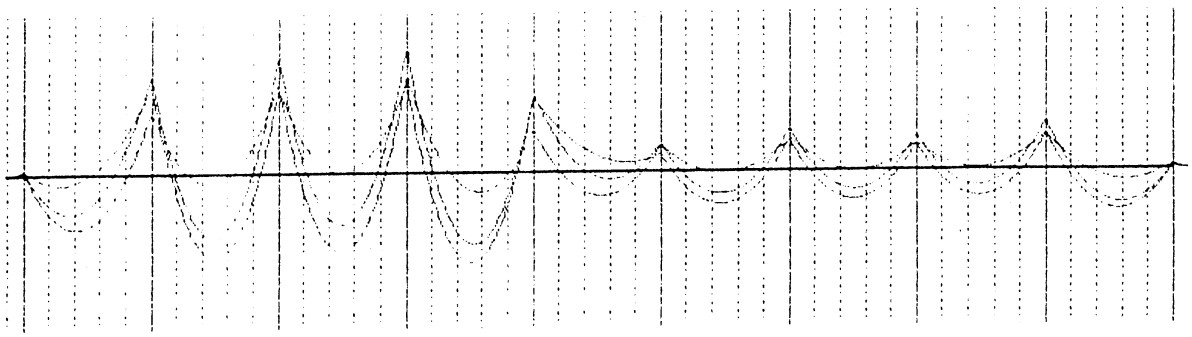
MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Moment	X	Moment	X	Moment	X
(1) N10	+51.51	1.34	+10.43	0.95	+37.31	1.17
(2) N11	+10.37	1.50	+79.68	1.63	+59.98	1.60
(3) N12	+73.57	1.60	-0.35	1.60	+48.42	1.60
(4) N13	+18.45	1.89	+84.09	1.66	+67.46	1.73
(5) N14	+23.07	1.76	-8.64	2.41	+7.53	1.96
(6) N15	+1.23	1.56	+31.30	1.53	+21.59	1.53
(7) N16	+27.47	1.66	-0.24	1.73	+18.06	1.66
(8) N17	-1.97	1.50	+25.30	1.56	+15.21	1.53
(9) N18	+37.21	1.86	+10.20	2.05	+31.20	1.92

ELASTIC BEAM SHEARS

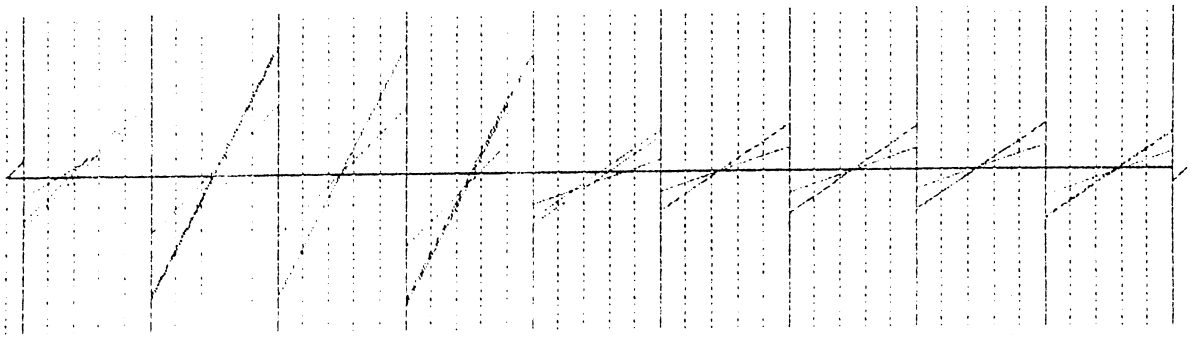
MARK	AT LEFT SUPPORT	AT 0.10 OF SPAN	AT 0.20 OF SPAN	AT 0.80 OF SPAN	AT 0.90 OF SPAN	AT RIGHT SUPPORT
L. Cant.						-24.05
(1) N10	+80.78	+61.18	+41.57	-85.65	-105.25	-124.85
N11	+197.53	+158.18	+118.84	-123.02	-162.37	-201.71
(3) N12	+194.70	+155.36	+116.02	-120.07	-159.41	-198.75
(4) N13	+210.00	+170.65	+131.31	-113.53	-152.88	-192.22
(5) N14	+80.71	+67.35	+53.99	-35.39	-48.75	-62.11
(6) N15	+62.84	+49.48	+36.12	-44.59	-57.95	-71.31
(7) N16	+68.68	+55.32	+41.96	-39.06	-52.42	-65.78
(8) N17	+64.15	+50.79	+37.43	-43.79	-57.15	-70.51
(9) N18	+79.26	+65.90	+52.54	-30.51	-43.87	-57.23
R. Cant.	+24.05					

ELASTIC SUPPORT REACTIONS

MARK	ODD SPANS L'D	EVEN SPANS L'D	ALL SPANS LOADED		
SUPPORT	Design Load	Design Load	Dead Load	Live Load	Design Load
#1	94.53	56.43	55.56	11.01	95.23
#2	207.25	277.23	168.25	50.43	316.57
#3	301.76	294.10	199.29	73.47	396.39
#4	313.82	302.06	207.16	74.19	408.75
#5	155.44	242.20	133.49	48.29	264.14
#6	94.42	79.79	58.47	21.18	115.73
	102.98	106.84	70.41	25.53	139.44
#8	96.87	96.10	64.79	23.42	128.00
#9	112.76	112.00	75.32	27.49	149.77
#10	70.98	48.98	41.41	12.87	78.38



)ending Moment Diagram



Shear Diagram

3EAM DESIGN FOR FLEXURE

fcu= 25MPa fy= 420MPa CODE: BS8110

	b (mm)	h (mm)	c (mm)	d' (mm)	
ALL SPANS	350	1250	125	125	mm

hf= 0 mm(Rectangular)

MARK	pos.	d (mm)	bf (mm)	M (kN.m)	R (MPa)	x/d	p (%)	p' (%)		As (mm^2)	As' (mm^2)
	sup F	1125	350	-1.9	0.00	0.00	0.16	0.00	*	625	0
L. Cant.	supp	1125	350	-4.8	0.01	0.00	0.16	0.00	*	625	0
	L supp	1125	350	-4.8	0.01	0.00	0.16	0.00	*	625	0
	L sup F	1125	350	-0.3	0.00	0.00	0.16	0.00	*	625	0
1) N10	span	1125	350	+51.5	0.12	0.01	0.16	0.00	*	625	0
	R sup F	1125	350	-74.3	0.17	0.02	0.16	0.00	*	625	0
	R supp	1125	350	-92.3	0.21	0.02	0.16	0.00	*	625	0

MARK	pos.	d (mm)	bf (mm)	M (kN.m)	R (MPa)	x/d	p (%)	p' (%)	As (mm^2)	As' (mm^2)
	L supp	1125	350	-92.3	0.21	0.02	0.16	0.00 *	625	0
	L sup F	1125	350	-64.9	0.15	0.01	0.16	0.00 *	625	0
(2) N11	span	1125	350	+79.7	0.18	0.02	0.16	0.00 *	625	0
	R sup F	1125	350	-79.7	0.18	0.02	0.16	0.00 *	625	0
	R supp	1125	350	-108.6	0.25	0.02	0.16	0.00 *	625	0
	L supp	1125	350	-108.6	0.25	0.02	0.16	0.00 *	625	0
	L sup F	1125	350	-80.8	0.18	0.02	0.16	0.00 *	625	0
3) N12	span	1125	350	+73.6	0.17	0.02	0.16	0.00 *	625	0
	R sup F	1125	350	-86.8	0.20	0.02	0.16	0.00 *	625	0
	R supp	1125	350	-115.2	0.26	0.03	0.16	0.00 *	625	0
	L supp	1125	350	-115.2	0.26	0.03	0.16	0.00 *	625	0
	L sup F	1125	350	-85.1	0.19	0.02	0.16	0.00 *	625	0
(4) N13	span	1125	350	+84.1	0.19	0.02	0.16	0.00 *	625	0
	R sup F	1125	350	-45.8	0.10	0.01	0.16	0.00 *	625	0
	R supp	1125	350	-71.9	0.16	0.02	0.16	0.00 *	625	0
	L supp	1125	350	-71.9	0.16	0.02	0.16	0.00 *	625	0
	L sup F	1125	350	-61.7	0.14	0.01	0.16	0.00 *	625	0
(5) N14	span	1125	350	+23.1	0.05	0.01	0.16	0.00 *	625	0
	R sup F	1125	350	-19.1	0.04	0.00	0.16	0.00 *	625	0
	R supp	1125	350	-26.6	0.06	0.01	0.16	0.00 *	625	0
	L supp	1125	350	-26.6	0.06	0.01	0.16	0.00 *	625	0
	L sup F	1125	350	-19.4	0.04	0.00	0.16	0.00 *	625	0
6) N15	span	1125	350	+31.3	0.07	0.01	0.16	0.00 *	625	0
	R sup F	1125	350	-29.3	0.07	0.01	0.16	0.00 *	625	0
	R supp	1125	350	-39.5	0.09	0.01	0.16	0.00 *	625	0
	L supp	1125	350	-39.5	0.09	0.01	0.16	0.00 *	625	0
	L sup F	1125	350	-29.7	0.07	0.01	0.16	0.00 *	625	0
(7) N16	span	1125	350	+27.5	0.06	0.01	0.16	0.00 *	625	0
	R sup F	1125	350	-24.1	0.05	0.01	0.16	0.00 *	625	0
	R supp	1125	350	-33.4	0.08	0.01	0.16	0.00 *	625	0
	L supp	1125	350	-33.4	0.08	0.01	0.16	0.00 *	625	0
	L sup F	1125	350	-24.4	0.05	0.01	0.16	0.00 *	625	0
8) N17	span	1125	350	+25.3	0.06	0.01	0.16	0.00 *	625	0
	R sup F	1125	350	-35.3	0.08	0.01	0.16	0.00 *	625	0
	R supp	1125	350	-45.5	0.10	0.01	0.16	0.00 *	625	0
	L supp	1125	350	-45.5	0.10	0.01	0.16	0.00 *	625	0
	L sup F	1125	350	-34.0	0.08	0.01	0.16	0.00 *	625	0
(9) N18	span	1125	350	+37.2	0.08	0.01	0.16	0.00 *	625	0
	R sup F	1125	350	-1.3	0.00	0.00	0.16	0.00 *	625	0
	R supp	1125	350	-4.8	0.01	0.00	0.16	0.00 *	625	0
	L supp	1125	350	-4.8	0.01	0.00	0.16	0.00 *	625	0
	L sup F	1125	350	-1.9	0.00	0.00	0.16	0.00 *	625	0

* = Nominal Reinforcement

CHOICE OF BARS FOR FLEXURE

Support Bars Chosen for Reinforcement Calculated at: SUPPORT CENTERLINES

MARK	pos.	As_B	As_T	Bottom Bars	Top Bars
	supp	0	625	- - -	3Y16 @132(96%)
				- - -	4Y14 @ 89(99%)
				- - -	3Y18 @131(122%)
				- - -	8Y10 @ 39(101%)

CHOICE OF BARS FOR FLEXURE

Support Bars Chosen for Reinforcement Calculated at: SUPPORT CENTERLINES

MARK	pos.	As_B	As_T	Bottom Bars	Top Bars
(1) N10	span	625	0	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)	- - - - - - - - - - - -
	supp	0	625	- - - - - - - - - - - -	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)
(2) N11	span	625	0	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)	- - - - - - - - - - - -
	supp	0	625	- - - - - - - - - - - -	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)
(3) N12	span	625	0	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)	- - - - - - - - - - - -
	supp	0	625	- - - - - - - - - - - -	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)
(4) N13	span	625	0	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)	- - - - - - -
	supp	0	625	- - - - - - - - - - - -	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)
(5) N14	span	625	0	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)	- - - - - - - - - - - -
	supp	0	625	- - - - - - - - - - - -	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)
(6) N15	span	625	0	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)	- - - - - - - - - - - -
	supp	0	625	- - - - - - - - - - - -	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)
(7) N16	span	625	0	3Y16 @132(96%) 4Y14 @ 89(99%)	- - - - - -

CHOICE OF BARS FOR FLEXURE

Support Bars Chosen for Reinforcement Calculated at: SUPPORT CENTERLINES

MARK	pos.	As_B	As_T	Bottom Bars	Top Bars
				3Y18 @131(122%) 8Y10 @ 39(101%)	- - - - - -
	supp	0	625	- - - - - - - - - - - -	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)
(8) N17	span	625	0	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)	- - - - - - - - - - - -
	supp	0	625	- - - - - - - - - - - -	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)
9) N18	span	625	0	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)	- - - - - - - - - - - -
	supp	0	625	- - - - - - - - - - - -	3Y16 @132(96%) 4Y14 @ 89(99%) 3Y18 @131(122%) 8Y10 @ 39(101%)

BEAM DESIGN FOR SHEAR

alue of vc Near Supports Based on Tension Steel Calculated at:
or Beam Spans : SUPPORT CENTERLINES.
or Cantilevers: SUPPORT CENTERLINES.

fcu= 25MPa fyv= 420MPa CODE: BS8110

MARK		X1 - X2 (metres)	Vu (kN)	v (MPa)	vc (MPa)	Asv/Sv (mm)	Stirrups
	nt.	0.00- 0.25				0.383 *	1Y10@409 2Y10@500 1Y12@500
	R	0.25- 0.25	15.03	0.038	0.342	0.383 *	1Y10@409 2Y10@500 1Y12@500
	L	0.15- 1.28	11.46	0.029	0.342	0.383 *	1Y10@409 2Y10@500 1Y12@500
)	N10	0.15- 3.11				0.383 *	1Y10@409 2Y10@500 1Y12@500
	R	1.99- 3.11	48.19	0.122	0.342	0.383 *	1Y10@409 2Y10@500 1Y12@500
	L	0.15- 1.28	43.66	0.111	0.342	0.383 *	1Y10@409 2Y10@500 1Y12@500
)	N11	0.15- 3.11				0.383 *	1Y10@409 2Y10@500 1Y12@500
	R	1.99- 3.11	47.84	0.121	0.342	0.383 *	1Y10@409 2Y10@500 1Y12@500
	L	0.15- 1.28	40.83	0.104	0.342	0.383 *	1Y10@409 2Y10@500 1Y12@500
)	N12	0.15- 3.11				0.383 *	1Y10@409 2Y10@500 1Y12@500
	R	1.99- 3.11	44.88	0.114	0.342	0.383 *	1Y10@409 2Y10@500 1Y12@500
	L	0.15- 1.28	56.12	0.143	0.342	0.383 *	1Y10@409 2Y10@500 1Y12@500
)	N13	0.15- 3.11				0.383 *	1Y10@409 2Y10@500 1Y12@500
	R	1.99- 3.11	38.35	0.097	0.342	0.383 *	1Y10@409 2Y10@500 1Y12@500

MARK		X1 - X2 (metres)	Vu (kN)	v (MPa)	vc (MPa)	Asv/Sv (mm)		Stirrups		
	L	0.15- 1.28	28.46	0.072	0.342	0.383	*	1Y10@409	2Y10@500	1Y12@500
N14		0.15- 3.11				0.383	*	1Y10@409	2Y10@500	1Y12@500
	R	1.99- 3.11	7.85	0.020	0.342	0.383	*	1Y10@409	2Y10@500	1Y12@500
	L	0.15- 1.28	10.59	0.027	0.342	0.383	*	1Y10@409	2Y10@500	1Y12@500
N15		0.15- 3.11				0.383	*	1Y10@409	2Y10@500	1Y12@500
	R	1.99- 3.11	19.06	0.048	0.342	0.383	*	1Y10@409	2Y10@500	1Y12@500
	L	0.15- 1.28	16.43	0.042	0.342	0.383	*	1Y10@409	2Y10@500	1Y12@500
N16		0.15- 3.11				0.383	*	1Y10@409	2Y10@500	1Y12@500
	R	1.99- 3.11	13.53	0.034	0.342	0.383	*	1Y10@409	2Y10@500	1Y12@500
	L	0.15- 1.28	11.90	0.030	0.342	0.383	*	1Y10@409	2Y10@500	1Y12@500
N17		0.15- 3.11				0.383	*	1Y10@409	2Y10@500	1Y12@500
	R	1.99- 3.11	18.26	0.046	0.342	0.383	*	1Y10@409	2Y10@500	1Y12@500
	L	0.15- 1.28	27.01	0.069	0.342	0.383	*	1Y10@409	2Y10@500	1Y12@500
N18		0.15- 3.11				0.383	*	1Y10@409	2Y10@500	1Y12@500
	R	1.99- 3.11	4.98	0.013	0.342	0.383	*	1Y10@409	2Y10@500	1Y12@500
	L	0.15- 0.15	15.03	0.038	0.342	0.383	*	1Y10@409	2Y10@500	1Y12@500
Cant.		0.15- 0.40				0.383	*	1Y10@409	2Y10@500	1Y12@500

* = Nominal Stirrups

Design Code: BS8110
Frame Type: Simple Beam
Load Pattern for Span Mom: Alternate Spans Loaded.
Load Pattern for Supp Mom: All Spans Loaded.
Load Factors: Code Standard

BEAMS

MARK	PROPERTIES			UNIFORM LOADS				POINT LOADS		
	Span	b	(I) h	DEAD	LIVE	X1	X2	DEAD	LIVE	X
(1) N20	8.00	0.35	1.25	11.50	2.75	0.00	4.00	75.32	27.49	4.00
				22.74	9.00	4.00	8.00	0.00	0.00	0.00

SUPPORTS

Support #	BREADTH
1	0.50
2	0.50

MAXIMUM ELASTIC BEAM SPAN MOMENTS (X to nearest 0.01 L)

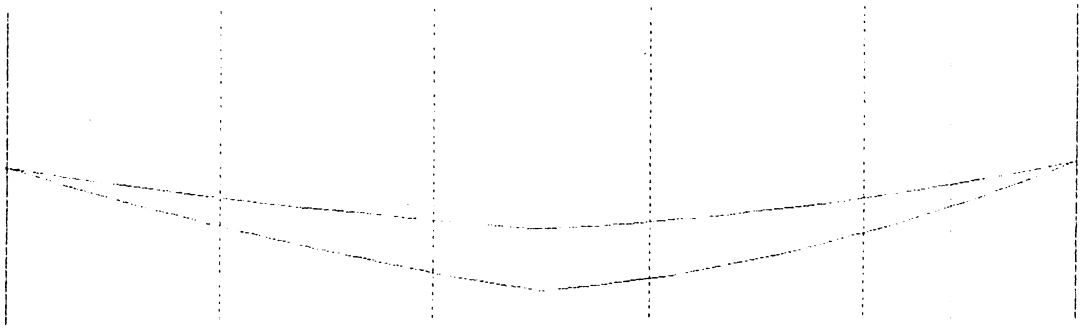
MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Moment	X	Moment	X	Moment	X
(1) N20	+565.81	4.00	+287.61	4.00	+565.81	4.00

ELASTIC BEAM SHEARS

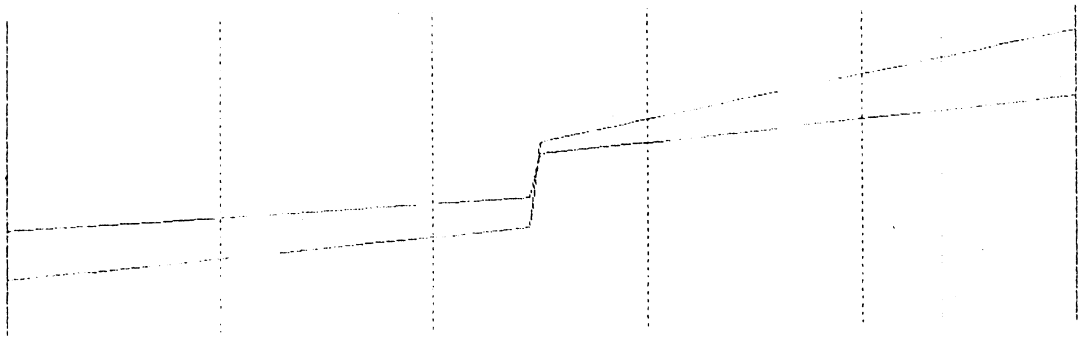
MARK	AT LEFT SUPPORT	AT 0.10 OF SPAN	AT 0.20 OF SPAN	AT 0.80 OF SPAN	AT 0.90 OF SPAN	AT RIGHT SUPPORT
(1) N20	+182.45	+166.05	+149.65	-159.95	-196.94	-233.93

ELASTIC SUPPORT REACTIONS

MARK	ODD SPANS L'D	EVEN SPANS L'D	ALL SPANS LOADED		
SUPPORT	Design Load	Design Load	Dead Load	Live Load	Design Load
#1	182.45	94.90	94.90	30.99	182.45
#2	233.93	117.38	117.38	43.49	233.93



Bending Moment Diagram



Shear Diagram

BEAM DESIGN FOR FLEXURE

fcu= 25MPa fy= 420MPa CODE: BS8110

hf= 0 mm(Rectangular)

	b (mm)	h (mm)	c (mm)	d' (mm)	
(1) N20	350	1250	125	125	mm

MARK	pos.	d (mm)	bf (mm)	M (kN.m)	R (MPa)	x/d	p (%)	p' (%)		As (mm^2)	As' (mm^2
	L supp	1125	350	0.0	0.00	0.00	0.16	0.00	*	625	
	L sup Γ	1125	350	+23.4	0.05	0.01	0.16	0.00	*	625	
(1) N20	span	1125	350	+565.8	1.28	0.14	0.37	0.00		1466	
	R sup Γ	1125	350	+28.6	0.06	0.01	0.16	0.00	*	625	
	R supp	1125	350	0.0	0.00	0.00	0.16	0.00	*	625	

* = Nominal Reinforcement

CHOICE OF BARS FOR FLEXURE

Support Bars Chosen for Reinforcement Calculated at:
MEDIAN BETWEEN SUPPORT FACES AND CETERLINES

MARK	pos.	As_B	As_T	Bottom Bars	Top Bars
	L supp	0	625	- - -	3Y16 @132(96%)
				- - -	4Y14 @ 89(99%)
				- - -	3Y18 @131(122%)
				- - -	8Y10 @ 39(101%)
(1) N20	span	1466	0	3Y25 @127(100%)	- - -
				7Y16 @ 44(96%)	- - -
				4Y22 @ 86(104%)	- - -
				5Y20 @ 65(107%)	- - -
	R supp	0	625	- - -	3Y16 @132(96%)
				- - -	4Y14 @ 89(99%)
				- - -	3Y18 @131(122%)
				- - -	8Y10 @ 39(101%)

BEAM DESIGN FOR SHEAR

Value of vc Near Supports Based on Tension Steel Calculated at:
MEDIAN BETWEEN SUPPORT FACES AND CETERLINES.

fcu= 25MPa fyv= 420MPa CODE: BS8110

MARK	X1 - X2 (metres)	Vu (kN)	v (MPa)	vc (MPa)	Asv/Sv (mm)		Stirrups		
L	0.25- 1.38	154.27	0.392	0.455	0.383	*	1Y10@409	2Y10@500	1Y12@500
1) N20	0.25- 7.75				0.383	*	1Y10@409	2Y10@500	1Y12@500
R	6.63- 7.75	170.35	0.433	0.455	0.383	*	1Y10@409	2Y10@500	1Y12@500

* = Nominal Stirrups

Design Code: BS8110
Frame Type: Simple Beam
Load Pattern for Span Mom: Alternate Spans Loaded.
Load Pattern for Supp Mom: All Spans Loaded.
Load Factors: Code Standard

BEAMS

MARK	PROPERTIES			UNIFORM LOADS			
	Span	b	(I) h	DEAD	LIVE	X1	X2
(1) N6	11.00	1.00	0.48	19.36	13.75	0.00	11.00

SUPPORTS

Support #	BREADTH
1	1.00
2	1.00

MAXIMUM ELASTIC BEAM SPAN MOMENTS (X to nearest 0.01 L)

MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Moment	X	Moment	X	Moment	X
(1) N6	+742.70	5.50	+292.82	5.50	+742.70	5.50

ELASTIC BEAM SHEARS

MARK	AT LEFT SUPPORT	AT 0.10 OF SPAN	AT 0.20 OF SPAN	AT 0.80 OF SPAN	AT 0.90 OF SPAN	AT RIGHT SUPPORT
(1) N6	+270.07	+216.06	+162.04	-162.04	-216.06	-270.07

ELASTIC SUPPORT REACTIONS

MARK	ODD SPANS L'D	EVEN SPANS L'D	ALL SPANS LOADED		
SUPPORT	Design Load	Design Load	Dead Load	Live Load	Design Load
#1	270.07	106.48	106.48	75.63	270.07
2	270.07	106.48	106.48	75.63	270.07

BEAM DESIGN FOR FLEXURE

fcu= 25MPa fy= 420MPa CODE: BS8110

	b (mm)	h (mm)	c (mm)	d' (mm)	
(1) N6	1000	475	50	50	mm

hf= 0 mm(Rectangular)

MARK	pos.	d (mm)	bf (mm)	M (kN.m)	R (MPa)	x/d	p (%)	p' (%)		As (mm^2)	As' (mm^2)
	L supp	425	1000	0.0	0.00	0.00	0.16	0.00	*	679	0
	L sup F	425	1000	+50.8	0.28	0.03	0.16	0.00	*	679	0
(1) N6	span	425	1000	+742.7	4.11	0.50	1.44	0.07		6134	287
	R sup F	425	1000	+50.8	0.28	0.03	0.16	0.00	*	679	0
	R supp	425	1000	0.0	0.00	0.00	0.16	0.00	*	679	0

* = Nominal Reinforcement

CHOICE OF BARS FOR FLEXURE

Support Bars Chosen for Reinforcement Calculated at: SUPPORT CENTERLINES

MARK	pos.	As_B	As_T	Bottom Bars	Top Bars
	L supp	0	679	- - -	6Y12 @184(100%)
				- - -	9Y10 @115(105%)
				- - -	13Y 8 @ 77(96%)
(1) N6	span	6134	287	12Y25 @ 82(96%)	6Y 8 @184(105%)
				19Y20 @ 51(97%)	- - -
				16Y22 @ 61(99%)	- - -
				8Y32 @128(105%)	- - -
	R supp	0	679	- - -	6Y12 @184(100%)
				- - -	9Y10 @115(105%)
				- - -	13Y 8 @ 77(96%)

BEAM DESIGN FOR SHEAR

Value of vc Near Supports Based on Tension Steel Calculated at:
SUPPORT CENTERLINES.

fcu= 25MPa fyv= 420MPa CODE: BS8110

MARK		X1 - X2 (metres)	Vu (kN)	v (MPa)	vc (MPa)	Asv/Sv (mm)		Stirrups
	L	0.50- 0.93	224.65	0.529	0.343	1.095	*	2Y10@286 3Y10@318 4Y10@318
(1) N6		0.50-10.50				1.095	*	2Y10@286 3Y10@318 4Y10@318
	R	10.08-10.50	224.65	0.529	0.343	1.095	*	2Y10@286 3Y10@318 4Y10@318

* Nominal Stirrups

Design Code: BS8110
Frame Type: Simple Beam
Load Pattern for Span Mom: Alternate Spans Loaded.
Load Pattern for Supp Mom: All Spans Loaded.
Load Factors: Code Standard

BEAMS

MARK	PROPERTIES			UNIFORM LOADS				POINT LOADS		
	Span	b	(I) h	DEAD	LIVE	X1	X2	DEAD	LIVE	X
(1) N7	8.50	0.98	0.48	16.30	7.15	0.00	8.50	106.48	75.63	5.80

SUPPORTS

Support #	BREADTH
1	0.20
2	0.20

MAXIMUM ELASTIC BEAM SPAN MOMENTS (X to nearest 0.01 L)

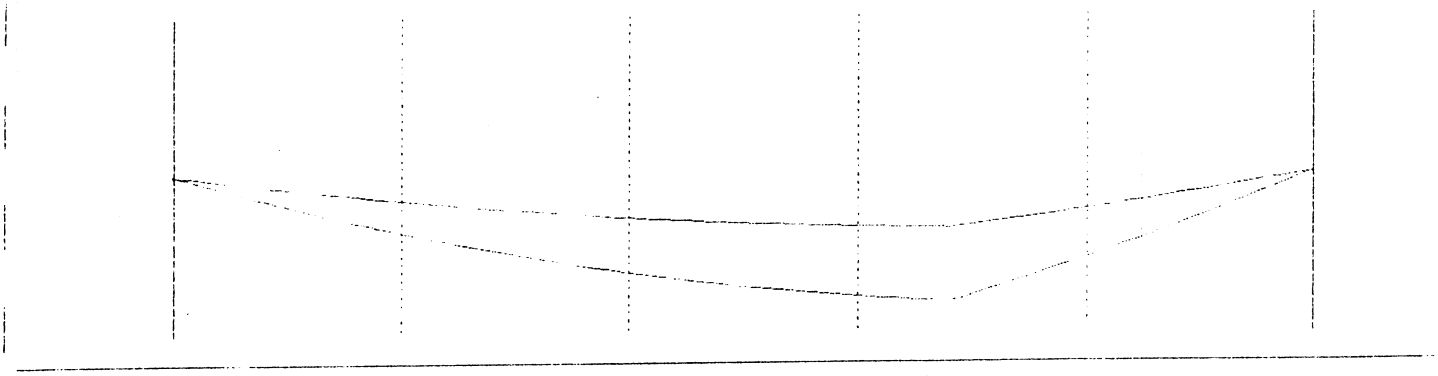
MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Moment	X	Moment	X	Moment	X
(1) N7	+765.16	5.78	+323.63	5.78	+765.16	5.78

ELASTIC BEAM SHEARS

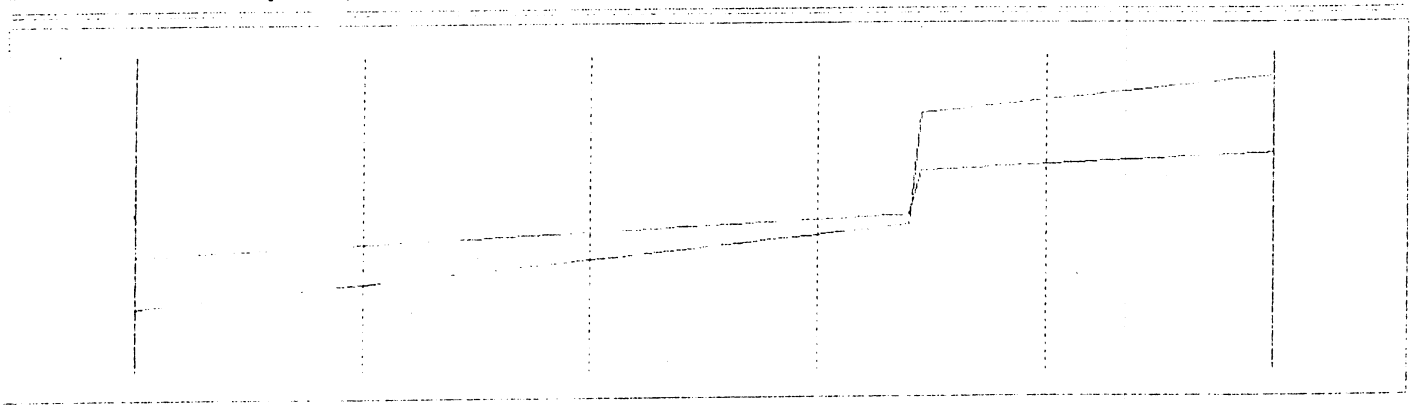
MARK	AT LEFT SUPPORT	AT 0.10 OF SPAN	AT 0.20 OF SPAN	AT 0.80 OF SPAN	AT 0.90 OF SPAN	AT RIGHT SUPPORT
(1) N7	+231.39	+202.27	+173.15	-271.65	-300.77	-329.89

ELASTIC SUPPORT REACTIONS

MARK	ODD SPANS L'D	EVEN SPANS L'D	ALL SPANS LOADED		
SUPPORT	Design Load	Design Load	Dead Load	Live Load	Design Load
#1	231.39	103.10	103.10	54.41	231.39
#2	329.89	141.93	141.93	81.99	329.89



Bending Moment Diagram



hear Diagram

BEAM DESIGN FOR FLEXURE

fcu= 25MPa fy= 420MPa CODE: BS8110

	b (mm)	h (mm)	c (mm)	d' (mm)	
(1) N7	975	475	50	50	mm

hf= 0 mm(Rectangular)

MARK	pos.	d (mm)	bf (mm)	M (kN.m)	R (MPa)	x/d	p (%)	p' (%)		As (mm^2)	As' (mm^2)
	L supp	425	975	0.0	0.00	0.00	0.16	0.00	*	662	0
	L sup F	425	975	+10.2	0.06	0.01	0.16	0.00	*	662	0
) N7	span	425	975	+765.2	4.34	0.50	1.52	0.14		6281	579
	R sup F	425	975	+14.1	0.08	0.01	0.16	0.00	*	662	0
	R supp	425	975	0.0	0.00	0.00	0.16	0.00	*	662	0

* = Nominal Reinforcement

CHOICE OF BARS FOR FLEXURE

Support Bars Chosen for Reinforcement Calculated at: SUPPORT CENTERLINES

MARK	pos.	As_B	As_T	Bottom Bars	Top Bars
	L supp	0	662	- - -	6Y12 @179(102%)
				- - -	8Y10 @128(96%)
				- - -	13Y 8 @ 75(98%)
(1) N7	span	6281	579	13Y25 @ 73(102%)	7Y10 @149(95%)
				16Y22 @ 59(97%)	12Y 8 @ 82(104%)
				20Y20 @ 47(100%)	
				8Y32 @125(102%)	- - -
	R supp	0	662	- - -	6Y12 @179(102%)
				- - -	8Y10 @128(96%)
				- - -	13Y 8 @ 75(98%)

BEAM DESIGN FOR SHEAR

alue of vc Near Supports Based on Tension Steel Calculated at:
SUPPORT CENTERLINES.

fcu= 25MPa fyv= 420MPa CODE: BS8110

MARK		X1 - X2 (metres)	Vu (kN)	v (MPa)	vc (MPa)	Asv/Sv (mm)		Stirrups
1) N7	L	0.10- 0.53	213.41	0.515	0.343	1.067	*	2Y10@294 3Y10@318 4Y10@31
		0.10- 8.40				1.067	*	2Y10@294 3Y10@318 4Y10@31
	R	7.98- 8.40	311.90	0.753	0.343	1.094		2Y10@287 3Y10@318 4Y10@31

* = Nominal Stirrups

Design Code: BS8110
Frame Type: Simple Beam
Load Pattern for Span Mom: Alternate Spans Loaded.
Load Pattern for Supp Mom: All Spans Loaded.
Load Factors: Code Standard

BEAMS

MARK	PROPERTIES			UNIFORM LOADS				POINT LOADS		
	Span	b	(I) h	DEAD	LIVE	X1	X2	DEAD	LIVE	X
(1) N8	7.00	0.98	0.48	16.30	7.15	0.00	7.00	106.48	75.63	5.00

SUPPORTS

Support #	BREADTH
1	0.20
2	0.20

MAXIMUM ELASTIC BEAM SPAN MOMENTS (X to nearest 0.01 L)

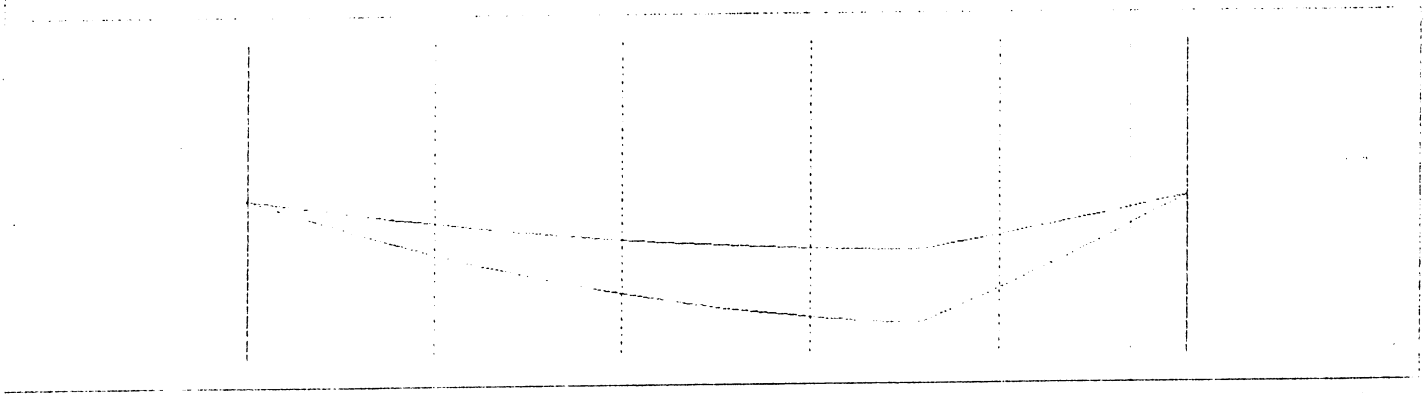
MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Moment	X	Moment	X	Moment	X
(1) N8	+556.33	4.97	+233.43	4.97	+556.33	4.97

ELASTIC BEAM SHEARS

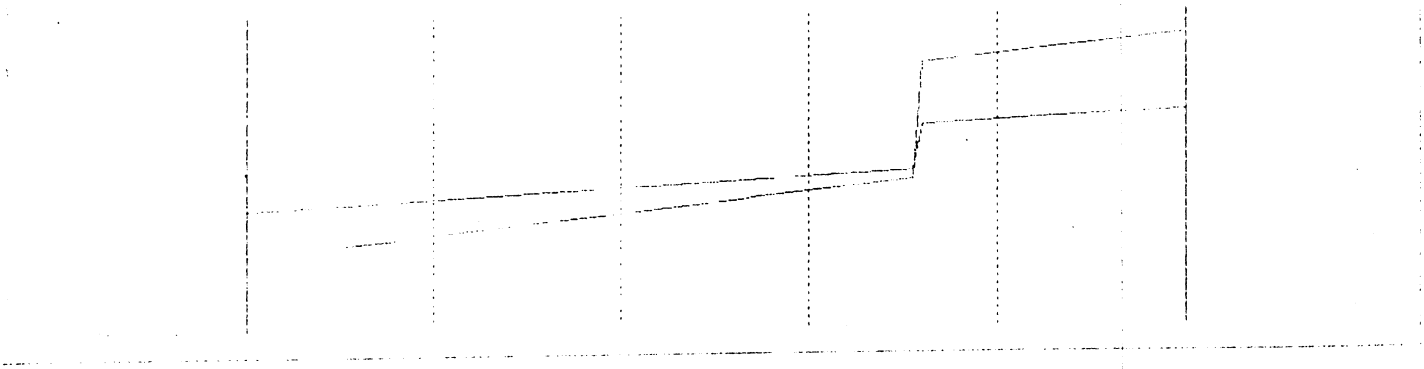
MARK	AT LEFT SUPPORT	AT 0.10 OF SPAN	AT 0.20 OF SPAN	AT 0.80 OF SPAN	AT 0.90 OF SPAN	AT RIGHT SUPPORT
(1) N8	+197.07	+173.09	+149.11	-264.85	-288.84	-312.82

ELASTIC SUPPORT REACTIONS

MARK	ODD SPANS L'D	EVEN SPANS L'D	ALL SPANS LOADED		
SUPPORT	Design Load	Design Load	Dead Load	Live Load	Design Load
#1	197.07	87.47	87.47	46.63	197.07
2	312.82	133.11	133.11	79.04	312.82



Bending Moment Diagram



)hear Diagram

BEAM DESIGN FOR FLEXURE

fcu= 25MPa fy= 420MPa CODE: BS8110

hf= 0 mm(Rectangular)

	b (mm)	h (mm)	c (mm)	d' (mm)	
(1) N8	975	475	50	50	mm

MARK	pos.	d (mm)	bf (mm)	M (kN.m)	R (MPa)	x/d	p (%)	p' (%)		As (mm^2)	As' (mm^2)
	L supp	425	975	0.0	0.00	0.00	0.16	0.00	*	662	0
	L sup F	425	975	+8.7	0.05	0.00	0.16	0.00	*	662	0
(1) N8	span	425	975	+556.3	3.16	0.38	1.04	0.00		4321	0
	R sup F	425	975	+13.2	0.08	0.01	0.16	0.00	*	662	0
	R supp	425	975	0.0	0.00	0.00	0.16	0.00	*	662	0

* = Nominal Reinforcement

CHOICE OF BARS FOR FLEXURE

Support Bars Chosen for Reinforcement Calculated at: SUPPORT CENTERLINES

MARK	pos.	As_B	As_T	Bottom Bars	Top Bars
	L supp	0	662	- - -	6Y12 @179(102%)
				- - -	8Y10 @128(96%)
				- - -	13Y 8 @ 75(98%)
(1) N8	span	4321	0	9Y25 @110(102%)	- - -
				11Y22 @ 88(97%)	- - -
				6Y32 @175(112%)	- - -
				14Y20 @ 68(102%)	- - -
	R supp	0	662	- - -	6Y12 @179(102%)
				- - -	8Y10 @128(96%)
				- - -	13Y 8 @ 75(98%)

BEAM DESIGN FOR SHEAR

/alue of vc Near Supports Based on Tension Steel Calculated at:
SUPPORT CENTERLINES.

fcu= 25MPa fyv= 420MPa CODE: BS8110

MARK		X1 - X2 (metres)	Vu (kN)	v (MPa)	vc (MPa)	Asv/Sv (mm)		Stirrups		
	L	0.10- 0.53	179.09	0.432	0.343	1.067	*	2Y10@294	3Y10@318	4Y10@318
) N8		0.10- 6.90				1.067	*	2Y10@294	3Y10@318	4Y10@318
	R	6.48- 6.90	294.83	0.712	0.343	1.067	*	2Y10@294	3Y10@318	4Y10@318

= Nominal Stirrups

Design Code: BS8110
Frame Type: Simple Beam
Load Pattern for Span Mom: Alternate Spans Loaded.
Load Pattern for Supp Mom: All Spans Loaded.
Load Factors: Code Standard

BEAMS

MARK	PROPERTIES			UNIFORM LOADS			
	Span	b (I)	h	DEAD	LIVE	X1	X2
(1) N9	7.20	0.25	2.45	97.24	32.50	0.00	7.20

SUPPORTS

Support #	BREADTH
1	0.25
2	0.25

MAXIMUM ELASTIC BEAM SPAN MOMENTS (X to nearest 0.01 L)

MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Moment	X	Moment	X	Moment	X
(1) N9	+1219.12	3.60	+630.12	3.60	+1219.12	3.60

ELASTIC BEAM SHEARS

MARK	AT LEFT SUPPORT	AT 0.10 OF SPAN	AT 0.20 OF SPAN	AT 0.80 OF SPAN	AT 0.90 OF SPAN	AT RIGHT SUPPORT
(1) N9	+677.29	+541.83	+406.37	-406.37	-541.83	-677.29

ELASTIC SUPPORT REACTIONS

MARK	ODD SPANS L'D	EVEN SPANS L'D	ALL SPANS LOADED		
SUPPORT	Design Load	Design Load	Dead Load	Live Load	Design Load
#1	677.29	350.06	350.06	117.00	677.29
2	677.29	350.06	350.06	117.00	677.29

BEAM DESIGN FOR FLEXURE

fcu= 25MPa fy= 420MPa CODE: BS8110

	b (mm)	h (mm)	c (mm)	d' (mm)	
(1) N9	250	2450	245	245	mm

hf= 0 mm(Rectangular)

MARK	pos.	d (mm)	bf (mm)	M (kN.m)	R (MPa)	x/d	p (%)	p' (%)		As (mm^2)	As' (mm^2)
	L supp	2205	250	0.0	0.00	0.00	0.16	0.00	*	875	0
	L sup F	2205	250	+42.9	0.04	0.00	0.16	0.00	*	875	0
(1) N9	span	2205	250	+1219.1	1.00	0.10	0.29	0.00		1589	0
	R sup F	2205	250	+42.9	0.04	0.00	0.16	0.00	*	875	0
	R supp	2205	250	0.0	0.00	0.00	0.16	0.00	*	875	0

* = Nominal Reinforcement

CHOICE OF BARS FOR FLEXURE

Support Bars Chosen for Reinforcement Calculated at: SUPPORT CENTERLINES

MARK	pos.	As_B	As_T	Bottom Bars	Top Bars
	L supp	0	875	- - - - - - - - - - - -	2Y25 @155(112%) 3Y20 @ 80(108%) 4Y18 @ 54(116%) 5Y16 @ 41(115%)
(N9	span	1589	0	2Y32 @148(101%) 4Y22 @ 53(96%) 4Y25 @ 52(124%)	- - - - - - - - -
	R supp	0	875	- - - - - - - - - - - -	2Y25 @155(112%) 3Y20 @ 80(108%) 4Y18 @ 54(116%) 5Y16 @ 41(115%)

BEAM DESIGN FOR SHEAR

Value of vc Near Supports Based on Tension Steel Calculated at:
SUPPORT CENTERLINES.

fcu= 25MPa fyv= 420MPa CODE: BS8110

MARK		X1 - X2 (metres)	Vu (kN)	v (MPa)	vc (MPa)	Asv/Sv (mm)		Stirrups		
	L	0.13 - 2.33	238.93	0.433	0.417	0.274	*	1Y10@500	2Y10@500	1Y12@500
1) N9		1.20 - 6.00				0.274	*	1Y10@500	2Y10@500	1Y12@500
	R	4.87 - 7.08	238.93	0.433	0.417	0.274	*	1Y10@500	2Y10@500	1Y12@500

* = Nominal Stirrups

Design Code: BS8110
Frame Type: Solid Slab
Load Pattern for Span Mom: Alternate Spans Loaded.
Load Pattern for Supp Mom: All Spans Loaded.
Load Factors: Code Standard

BEAMS

MARK	PROPERTIES			UNIFORM LOADS				POINT LOADS		
	Span	b	(I) h	DEAD	LIVE	X1	X2	DEAD	LIVE	X
(1) Slab	8.00	1.00	0.30	9.20	5.00	0.00	8.00	0.00	0.00	0.00
R. Cant.				9.20	5.00	0.00	1.20	54.20	5.00	1.20

SUPPORTS

Support #	BREADTH
1	0.50
2	0.50

ASTIC BEAM SUPPORT MOMENTS

MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Left	Right	Left	Right	Left	Right
(1) Slab	0.00	-71.66	0.00	-115.69	0.00	-115.69
R. Cant.	71.66		-115.69		-115.69	

MAXIMUM ELASTIC BEAM SPAN MOMENTS (X to nearest 0.01 L)

MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Moment	X	Moment	X	Moment	X
(1) Slab	+133.12	3.60	+27.12	2.40	+114.20	3.28

ELASTIC BEAM SHEARS

MARK	AT LEFT SUPPORT	AT 0.10 OF SPAN	AT 0.20 OF SPAN	AT 0.80 OF SPAN	AT 0.90 OF SPAN	AT RIGHT SUPPORT
(1) Slab	+74.56	+57.86	+41.15	-64.57	-81.28	-97.98
R. Cant.	+108.94					

ELASTIC SUPPORT REACTIONS

MARK	ODD SPANS L'D	EVEN SPANS L'D	ALL SPANS LOADED		
SUPPORT	Design Load	Design Load	Dead Load	Live Load	Design Load
#1	74.56	22.34	27.84	18.80	69.06
#2	157.72	160.20	111.00	32.20	206.92

Design Code: BS8110
Frame Type: Solid Slab
Load Pattern for Span Mom: Alternate Spans Loaded.
Load Pattern for Supp Mom: All Spans Loaded.
Load Factors: Code Standard

BEAMS

MARK	PROPERTIES			UNIFORM LOADS				POINT LOADS		
	Span	b	(I) h	DEAD	LIVE	X1	X2	DEAD	LIVE	X
(1) Slab	8.00	1.00	0.30	9.20	5.00	0.00	8.00	0.00	0.00	0.00
R. Cant.				9.20	5.00	0.00	1.20	54.20	5.00	1.20

SUPPORTS

Support #	BREADTH
1	0.50
2	0.50

ASTIC BEAM SUPPORT MOMENTS

MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Left	Right	Left	Right	Left	Right
(1) Slab	0.00	-71.66	0.00	-115.69	0.00	-115.69
R. Cant.	71.66		-115.69		-115.69	

MAXIMUM ELASTIC BEAM SPAN MOMENTS (X to nearest 0.01 L)

MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Moment	X	Moment	X	Moment	X
(1) Slab	+133.12	3.60	+27.12	2.40	+114.20	3.28

ELASTIC BEAM SHEARS

MARK	AT LEFT SUPPORT	AT 0.10 OF SPAN	AT 0.20 OF SPAN	AT 0.80 OF SPAN	AT 0.90 OF SPAN	AT RIGHT SUPPORT
(1) Slab	+74.56	+57.86	+41.15	-64.57	-81.28	-97.98
R. Cant.	+108.94					

ELASTIC SUPPORT REACTIONS

MARK	ODD SPANS L'D	EVEN SPANS L'D	ALL SPANS LOADED		
SUPPORT	Design Load	Design Load	Dead Load	Live Load	Design Load
#1	74.56	22.34	27.84	18.80	69.06
#2	157.72	160.20	111.00	32.20	206.92

Design Code: BS8110
Frame Type: Solid Slab
Load Pattern for Span Mom: Alternate Spans Loaded.
Load Pattern for Supp Mom: All Spans Loaded.
Load Factors: Code Standard

BEAMS

MARK	PROPERTIES			UNIFORM LOADS				POINT LOADS		
	Span	b	(I) h	DEAD	LIVE	X1	X2	DEAD	LIVE	X
(1) Slab	8.00	1.00	0.30	9.20	5.00	0.00	8.00	0.00	0.00	0.00
R. Cant.				9.20	5.00	0.00	1.20	54.20	5.00	1.20

SUPPORTS

Support #	BREADTH
1	0.50
2	0.50

\STIC BEAM SUPPORT MOMENTS

MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Left	Right	Left	Right	Left	Right
(1) Slab	0.00	-71.66	0.00	-115.69	0.00	-115.69
R. Cant.	71.66		-115.69		-115.69	

MAXIMUM ELASTIC BEAM SPAN MOMENTS (X to nearest 0.01 L)

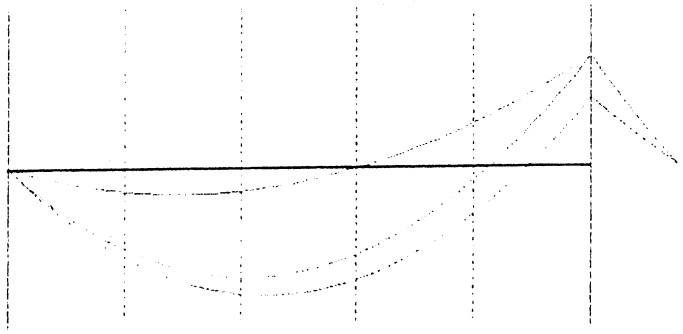
MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Moment	X	Moment	X	Moment	X
(1) Slab	+133.12	3.60	+27.12	2.40	+114.20	3.28

ELASTIC BEAM SHEARS

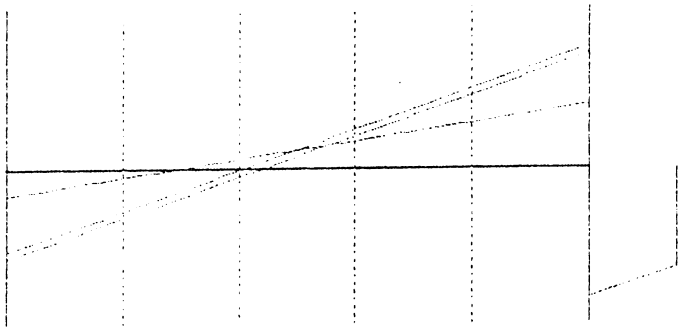
ARK	AT LEFT SUPPORT	AT 0.10 OF SPAN	AT 0.20 OF SPAN	AT 0.80 OF SPAN	AT 0.90 OF SPAN	AT RIGHT SUPPORT
(1) Slab	+74.56	+57.86	+41.15	-64.57	-81.28	-97.98
R. Cant.	+108.94					

ELASTIC SUPPORT REACTIONS

MARK	ODD SPANS L'D	EVEN SPANS L'D	ALL SPANS LOADED		
SUPPORT	Design Load	Design Load	Dead Load	Live Load	Design Load
#1	74.56	22.34	27.84	18.80	69.06
#2	157.72	160.20	111.00	32.20	206.92



Bending Moment Diagram



Shear Diagram

BEAM DESIGN FOR FLEXURE

fcu= 25MPa fy= 420MPa CODE: BS8110

	b (mm)	h (mm)	c (mm)	d' (mm)	
ALL SPANS	1000	300	35	40	mm

hf= 0 mm(Rectangular)

MARK	pos.	d (mm)	bf (mm)	M (kN.m)	R (MPa)	x/d	p (%)	p' (%)		As (mm^2)	As' (mm^2)
	L supp	260	1000	0.0	0.00	0.00	0.16	0.00	*	429	0
	L sup F	260	1000	+5.3	0.08	0.01	0.16	0.00	*	429	0
(1) Slab	span	265	1000	+133.1	1.90	0.21	0.57	0.00		1518	0
	R sup F	260	1000	-103.2	1.53	0.16	0.45	0.00		1173	0
	R supp	260	1000	-115.7	1.71	0.19	0.51	0.00		1330	0
	L supp	260	1000	-115.7	1.71	0.19	0.51	0.00		1330	0
	L sup F	260	1000	-89.1	1.32	0.14	0.39	0.00		1001	0

* = Nominal Reinforcement

CHOICE OF BARS FOR FLEXURE

Support Bars Chosen for Reinforcement Calculated at: SUPPORT CENTERLINES

MARK	pos.	As_B	As_T	Bottom Bars	Top Bars
	L supp	0	429	- - -	1Y10 @200(97%
(1) Slab	span	1518	0	1Y20 @230(99%) 1Y18 @188(98%) 1Y16 @146(102%) 1Y14 @114(101%)	- - - - - - - - - - - -
	supp	0	1330	- - - - - - - - - - - -	1Y18 @218(96% 1Y16 @166(101% 1Y14 @134(97% 1Y10 @ 70(99%

BEAM DESIGN FOR SHEAR

Value of vc Near Supports Based on Tension Steel Calculated at:
For Beam Spans : SUPPORT CENTERLINES.
For Cantilevers: SUPPORT CENTERLINES.

fcu= 25MPa fyv= 420MPa CODE: BS8110

MARK	X1 - X2 (metres)	Vu (kN)	v (MPa)	vc (MPa)	Asv/Sv (mm)		Stirrups		
(1) Slab	L 0.25- 0.52 0.25- 7.75 R 7.49- 7.75	63.81 87.23	0.241 0.329	0.386 0.563	0.000 0.000 0.000	* 	-- --	-- --	-- --
R. Cant.	L 0.25- 0.52 0.25- 1.20	98.18	0.371	0.563	0.000 0.000	* 	--	--	--

* = Nominal Stirrups

Design Code: BS8110
Frame Type: Simple Beam
Load Pattern for Span Mom: Alternate Spans Loaded.
Load Pattern for Supp Mom: All Spans Loaded.
Load Factors: Code Standard

BEAMS

MARK	PROPERTIES			UNIFORM LOADS				POINT LOADS		
	Span	b	(I) h	DEAD	LIVE	X1	X2	DEAD	LIVE	X
(1) N21	8.00	0.35	1.25	11.50	2.75	0.00	4.00	199.29	73.47	4.00
				22.74	9.00	4.00	8.00	0.00	0.00	0.00

SUPPORTS

Support #	BREADTH
1	0.50
2	0.50

MAXIMUM ELASTIC BEAM SPAN MOMENTS (X to nearest 0.01 L)

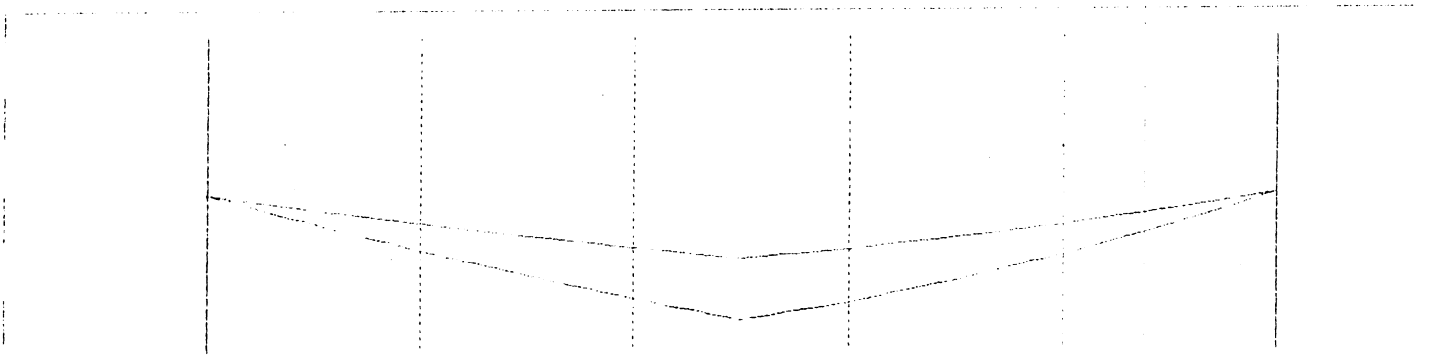
MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Moment	X	Moment	X	Moment	X
(1) N21	+1060.08	4.00	+535.55	4.00	+1060.08	4.00

ELASTIC BEAM SHEARS

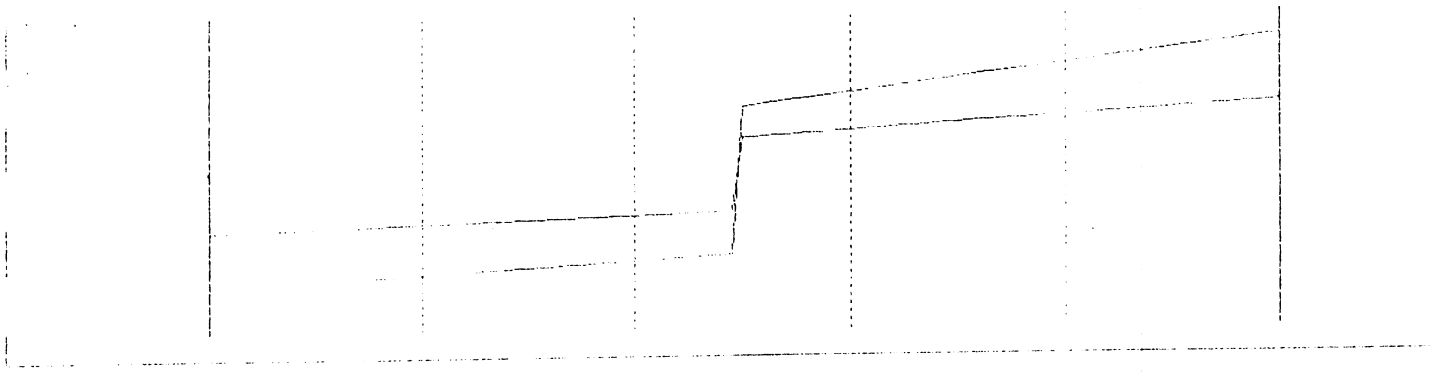
MARK	AT LEFT SUPPORT	AT 0.10 OF SPAN	AT 0.20 OF SPAN	AT 0.80 OF SPAN	AT 0.90 OF SPAN	AT RIGHT SUPPORT
(1) N21	+306.02	+289.62	+273.22	-283.51	320.50	-357.49

ELASTIC SUPPORT REACTIONS

MARK	ODD SPANS L'D	EVEN SPANS L'D	ALL SPANS LOADED		
SUPPORT	Design Load	Design Load	Dead Load	Live Load	Design Load
#1	306.02	156.89	156.89	53.99	306.02
#2	357.49	179.37	179.37	66.49	357.49



Bending Moment Diagram



Shear Diagram

BEAM DESIGN FOR FLEXURE

fcu= 25MPa fy= 420MPa CODE: BS8110

	b (mm)	h (mm)	c (mm)	d' (mm)	
(1) N21	350	1250	125	125	mm

hf= 0 mm(Rectangular)

MARK	pos.	d (mm)	bf (mm)	M (kN.m)	R (MPa)	x/d	p (%)	p' (%)		As (mm^2)	As' (mm^2
	L supp	1125	350	0.0	0.00	0.00	0.16	0.00	*	625	
	L sup F	1125	350	+38.9	0.09	0.01	0.16	0.00	*	625	
(1) N21	span	1125	350	+1060.1	2.39	0.27	0.75	0.00		2939	
	R sup F	1125	350	+44.1	0.10	0.01	0.16	0.00	*	625	
	R supp	1125	350	0.0	0.00	0.00	0.16	0.00	*	625	

* = Nominal Reinforcement

CHOICE OF BARS FOR FLEXURE

Support Bars Chosen for Reinforcement Calculated at: SUPPORT CENTERLINES

MARK	pos.	As_B	As_T	Bottom Bars	Top Bars
	L supp	0	625	- - -	3Y16 @132(96%
				- - -	4Y14 @ 89(99%
				- - -	3Y18 @131(122%
				- - -	8Y10 @ 39(101%
(1) N21	span	2939	0	6Y25 @ 51(100%)	- - -
				4Y32 @ 83(109%)	- - -
				2 Lyrs 3Y25 @127(100%)	- - -
				2 Lyrs 4Y22 @ 86(103%)	- - -
	R supp	0	625	- - -	3Y16 @132(96%
				- - -	4Y14 @ 89(99%
				- - -	3Y18 @131(122%
				- - -	8Y10 @ 39(101%

BEAM DESIGN FOR SHEAR

Value of vc Near Supports Based on Tension Steel Calculated at:
SUPPORT CENTERLINES.

fcu= 25MPa fyv= 420MPa CODE: BS8110

MARK	X1 - X2 (metres)	Vu (kN)	v (MPa)	vc (MPa)	Asv/Sv (mm)		Stirrups
L	0.25- 1.38	277.83	0.706	0.573	0.383	*	1Y10@409 2Y10@500 1Y12@500
1) N21	0.25- 7.75				0.383	*	1Y10@409 2Y10@500 1Y12@500
R	6.63- 7.75	293.92	0.746	0.573	0.383	*	1Y10@409 2Y10@500 1Y12@500

* = Nominal Stirrups

Design Code: BS8110
Frame Type: Simple Beam
Load Pattern for Span Mom: Alternate Spans Loaded.
Load Pattern for Supp Mom: All Spans Loaded.
Load Factors: Code Standard

BEAMS

MARK	PROPERTIES			UNIFORM LOADS				POINT LOADS		
	Span	b	(I) h	DEAD	LIVE	X1	X2	DEAD	LIVE	X
(1) N22	8.00	0.35	1.25	11.50	2.75	0.00	4.00	168.25	50.43	4.00
				41.72	14.00	4.00	8.00	0.00	0.00	0.00

SUPPORTS

Support #	BREADTH
1	0.50
2	0.50

MAXIMUM ELASTIC BEAM SPAN MOMENTS (X to nearest 0.01 L)

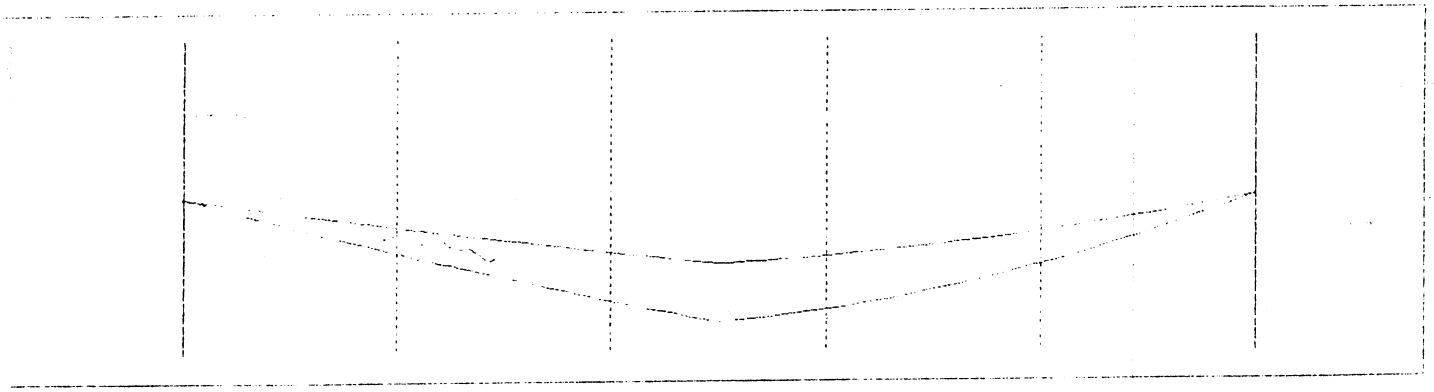
MARK	ODD SPANS LOADED		EVEN SPANS LOADED		ALL SPANS LOADED	
	Moment	X	Moment	X	Moment	X
(1) N22	+1037.70	4.00	+549.38	4.00	+1037.70	4.00

ELASTIC BEAM SHEARS

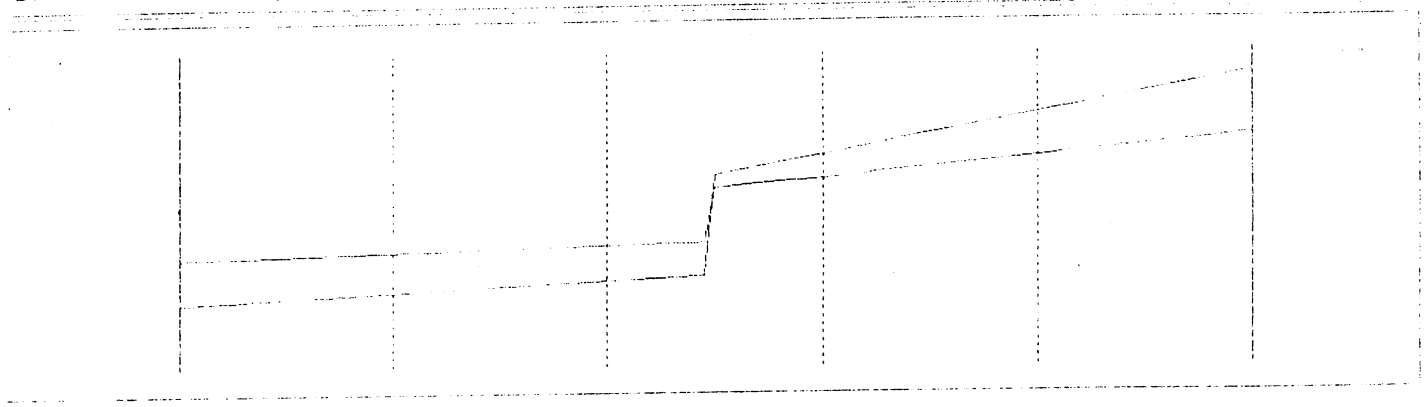
MARK	AT LEFT SUPPORT	AT 0.10 OF SPAN	AT 0.20 OF SPAN	AT 0.80 OF SPAN	AT 0.90 OF SPAN	AT RIGHT SUPPORT
(1) N22	+300.43	+284.03	+267.63	-291.75	-356.40	-421.04

ELASTIC SUPPORT REACTIONS

MARK	ODD SPANS L'D	EVEN SPANS L'D	ALL SPANS LOADED		
SUPPORT	Design Load	Design Load	Dead Load	Live Load	Design Load
#1	300.43	160.35	160.35	47.46	300.43
#2	421.04	220.79	220.79	69.96	421.04



Bending Moment Diagram



Shear Diagram

BEAM DESIGN FOR FLEXURE

fcu= 25MPa fy= 420MPa CODE: BS8110

	b (mm)	h (mm)	c (mm)	d' (mm)	
(1) N22	350	1250	125	125	mm

hf= 0 mm(Rectangular)

MARK	pos.	d (mm)	bf (mm)	M (kN.m)	R (MPa)	x/d	p (%)	p' (%)		As (mm^2)	As' (mm^2)
	L supp	1125	350	0.0	0.00	0.00	0.16	0.00	*	625	0
	L sup F	1125	350	+39.7	0.09	0.01	0.16	0.00	*	625	0
(1) N22	span	1125	350	+1037.7	2.34	0.26	0.73	0.00		2867	0
	R sup F	1125	350	+53.9	0.12	0.01	0.16	0.00	*	625	0
	R supp	1125	350	0.0	0.00	0.00	0.16	0.00	*	625	0

* = Nominal Reinforcement

CHOICE OF BARS FOR FLEXURE

Support Bars Chosen for Reinforcement Calculated at: SUPPORT CENTERLINES

MARK	pos.	As_B	As_T	Bottom Bars	Top Bars
	L supp	0	625	- - -	3Y16 @132(96%)
				- - -	4Y14 @ 89(99%)
				- - -	3Y18 @131(122%)
				- - -	8Y10 @ 39(101%)
(1) N22	span	2867	0	6Y25 @ 51(103%)	- - -
				4Y32 @ 83(112%)	- - -
				2 Lyrs 3Y25 @127(103%)	- - -
				2 Lyrs 4Y22 @ 86(106%)	- - -
	R supp	0	625	- - -	3Y16 @132(96%)
				- - -	4Y14 @ 89(99%)
				- - -	3Y18 @131(122%)
				- - -	8Y10 @ 39(101%)

BEAM DESIGN FOR SHEAR

Value of vc Near Supports Based on Tension Steel Calculated at:
SUPPORT CENTERLINES.

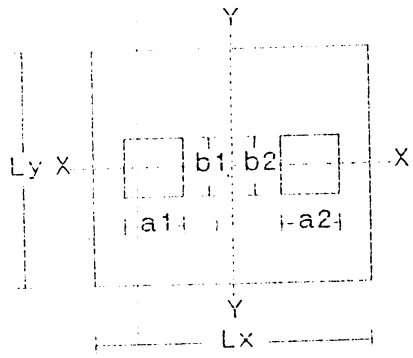
fcu= 25MPa fyv= 420MPa CODE: BS8110

MARK	X1 (metres)	X2	Vu (kN)	v (MPa)	vc (MPa)	Asv/Sv (mm)		Stirrups		
L	0.25	1.38	272.24	0.691	0.569	0.383	*	1Y10@409	2Y10@500	1Y12@500
) N22	0.25	7.51				0.383	*	1Y10@409	2Y10@500	1Y12@500
R	6.63	7.75	309.93	0.787	0.569	0.383	*	1Y10@409	2Y10@500	1Y12@500

< = Nominal Stirrups

PUT

Design Bearing Capacity, Qu = 290.00 kPa
Design Surcharge Load, Wu = 10.00 kPa
Span, L = 3.18 m



COMBINED FOOTING	Column 1	Column 2	
lumn Design Load, N =	5595.19	3145.55	kN
lumn Design Mom, Mx =	27.46	0.00	kN.m
olumn Design Mom, My =	25.00	0.00	kN.m
olumn Size in X, a =	600	600	mm
lumn Size in Y, b =	425	600	mm

Footing Depth, h = 1000 mm

Concrete Grade, fcu= 25 MPa
Steel Grade, fy = 420 MPa
MaxCover to center of Bars, c = 60 mm

CODE: BS8110

ALYSIS

Footing X Dimension, Lx = 7.77 m
Footing Y Dimension, Ly = 4.70 m
Center of Footing from Column 1 = 1.175 m

Total Design Load, ~N = 10327.84 kN
Summed Moment at Centroid, Mx = 27.46 kN.m
Summed Moment at Centroid, My = 258.24 kN.m

	TOTAL SOIL STRESSES	NET SOIL STRESSES
S1	289.04 kPa	245.61 kPa
S2	287.12 kPa	243.69 kPa
S3	276.21 kPa	232.78 kPa
S4	278.13 kPa	234.70 kPa

EXURE

	MOMENTS ABOUT Y-AXIS			ABOUT X AXIS
	At Column 1	In Span	At Column 2	Across X
M =	3212.38 kN.m	0.00 kN.m	1444.49 kN.m	5148.91 kN.m
R =	0.77 MPa	0.00 MPa	0.35 MPa	0.75 MPa
p =	0.22 %	0.15 %	0.15 %	0.21 %
As=	9706 mm2	6714 mm2	6714 mm2	15538 mm2
		Nominal	Nominal	
	19Y25@253(96%)	14Y25@350(102%)	14Y25@350(102%)	31Y25@254(98%)
	30Y20@157(97%)	17Y22@285(96%)	17Y22@285(96%)	39Y22@201(95%)
	25Y22@190(98%)	21Y20@228(98%)	21Y20@228(98%)	48Y20@162(97%)
	37Y18@127(97%)	26Y18@182(98%)	26Y18@182(98%)	59Y18@132(96%)

EAR AND PUNCHING

Max Permissible Shear Stress =	4.00 MPa	
Maximum Shear Stress =	2.87 MPa	O.K.
Max. Shear Stress Across Y at Column Faces =	0.60 MPa	O.K.

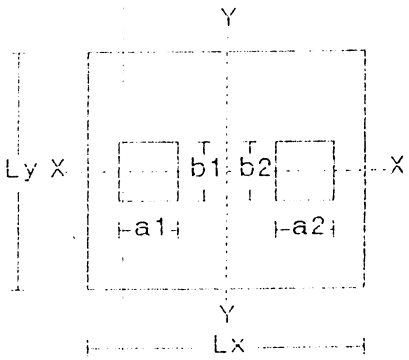
Punching Perimeter For Col1 Outside Base

Length of Punching Perimeter for Column 2 =	13680 mm	
Design Conc. Punching Shear Stress for Col 2 =	0.36 MPa	
Punching Shear Force for Column 2 =	315.03 kN	
Punching Shear Stress for Column 2 =	0.02 MPa	O.K.

LOCATION	v	vc	Asv/Sv	Stirrups
hear Across Y - Col 1 Cant	0.368	0.381	0.000	STIRRUPS NOT REQUIRED
Shear Across Y - Col 1 Span	0.054	0.381	0.000	STIRRUPS NOT REQUIRED
Shear Across Y - Col 2 Span	0.231	0.337	0.000	STIRRUPS NOT REQUIRED
hear Across Y - Col 2 Cant	0.168	0.337	0.000	STIRRUPS NOT REQUIRED

PUT

Design Bearing Capacity, Qu = 290.00 kPa
Design Surcharge Load, Wu = 10.00 kPa
Span, L = 3.18 m



COMBINED FOOTING	Column 1	Column 2	
lumn Design Load, N =	4562.59	3145.55	kN
lumn Design Mom, Mx =	11.28	0.00	kN.m
olumn Design Mom, My =	10.00	0.00	kN.m
olumn Size in X, a =	600	600	mm
olumn Size in Y, b =	425	600	mm

Footing Depth, h = 900 mm

Concrete Grade, fcu= 25 MPa
Steel Grade, fy = 420 MPa
MaxCover to center of Bars, c = 60 mm

CODE: BS8110

ALYSIS

Footing X Dimension, Lx = 7.37 m
Footing Y Dimension, Ly = 4.30 m
Center of Footing from Column 1 = 1.275 m

Total Design Load, ~N = 8978.11 kN
Summed Moment at Centroid, Mx = 11.28 kN.m
Summed Moment at Centroid, My = -169.25 kN.m

	TOTAL SOIL STRESSES	NET SOIL STRESSES
S1	279.26 kPa	239.22 kPa
S2	278.27 kPa	238.23 kPa
S3	286.96 kPa	246.91 kPa
S4	287.95 kPa	247.90 kPa

EXURE

	MOMENTS ABOUT Y-AXIS			ABOUT X-AXIS
	At Column 1	In Span	At Column 2	Across X
M =	2365.82 kN.m	0.00 kN.m	1138.42 kN.m	4148.77 kN.m
R =	0.78 MPa	0.00 MPa	0.38 MPa	0.80 MPa
p =	0.22 %	0.15 %	0.15 %	0.23 %
As=	8002 mm2	5529 mm2	5529 mm2	14044 mm2
		Nominal	Nominal	
	16Y25@277(98%)	14Y22@320(96%)	14Y22@320(96%)	28Y25@268(98%)
	25Y20@173(98%)	17Y20@260(97%)	17Y20@260(97%)	43Y20@172(96%)
	30Y18@144(95%)	21Y18@208(96%)	21Y18@208(96%)	36Y22@207(97%)
	21Y22@208(100%)	27Y16@160(98%)	27Y16@160(98%)	53Y18@139(96%)

HEAR AND PUNCHING

Max Permissible Shear Stress =	4.00 MPa	
Maximum Shear Stress =	2.61 MPa	O.K.
Max. Shear Stress Across Y at Column Faces =	0.62 MPa	O.K.

Punching Perimeter For Col1 Outside Base

Length of Punching Perimeter for Column 2 =	12480 mm	
Design Conc. Punching Shear Stress for Col 2 =	0.36 MPa	
Punching Shear Force for Column 2 =	801.25 kN	
Punching Shear Stress for Column 2 =	0.08 MPa	O.K.

LOCATION	v	vc	Asv/Sv	Stirrups
hear Across Y - Col 1 Cant	0.374	0.382	0.000	STIRRUPS NOT REQUIRED
Shear Across Y - Col 1 Span	0.003	0.382	0.000	STIRRUPS NOT REQUIRED
Shear Across Y - Col 2 Span	0.256	0.338	0.000	STIRRUPS NOT REQUIRED
hear Across Y - Col 2 Cant	0.184	0.338	0.000	STIRRUPS NOT REQUIRED

JOINT COORDINATES

Joint No.	X (m)	Y (m)	Joint No.	X (m)	Y (m)
1	0.000	12.200	13	3.260	8.750
2	3.260	12.200	14	6.520	8.750
3	6.520	12.200	15	9.780	8.750
4	9.780	12.200	16	13.040	8.750
5	13.040	12.200	17	16.300	8.750
6	16.300	12.200	18	19.560	8.750
7	19.560	12.200	19	22.820	8.750
8	22.820	12.200	20	26.080	8.750
9	26.080	12.200	21	29.340	8.750
10	29.340	12.200	22	32.600	8.750
11	32.600	12.200	23	3.260	0.000
12	0.000	8.750	24	26.080	0.000

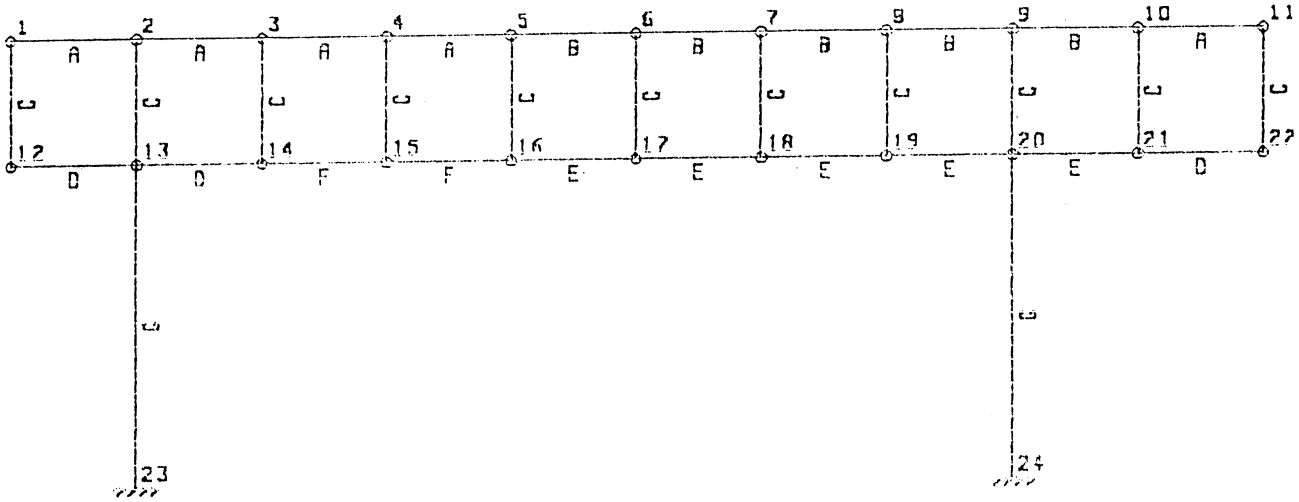
JOINT RESTRAINTS

Joint 23 : Fixed
Joint 24 : Fixed

No of Equations = 66

MEMBER IDENTIFICATION

Member No.	Joint J	Joint K	Member Type	Length (m)	Lx (m)	Ly (m)
1	1	2	A	3.260	3.260	0.000
2	2	3	A	3.260	3.260	0.000
3	3	4	A	3.260	3.260	0.000
4	4	5	A	3.260	3.260	0.000
5	5	6	B	3.260	3.260	0.000
6	6	7	B	3.260	3.260	0.000
7	7	8	B	3.260	3.260	0.000
8	8	9	B	3.260	3.260	0.000
9	9	10	B	3.260	3.260	0.000
10	10	11	A	3.260	3.260	0.000
11	12	1	C	3.450	0.000	3.450
12	13	2	C	3.450	0.000	3.450
13	14	3	C	3.450	0.000	3.450
14	15	4	C	3.450	0.000	3.450
15	16	5	C	3.450	0.000	3.450
16	17	6	C	3.450	0.000	3.450
17	18	7	C	3.450	0.000	3.450
18	19	8	C	3.450	0.000	3.450
19	20	9	C	3.450	0.000	3.450
20	21	10	C	3.450	0.000	3.450
21	22	11	C	3.450	0.000	3.450
22	12	13	D	3.260	3.260	0.000
23	13	14	D	3.260	3.260	0.000
24	14	15	E	3.260	3.260	0.000
25	15	16	E	3.260	3.260	0.000
26	16	17	E	3.260	3.260	0.000
27	17	18	E	3.260	3.260	0.000
28	18	19	E	3.260	3.260	0.000
29	19	20	E	3.260	3.260	0.000
30	20	21	E	3.260	3.260	0.000
31	21	22	D	3.260	3.260	0.000
32	23	13	G	8.750	0.000	8.750
33	24	20	G	8.750	0.000	8.750



Modulus of Elasticity
Ec = 18000000 kN/m^2

MBER PROPERTIES AND LOADS

em. pe	L (m)	Lx (m)	Ly (m)	DL (kN/m)	LL (kN/m)	HL (kN/m)	X1 (m)	X2 (m)	I (m^4)	A (m^2)
..	3.26	3.26	0.00	25.20 8.16	7.50 6.00	0.00 0.00	0.00 0.00	3.26 3.26	0.5000000	1.2500000
	3.26	3.26	0.00	25.20	7.50	0.00	0.00	3.26	0.5000000	1.2500000
C	3.45	0.00	3.45						0.5000000	1.1000000
	3.26	3.26	0.00	51.80 11.04	20.00 6.00	0.00 0.00	0.00 0.00	3.26 3.26	0.5000000	1.2500000
F	3.26	3.26	0.00	51.80	20.00	0.00	0.00	3.26	0.5000000	1.2500000
	3.26	3.26	0.00	51.80 106.20	20.00 22.50	0.00 0.00	0.00 0.00	3.26 3.26	0.5000000	1.2500000
	8.75	0.00	8.75						0.9000000	0.9000000

LOAD COMBINATIONS AND FACTORS

LOAD COMBINATION	1	2	3	4	5
DEAD LOAD FACTOR	1.40				
LIVE LOAD FACTOR	1.60				

JOINT LOADINGS

LOAD COMBINATION 1

JOINT	Fx (+ --->)	Fy (+ Down)	Moment (+ CW)
1	0.00	234.00	0.00
2	0.00	421.00	0.00
3	0.00	358.00	0.00
4	0.00	358.00	0.00
5	0.00	421.00	0.00
6	0.00	234.00	0.00
7	0.00	234.00	0.00
8	0.00	234.00	0.00
9	0.00	234.00	0.00
10	0.00	421.00	0.00
11	0.00	234.00	0.00
12	0.00	40.70	0.00
13	0.00	40.70	0.00
14	0.00	40.70	0.00
15	0.00	40.70	0.00
16	0.00	40.70	0.00
17	0.00	40.70	0.00
18	0.00	40.70	0.00
19	0.00	40.70	0.00
20	0.00	40.70	0.00
21	0.00	40.70	0.00
22	0.00	40.70	0.00

DISPLACEMENTS

LOAD COMBINATION 1

Joint No	X (--->) (mm)	Y (Down) (mm)	Rotation (CW) (Degrees)
1	2.905342	1.071314	0.044353605
2	2.942890	3.722699	0.051132335
3	2.907967	6.974817	0.052043074
4	2.357458	9.852955	0.036834165
5	1.525203	11.217734	0.007431437
6	0.710576	10.705036	-0.021274960
7	0.128508	8.713753	-0.039935242
8	0.057723	6.048326	-0.040543209
9	0.243398	3.910610	-0.025212039
10	0.515276	3.124689	-0.009678007
11	0.586194	2.738621	-0.007811277
12	0.370493	1.021668	0.038204820
13	0.332945	3.083442	0.038715233
14	0.147280	6.736846	0.062123016
15	0.477201	9.915890	0.037897430
16	1.088870	11.249067	0.006293016

LOAD COMBINATION 1

Joint No	X (---->) (mm)	Y (Down) (mm)	Rotation (CW) (Degrees)
17	1.682908	10.712147	-0.021156237
18	2.044388	8.715351	-0.040951735
19	2.010032	5.794822	-0.049376707
20	1.488323	3.260747	-0.014863586
21	1.216445	3.015717	-0.004853190
22	1.145526	2.739382	-0.007676164
23	0.000000	0.000000	0.000000000
24	0.000000	0.000000	0.000000000

MEMBER FORCES

Axial : Compression [+ve]
Moment : Sagging [+ve]

Member Type	Member No.	Joints J	Joints K	Load Comb No	Joint J Axial (kN)	Joint J Shear (kN)	Joint J Moment (kN.m)	Joint K Axial (kN)	Joint K Shear (kN)	Joint K Moment (kN.m)	Span Moment (kN.m)
A	1	1	2	1	-129.6	-202.9	4.1	-129.6	-202.9	-657.3	
A	2	2	3	1	120.5	987.8	-1654.1	120.5	987.8	1566.3	
A	3	3	4	1	1899.8	1090.1	-1044.0	1899.8	1090.1	2509.6	
A	4	4	5	1	2872.1	328.8	880.8	2872.1	328.8	1952.7	
A	10	10	11	1	244.7	347.5	-656.4	-244.7	347.5	476.5	
B	5	5	6	1	2811.2	370.5	1987.2	2811.2	-370.5	779.2	
B	6	6	7	1	2008.7	-779.1	2169.0	2008.7	-779.1	-370.8	
B	7	7	8	1	642.7	-1171.8	1939.3	642.7	-1171.8	-1880.7	
B	8	8	9	1	-1039.1	-832.5	618.2	-1039.1	-832.5	-2095.7	
B	9	9	10	1	-938.2	644.2	-1798.6	-938.2	644.2	301.6	
C	11	12	1	1	142.5	129.6	-503.5	142.5	129.6	-56.4	
C	12	13	2	1	1834.4	-250.1	-133.9	1834.4	-250.1	-996.8	
C	13	14	3	1	682.9	-1779.2	3528.1	682.9	-1779.2	-2610.3	
C	14	15	4	1	-180.6	-972.3	1725.6	-180.6	-972.3	-1628.8	
C	15	16	5	1	-89.9	60.8	-156.8	-89.9	60.8	53.1	
C	16	17	6	1	20.4	802.5	-1379.0	-20.4	802.5	1389.8	
C	17	18	7	1	-4.6	1366.0	-2402.6	-4.6	1366.0	2310.1	
C	18	19	8	1	727.4	1681.8	-3303.3	727.4	1681.8	2498.9	
C	19	20	9	1	1864.8	-100.9	645.3	1864.8	-100.9	297.1	

EMBER FORCES

Axial : Compression [+ve]
oment : Sagging [+ve]

Member Type + No.	Joints J - K	Load Comb No	Joint J Axial (kN)	Joint J Shear (kN)	Joint J Moment (kN.m)	Joint K Axial (kN)	Joint K Shear (kN)	Joint K Moment (kN.m)	Span Moment (kN.m)
20	21 10	1	312.7	693.5	1416.0	312.7	693.5	-976.6	
C 21	22 11	1	-2.2	-244.7	428.3	-2.2	-244.7	-416.0	
22	12 13	1	129.6	-394.4	618.2	129.6	-394.4	-667.4	
D 23	13 14	1	640.7	2446.0	-5114.9	640.7	2446.0	2859.1	
31	21 22	1	244.7	249.7	-271.0	244.7	249.7	543.1	
B 26	16 17	1	-2050.0	-355.6	1902.3	2050.0	-355.6	743.0	
27	17 18	1	-1247.4	-716.6	2121.9	-1247.4	-716.6	-214.3	
E 28	18 19	1	118.6	-1093.5	2188.3	118.6	-1093.5	-1376.4	
29	19 20	1	1800.4	-2202.4	1926.9	1800.4	-2202.4	-5252.8	
E 30	20 21	1	938.2	984.7	-2087.4	938.2	984.7	1122.7	
F 24	14 15	1	-1138.5	1039.8	-527.7	-1138.5	1039.8	2862.2	
G 25	15 16	1	2110.8	236.9	1136.6	-2110.8	236.9	1909.0	
C 32	23 13	1	5137.9	-761.2	2079.4	5137.9	-761.2	-4581.4	
G 33	24 20	1	5433.3	761.2	-2850.1	5433.3	761.2	3810.7	

REACTIONS

LOAD COMBINATION 1

Joint No.	X (<---) (kN)	Y (UP) (kN)	Mom. (+CCW) (kN.m)
23	-761.23	5137.90	-2079.36
24	761.23	5433.34	2850.09

IGN OF MEMBERS

MATERIAL PROPERTIES

= 25 MPa fy = 420 MPa

Member Type A

ength = 3 Lx = 3.260 Ly = 0.000

Member No.	Joint J	Joint K	b (mm)	h (mm)	c (mm)
1	1	2	500	1250	100
2	2	3	500	1250	100
3	3	4	500	1250	100
4	4	5	500	1250	100
10	10	11	500	1250	100

Member No.	Joint No.	bf (mm)	M_max (KN.m)	M_min (KN.m)	P-max (kN)	P-min (kN)	p_B (%)	p_T (%)	As_B (mm^2)	As_T (mm^2)
1	1	500	4.1	4.1	-129.6	-129.6	0.14	0.00	893	0
	2	500	-657.3	-657.3	-129.6	-129.6	0.00	0.26	0	1642
2	2	500	1654.1	-1654.1	120.5	120.5	0.00	0.72	0	4519
	3	500	1566.3	1566.3	120.5	120.5	0.68	0.00	4241	0
3	3	500	-1044.0	-1044.0	1899.8	1899.8	0.00	0.43	0	2692
	4	500	2509.6	2509.6	1899.8	1899.8	1.22	0.00	7632	0
4	4	500	880.8	880.8	2872.1	2872.1	0.36	0.00	2240	0
	5	500	1952.7	1952.7	2872.1	2872.1	0.88	0.00	5514	0
10	10	500	-656.4	-656.4	-244.7	-244.7	0.00	0.26	0	1639
	11	500	476.5	476.5	-244.7	-244.7	0.19	0.00	1174	0

Member Type B

ength = 3 Lx = 3.260 Ly = 0.000

Member No.	Joint J	Joint K	b (mm)	h (mm)	c (mm)
5	5	6	500	1250	100
6	6	7	500	1250	100
7	7	8	500	1250	100
8	8	9	500	1250	100
9	9	10	500	1250	100

Member No.	b (mm)	h (mm)	Joint No.	Comb No.	Axial (kN)	Moment (kN.m)	p_B (%)	p_T (%)	As_B (mm^2)	As_T (mm^2)
5	500	1250	5	1	2811.2	1987.2	0.08	0.08	502	502
5	500	1250	6	1	2811.2	779.2	8.03	8.03	50200	50200
6	500	1250	6	1	2008.7	2169.0	0.06	0.06	359	359
6	500	1250	7	1	2008.7	-370.8	5.74	5.74	35869	35869
7	500	1250	7	1	642.7	1939.3	0.02	0.02	115	115
7	500	1250	8	1	642.7	-1880.7	1.84	1.84	11476	11476
8	500	1250	8	1	-1039.1	618.2	-0.03	-0.03	-186	-186
8	500	1250	9	1	-1039.1	-2095.7	-2.97	-2.97	-18556	-18556
9	500	1250	9	1	-938.2	-1798.6	-0.03	-0.03	-168	-168
	500	1250	10	1	-938.2	301.6	-2.68	-2.68	-16754	-16754

Member Type C

ength = 3 Lx = 0.000 Ly = 3.450

Member No.	Joint J	Joint K	b (mm)	h (mm)	c (mm)
11	12	1	500	1250	100
12	13	2	500	1250	100
13	14	3	500	1250	100
14	15	4	500	1250	100
15	16	5	500	1250	100
16	17	6	500	1250	100
17	18	7	500	1250	100
18	19	8	500	1250	100
19	20	9	500	1250	100
20	21	10	500	1250	100

Member No.	b (mm)	h (mm)	Joint No.	Comb No.	Axial (kN)	Moment (kN.m)	p_B (%)	p_T (%)	As_B (mm^2)	As_T (mm^2)
11	500	1250	12	1	142.5	-503.5	-0.01	-0.01	-76	-76
11	500	1250	1	1	142.5	-56.4	-1.22	-1.22	-7621	-7621
12	500	1250	13	1	1834.4	-133.9	0.00	0.00	0	0
12	500	1250	2	1	1834.4	-996.8	0.00	0.00	0	0
13	500	1250	14	1	682.9	3528.1	0.02	0.02	122	122
13	500	1250	3	1	682.9	2610.3	1.95	1.95	12194	12194
14	500	1250	15	1	-180.6	1725.6	-0.01	-0.01	-32	-32
14	500	1250	4	1	-180.6	-1628.8	-0.52	-0.52	-3225	-3225
15	500	1250	16	1	-89.9	-156.8	0.00	0.00	-16	-16
5	500	1250	5	1	-89.9	53.1	-0.26	-0.26	-1606	-1606
16	500	1250	17	1	-20.4	-1379.0	0.00	0.00	-4	-4
16	500	1250	6	1	-20.4	1389.8	-0.06	-0.06	-364	-364
17	500	1250	18	1	-4.6	-2402.6	0.00	0.00	-1	-1
17	500	1250	7	1	-4.6	2310.1	-0.01	-0.01	-82	-82
18	500	1250	19	1	727.4	-3303.3	0.02	0.02	130	130
18	500	1250	8	1	727.4	2498.9	2.08	2.08	12990	12990
19	500	1250	20	1	1864.8	645.3	0.00	0.00	0	0
19	500	1250	9	1	1864.8	297.1	0.00	0.00	0	0
20	500	1250	21	1	312.7	1416.0	0.01	0.01	56	56
20	500	1250	10	1	312.7	-976.6	0.89	0.89	5584	5584

Member Type C

Length = 3 Lx = 0.000 Ly = 3.450

Member No.	Joint J	Joint K	b (mm)	h (mm)	c (mm)
21	22	11	500	1100	100

Member No.	Joint No.	bf (mm)	M_max (kN.m)	M_min (kN.m)	P-max (kN)	P-min (kN)	p_B (%)	p_T (%)	As_B (mm^2)	As_T (mm^2)
21	22	500	428.3	428.3	-2.2	-2.2	0.22	0.00	1222	0
	11	500	-416.0	-416.0	-2.2	-2.2	0.00	0.22	0	1185

Member Type D

Length = 3 Lx = 3.260 Ly = 0.000

Member No.	Joint J	Joint K	b (mm)	h (mm)	c (mm)
22	12	13	500	1250	100
23	13	14	500	1250	100
31	21	22	500	1250	100

Member No.	Joint No.	b (mm)	d (mm)	bf (mm)	M_max (kN.m)	M_min (kN.m)	p_B (%)	p_T (%)	As_B (mm^2)	As_T (mm^2)
22	12	500	1150	500	618.2	618.2	0.25	0.00	1539	0
	13	500	1150	500	-667.4	-667.4	0.00	0.27	0	1668
23	13	500	1150	500	-5114.9	-5114.9	1.06	2.33	6623	14534
	14	500	1150	500	2859.1	2859.1	1.38	0.12	8652	741
31	21	500	1150	500	-271.0	-271.0	0.00	0.14	0	893
	22	500	1150	500	543.1	543.1	0.22	0.00	1344	0

Member Type E

Length = 3 Lx = 3.260 Ly = 0.000

Member No.	Joint J	Joint K	b (mm)	h (mm)	c (mm)
26	16	17	500	1250	100
27	17	18	500	1250	100
28	18	19	500	1250	100
29	19	20	500	1250	100
30	20	21	500	1250	100

Member No.	Joint No.	bf (mm)	M_max (KN.m)	M_min (KN.m)	P-max (kN)	P-min (kN)	p_B (%)	p_T (%)	As_B (mm^2)	As_T (mm^2)
26	16	500	1902.3	1902.3	-2050.0	-2050.0	0.85	0.05	5287	326
	17	500	743.0	743.0	-2050.0	-2050.0	0.60	0.29	3775	1838
27	17	500	2121.9	2121.9	-1247.4	-1247.4	0.98	0.00	6116	0
	18	500	214.3	214.3	-1247.4	-1247.4	0.00	0.14	0	893
28	18	500	2188.3	2188.3	118.6	118.6	1.02	0.00	6361	0
	19	500	-1376.4	-1376.4	118.6	118.6	0.00	0.59	0	3658
29	19	500	1926.9	1926.9	1800.4	1800.4	0.87	0.00	5425	0
	20	500	-5252.8	-5252.8	1800.4	1800.4	1.12	2.38	6983	14894
30	20	500	-2087.4	-2087.4	938.2	938.2	0.00	0.96	0	5991
	21	500	1122.7	1122.7	938.2	938.2	0.47	0.00	2915	0

Member Type Γ

engths = 3 Lx = 3.260 Ly = 0.000

Member No.	Joint J	Joint K	b (mm)	h (mm)	c (mm)
24	14	15	500	1250	100
25	15	16	500	1250	100

ember No.	Joint No.	bf (mm)	M_max (KN.m)	M_min (KN.m)	P-max (kN)	P-min (kN)	p_B (%)	p_T (%)	As_B (mm^2)	As_T (mm^2)
24	14	500	-527.7	-527.7	-1138.5	-1138.5	0.00	0.21	0	1305
	15	500	2862.2	2862.2	-1138.5	-1138.5	1.39	0.12	8660	749
25	15	500	1136.6	1136.6	-2110.8	-2110.8	0.70	0.23	4372	1408
	16	500	1909.0	1909.0	-2110.8	-2110.8	0.86	0.06	5379	401

Member Type G

e th = 9 Lx = 0.000 Ly = 8.750

Member No.	Joint J	Joint K	b (mm)	h (mm)	c (mm)
32	23	13	900	900	90
33	24	20	900	900	90

Member No.	Joint No.	bf (mm)	M_max (kN.m)	M_min (kN.m)	P-max (kN)	P-min (kN)	p_B (%)	p_T (%)	As_B (mm^2)	As_T (mm^2)
32	23	900	2079.4	2079.4	5137.9	5137.9	0.14	0.77	1157	6197
	13	900	4581.4	4581.4	5137.9	5137.9	1.94	0.14	15712	1157
33	24	900	-2850.1	-2850.1	5433.3	5433.3	1.18	0.14	9532	1157
	20	900	3810.7	3810.7	5433.3	5433.3	0.14	1.63	1157	13185

fcu = 25 MPa
fy = 420 MPa

olumn ID : Vierendeel Vertical Members

sign Axial Load, N =	683.0	Section Breadth, b =	500	b Bars =	18
Design Moment, Mx =	3528.0	Depth, h =	1100	h Bars =	0
Design Moment, My =	0.0	Cover, c =	100	Total Bars =	40

JNIAXIAL Short

Required Bar Dia = 24.92 mm
p = 3.55 %

JSE: Bar Dia = 25 mm
---> p = 3.57 %
Ratio = (100.60%)

olumn ID : Vierendeel Columnal Members

sign Axial Load, N =	5433.0	Section Breadth, b =	900	b Bars =	5
Design Moment, Mx =	2850.0	Depth, h =	900	h Bars =	5
sign Moment, My =	0.0	Cover, c =	50	Total Bars =	24

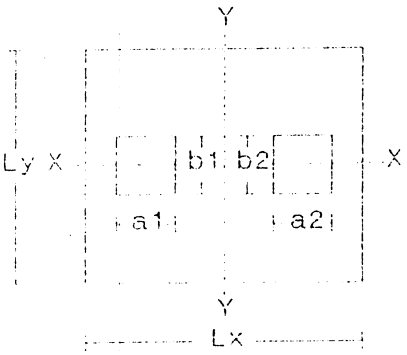
JNIAXIAL Short

Required Bar Dia = 30.71 mm
p = 2.19 %

USE: Bar Dia = 32 mm
---> p = 2.38 %
Ratio = (108.56%)

PUT

Design Bearing Capacity, Qu = 290.00 kPa
Design Surcharge Load, Wu = 10.00 kPa
Span, L = 7.50 m



COMBINED FOOTING	Column 1	Column 2	
lumn Design Load, N =	5433.00	5433.00	kN
lumn Design Mom, Mx =	1425.00	1425.00	kN.m
olumn Design Mom, My =	0.00	0.00	kN.m
olumn Size in X, a =	900	900	mm
lumn Size in Y, b =	900	900	mm

Footing Depth, h = 900 mm

Concrete Grade, fcu= 25 MPa
Steel Grade, fy = 420 MPa
MaxCover to center of Bars, c = 60 mm

CODE: BS8110

ALYSIS

Footing X Dimension, Lx = 13.20 m
Footing Y Dimension, Ly = 4.50 m
Center of Footing from Column 1 = 3.750 m

Total Design Load, ~N = 13240.06 kN
Summed Moment at Centroid, Mx = 2850.00 kN.m
Summed Moment at Centroid, My = 0.00 kN.m

	TOTAL SOIL STRESSES	NET SOIL STRESSES
S1	286.87 kPa	246.90 kPa
S2	158.92 kPa	118.96 kPa
S3	158.92 kPa	118.96 kPa
S4	286.87 kPa	246.90 kPa

EXURE

	MOMENTS ABOUT Y-AXIS			ABOUT X-AXIS
	At Column 1	In Span	At Column 2	Across X
M =	2370.76 kN.m	2444.65 kN.m	2370.76 kN.m	7537.13 kN.m
R =	0.75 MPa	0.77 MPa	0.75 MPa	0.81 MPa
p =	0.21 %	0.22 %	0.21 %	0.23 %
As=	8005 mm2	8265 mm2	8005 mm2	25530 mm2
	16Y25@290(98%)	17Y25@272(101%)	16Y25@290(98%)	50Y25@266(96%)
	25Y20@182(98%)	21Y22@218(97%)	25Y20@182(98%)	64Y22@207(95%)
	21Y22@218(100%)	26Y20@174(99%)	21Y22@218(100%)	78Y20@170(96%)
	30Y18@150(95%)	31Y18@145(95%)	30Y18@150(95%)	96Y18@137(96%)

SHEAR AND PUNCHING

Max Permissible Shear Stress =	4.00 MPa	
Maximum Shear Stress =	1.75 MPa	O.K.
Max. Shear Stress Across Y at Column Faces =	0.72 MPa	O.K.

Punching Perimeter For Col1 Outside Base

Length of Punching Perimeter for Column 2 =	13680 mm	
Design Conc. Punching Shear Stress for Col 2 =	0.38 MPa	
Punching Shear Force for Column 2 =	3293.39 kN	
Punching Shear Stress for Column 2 =	0.29 MPa	O.K.

LOCATION	v	vc	Asv/Sv	Stirrups
Shear Across Y - Col 1 Cant	0.340	0.377	0.000	STIRRUPS NOT REQUIRED
Shear Across Y - Col 1 Span	0.536	0.377	4.926	5Y12@229 6Y12@275 7Y12@32
Shear Across Y - Col 2 Span	0.536	0.377	4.926	5Y12@229 6Y12@275 7Y12@32
Shear Across Y - Col 2 Cant	0.340	0.377	0.000	STIRRUPS NOT REQUIRED

The Ministry of Tourism and Antiquities
The Ministry of Planning

Detailed Design
for
Tourism Sector Development Project
in
the Hashemite Kingdom of Jordan

National Museum

STRUCTURAL CALCULATION SHEETS
Lateral Stability Calculations

March 2000

(3)

The JICA Detailed Design Study Team

Pacific Consultants International, Tokyo

Yamashita Sekkei Inc.

Local Consultant :

Jafar Tukan and Partners

JAFAR TUKAN & PARTNERS
ARCHITECTS & ENGINEERS
P.O.BOX 2902 AMMAN, JORDAN

Made by: JT | Checked by: | Date: | Page No.: F1

Project: National Museum – Amman

Element: Lateral Stability

Reference:

Storey Mass & Storey Centers

Assumed storey mass:

2nd	$g = 12.0$ KN/m²
1st	$g = 17.0$ KN/m²
Grd	$g = 14.2$ KN/m²
Bas	$g = 16.6$ KN/m²

Zone B for Amman

Calculations of storey areas on p. 542–547

Storey	Area	Avg Mass	Mass	x_c	y_c
2nd	2565	12.0	30,780	43.20	15.82
1st	2359	17.0	40,103	45.67	16.13
Grd	629	14.2	8,932	22.69	15.31
Bas	2979	16.6	49,451	46.34	15.85

Seismic & Wind Loading

Calculation on p. 548–552

Base Shear Coefficient: coeff = 0.101 in y
" = 0.112 in x

Configuration of Bracing System

Plan of Bracing System on p. E7

Calculation of core section properties on p. 553-577

① Core 1x : $x = 0.4$ m, $y = 22.30$ m, $\alpha = 6°$

P.553

$A_v = (6.389 + 7.374) \times 0.2 = 2.75$ m²

$I = 20.66$ m⁴

② Core 1y' : $x = -2.1$ m, $y = 21.7$ m, $\alpha = 96°$

4.025 x 0.25

$A_v = 4.025 \times 0.25 = 1.01$ m²

$I = (4.025)^3 \times 0.25/12 = 1.38$ m⁴

③ Core 2x : $x = 55.02$ m, $y = 10.79$ m, $\alpha = 0$

P. 558

$A_v = (5.4 + 4.6 + 4.0) \times 0.2 = 14$ m²

$I = 14.08$ m⁴

④ Core 2y : $x = 55.02$ m, $y = 10.79$ m, $\alpha = 90°$

P. 558

$A_v = (5.4 + 3.3 + 1.9) \times 0.2 = 10.6$ m²

$I = 16.44$ m³

⑤ Core 3x : $x = 77.61$ m, $y = 1.29$ m, $\alpha = 0°$

P. 563

$A_v = 16.45 \times 025 + (5.45 + 1.0 + 3.8) \times 0.2 = 6.163$ m²

$I = 165.72$ m⁴

⑥ Core 3y : $x = 77.61$ m, $y = 1.02$ m, $\alpha = 90°$

P. 563

$A_v = 3.2 \times 6.75 + 3.2 \times 2 \times 0.2 = 2.08$ m²

$I = 14.434$

National Museum - Amman

Project | No. | Element: Bracing System | Reference

⑦ Core 4x

P. 568

$x = 78.15$ m. $\alpha = 0$
$y = 31.15$ m

$A_v = 16.45 \times 0.25 + 5.45 \times 0.2 = 5.2$ m²
$I = 218.07$ m⁴

⑧ Core 4y

P 569

$x = 78.15$ m $\alpha = 90°$
$y = 31.15$ m

$A_v = 3.2 \times 2 \times 0.25 + 3.2 \times 2 \times 0.2 = 2.88$ m²
$I = 11.66$ m⁴

⑨ Core 5x'

P. 573

$x = 91.86$ m
$y = 25.50$ m $\alpha = 174°$

$A_v = 7.9 \times 0.25 = 1.975$ m²
$I = 12.07$ m⁴

⑩ Core 5y'

P. 577

$x = 91.86$ m
$y = 25.50$ m $\alpha = 84$

$A_v = (5 \times 1.3 + 3.2) \times 0.25 = 2.425$ m²
$I = 128.6$ m⁴

⑪ Wall 1

36.42×0.25

$x = 33.26$ m $\alpha = 0$
$y = 32.12$ m

$A_v = 14.105$ m²
$I = 3741.6$ m³

⑫ Wall 2

$40.52 \times .25$

$x = 20.26$ m $\alpha = 0°$
$y = 0.125$ m

$A_v = 10.13$ m²
$I = 1386.0$ m⁴

⑬ Wall 3

16.42×0.25

$x = 53.14$ m $\alpha = 0°$
$y = 0.125$ m

$A_v = 4.105$ m²
$I = 92.23$ m³

National Museum - Amman

Project | No | Element: Bracing System | Reference

(14) Wall 4
15.6 x 0.25

x = -0.69 m
y = 7.77 m
α = 90°
Av = 3.9 m²
I = 79.09 m⁴

(15) Wall 5
9.59 x 0.25

x = 5.05 m
y = 27.45 m
α = 90°
Av = 2.40 m²
I = 18.37 m⁴

Lateral Load Analysis

Analysis on p. 586 - 587

Loading Eccentricities $e_x = 0.0$ As actual lack of symmetry exists

$e_y = 0.05 \times 32.2 = 1.61$ m Nominal Ecc.

Max Displacement = 1.48 mm

Shear Wall Design

$V_c = 0.63$ MPa for $f_{cu} = 25$ MPa

$V_c' = V_c / 1.4 = 0.45$ MPa

(1) Core 1x' $v = 379 / 2.75 / 0.8 / 1000 = 0.17$ MPa $< V_c'$ O.K

from Interaction Diag on p 555 & p. 557

$M = 3130$ KN-m $\rho = 0.7\%$ (Nominal)

(2) Core 1y' $v = 489 / 1.8 / 1.01 / 1000 = .59$ MPa Nominal

for $v = 1.4 \times 0.59 = 0.82$

$M = 3101$ KN-m $A_{sv}/S_v = 0.101$ 5IY/@12cm

I. Diag on p. 554 & 556 $\rho = 0\%$ (Nominal)

Shear Wall Design

③ Core 2x: $v = 788./0.8/14/1000 = .07 < v_c'$

$M = 4578$ KN-m

Int Diag on p. 560 & p. 562 P= Nominal

④ Core 2y $v = 764./0.8/10.6/1000 = 0.09$ MPa $< v_c'$

$M = 4690$ KN-m

Int Diag on p. 559 & 561 P = Nominal

⑤ Core 3x $v = 1171./0.8/6.63/1000 = 0.24 < v_c'$

Checking Moment against Interaction Diagram

(p. 565 & 567) $M = 14,932$ KN-m P = Nominal

⑥ Core 3y $v = 288/0.8/2.08/1000 = 0.173 < v_c'$

(p. 564 & 566) $M = 2469$ KN-m P = Nominal

⑦ Core 4x $v = 1041/0.8/5.2/1000 = 0.25$ MPa $> v_c'$

Checking M v.s. Interaction Diagram

(p. 570 & 572) $M = 13737$ MPa P = Nominal

⑧ Core 4y $v = 331.2/0.8/2.88/1000 = 0.143$ MPa $< v_c'$

(p. 569 & 571) $M = 2374$ KN-m P = Nominal

⑨ Core 5x $v = 354.4/0.8/1975/1000 = 0.23$ MPa $< v_c'$

(p. 575 & 577) $M = 2815$ KN-m P = Nominal

JAFAR TUKAN & PARTNERS
ARCHITECTS & ENGINEERS
P.O.BOX 2902 AMMAN, JORDAN

DT | Made by | Checked by | Date | E6 Page No.

National Museum - Amman

Project | No | Element | Reference

Shear Wall Design

(10) Core Sys: In Bas Storey:
$v = 4684.8/0.8/18.2/0.25/1000 = 1.29$ MPa
In 1st Storey (critical)
$v = 5730/0.8/2.425/1000 = 1.92$ MPa

for $v = 1.4 \times 1.92 = 2.69$ MPa
Divide Shear Resistance 2/3 x 1/3
Between Horizontal & Vertical Steel
$A_{sv}/S_v = 0.444$ Use ~~V14@20~~ H14@20
for Columns S14@10

(p 578 & 579) $M = 6787.3$ KN-m ρ = Nominal

(11) Wall 1: $v = 3353/0.8/141.05/1000 = 0.30$ MPa $< v'_c$
$M = 58,617$ KN-m
$M/bh^2 = 0.074 << 0.5$ ρ = Nominal

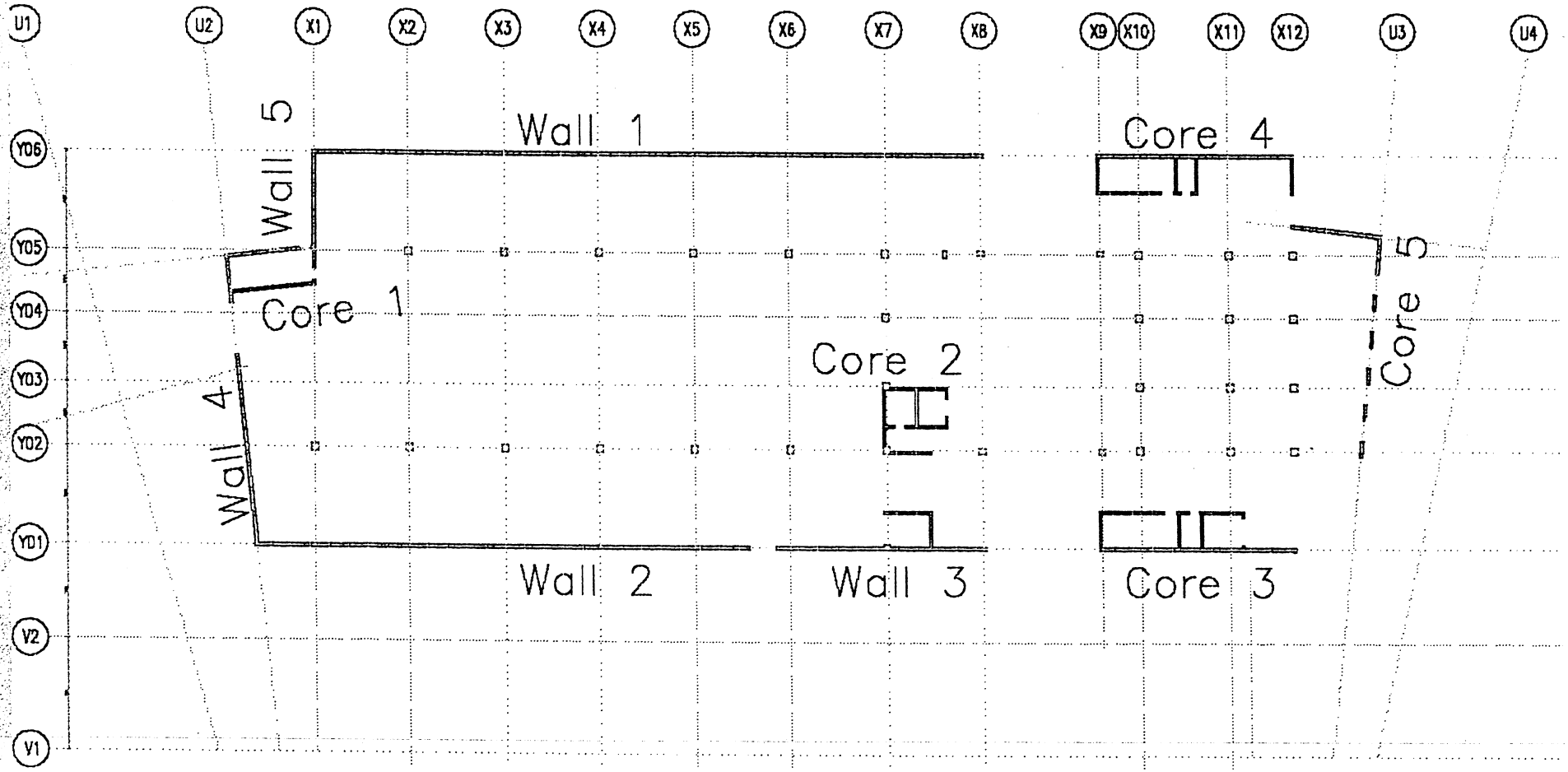
(12) Wall 2: $v = 2402/0.2/10.13/1000 = 0.30$ MPa $< v'_c$
$M = 42,906$ KN-m
$M/bh^2 = 0.0996 < 0.5$ ρ = Nominal

(13) Wall 3: $v = 761.9/.8/4.105/1000 = 0.23$ MPa $< v'_c$
$M = 9201$ KN-m
$M/bh^2 = 0.13 < 0.5$ ρ = Nominal

(14) Wall 4: $v = 4980/0.2/3.9/1000 = 1.6$ MPa
for $v = 1.4 \times 1.6 = 2.24$ Use H14@20 ~~V14@20~~
$M = 66800$ KN-m
$M/bh^2 = 1.097$ $\rho = 0.667$ Use V14@15

(15) Wall 5: $v = 336/.8/24/1000 = 0.18$ MPa $< v'_c$
$M = 2782$ KN-m
$M/bh^2 = 0.12 << 0.5$ Nominal

for all walls V14@15 H12@20


U1
U2
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
X12
U3
U4
Y06
Y05
Y04
Y03
Y02
Y01
V2
V1
Wall 5
Wall 1
Core 4
Core 1
Core 2
Core 5
Wall 4
Wall 2
Wall 3
Core 3

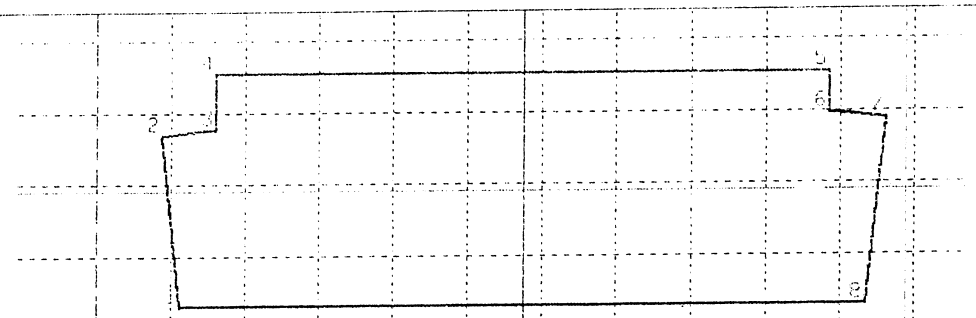
lculation: Properties of an Irregular Area

COORDINATES OF VERTEX POINTS

Point #	X (m)	Y (m)
1	11.270	53.120
2	8.770	76.910
3	16.190	77.690
4	16.190	85.470
5	98.570	85.470
6	98.570	79.770
7	106.180	78.970
8	103.470	53.120
9	11.270	53.120

Section Properties (Phi CCW +ve)

Area,	A =	2.97941E+03	m^2
X Coordinate of Centroid,	Xc =	57.607	m
Y Coordinate of Centroid,	Yc =	69.016	m
Moment of Inertia, Centroidal X-axis,	Ix =	2.50997E+05	m^4
Moment of Inertia, Centroidal Y-axis,	Iy =	2.12600E+06	m^4
Product of Inertia,	Ixy =	6.63047E+03	m^4
Angle, Cetroidal to Principal axes,	Phi =	90.190	Deg
Moment of Inertia, Principal X-axis,	Ix' =	2.12602E+06	m^4
Moment of Inertia, Principal Y-axis,	Iy' =	2.50973E+05	m^4



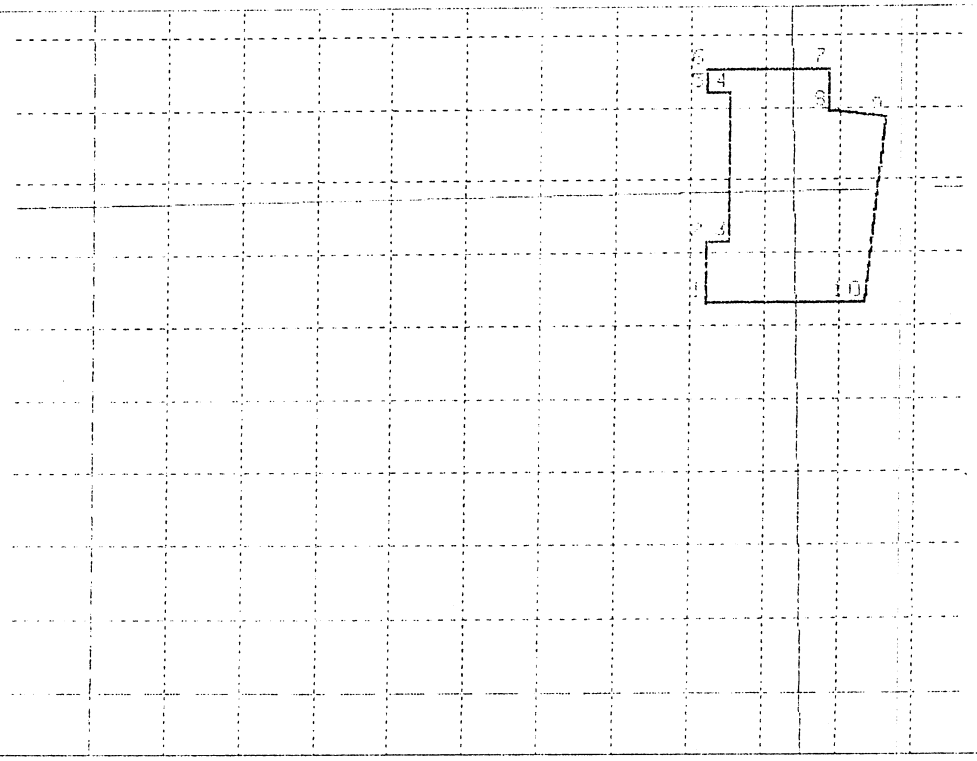
lculation: Properties of an Irregular Area

COORDINATES OF VERTEX POINTS

Point #	X (m)	Y (m)
1	82.070	53.170
2	82.070	61.420
3	85.240	61.590
4	85.240	82.220
5	82.070	82.220
6	82.070	85.420
7	98.520	85.420
8	98.520	79.730
9	106.130	78.830
10	103.420	53.170
11	82.070	53.170

Section Properties (Phi CCW +ve)

Area,	A =	6.28774E+02	m^2
X Coordinate of Centroid,	Xc =	93.958	m
Y Coordinate of Centroid,	Yc =	68.476	m
Moment of Inertia, Centroidal X-axis,	Ix =	5.26791E+04	m^4
Moment of Inertia, Centroidal Y-axis,	Iy =	2.24224E+04	m^4
Product of Inertia,	Ixy =	-4.98811E+02	m^4
Angle, Cetroidal to Principal axes,	Phi =	0.940	Deg
Moment of Inertia, Principal X-axis,	Ix' =	5.26873E+04	m^4
Moment of Inertia, Principal Y-axis,	Iy' =	2.24142E+04	m^4



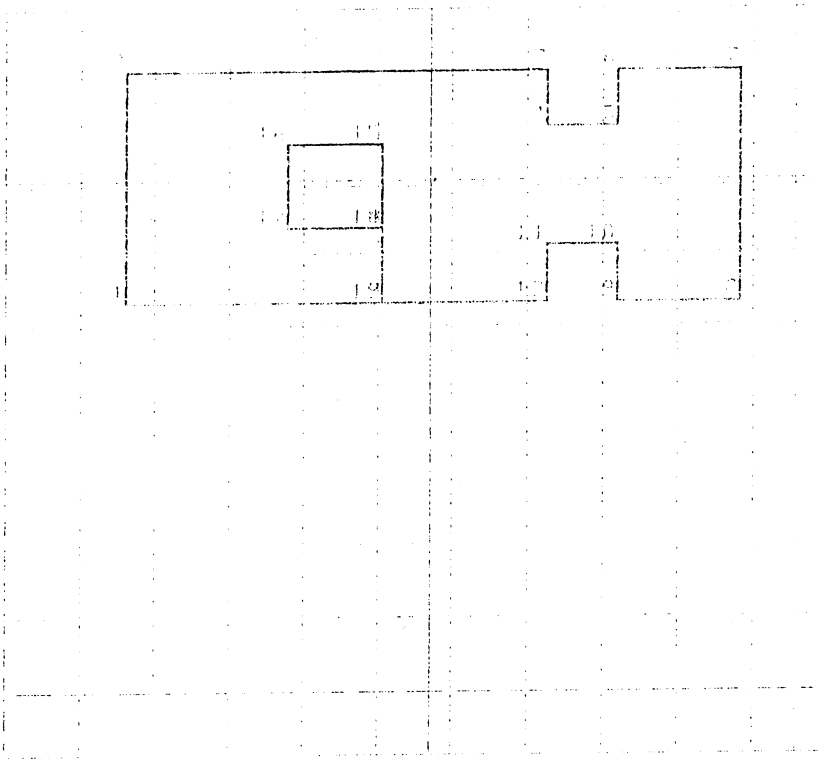
.lculation: Properties of an Irregular Area

COORDINATES OF VERTEX POINTS

Point #	X (m)	Y (m)
1	16.240	53.170
2	16.240	85.420
3	72.670	85.420
4	72.670	77.590
5	82.070	77.590
6	82.070	85.420
7	98.520	85.420
8	98.520	53.170
9	82.070	53.170
10	82.070	60.990
11	72.670	60.990
12	72.670	53.170
13	50.770	53.170
14	50.770	63.490
15	50.770	75.090
16	38.070	75.090
17	38.070	63.490
18	50.770	63.490
19	50.770	53.170
20	16.240	53.170

Section Properties (Phi CCW +ve)

Area,	A =	2.35910E+03	m^2
X Coordinate of Centroid,	Xc =	56.943	m
Y Coordinate of Centroid,	Yc =	69.295	m
Moment of Inertia, Centroidal X-axis,	Ix =	2.05648E+05	m^4
Moment of Inertia, Centroidal Y-axis,	Iy =	1.40999E+06	m^4
Product of Inertia,	Ixy =	-2.41054E+01	m^4
Angle, Cetroidal to Principal axes,	Phi =	90.000	Deg
Moment of Inertia, Principal X-axis,	Ix' =	1.40999E+06	m^4
Moment of Inertia, Principal Y-axis,	Iy' =	2.05648E+05	m^4



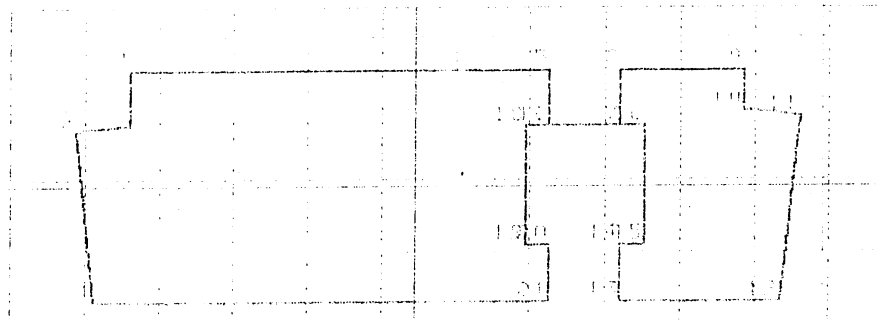
lculation: Properties of an Irregular Area

COORDINATES OF VERTEX POINTS

Point #	X (m)	Y (m)
1	11.270	53.170
2	8.770	76.910
3	16.190	77.690
4	16.190	85.470
5	72.670	85.470
6	72.670	77.590
7	82.070	77.590
8	82.070	85.470
9	98.570	85.470
10	98.570	79.770
11	106.180	78.970
12	103.470	53.120
13	82.070	53.170
14	82.070	60.990
15	85.270	60.990
16	85.270	77.590
17	72.670	77.590
18	69.470	77.590
19	69.470	60.990
20	72.670	60.990
21	72.670	53.170
22	11.270	53.170

Section Properties (Phi CCW +ve)

Area,	A =	2.56541E+03	m^2
X Coordinate of Centroid,	Xc =	54.459	m
Y Coordinate of Centroid,	Yc =	68.994	m
Moment of Inertia, Centroidal X-axis,	Ix =	2.21097E+05	m^4
Moment of Inertia, Centroidal Y-axis,	Iy =	1.93136E+06	m^4
Product of Inertia,	Ixy =	3.68708E+03	m^4
Angle, Cetroidal to Principal axes,	Phi =	90.120	Deg
Moment of Inertia, Principal X-axis,	Ix' =	1.93137E+06	m^4
Moment of Inertia, Principal Y-axis,	Iy' =	2.21089E+05	m^4



STOREY HEIGHTS & FLOOR SLAB LEVELS

Level #	Name	Storey Height	Floor Slab Level Above Base	Above Grnd
1	Roof		19.90	13.40
2	2nd	5.90	14.00	7.50
3	1st	3.75	10.25	3.75
4	Grd	3.75	6.50	0.00
5	Bas	5.50	1.00	-5.50

Dist. from Floor of Bas Storey to Base Level = 1.00 m
Dist. Between Base Level and Ground Level = 6.50 m
Height of Parapet Above 2nd Storey = 1.50 m

==========

WIND LOAD CALCULATION
CODE : Jordanian Building Code 1986

BUILDING DIMENSIONS

Height of the Building = 14.90 m
Length of the building (in plan) = 94.91 m
Breadth of the building (in plan) = 32.30 m

WIND LOAD CALCULATION FACTORS

Basic Wind Speed = 35 m/sec

TOPOGRAPHY FACTOR S1 = 1.0

Building is not on a very exposed hill slope or crest. Neither is it in a valley shaped to produce funneling of the wind.

Ground Roughness Category = 2

Open country with scattered obstructions.

Building Class C

Greatest dimension of building exceeds 50 metres.

STATISTICAL FACTOR S3 = 1

Force Coefficient(s)

Determined from TABLE 10
For Wind acting on Long Facade: Cf =1.094
For Wind acting on Short Facade: Cf =0.703

==========

WIND LOAD ACTING ON LONG FACADE OF BUILDING

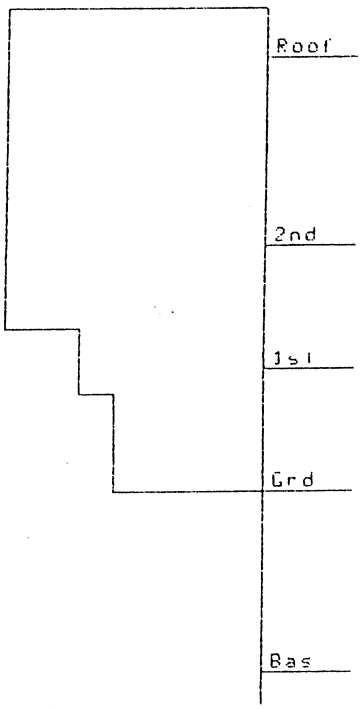
HEIGHT (m)	Factor S2	Design Wind Speed (m/sec)	DYNAMIC PRESSURE (kN/m^2)	WIND FORCE (kN/m^2)
0.00	0.63	22.05	0.298	0.326
3.00	0.63	22.05	0.298	0.326
5.00	0.70	24.50	0.368	0.402
10.00	0.83	29.05	0.517	0.566
14.90	0.83	29.05	0.517	0.566

WIND LOAD ACTING ON SHORT FACADE OF BUILDING

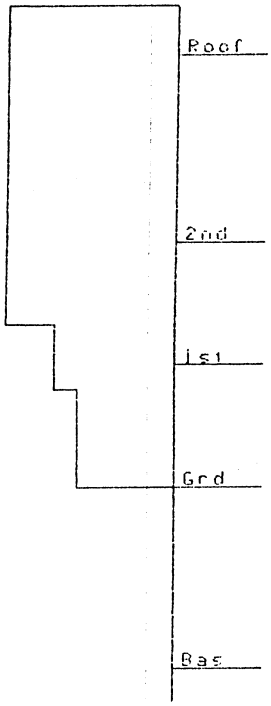
HEIGHT (m)	Factor S2	Design Wind Speed (m/sec)	DYNAMIC PRESSURE (kN/m^2)	WIND FORCE (kN/m^2)
0.00	0.63	22.05	0.298	0.210
3.00	0.63	22.05	0.298	0.210
5.00	0.70	24.50	0.368	0.259
10.00	0.83	29.05	0.517	0.364
14.90	0.83	29.05	0.517	0.364

EFFECTIVE WIND FORCES AT FLOOR SLAB LEVELS

Level (t-b) #	Name	Slab Level Above Grnd (m)	FORCE ON LONG FACADE (kN)	FORCE ON SHORT FACADE (kN)
1	Roof	13.40	238.99	52.28
2	2nd	7.50	259.13	56.68
3	1st	3.75	144.77	31.67
4	Grd	0.00	58.02	12.69
5	Bas	-5.50	0.00	0.00
	BASE SHEAR		700.91	153.32
	OVERTURNING MOMENT		10244.72	2241.00



LONG FACADE



SHORT FACADE

PROFILE OF WIND FORCES AT FLOOR SLAB LEVELS

EARTHQUAKE LOAD CALCULATION
CODE : Jordanian Building Code 1986

BUILDING DIMENSIONS

Height of the Building =	19.90 m
Length of the building (in plan) =	94.91 m
Breadth of the building (in plan) =	32.30 m

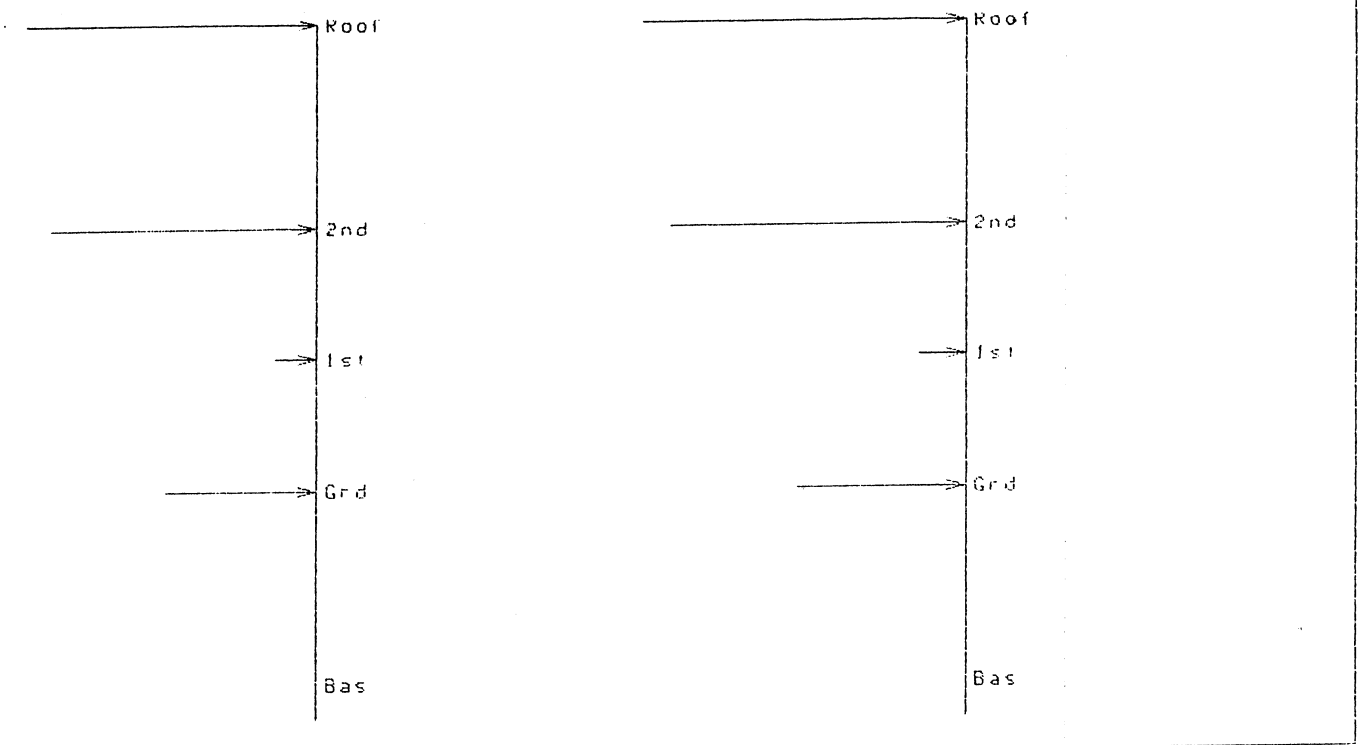
EARTHQUAKE LOAD CALCULATION FACTORS

INTENSITY FACTOR	Alpha = 0.50	ZONE B	
OCCUPANCY IMPORTANCE FACTOR	Eta = 1.20		
BEHAVIOUR FACTOR	Theta = 1.33		
Fundamental Period of building	T = 0.17 sec	in Short Direction	
	T = 0.07 sec	in Long Direction	
DYNAMIC FACTOR	Beta = 0.09	in Short Direction	
	Beta = 0.10	in Long Direction	
Characteristic Site Period	Ts= 0.60 sec		
SOIL FACTOR	Delta = 1.30	in Short Direction	
	Delta = 1.30	in Long Direction	
BASE SHEAR COEFFICIENT	Coeff.= .093	in Short Direction	
	Coeff.= .104	in Long Direction	

EQUIVALENT STATIC EARTHQUAKE FORCES AT FLOOR SLAB LEVELS

Level (t-b) #	Name	Slab Level Above Base (m)	Storey Mass (kN)	FORCE IN SHORT DIR. (kN)	FORCE IN LONG DIR. (kN)
1	Roof	19.90	30780.0	3921.4	4369.7
2	2nd	14.00	40103.0	3594.4	4005.3
3	1st	10.25	8932.0	586.1	653.1
4	Grd	6.50	49451.0	2057.8	2293.1
5	Bas	1.00	0.0	0.0	0.0
	BASE SHEAR			10159.8	11321.2
	OVERTURNING MOMENT			147741.1	164630.0

H/Ds in Short Direction = .62
H/Ds in Long Direction = .21



SHORT DIRECTION LONG DIRECTION

EQUIVALENT STATIC EARTHQUAKE FORCES AT FLOOR SLAB LEVELS

COORDINATES OF VERTEX POINTS (mm)

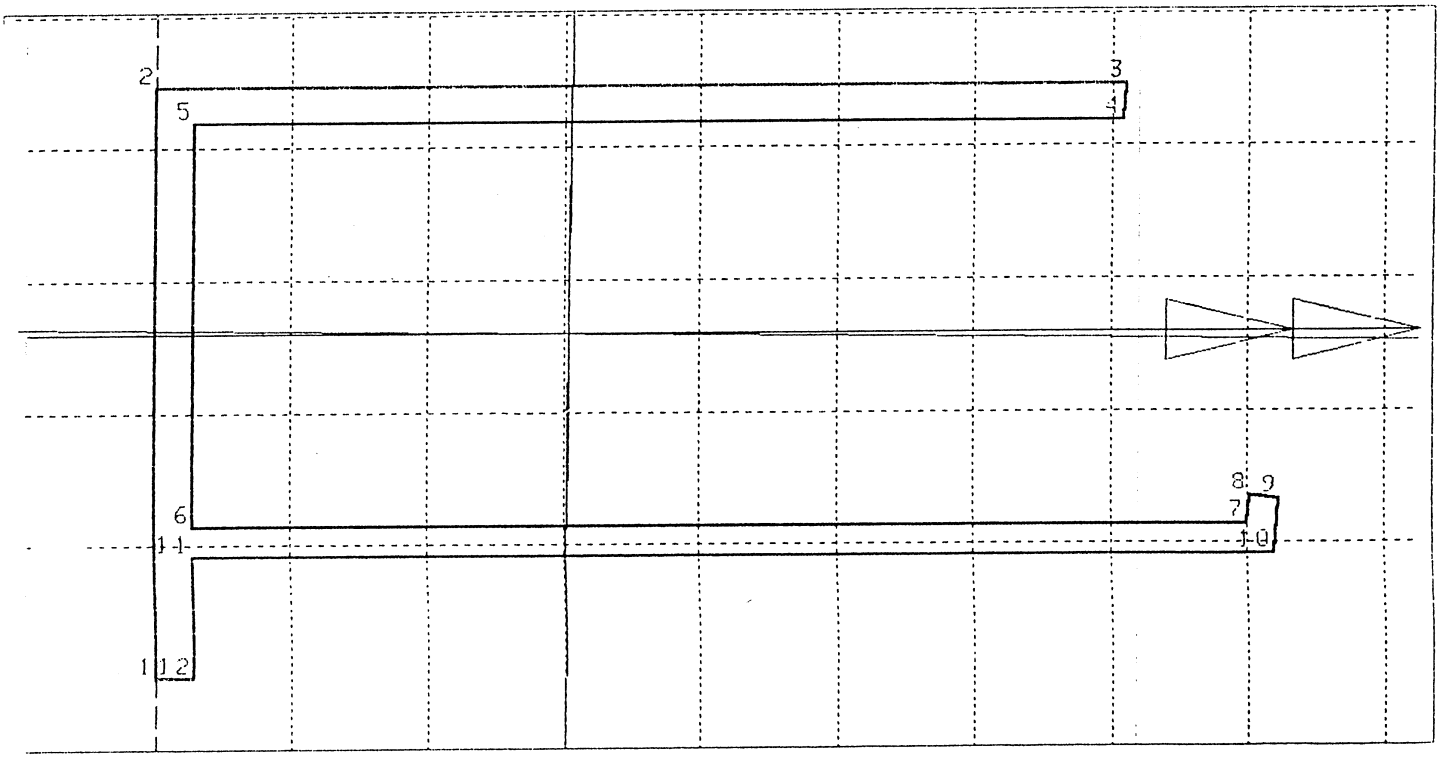
Point	X	Y
1	0.0	0.0
2	0.0	4025.0
3	6389.0	4025.0
4	6369.0	3775.0
5	250.0	3775.0
6	250.0	1025.0
7	7194.0	1025.0
8	7214.0	1218.0
9	7413.0	1197.0
10	7374.0	825.0
11	250.0	825.0
12	250.0	0.0
13	0.0	0.0

Properties of Concrete Section (Phi CCW +ve)

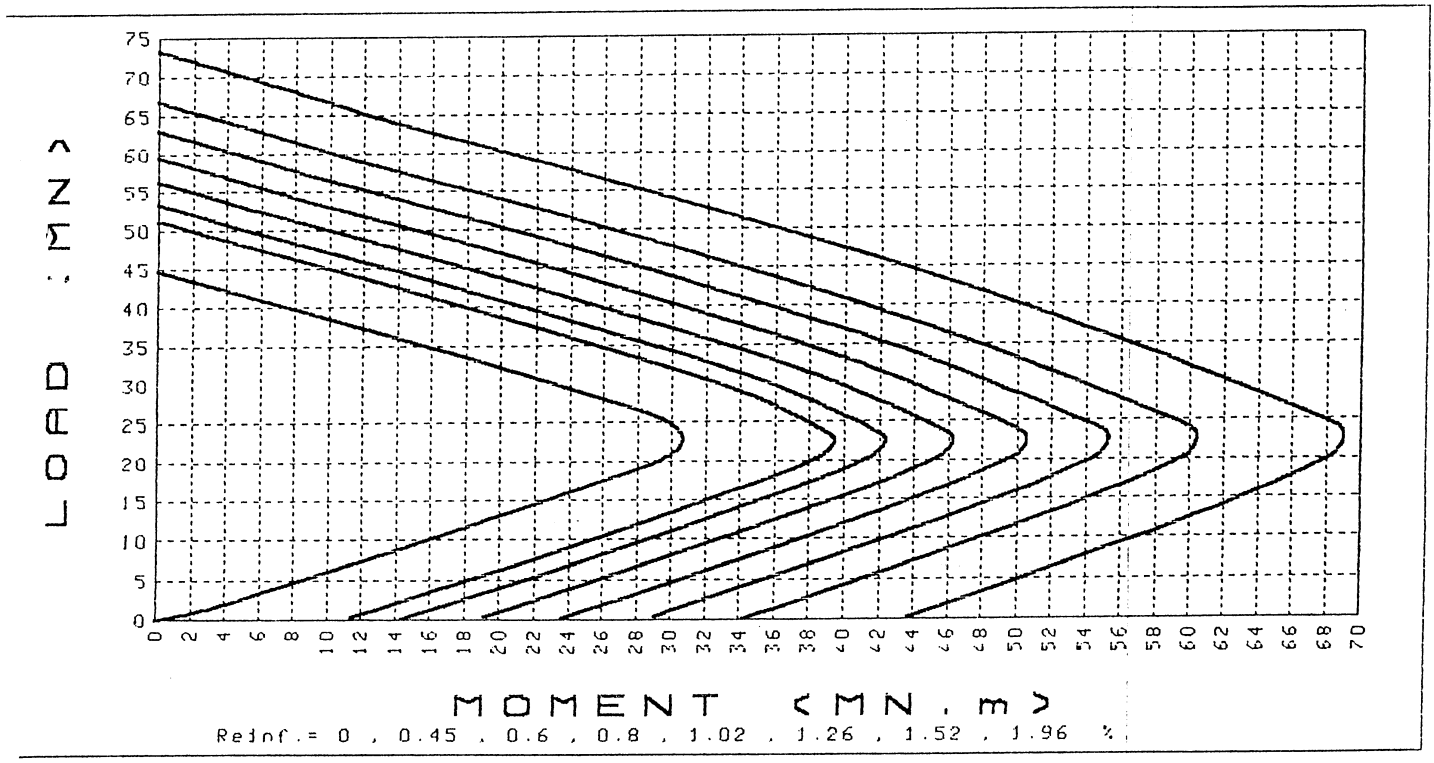
Area,	A =	4.00209E+06	mm^2
X Coordinate of Centroid,	Xc =	2728	mm
Y Coordinate of Centroid,	Yc =	2339	mm
Moment of Inertia, Centroidal X-axis,	Ix =	8.12018E+12	mm^4
Moment of Inertia, Centroidal Y-axis,	Iy =	2.06602E+13	mm^4
Product of Inertia,	Ixy =	-1.44191E+11	mm^4
Angle, Cetroidal to Principal axes,	Phi =	89.330	Deg
Moment of Inertia, Principal X-axis,	Ix' =	2.06619E+13	mm^4
Moment of Inertia, Principal Y-axis,	Iy' =	8.11852E+12	mm^4

TYPE OF ANALYSIS: Simplified.
Lack of Symmetry about Principal Axes Ignored.

ment Vector Angle, Theta = 360 degees CCW FROM x-axis

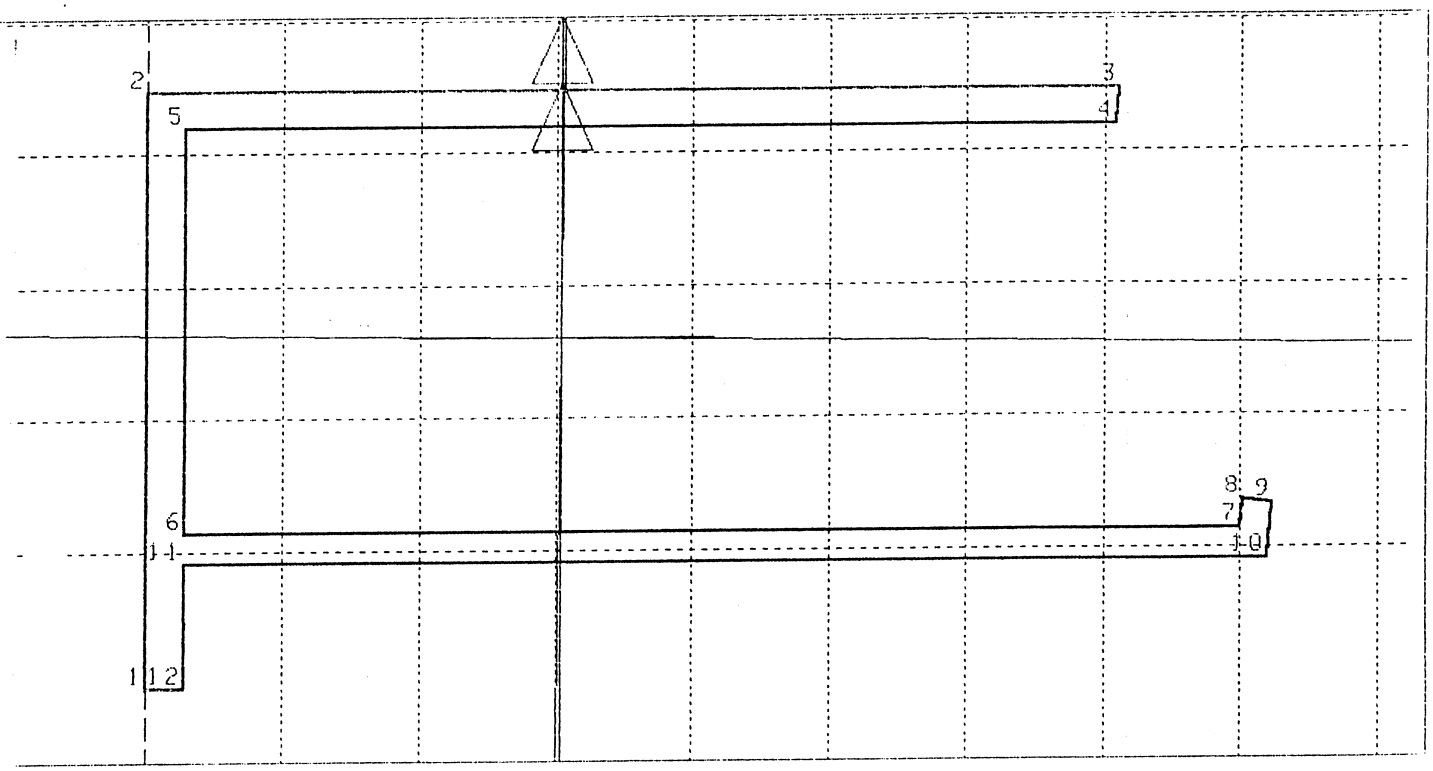


fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110

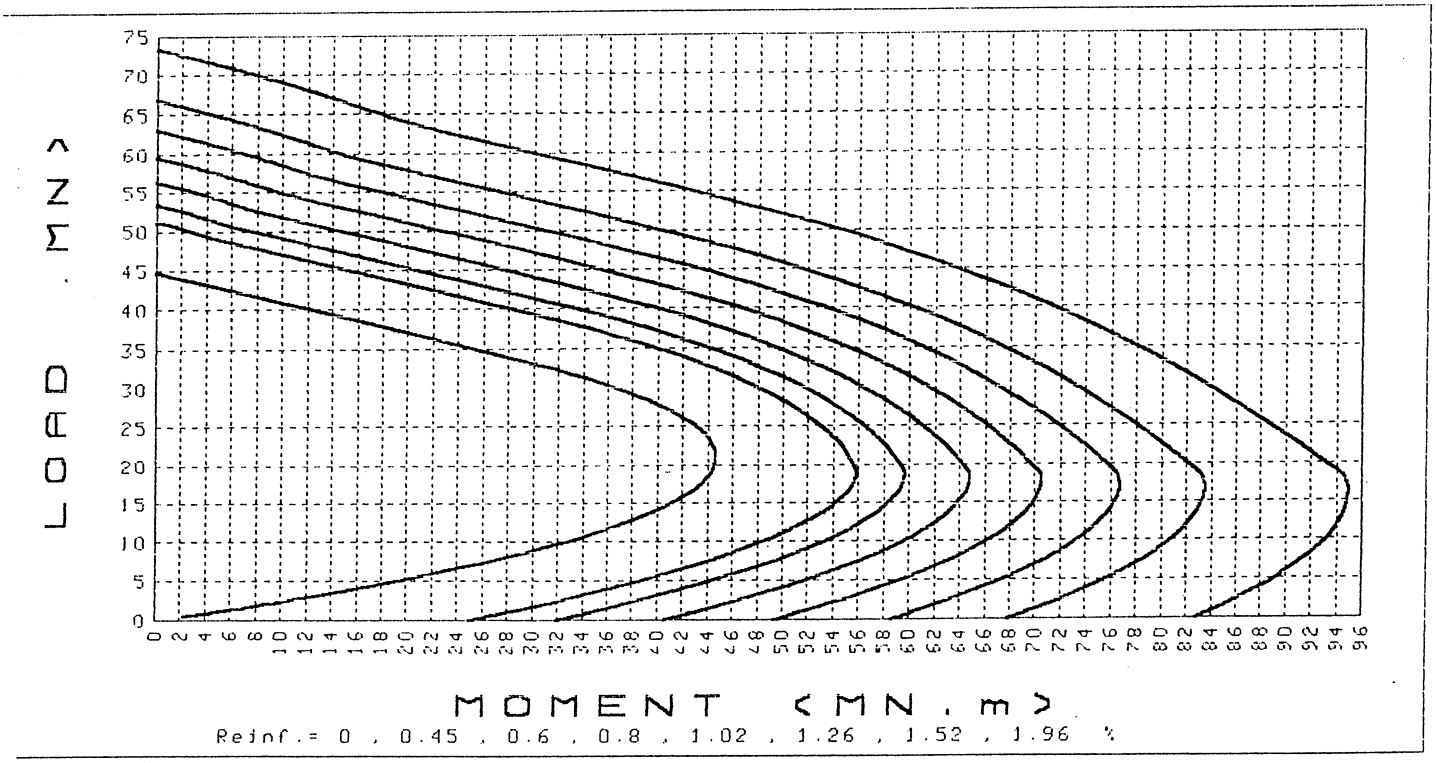


CODE : BS8110

ment Vector Angle, Theta = 90 degees CCW FROM x-axis

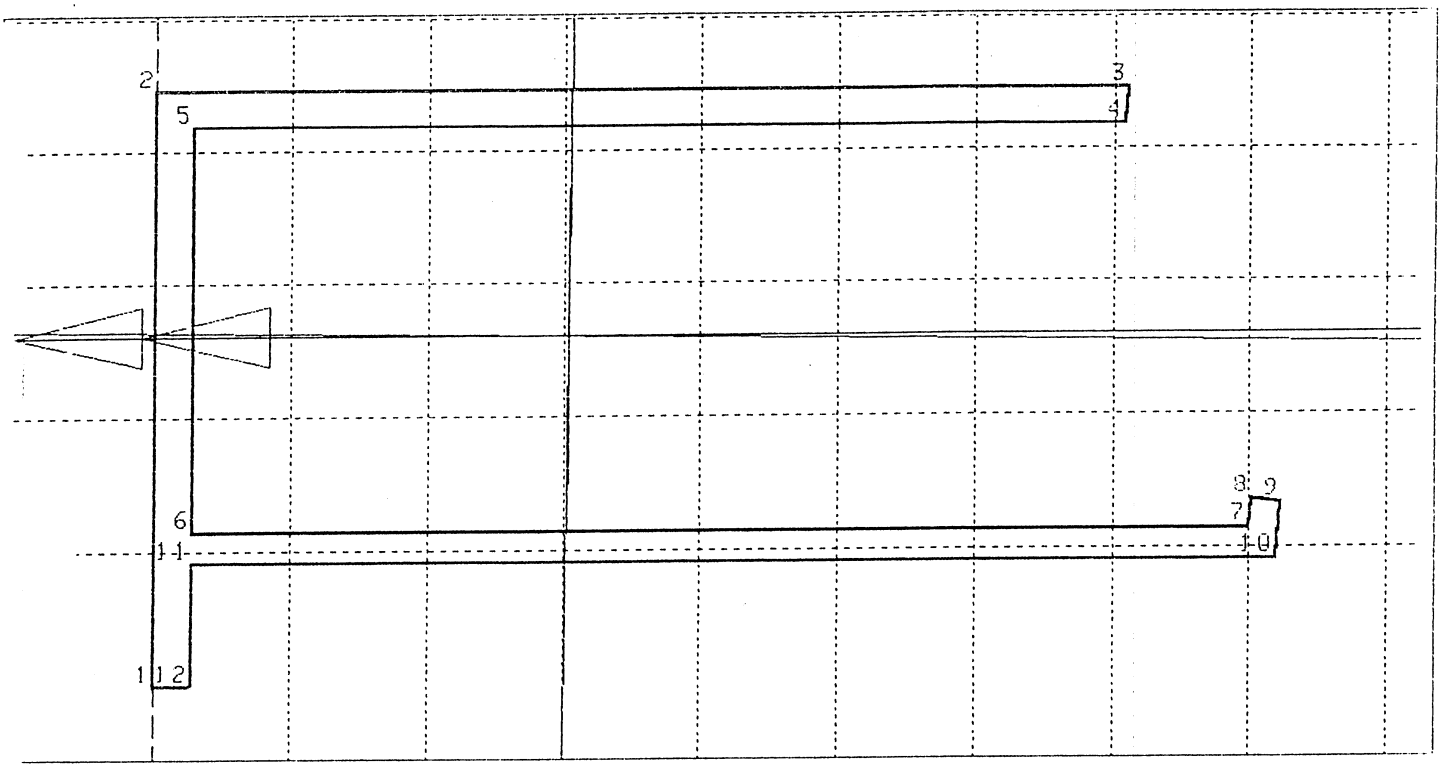


fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110

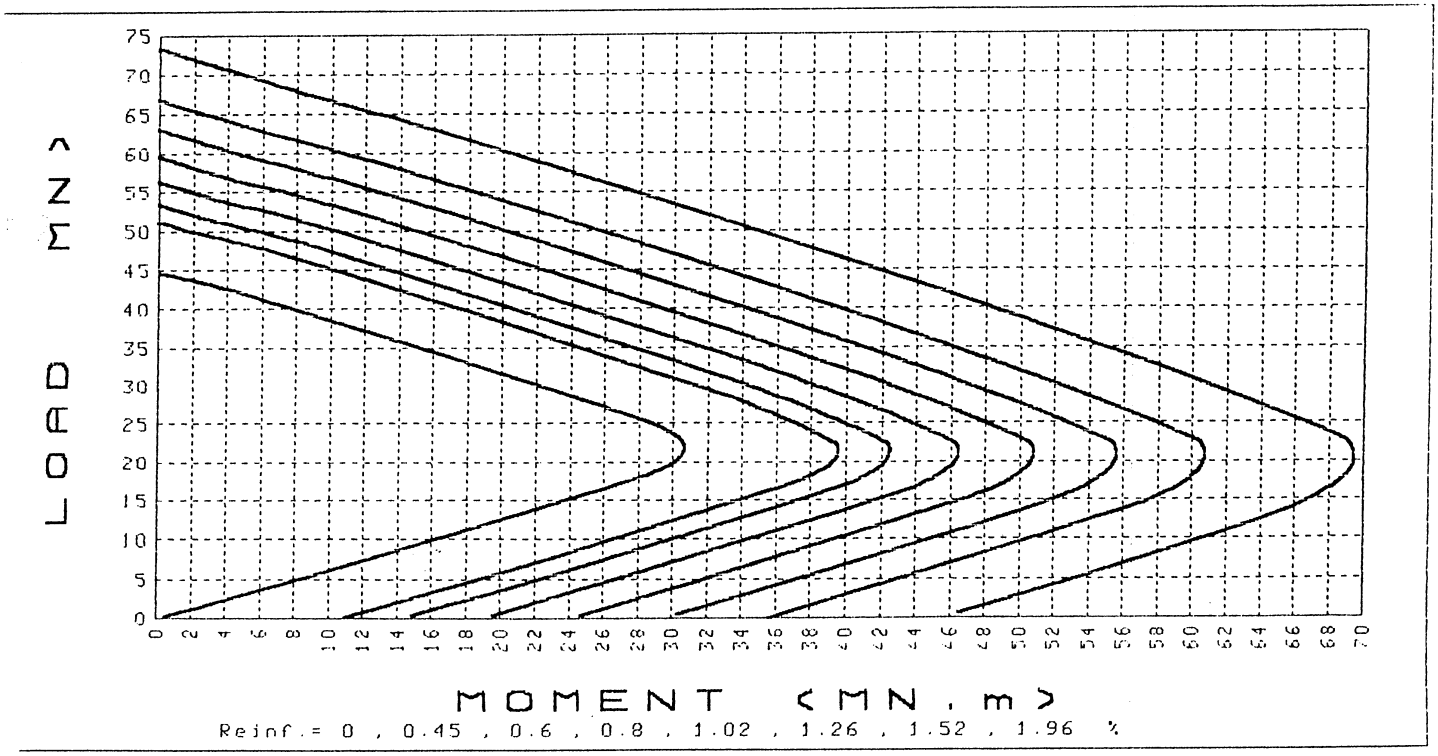


CODE : BS8110

ment Vector Angle, Theta = 180 degees CCW FROM x-axis

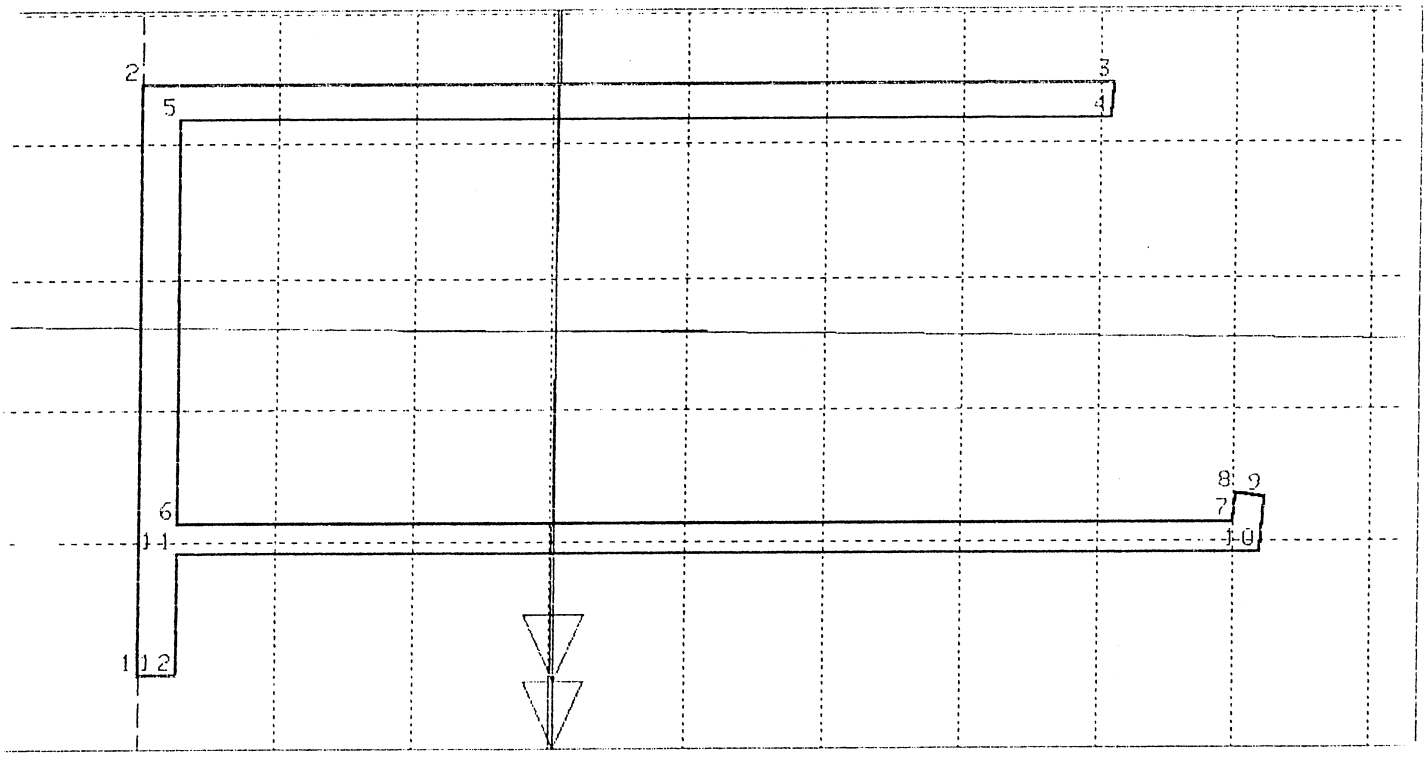


fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110

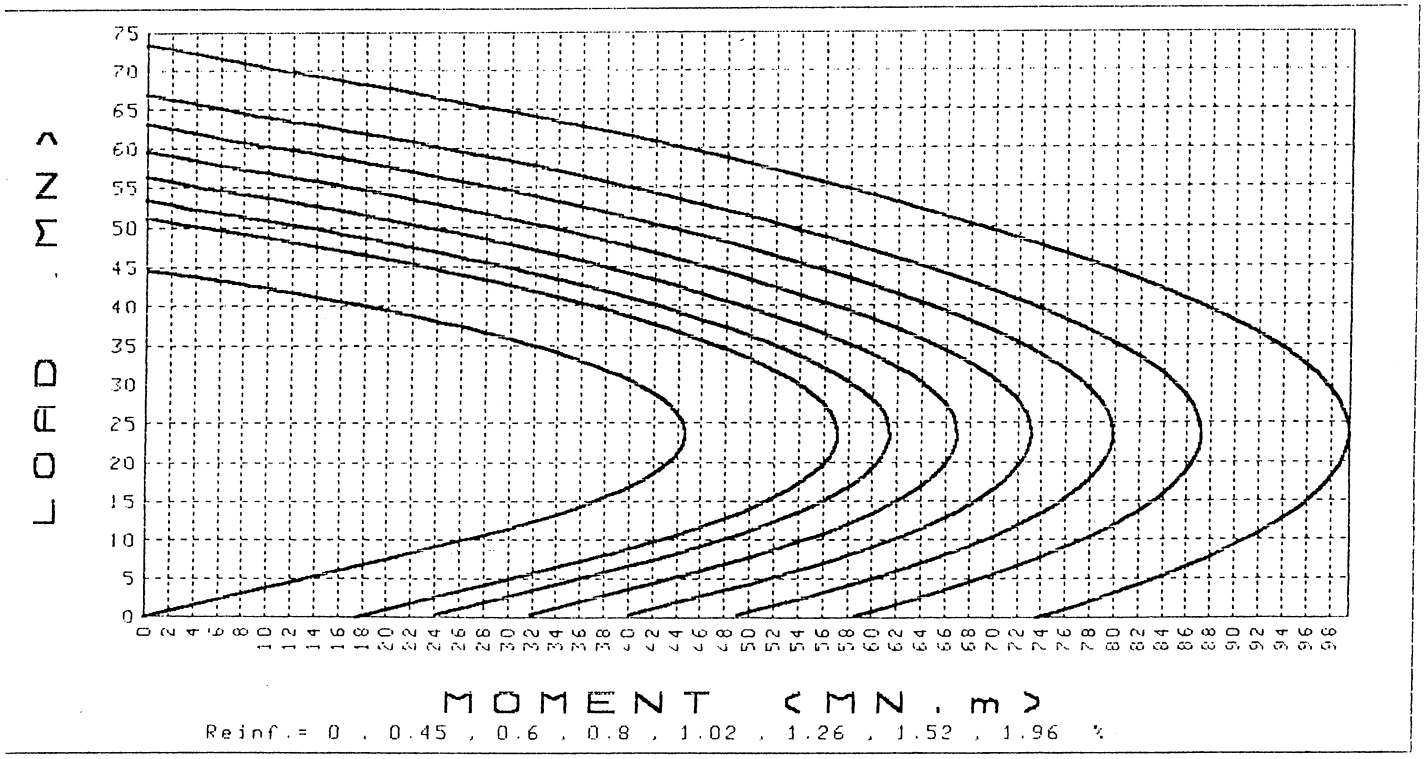


CODE : BS8110

ment Vector Angle, Theta = 270 degees CCW FROM x-axis



fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110



CODE : BS8110

COORDINATES OF VERTEX POINTS (mm)

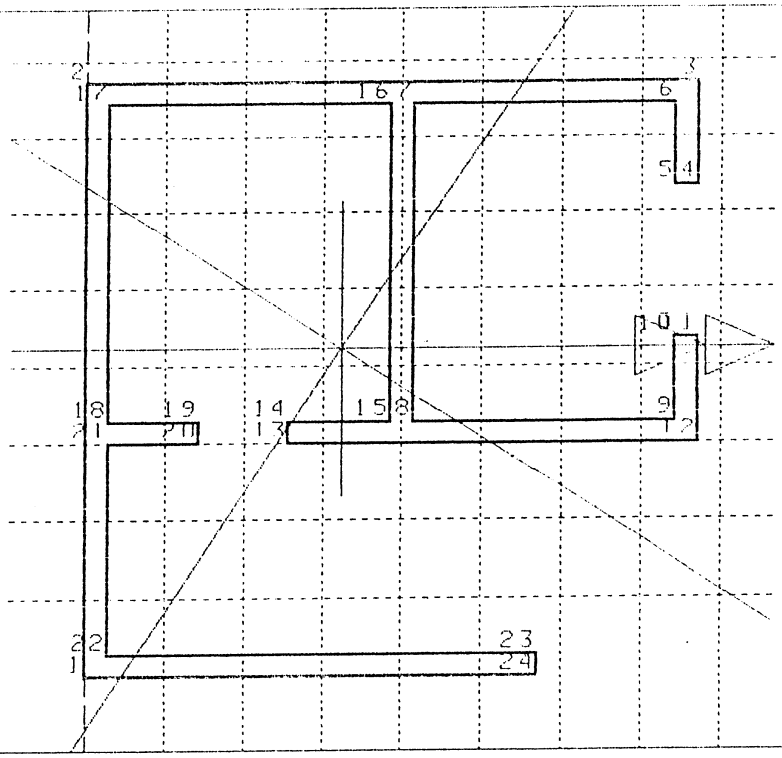
Point	X	Y
1	0.0	0.0
2	0.0	5400.0
3	5400.0	5400.0
4	5400.0	4450.0
5	5200.0	4450.0
6	5200.0	5200.0
7	2900.0	5200.0
8	2900.0	2300.0
9	5200.0	2300.0
10	5200.0	3050.0
11	5400.0	3050.0
12	5400.0	2100.0
13	1800.0	2100.0
14	1800.0	2300.0
15	2700.0	2300.0
16	2700.0	5200.0
17	200.0	5200.0
18	200.0	2300.0
19	1000.0	2300.0
20	1000.0	2100.0
21	200.0	2100.0
22	200.0	200.0
23	4000.0	200.0
24	4000.0	0.0
25	0.0	0.0

Properties of Concrete Section (Phi CCW +ve)

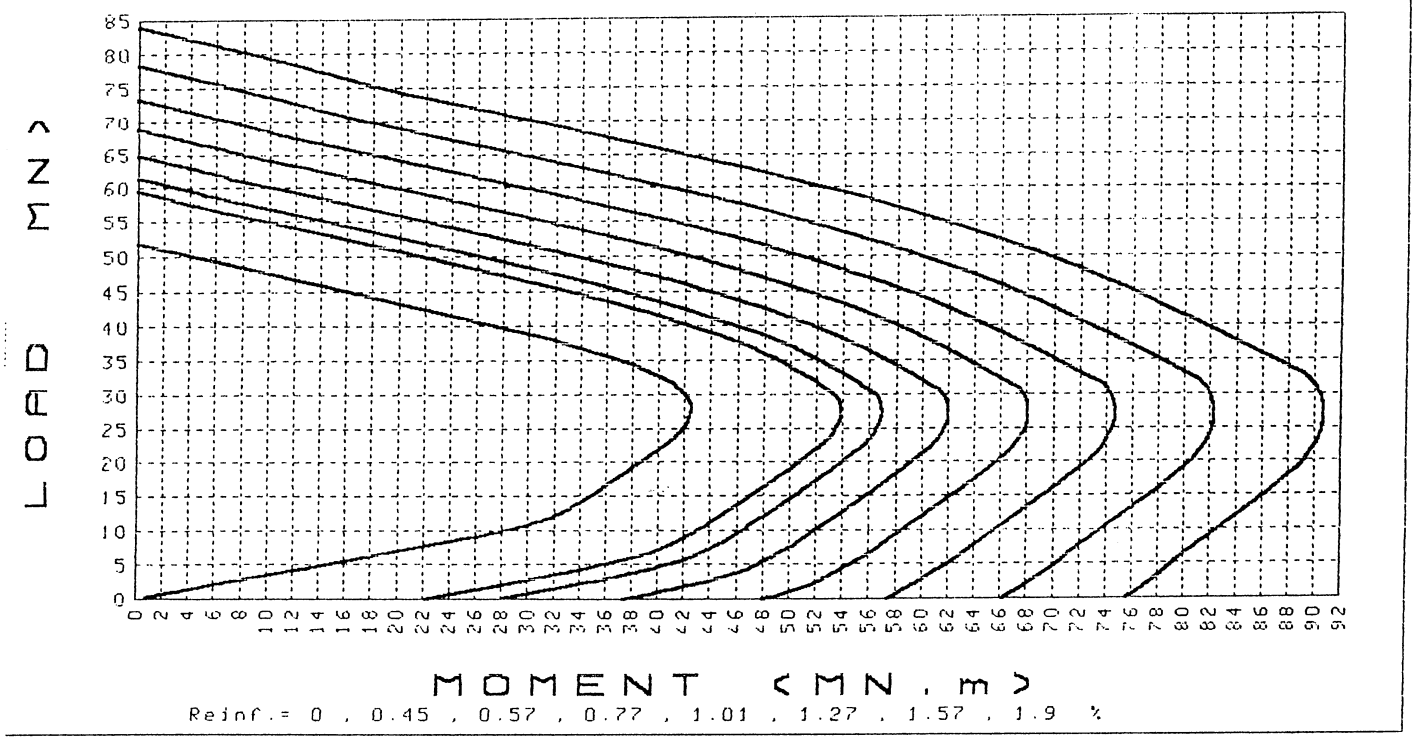
Area,	A =	4.64000E+06	mm^2
X Coordinate of Centroid,	Xc =	2267	mm
Y Coordinate of Centroid,	Yc =	2961	mm
Moment of Inertia, Centroidal X-axis,	Ix =	1.64422E+13	mm^4
Moment of Inertia, Centroidal Y-axis,	Iy =	1.40874E+13	mm^4
Product of Inertia,	Ixy =	2.70493E+12	mm^4
Angle, Cetroidal to Principal axes,	Phi =	146.740	Deg
Moment of Inertia, Principal X-axis,	Ix' =	1.82148E+13	mm^4
Moment of Inertia, Principal Y-axis,	Iy' =	1.23147E+13	mm^4

TYPE OF ANALYSIS: Simplified.
Lack of Symmetry about Principal Axes Ignored.

..ient Vector Angle, Theta = 360 degees CCW FROM x-axis

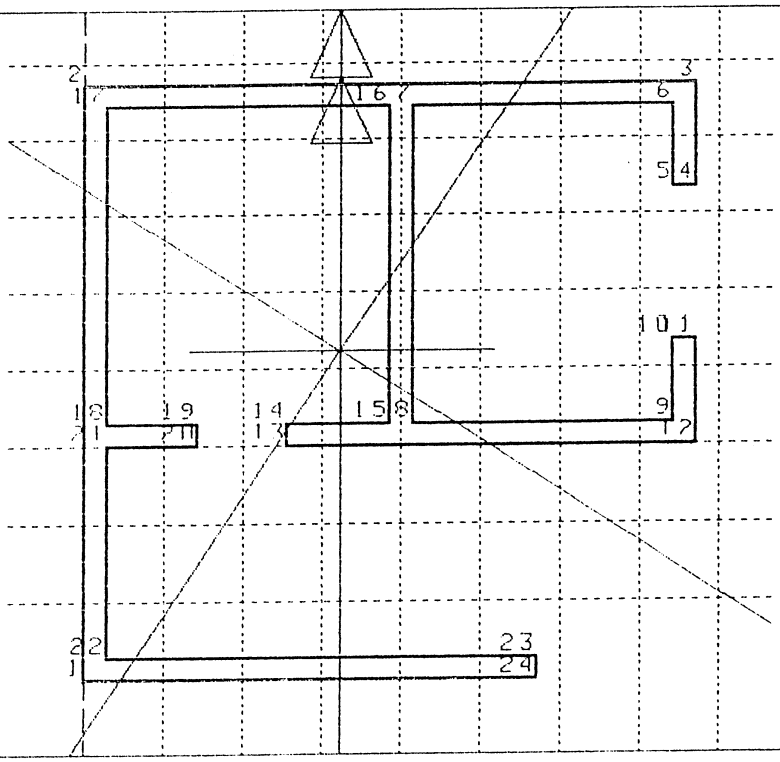


fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110

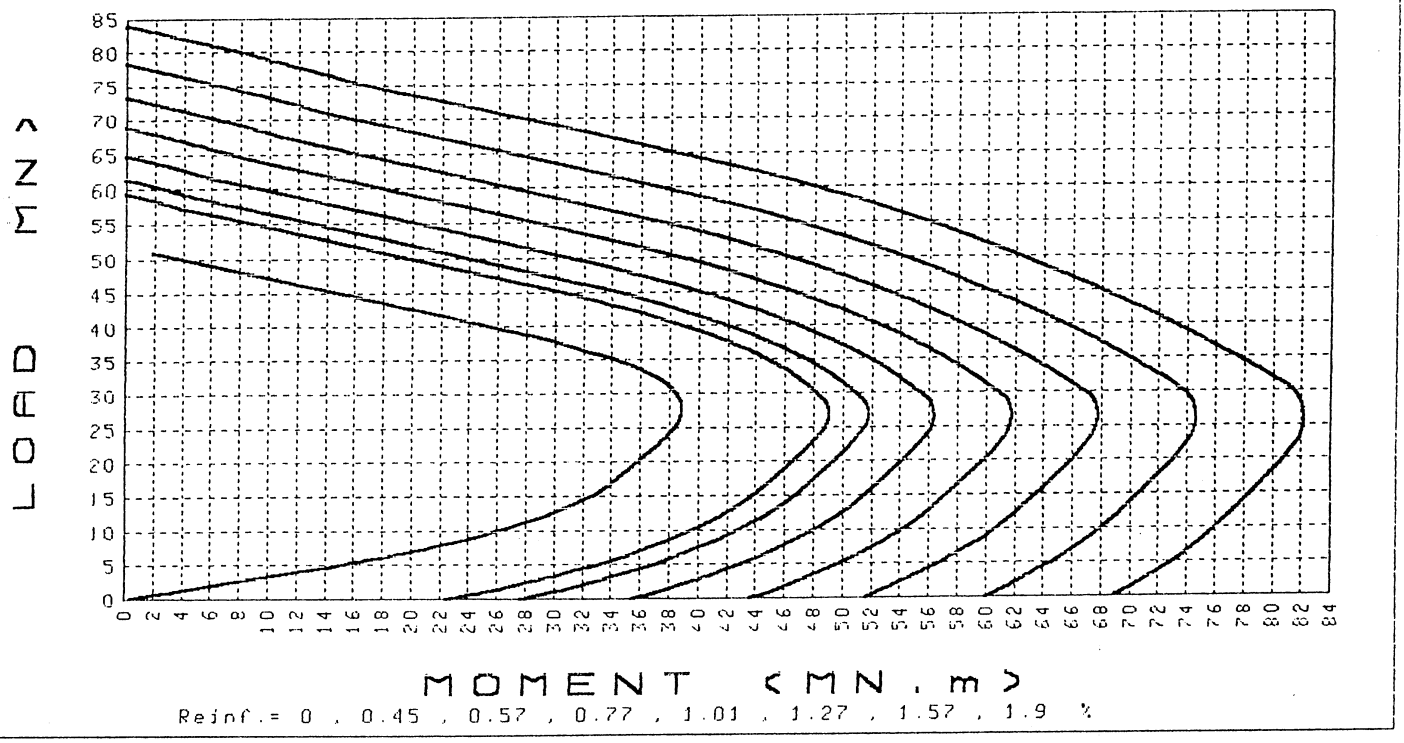


CODE : BS8110

.ment Vector Angle, Theta = 90 degees CCW FROM x-axis

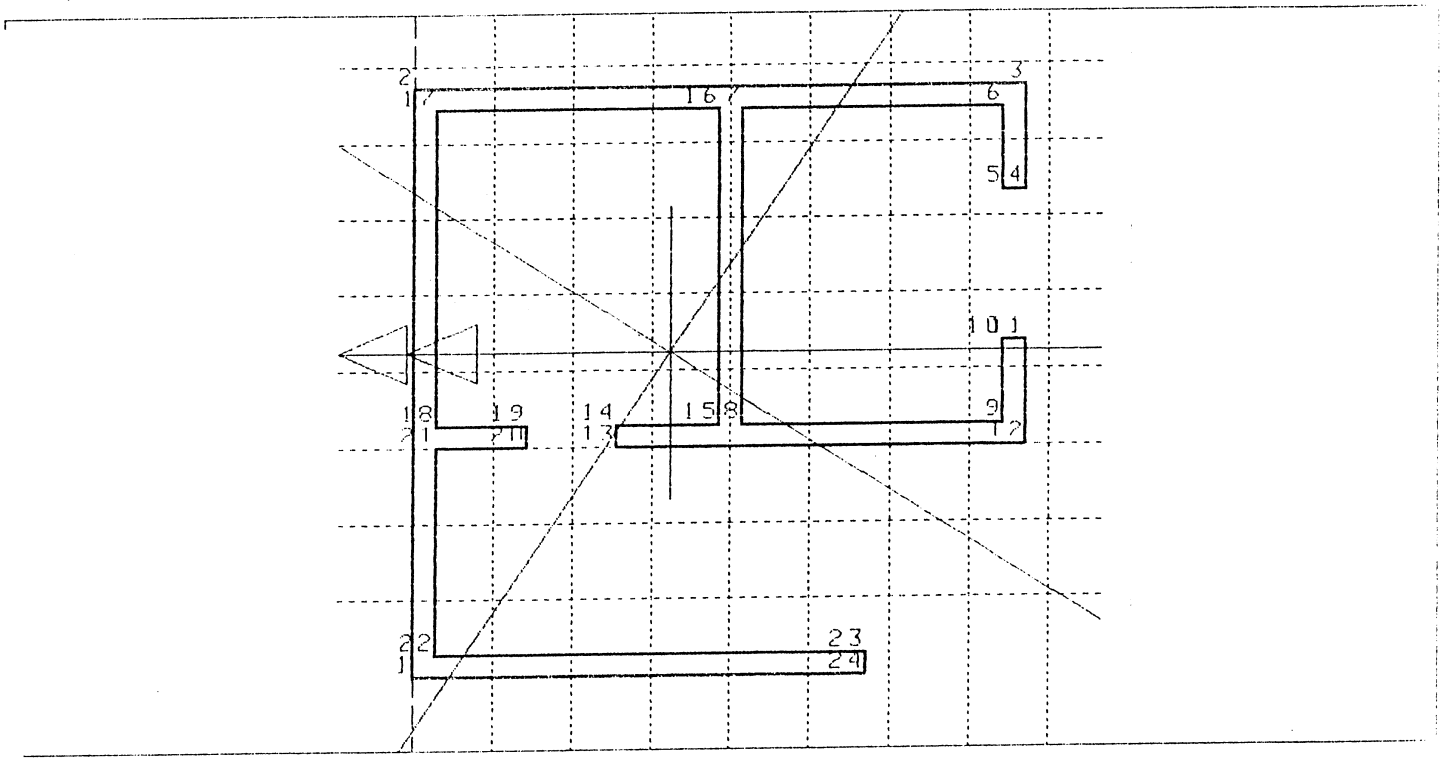


fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110

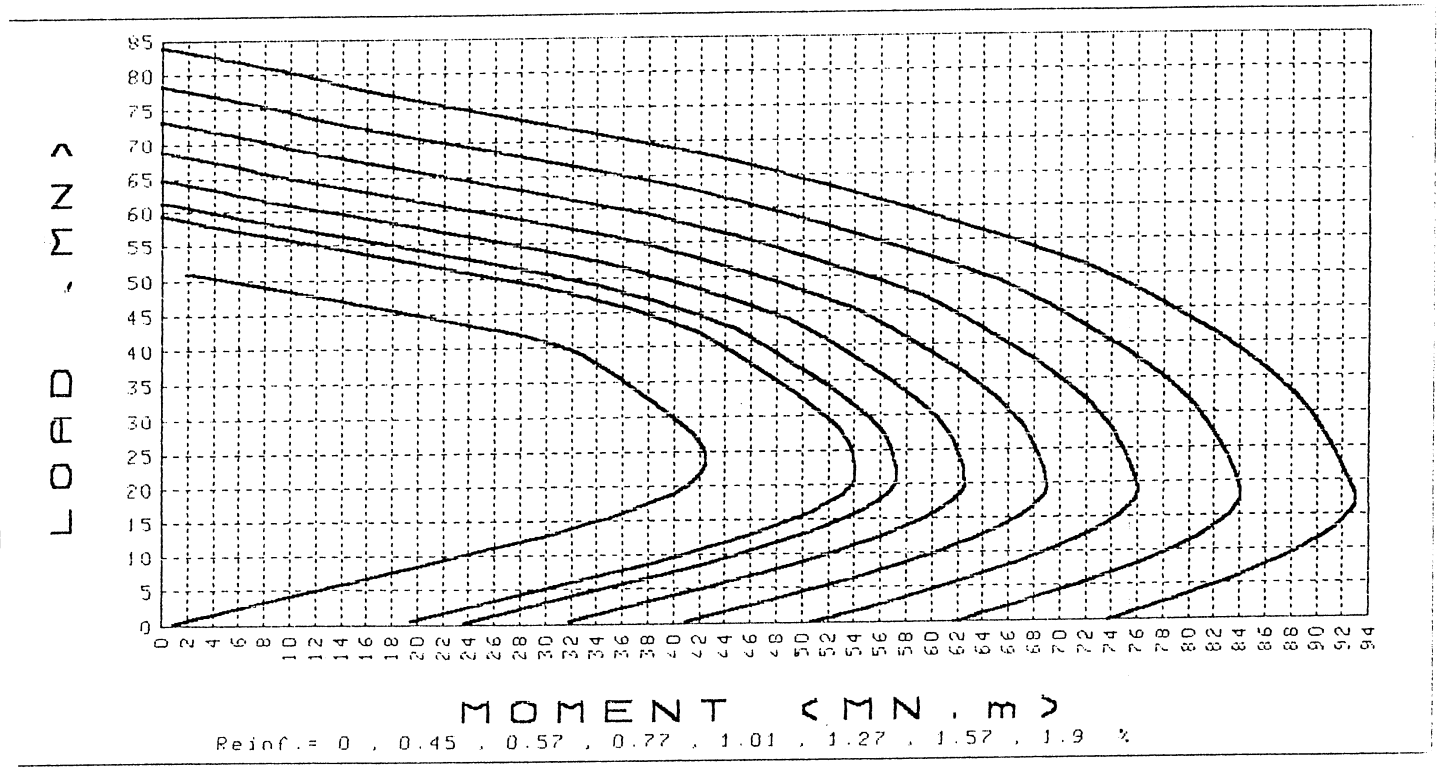


CODE : BS8110

oment Vector Angle, Theta = 180 degees CCW FROM x-axis

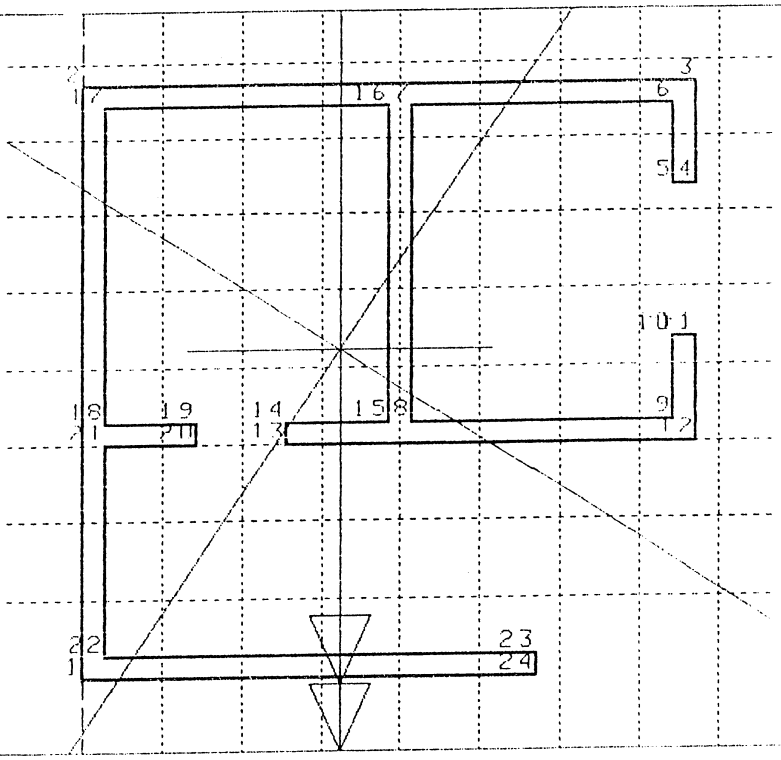


fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110

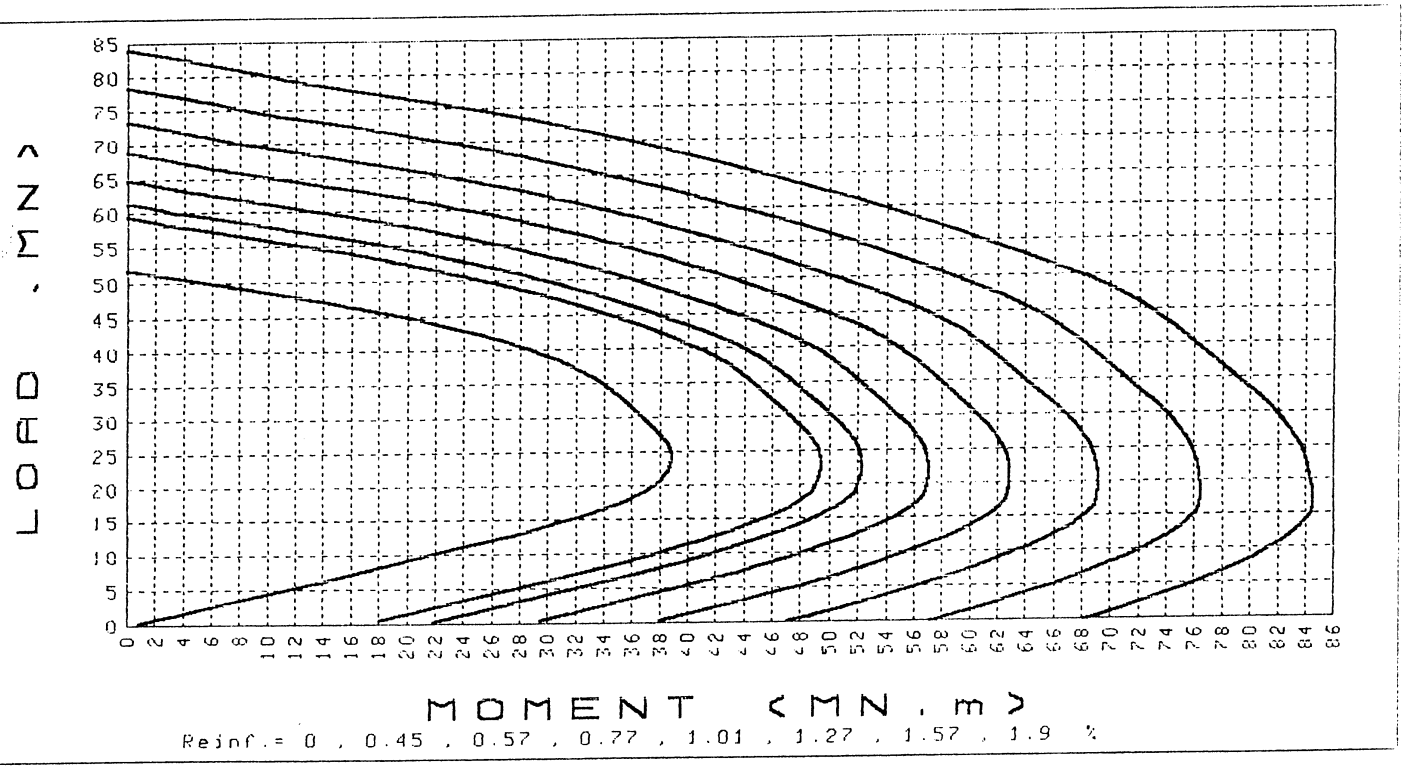


CODE : BS8110

ment Vector Angle, Theta = 270 degees CCW FROM x-axis



fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110



CODE : BS8110

COORDINATES OF VERTEX POINTS (mm)

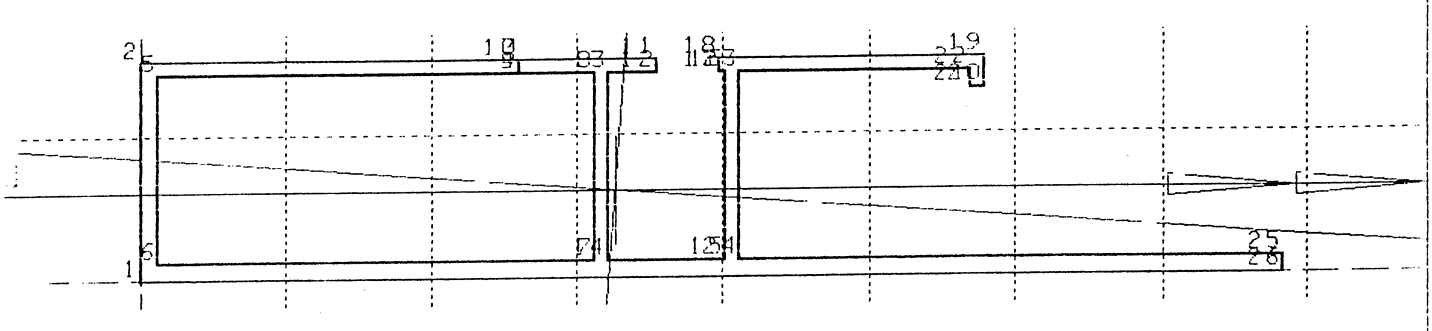
Point	X	Y
1	0.0	0.0
2	0.0	3200.0
3	5450.0	3200.0
4	5450.0	3000.0
5	250.0	3000.0
6	250.0	250.0
7	6550.0	250.0
8	6550.0	3000.0
9	5450.0	3000.0
10	5450.0	3200.0
11	7450.0	3200.0
12	7450.0	3000.0
13	6750.0	3000.0
14	6750.0	250.0
15	8450.0	250.0
16	8450.0	3000.0
17	8350.0	3000.0
18	8350.0	3200.0
19	12150.0	3200.0
20	12150.0	2750.0
21	11950.0	2750.0
22	11950.0	3000.0
23	8650.0	3000.0
24	8650.0	250.0
25	16450.0	250.0
26	16450.0	0.0
27	0.0	0.0

Properties of Concrete Section (Phi CCW +ve)

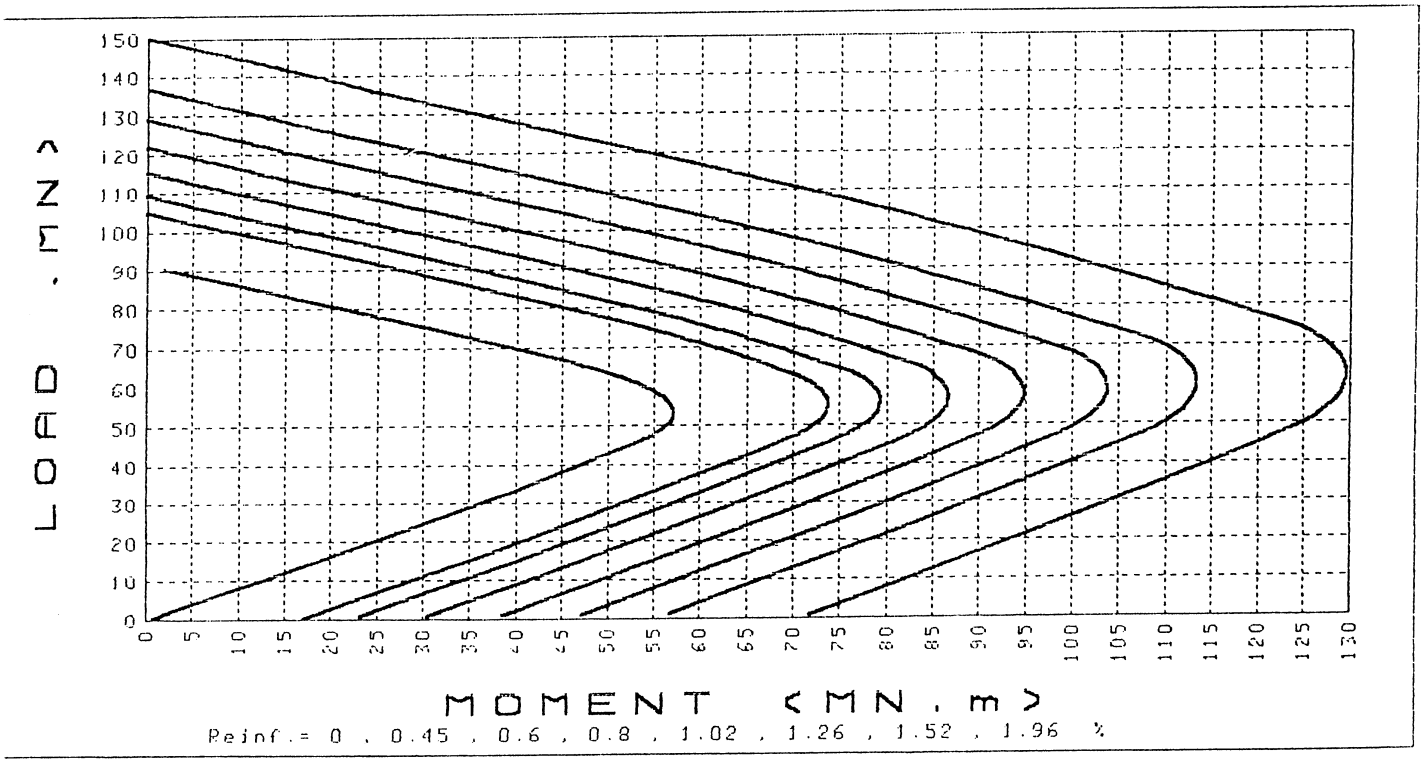
Area,	A =	8.20000E+06	mm^2
X Coordinate of Centroid,	Xc =	6855	mm
Y Coordinate of Centroid,	Yc =	1285	mm
Moment of Inertia, Centroidal X-axis,	Ix =	1.44345E+13	mm^4
Moment of Inertia, Centroidal Y-axis,	Iy =	1.65719E+14	mm^4
Product of Inertia,	Ixy =	-1.11986E+13	mm^4
Angle, Cetroidal to Principal axes,	Phi =	85.780	Deg
Moment of Inertia, Principal X-axis,	Ix' =	1.66543E+14	mm^4
Moment of Inertia, Principal Y-axis,	Iy' =	1.36100E+13	mm^4

TYPE OF ANALYSIS: Simplified.
Lack of Symmetry about Principal Axes Ignored.

ment Vector Angle, Theta = 360 degees CCW FROM x-axis

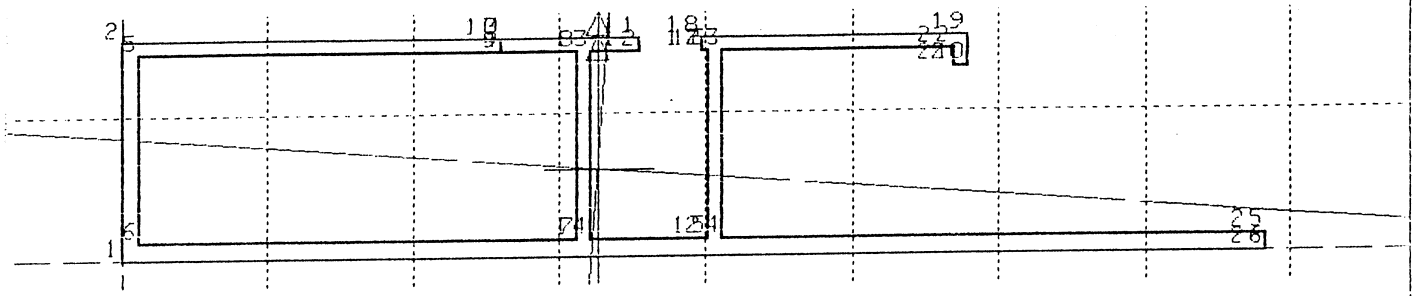


fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110

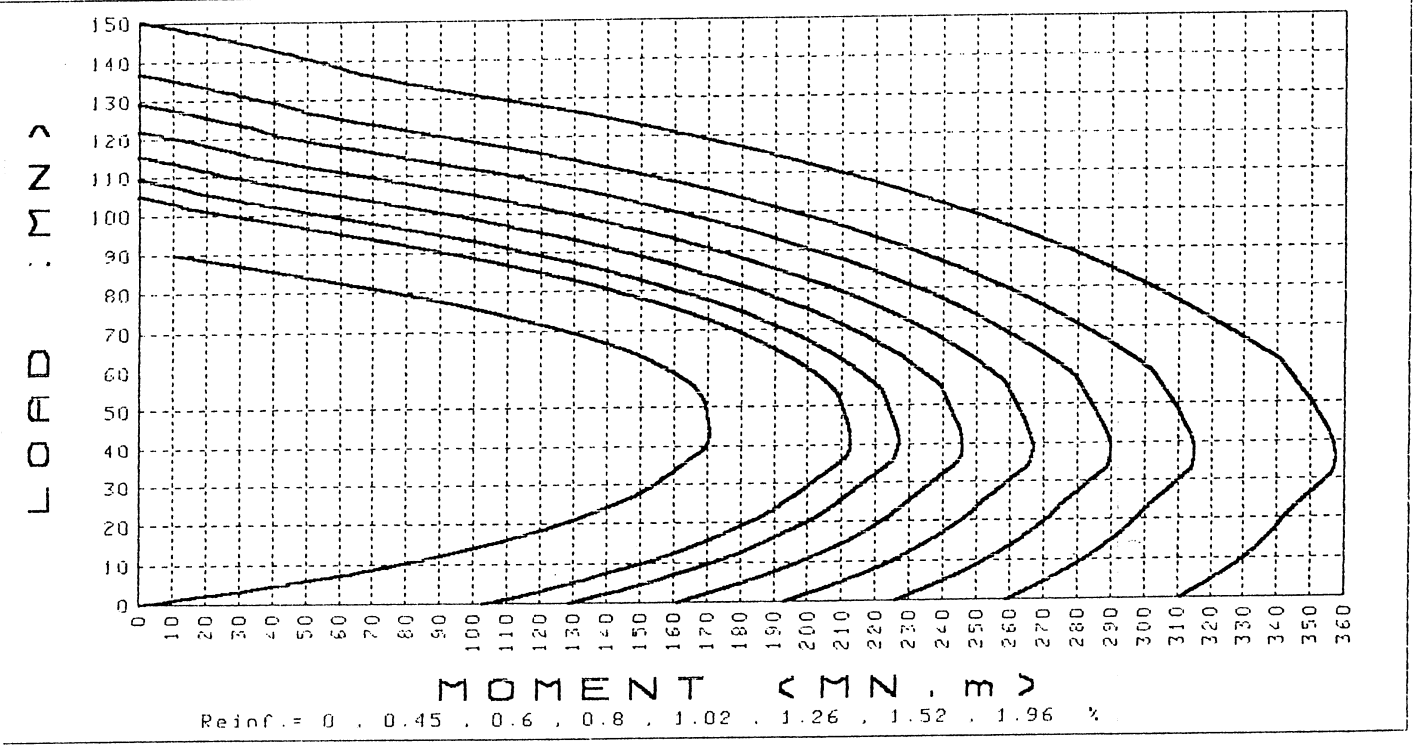


CODE : BS8110

ient Vector Angle, Theta = 90 degees CCW FROM x-axis

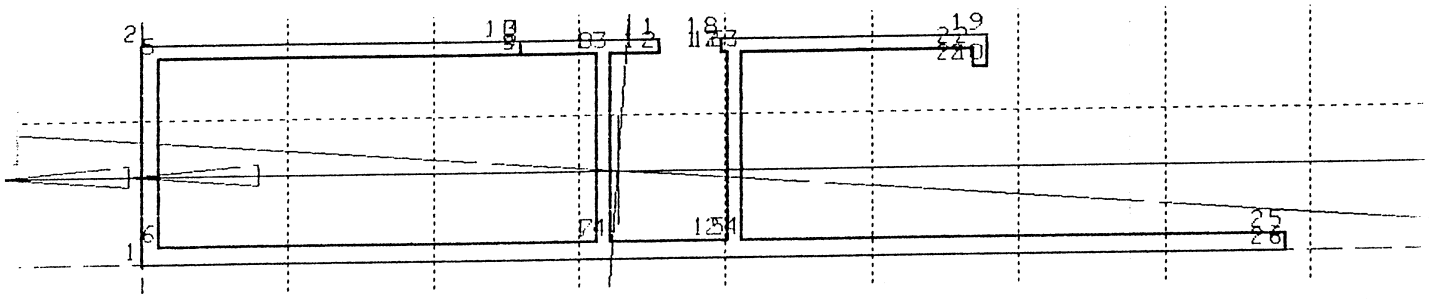


fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110

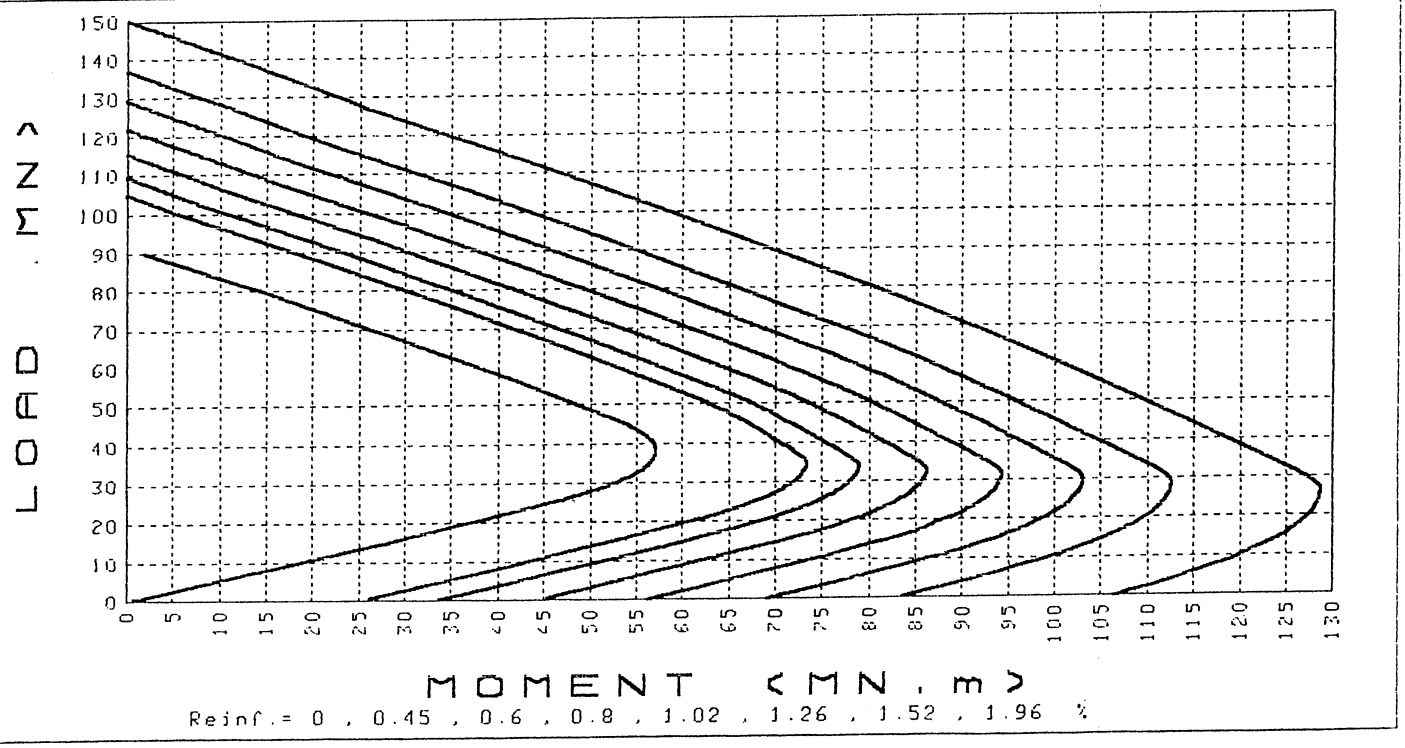


CODE : BS8110

ment Vector Angle, Theta = 180 degees CCW FROM x-axis

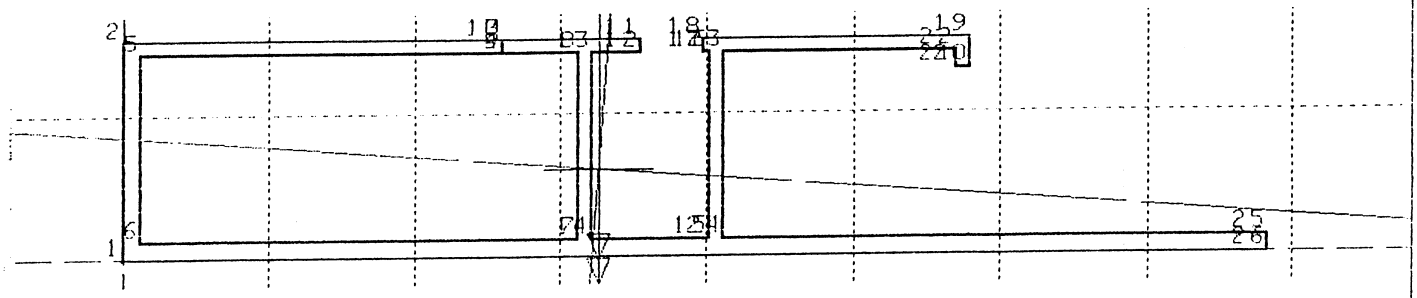


fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110

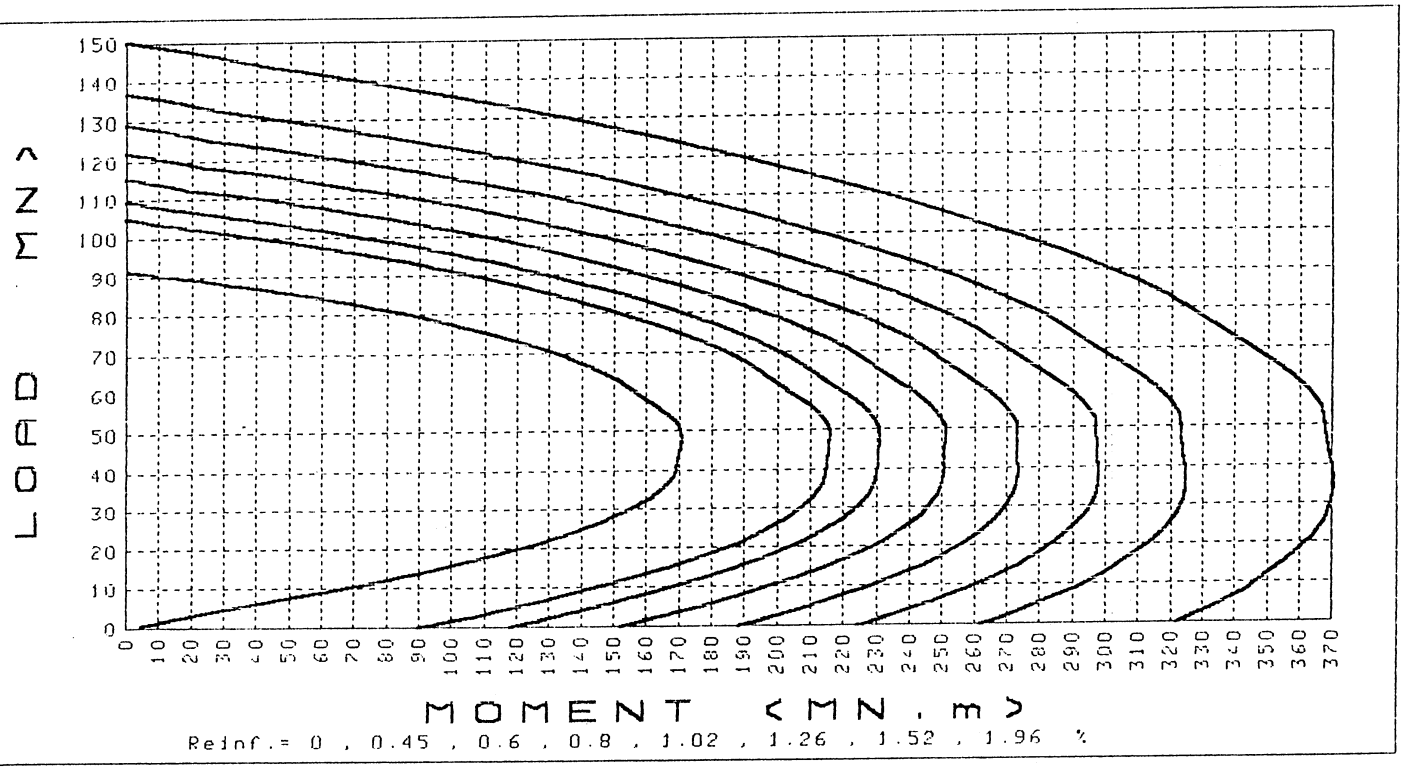


CODE : BS8110

ent Vector Angle, Theta = 270 degees CCW FROM x-axis



fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110



CODE : BS8110

COORDINATES OF VERTEX POINTS (mm)

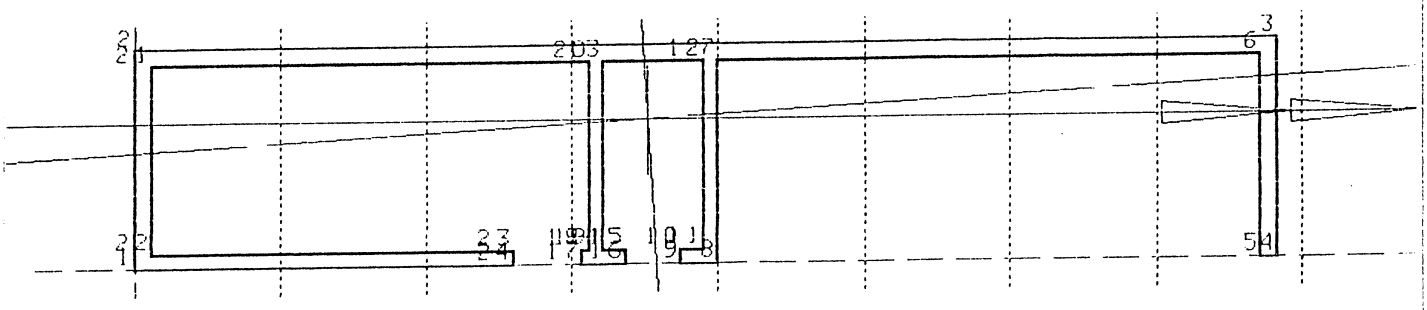
Point	X	Y
1	0.0	0.0
2	0.0	3200.0
3	16450.0	3200.0
4	16450.0	0.0
5	16200.0	0.0
6	16200.0	2950.0
7	8400.0	2950.0
8	8400.0	0.0
9	7875.0	0.0
10	7875.0	200.0
11	8200.0	200.0
12	8200.0	2950.0
13	6750.0	2950.0
14	6750.0	200.0
15	7075.0	200.0
16	7075.0	0.0
17	6450.0	0.0
18	6450.0	200.0
19	6550.0	200.0
20	6550.0	2950.0
21	250.0	2950.0
22	250.0	200.0
23	5450.0	200.0
24	5450.0	0.0
25	0.0	0.0

Properties of Concrete Section (Phi CCW +ve)

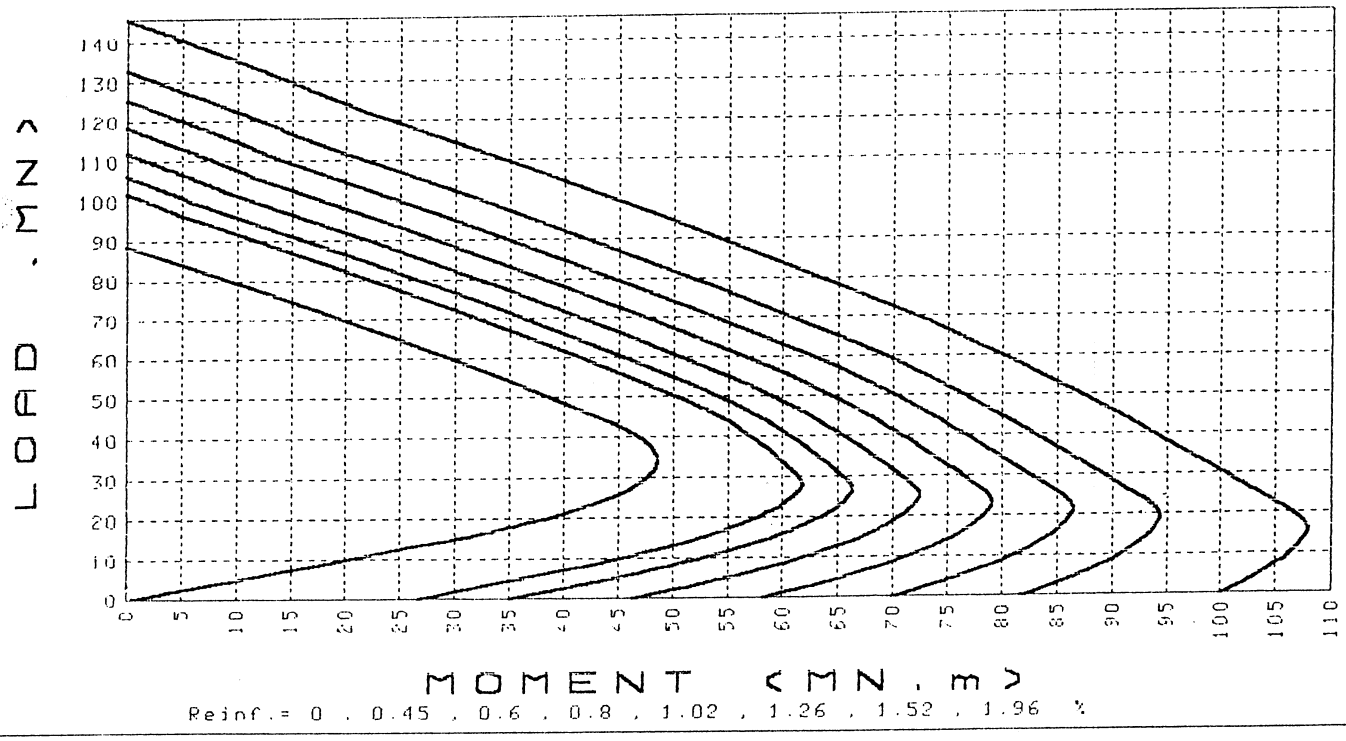
Area,	A =	7.95750E+06	mm^2
X Coordinate of Centroid,	Xc =	7395	mm
Y Coordinate of Centroid,	Yc =	2096	mm
Moment of Inertia, Centroidal X-axis,	Ix =	1.16573E+13	mm^4
Moment of Inertia, Centroidal Y-axis,	Iy =	2.18070E+14	mm^4
Product of Inertia,	Ixy =	1.19724E+13	mm^4
Angle, Cetroidal to Principal axes,	Phi =	93.310	Deg
Moment of Inertia, Principal X-axis,	Ix' =	2.18762E+14	mm^4
Moment of Inertia, Principal Y-axis,	Iy' =	1.09651E+13	mm^4

TYPE OF ANALYSIS: Simplified.
Lack of Symmetry about Principal Axes Ignored.

ment Vector Angle, Theta = 360 degees CCW FROM x-axis

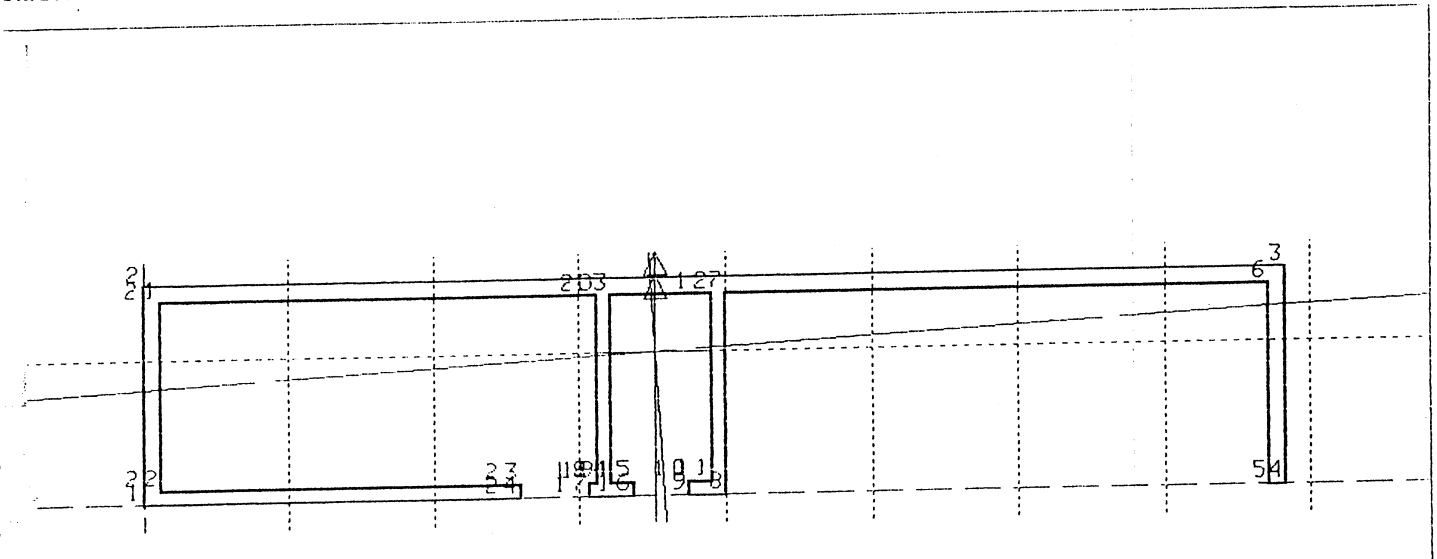


fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110

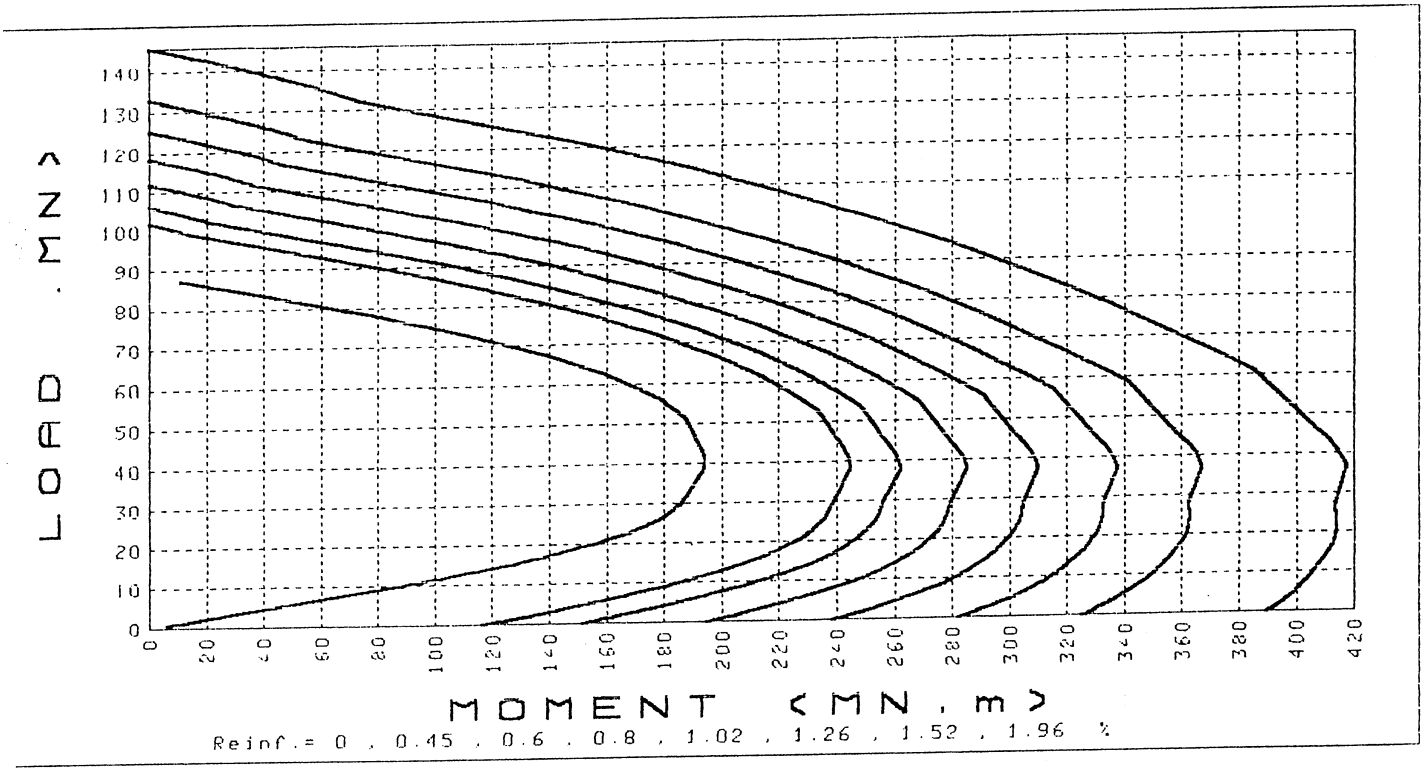


CODE : BS8110

..ient Vector Angle, Theta = 90 degees CCW FROM x-axis

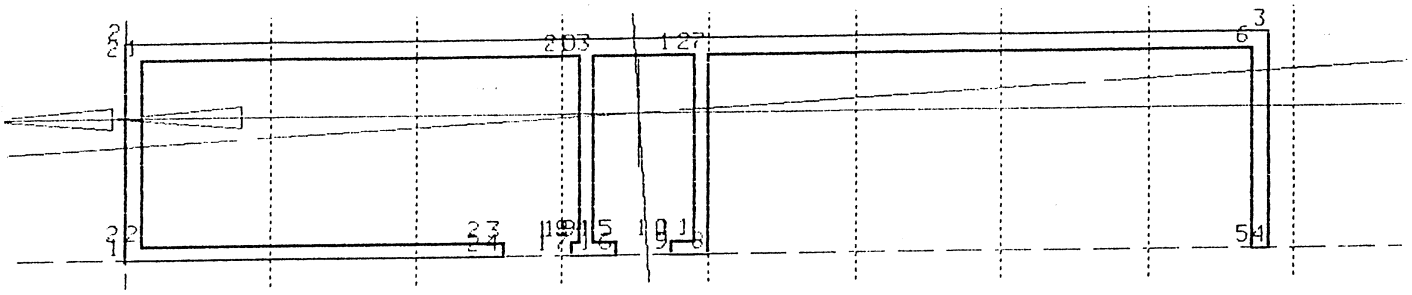


fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110

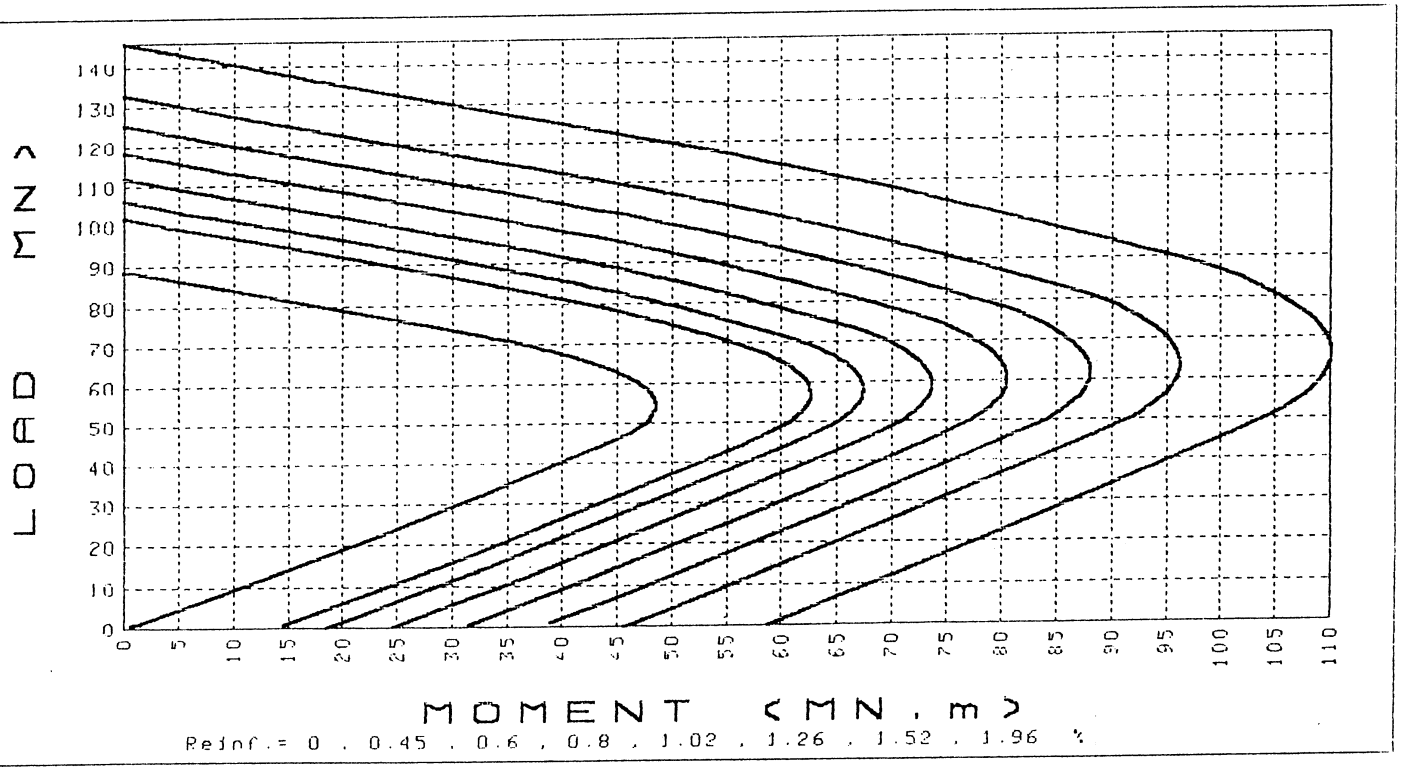


CODE : BS8110

ument Vector Angle, Theta = 180 degees CCW FROM x-axis

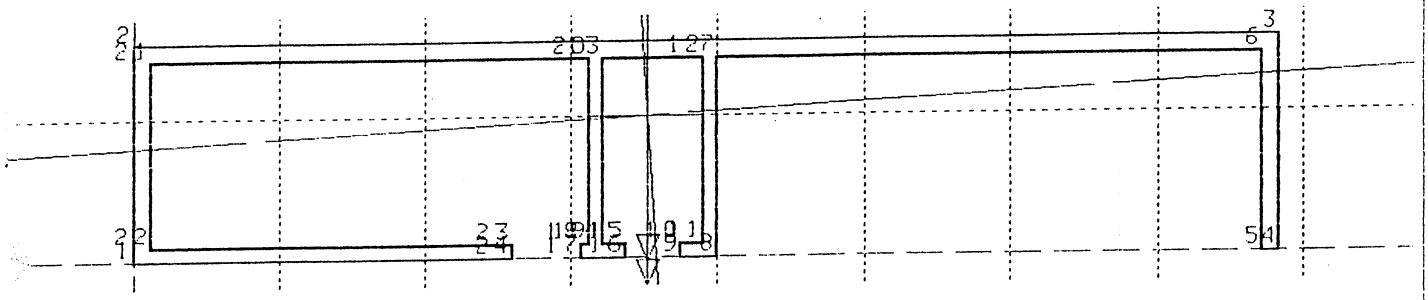


fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110

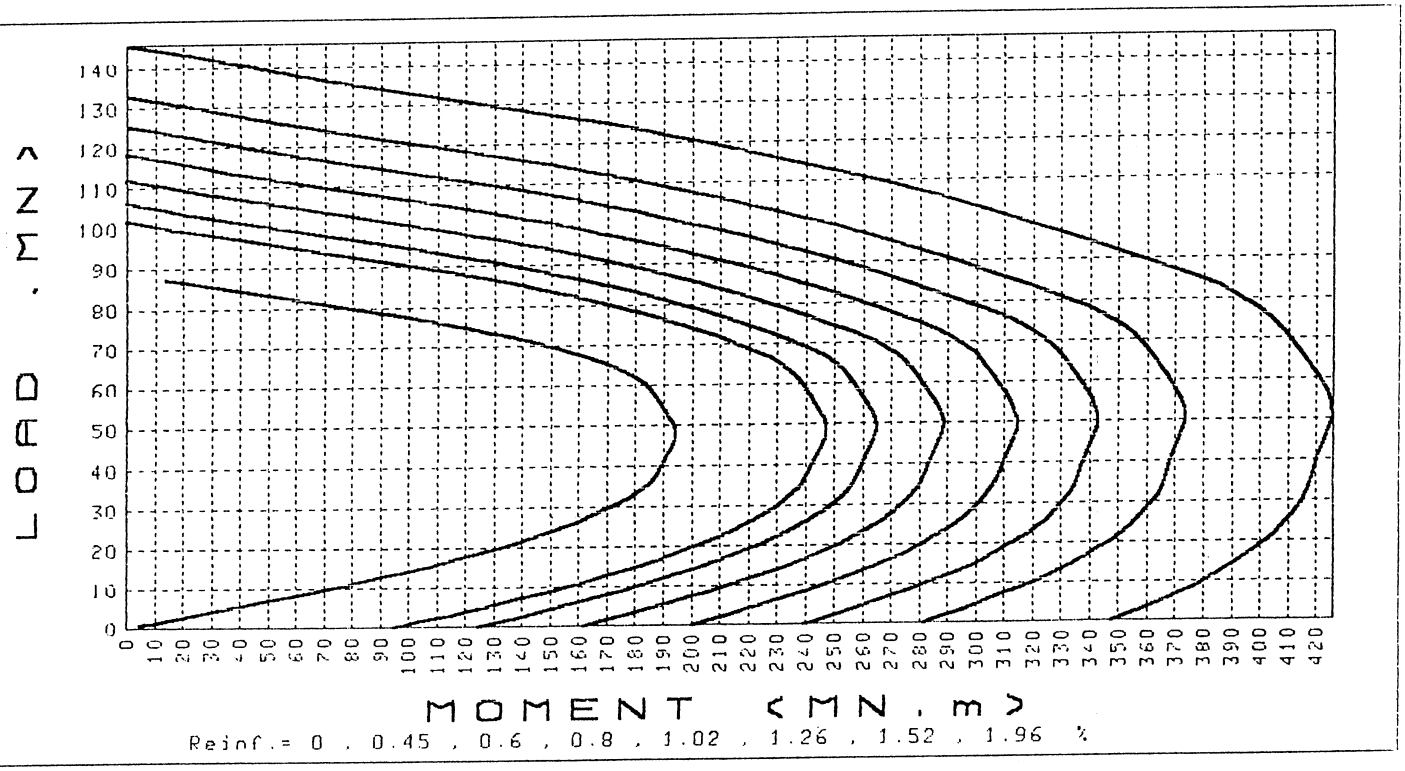


CODE : BS8110

ment Vector Angle, Theta = 270 degees CCW FROM x-axis



fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110



CODE : BS8110

COORDINATES OF VERTEX POINTS (mm)

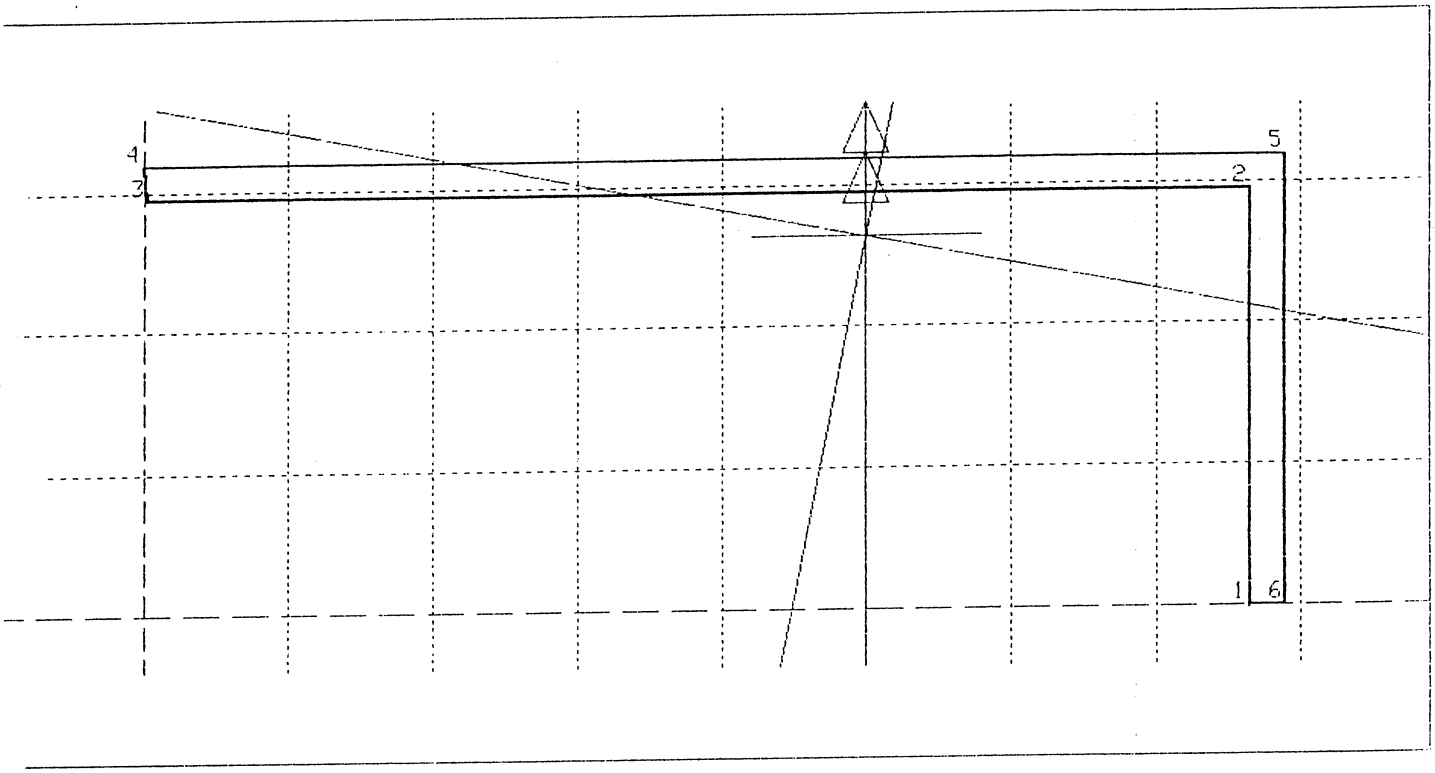
Point	X	Y
1	7654.0	0.0
2	7654.0	2949.0
3	26.0	2949.0
4	0.0	3199.0
5	7904.0	3199.0
6	7904.0	0.0
7	7654.0	0.0

Properties of Concrete Section (Phi CCW +ve)

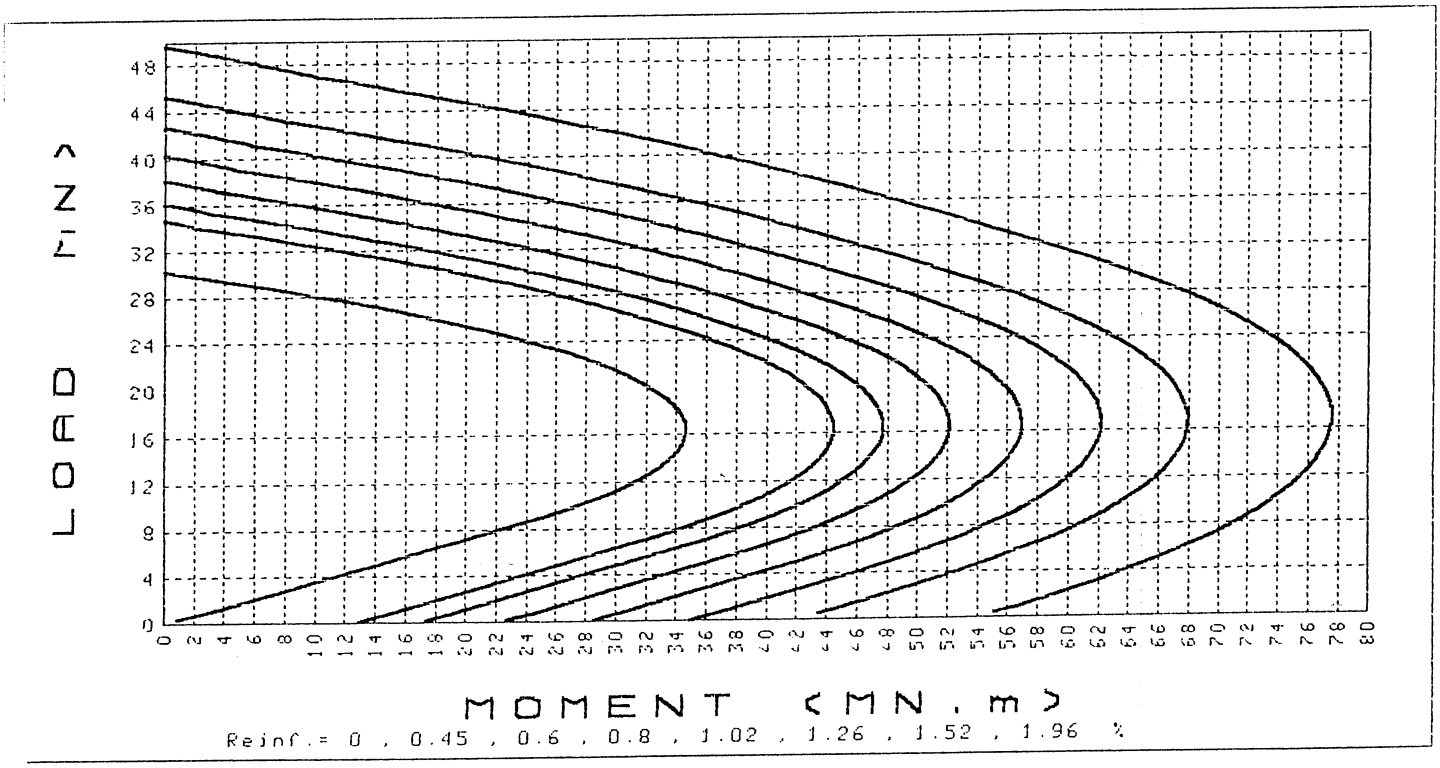
Area,	A =	2.71000E+06	mm^2
X Coordinate of Centroid,	Xc =	4998	mm
Y Coordinate of Centroid,	Yc =	2639	mm
Moment of Inertia, Centroidal X-axis,	Ix =	1.91774E+12	mm^4
Moment of Inertia, Centroidal Y-axis,	Iy =	1.80740E+13	mm^4
Product of Inertia,	Ixy =	-3.28029E+12	mm^4
Angle, Cetroidal to Principal axes,	Phi =	78.940	Deg
Moment of Inertia, Principal X-axis,	Ix' =	1.87146E+13	mm^4
Moment of Inertia, Principal Y-axis,	Iy' =	1.27713E+12	mm^4

TYPE OF ANALYSIS: Simplified.
Lack of Symmetry about Principal Axes Ignored.

ment Vector Angle, Theta = 90 degees CCW FROM x-axis

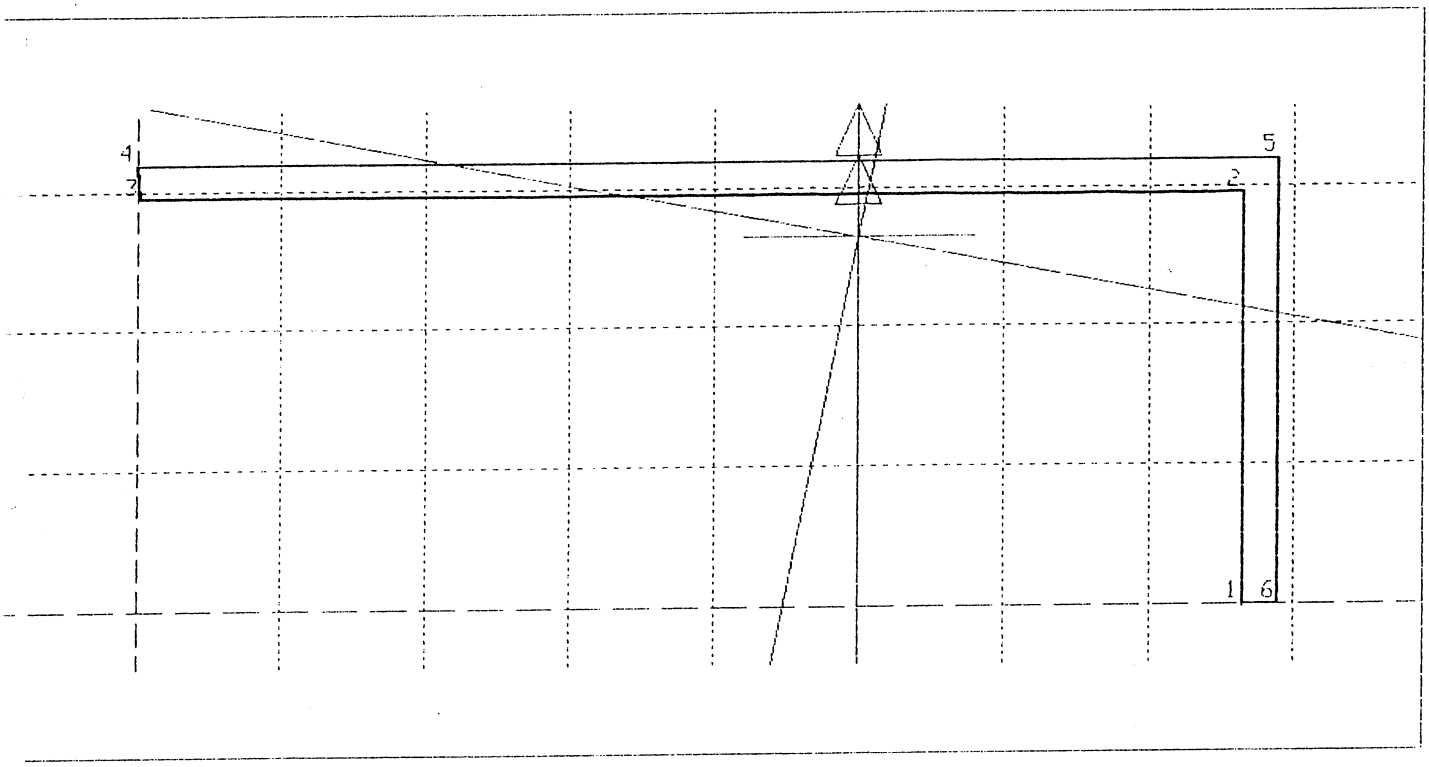


fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110

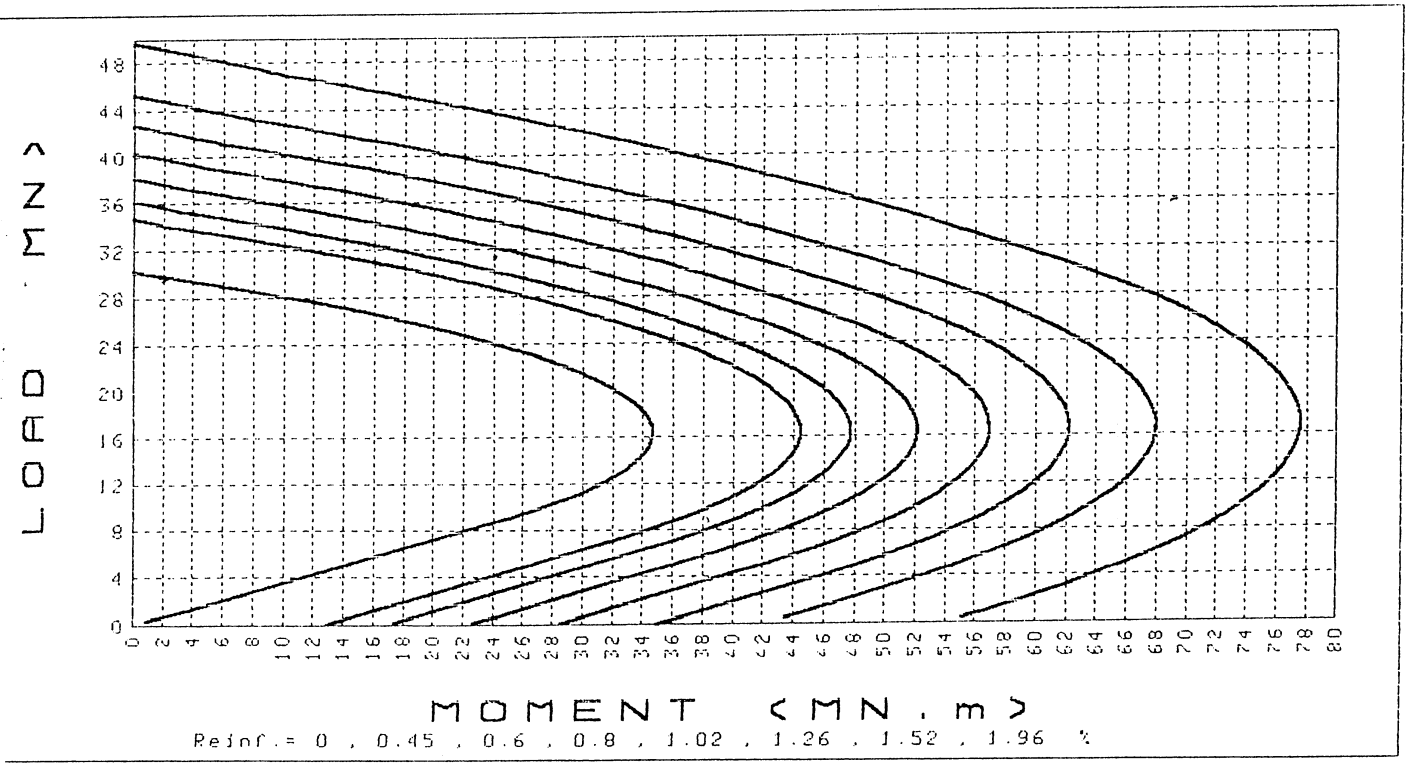


CODE : BS8110

ient Vector Angle, Theta = 90 degees CCW FROM x-axis

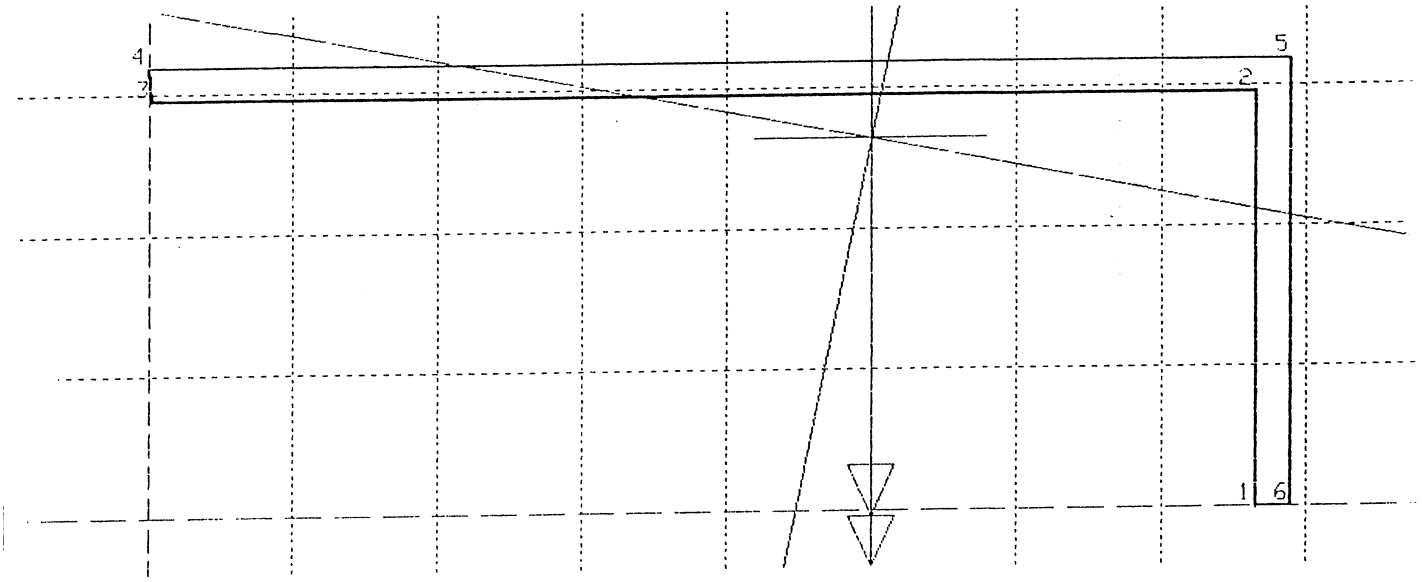


fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110

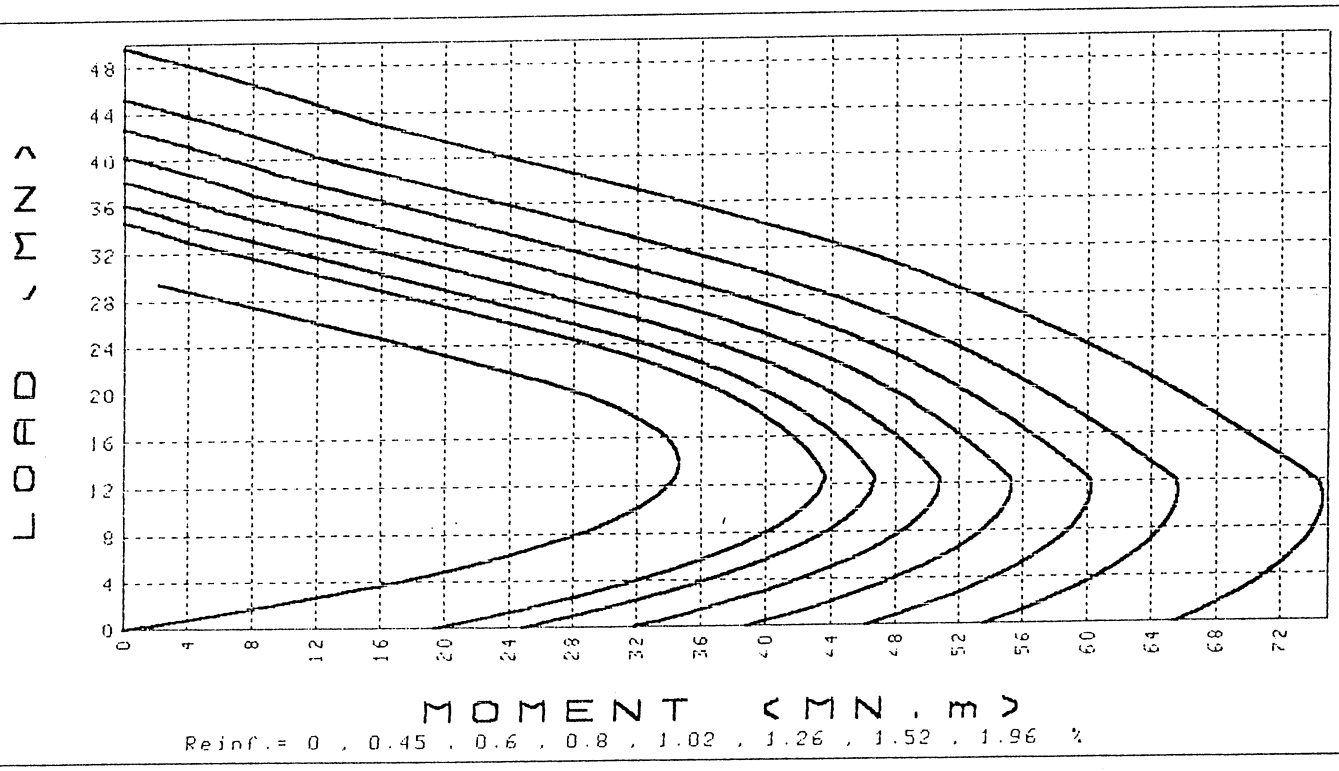


CODE : BS8110

..oment Vector Angle, Theta = 270 degees CCW FROM x-axis



fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110



CODE : BS8110

COORDINATES OF VERTEX POINTS (mm)

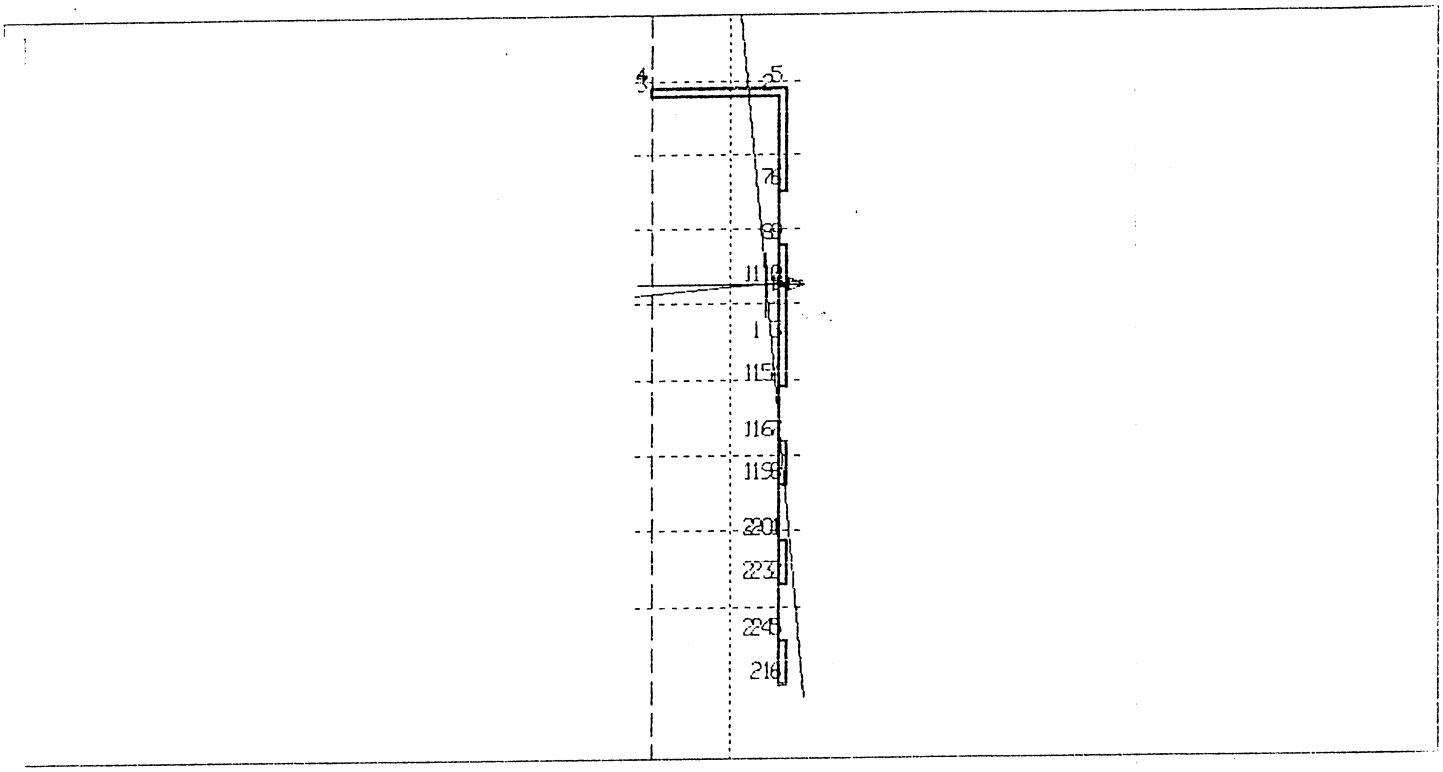
Point	X	Y
1	3750.0	0.0
2	3750.0	17950.0
3	0.0	17950.0
4	0.0	18200.0
5	4000.0	18200.0
6	4000.0	15000.0
7	3750.0	15000.0
8	3750.0	13300.0
9	4000.0	13300.0
10	4000.0	12000.0
11	3750.0	12000.0
12	4000.0	12000.0
13	4000.0	10300.0
14	4000.0	9000.0
15	3750.0	9000.0
16	3750.0	7300.0
17	4000.0	7300.0
18	4000.0	6000.0
19	3750.0	6000.0
20	3750.0	4300.0
21	4000.0	4300.0
22	4000.0	3000.0
23	3750.0	3000.0
24	3750.0	1300.0
25	4000.0	1300.0
26	4000.0	0.0
27	3750.0	0.0

Properties of Concrete Section (Phi CCW +ve)

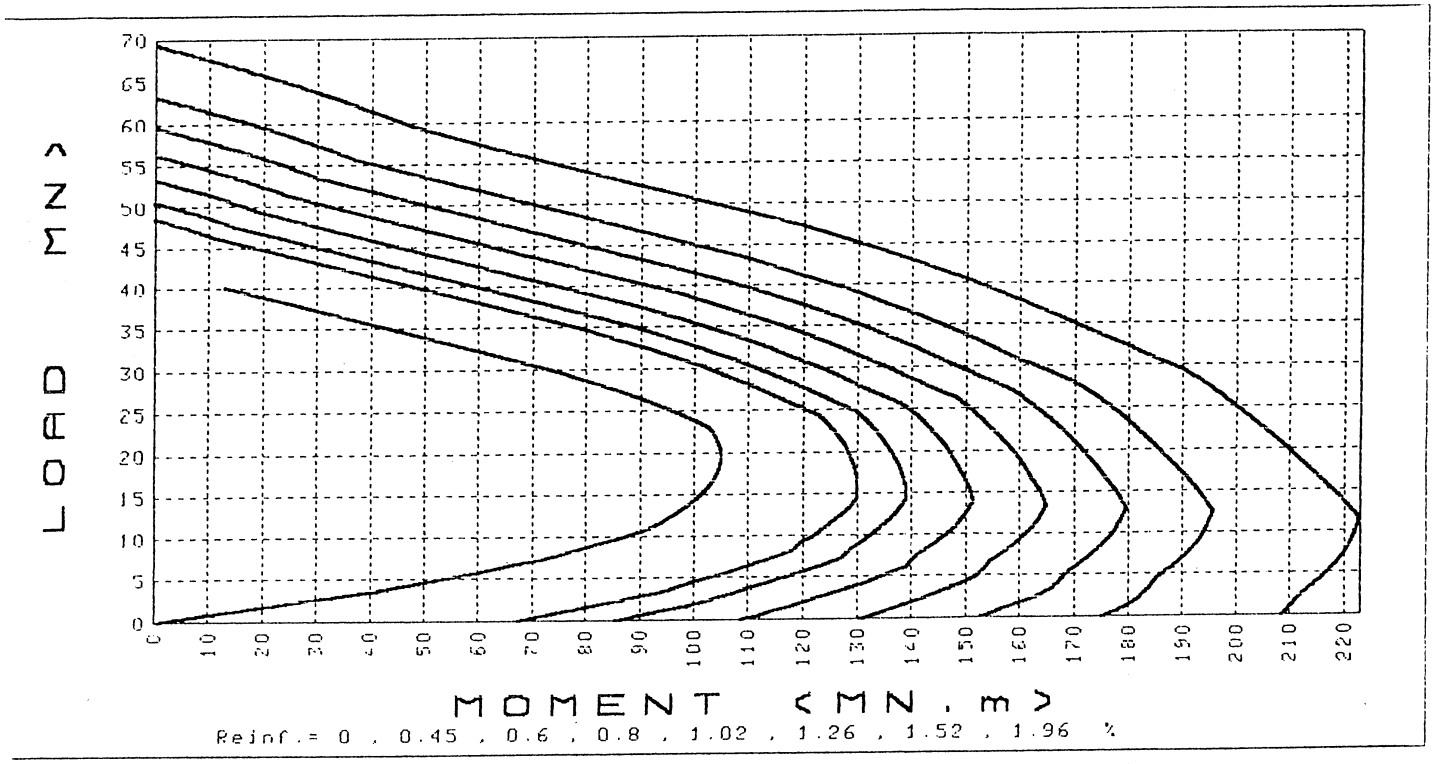
Area,	A =	3.78750E+06	mm^2
X Coordinate of Centroid,	Xc =	3380	mm
Y Coordinate of Centroid,	Yc =	12085	mm
Moment of Inertia, Centroidal X-axis,	Ix =	1.28587E+14	mm^4
Moment of Inertia, Centroidal Y-axis,	Iy =	3.93536E+12	mm^4
Product of Inertia,	Ixy =	-1.12318E+13	mm^4
Angle, Cetroidal to Principal axes,	Phi =	5.100	Deg
Moment of Inertia, Principal X-axis,	Ix' =	1.29591E+14	mm^4
Moment of Inertia, Principal Y-axis,	Iy' =	2.93141E+12	mm^4

TYPE OF ANALYSIS: Simplified.
Lack of Symmetry about Principal Axes Ignored.

_ment Vector Angle, Theta = 360 degees CCW FROM x-axis

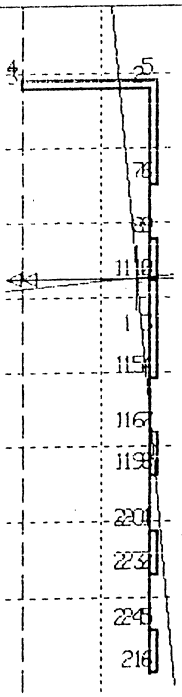


fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110

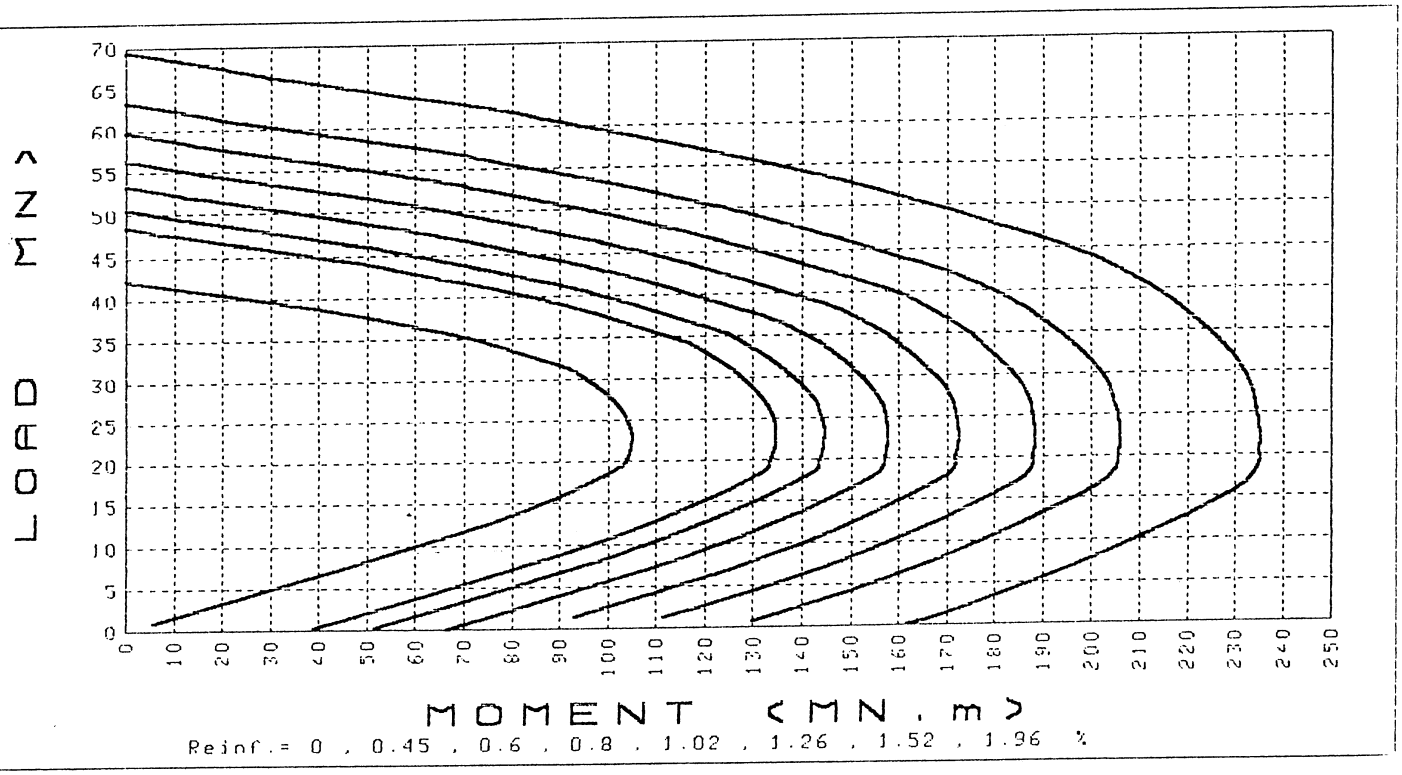


CODE : BS8110

ment Vector Angle, Theta = 180 degees CCW FROM x-axis



fcu = 25.0 MPa fy = 420.0 MPa CODE : BS8110



CODE : BS8110

umber of Walls = 15
umber of Storeys = 4
nber of Frames = 0

Elastic Modulus = 30000000 kN/m^2
Shear Modulus = 12000000 kN/m^2

STOREY HEIGHTS + CENTERS OF MASS

	Storey Name	Height (m)	CENTER OF MASS Xc (m)	Yc (m)
1	2nd	5.90	43.20	15.82
2	1st	3.75	45.67	16.13
3	Grd	3.75	82.69	15.31
4	Bas	5.50	46.34	15.85

SHEAR WALLS

#	WALL Mark	Xc (m)	Yc (m)	Angle (deg)	Storey (T-B)	Av (m^2)	I (m^4)	H1st (m)	Base K (kN/rad)
1	Core 1x'	0.40	22.30	6.00	ALL	2.750	20.66000	5.50	Fixed
2	Core 1y'	0.00	21.70	96.00	ALL	1.010	1.38000	5.50	Fixed
3	Core 2x	55.02	10.79	0.00	ALL	14.000	14.08000	5.50	Fixed
4	Core 2y	55.02	10.79	90.00	ALL	10.600	16.44000	5.50	Fixed
5	Core 3x	77.61	1.29	0.00	ALL	6.163	165.72000	5.50	Fixed
6	Core 3y	77.61	1.02	90.00	ALL	2.080	14.43400	5.50	Fixed
7	Core 4x	78.15	31.15	0.00	ALL	5.200	218.07000	5.50	Fixed
8	Core 4y	78.15	31.15	90.00	ALL	2.880	11.66000	5.50	Fixed
9	Core 5x'	91.86	25.50	174.00	ALL	1.975	18.07000	5.50	Fixed
10	Core 5y	91.86	25.50	84.00	ALL	2.425	128.60000	5.50	Fixed
11	wall 1	33.26	32.12	0.00	ALL	14.105	3741.60000	5.50	Fixed
12	Wall 2	20.26	0.13	0.00	ALL	10.130	1386.00000	5.50	Fixed
13	Wall 3	53.14	0.13	0.00	ALL	4.105	92.23000	5.50	Fixed
14	Wall 4	0.69	7.77	96.00	ALL	3.900	79.09000	5.50	Fixed
15	Wall 5	5.05	27.45	90.00	ALL	2.400	18.37000	5.50	Fixed

L A T E R A L S T O R Y F O R C E S

LOADING : Seismic Loading
Ecc in X: 0 m
Ecc in Y: 1.61 m

Storey (T-B)	X-FORCE (kN)	Y-FORCE (kN)
1 2nd	4369.70	3921.40
2 1st	4005.30	3594.40
3 Grd	653.10	586.10
4 Bas	2293.10	2057.80
Total	+11321.20	+10159.70