POSEC	설계 계산서 CALCULATION SHEET	문서번호 DOC. NO. 페이지 표지 PAGE

☐ PROJECT CODE : 960030EA

☐ PROJECT NAME :POS-THAI STEEL SERVICE CENTER DETAIL DESIGN

☐ 계산서 번호 :
CAL.SHEET NO.

☐ 제 목 : STRUCTURAL CALCULATION (ARCHITECTURE)
TITLE

☐ 발 주 자 : POS-THAI STEEL SERVICE CENTER CO.,LTD
CLIENT

개정번호 REV.NO.	일자 DATE	내용 DESCRIPTION	작성 PREPARATION	검토 REVIEW	승인 APPROVAL
△0	'97.2.28	POS-THAISTEEL SERVICECENTER STRUCTURAL CALCULATION	장근호 설계감리본부	진용주 설계감리본부	조건호 설계감리본부

포스코개발주식회사
POSCO Engineering & Construction Co.,Ltd.

EDP-07-01(96-06-15)

POSEC	설계 계산서 CALCULATION SHEET	문서번호 DOC. NO. 페이지 표지 PAGE

☐ PROJECT CODE : 960030EA

☐ PROJECT NAME :POS-THAI STEEL SERVICE CENTER DETAIL DESIGN

☐ 계산서 번호 CAL.SHEET NO. :

☐ 제 목 TITLE : STRUCTURAL CALCULATION (ARCHITECTURE)

☐ 발 주 자 CLIENT : POS-THAI STEEL SERVICE CENTER CO.,LTD

FOR CONSTRUCTION OUT 1997. 3. 3 POSEC

개정번호 REV.NO.	일자 DATE	내용 DESCRIPTION	작성 PREPARATION	검토 REVIEW	승인 APPROVAL
0	'97.2.28	POS-THAISTEEL SERVICECENTER STRUCTURAL CALCULATION	장근호 설계감리본부	진용주 설계감리본부	조원호 설계감리본부

포스코개발주식회사
POSCO Engineering & Construction Co.,Ltd.

I N D E X

1. GENERAL DESCRIPTION

1.1 STRUCTURAL SYSTEM

THIS CALCULATIONS PERTAIN TO THE STRUCTURAL STEEL DESIGN FOR POS-THAI STEEL SERVICE CENTER, BANGKOK THAILAND.

THE WHOLE LENGTH TO THE LONGITUDINAL DIRECTION IS 125M AND TO THE CROSS DIRECTION IS 65M. THE BUILDING CONSIST OF MILL YARD AND STORAGE YARD. IN ORDER TO PROVIDE STRUCTURAL STAVILITY FOR THE LATERAL FORCES, ROOF BRACINGS ACT IN THEIR PLANE CREATING RIGID DIAPHRAGMS WHICH DISTRIBUTE THE FORCES TO THE WALL BRACINGS AND COLUMNS. THE WALL BRACINGS CARRY THE LATERAL FORCES TO THE LONGITUDINAL DIRECTION AND TRANSMIT TO THE FOUNDATIONS.

1.2 CODES AND REGULATIONS

1) NATIONAL BUILDING CODE OF THAILAND

2) AMERICAN INSTITUTE OF STEEL CONSTRUCTION(AISC) SPECIFICATION FOR DESIGN, FABRICATION, AND ERECTION OF STRUCTIONAL STEEL FOR BUILDINGS, 9TH EDITION

3) AMERICAN WELDING SOCIETY(AWS) STANDARD CODE FOR ARC AND GAS WELDING IN BUILDING CONSTRUCTION

1.3 MATERIALS AND STRENGTH PLATES, ROLLED SHAPES : A36

PLATES, ROLLED SHAPES : A570 GRADES

ANCHOR BOLTS : ASTM A36

PILE : □400 x 400 PC PILE : Ra = 60t/EA

BOLTS : SLIP-RESISTANT FRICTION TYPE HIGH STRENGTH BOLTS. .

1.4 LOAD COMBINATION

1) D.L + C.L(→)
2) D.L + C.L(←)
3) 0.75(D.L + W.L(→))
4) 0.75(D.L + W.L(←))
5) 0.75(D.L + C.L(→) + W.L(→))
6) 0.75(D.L + C.L(←) + W.L(←))

D.L : DEAD LOAD
C.L : CRANE LOAD
W.L : WIND LOAD

1.5 ALLOWABLE DEFLECTION

1) VERTICAL

① BEAMS, GIRDERS, TRUSSES : L/450(LONG TERM) , L/300(SHORT TERM)

② CANTILEVER GIRDERS : L/300(LONG TERM) , L/200(SHORT TERM)

③ CRANE RUNWAY GIRDER : L/1000

④ PURLIN & JOIST : L/300(LONG TERM) , L/200(SHORT TERM)

2) HORIZONTAL

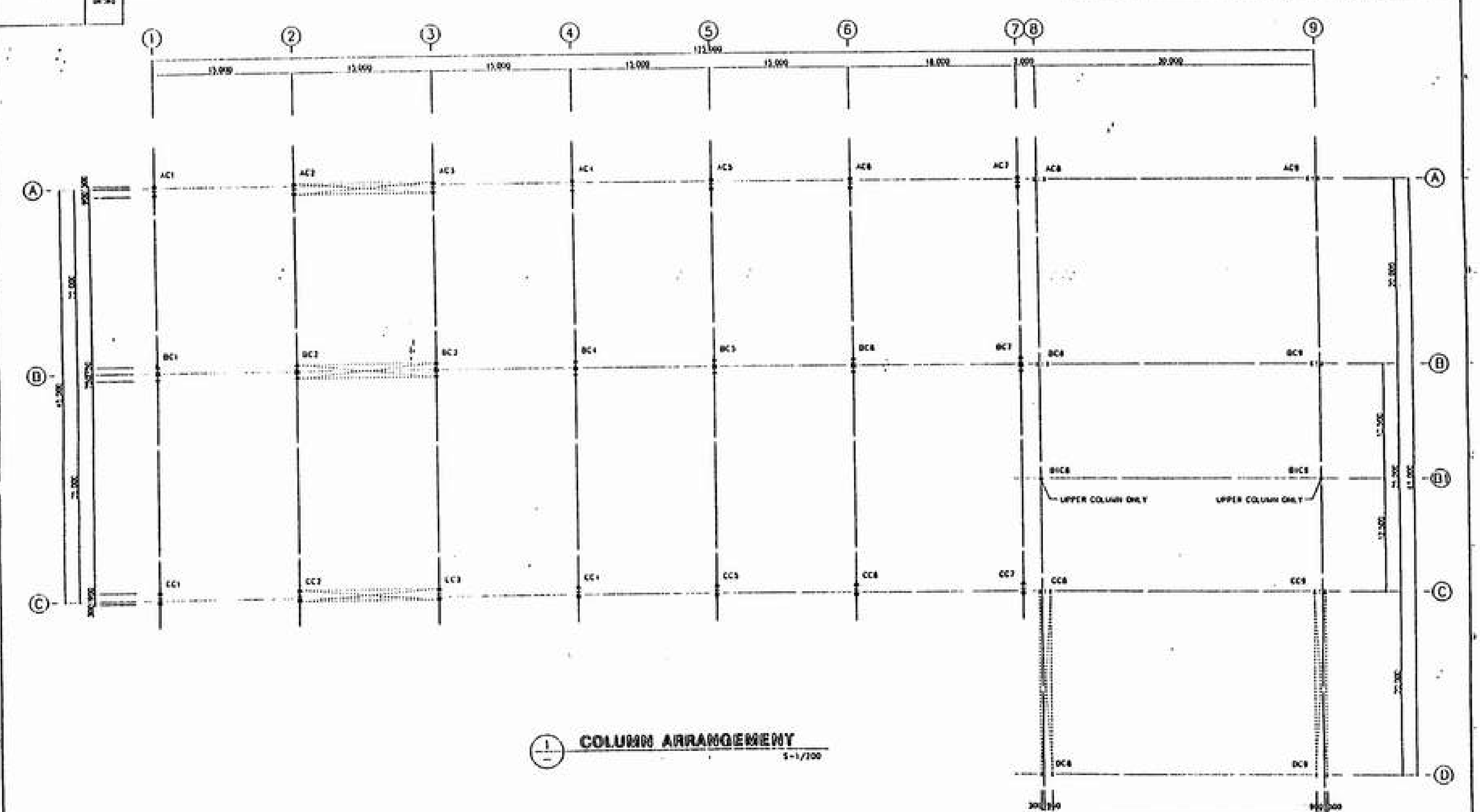
① MAIN COLUMN : H/600(CRANE THRUST), H/250(SHORT TERM)

② SUB COLUMN : H/200

③ HORIZONTAL BEAM : L/200

④ CRANE RUNWAY GIRDER : L/800

2. FRAMING DRAWING (PLAN & ELEVATION)



COLUMN ARRANGEMENT
S-1/200

POS-THAI Steel Service Center Co.,Ltd

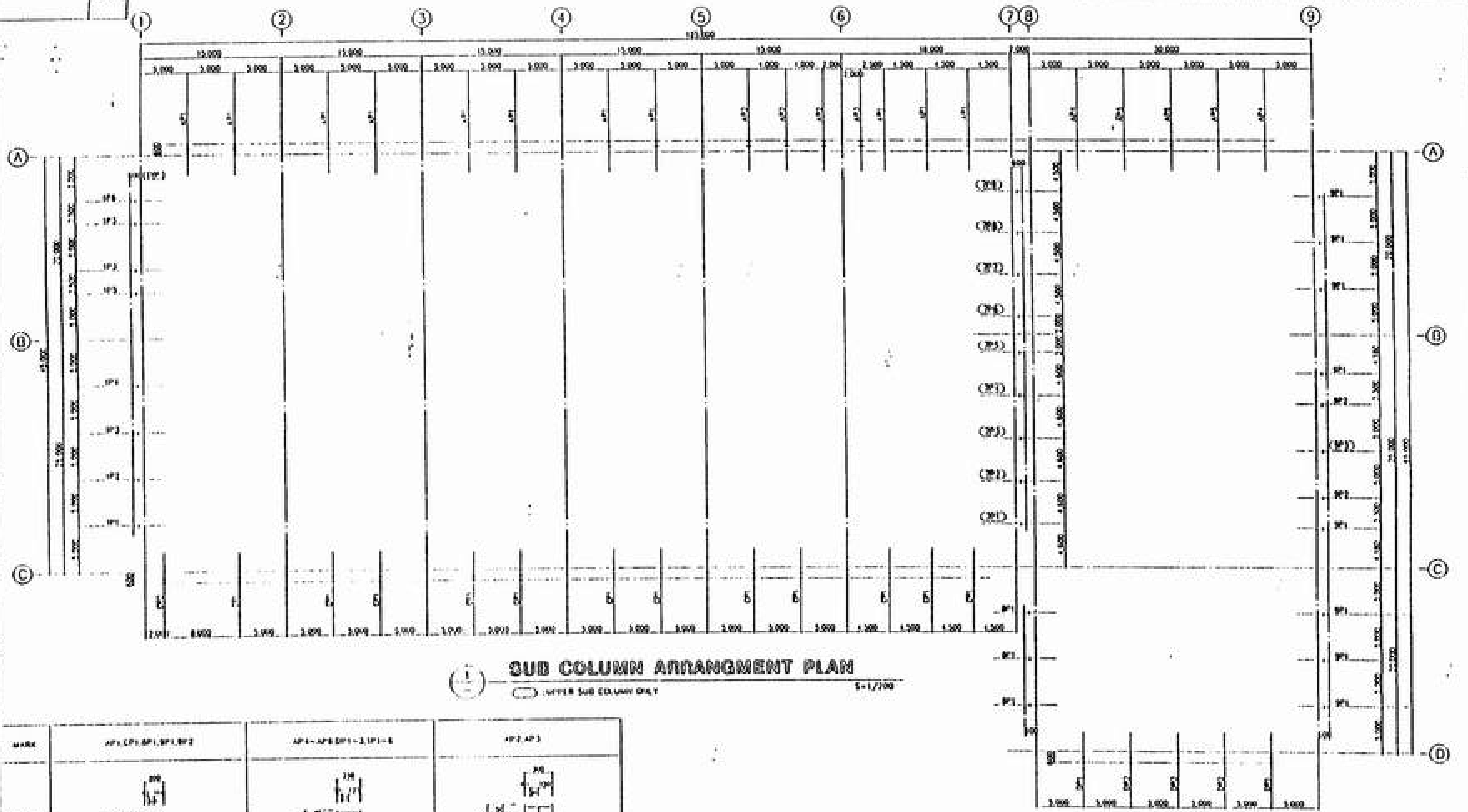
POSEC

SCALE 1/200
UNIT mm
DATE 97.2
PROJECT POS-THAI STEEL SERVICE CENTER
TITLE MAIN COLUMN ARRANGEMENT PLAN
PROJ. NO. 960030
DWG. NO. 090-EA141-101
CAD. NO.
CLIENT NO.

NO | DATE | REVISIONS & DESCRIPTION | DRAWN | CHECKED | REVIEWED | APPROVED

NOTES & REF. DWG

NO | DESCRIPTION | MATERIAL | UNIT | Q'TY | REMARKS



SUB COLUMN ARRANGMENT PLAN

S=1/200

( ) : UPPER SUB COLUMN ONLY

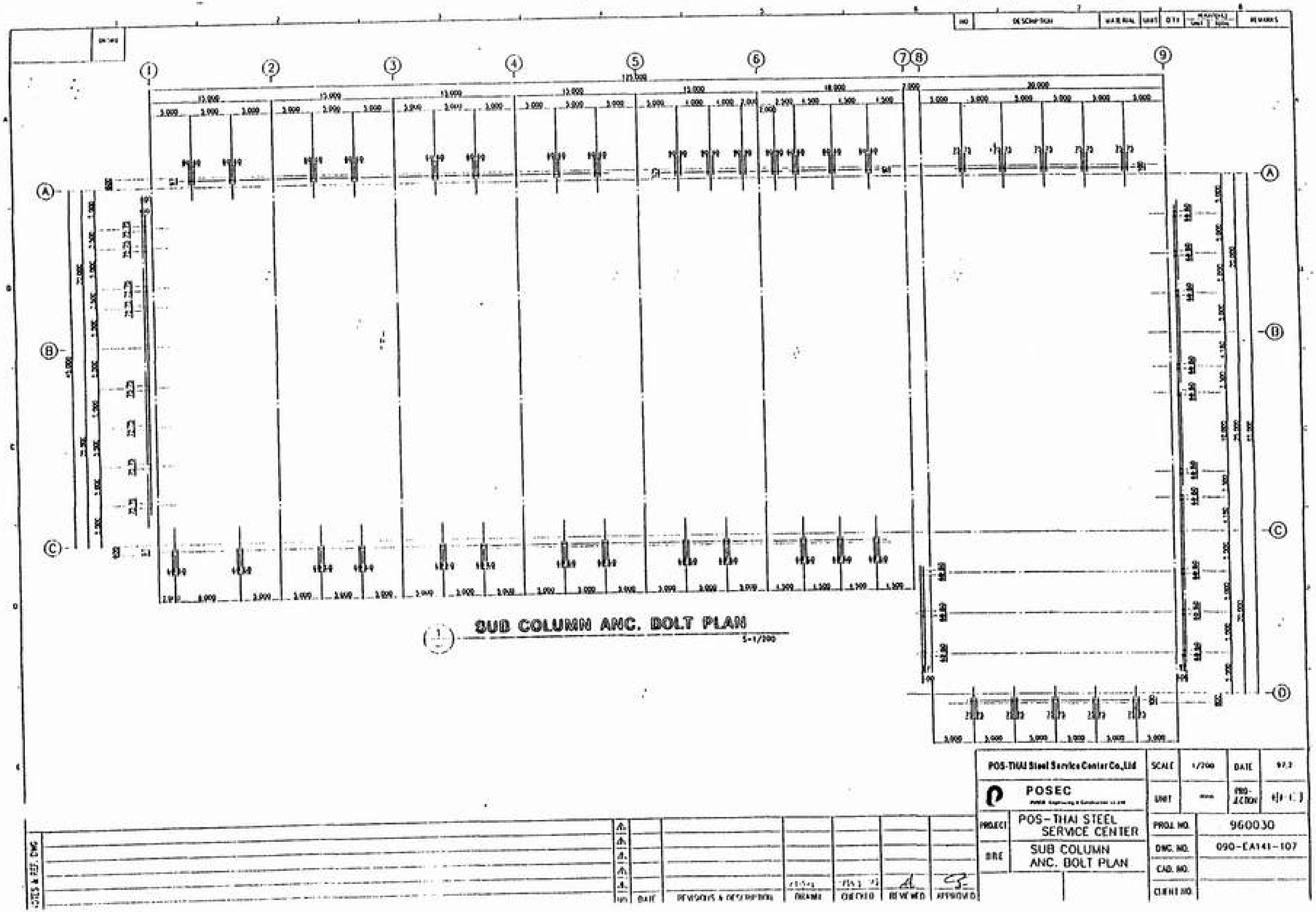
MARK	[illegible]	[illegible]	AP2, AP3
SHAPE			
MEMBER	H-194x150x6x9	H-200x200x8x12	H-250x250x9x14
PLATE	PL-20x200x250	PL-20x250x250	PL-20x300x300
ANC BOLT	2-M20x600	2-M20x600	2-M20x600

POS-THAI Steel Service Center Co.,Ltd	POSEC
SCALE	1/200
DATE	97.2
UNIT	mm
PROJECT	POS-THAI STEEL SERVICE CENTER
TITLE	SUB COLUMN ARRANGMENT PLAN
PROJ NO.	960030
DWG NO.	090-EA141-102
CAD NO.	
CLIENT NO.	

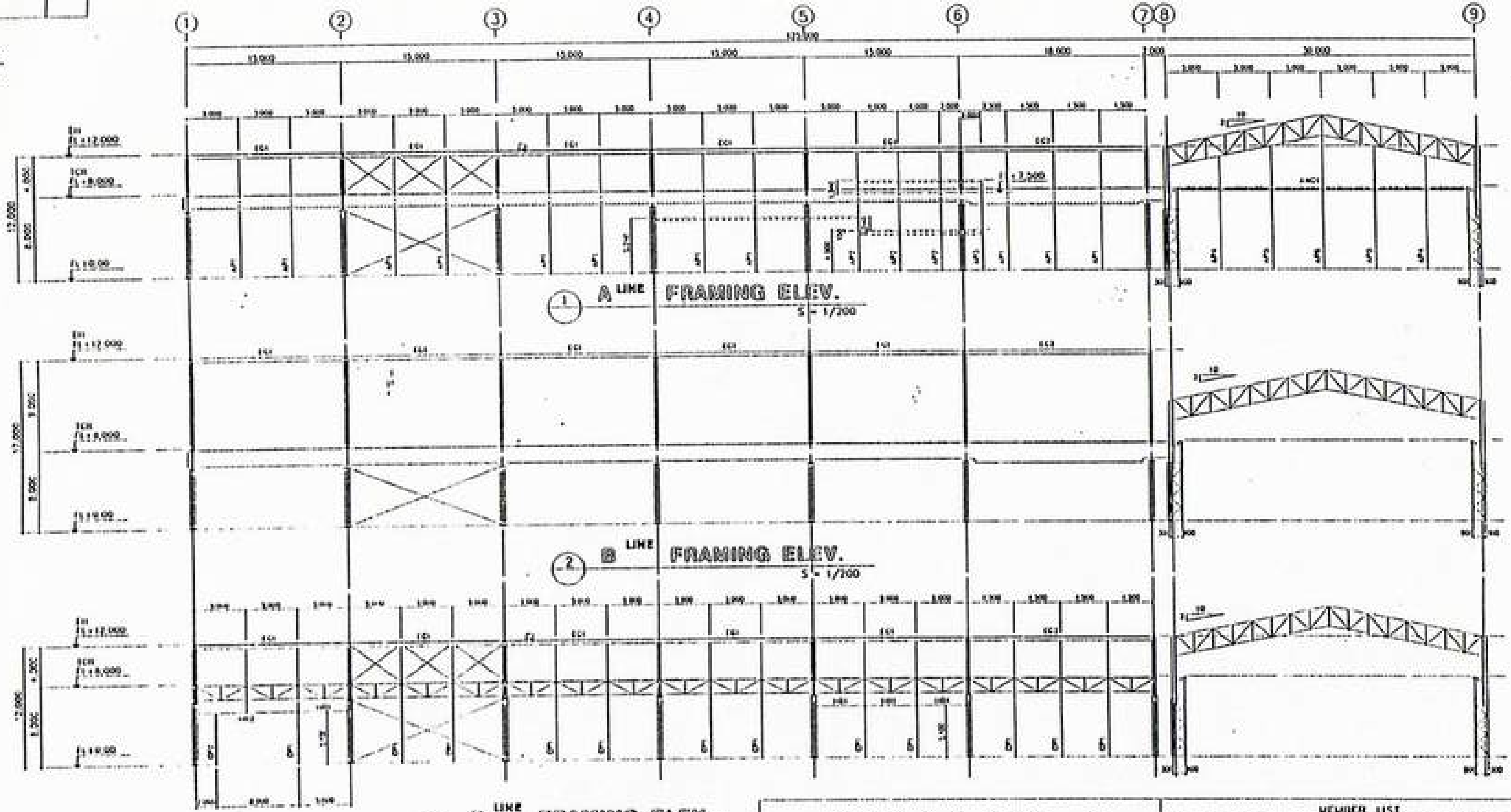
NO. | DATE | REVISIONS & DESCRIPTION | DRAWN | CHECKED | REVIEWED | APPROVED

NOTES & REF. DWG

NO | DESCRIPTION | MATERIAL | UNIT | QTY | REMARKS



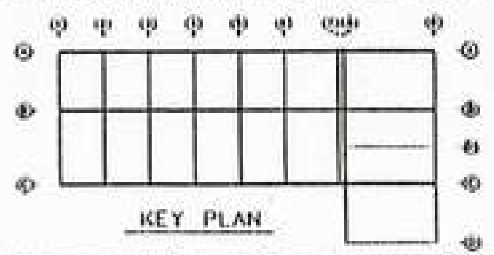
SUB COLUMN ANC. BOLT PLAN
S=1/200
POS-THAI Steel Service Center Co.,Ltd
POSEC
PROJECT POS-THAI STEEL SERVICE CENTER
SUB COLUMN ANC. BOLT PLAN
SCALE 1/200
DATE 97.2
UNIT mm
PROJ. NO. 960030
DWG. NO. 090-EA141-107
CAD. NO.
CLIENT NO.
NO. DATE REVISIONS & DESCRIPTION DRAWN CHECKED REVIEWED APPROVED
NOTES & REF. DWG
NO. DESCRIPTION MATERIAL UNIT Q'TY REMARKS



1 A LINE FRAMING ELEV. S = 1/200

2 B LINE FRAMING ELEV. S = 1/200

3 C LINE FRAMING ELEV. S = 1/200



KEY PLAN

MEMBER LIST

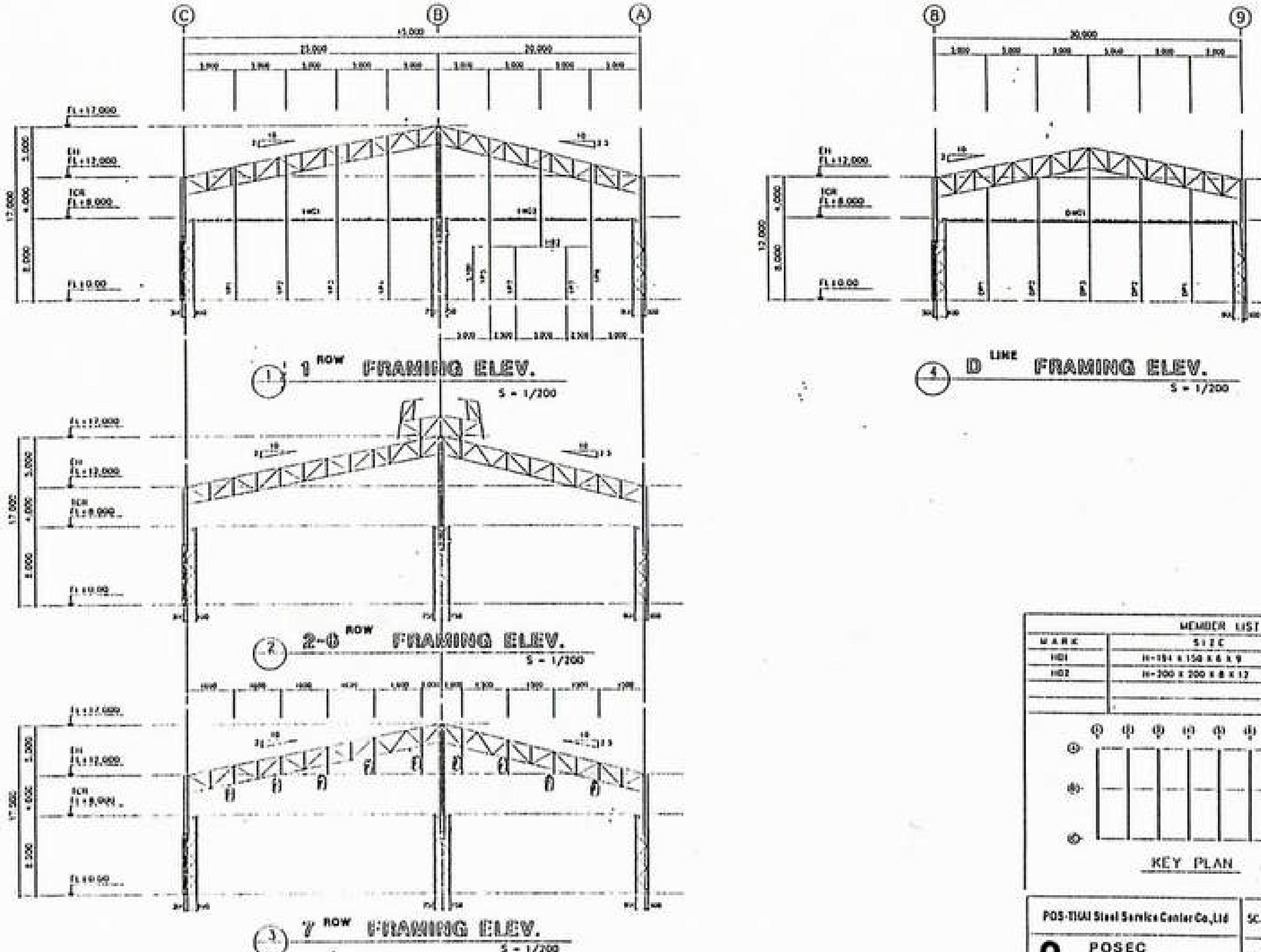
MARK	SIZE	REMARK
HB1	H-194 x 150 x 6 x 9	
HB2	H-200 x 200 x 8 x 12	

POS-THAI Steel Service Center Co.,Ltd

POSEC

SCALE	1/200	DATE	97.3
PROJECT	POS-THAI STEEL SERVICE CENTER	PROJ. NO.	960030
TITLE	FRAMING ELEVATION -1	DWG. NO.	090-EA141-111
		CAD. NO.	

NOTES & REF. DWG



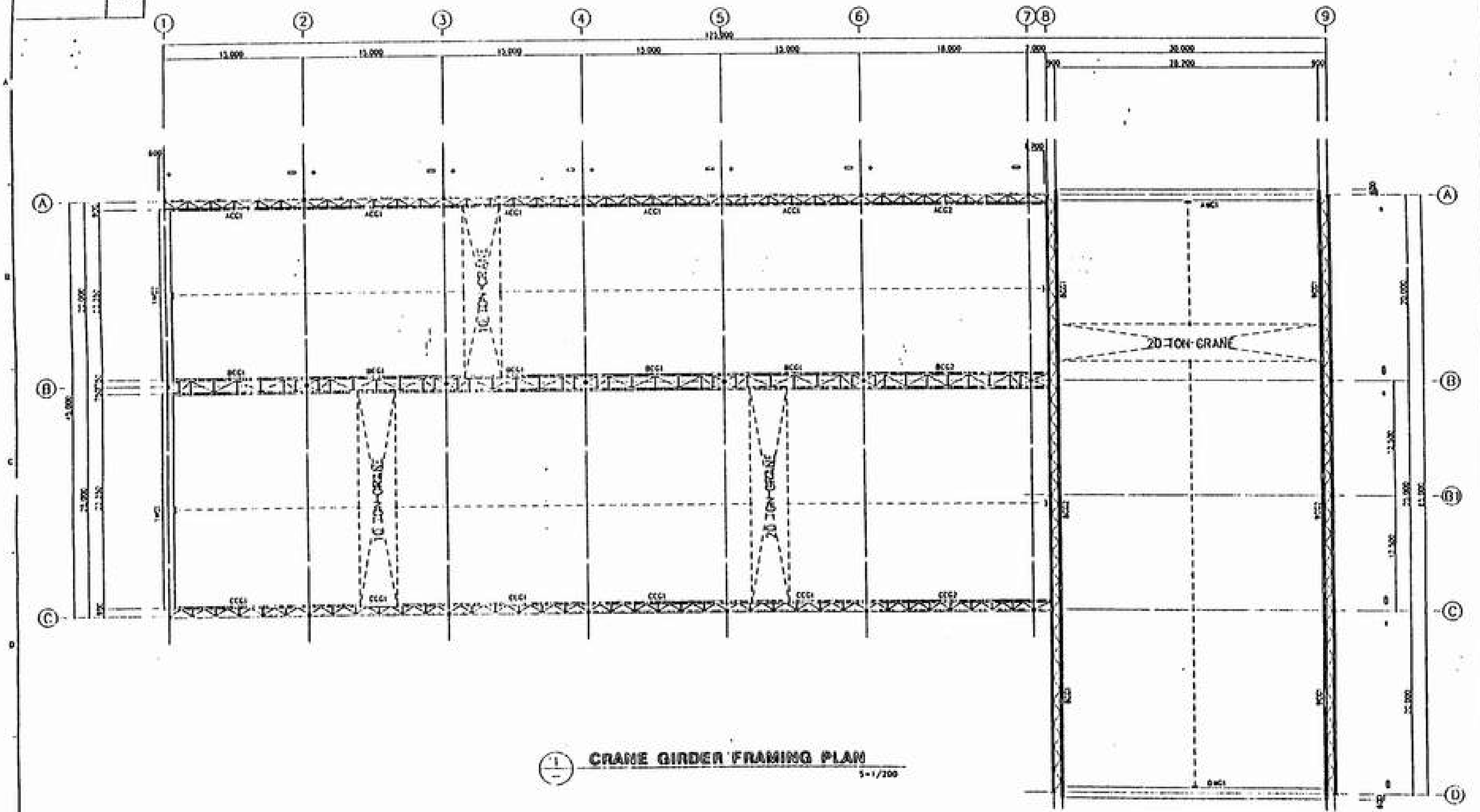
MEMBER LIST

MARK	SIZE	REMARK
H01	H-194 X 150 X 6 X 9	
H02	H-200 X 200 X 8 X 12	

KEY PLAN

POS-THAI Steel Service Center Co.,Ltd		SCALE	1/200	DATE	97.7
POSEC		UNIT	mm	PRO-JECTION	
PROJECT	POS-THAI STEEL SERVICE CENTER	PROJ. NO.	960030		
TITLE	FRAMING ELEVATION - 2	DWG. NO.	090-CA141-112		
		CAD. NO.			

NOTES & REF. DWG

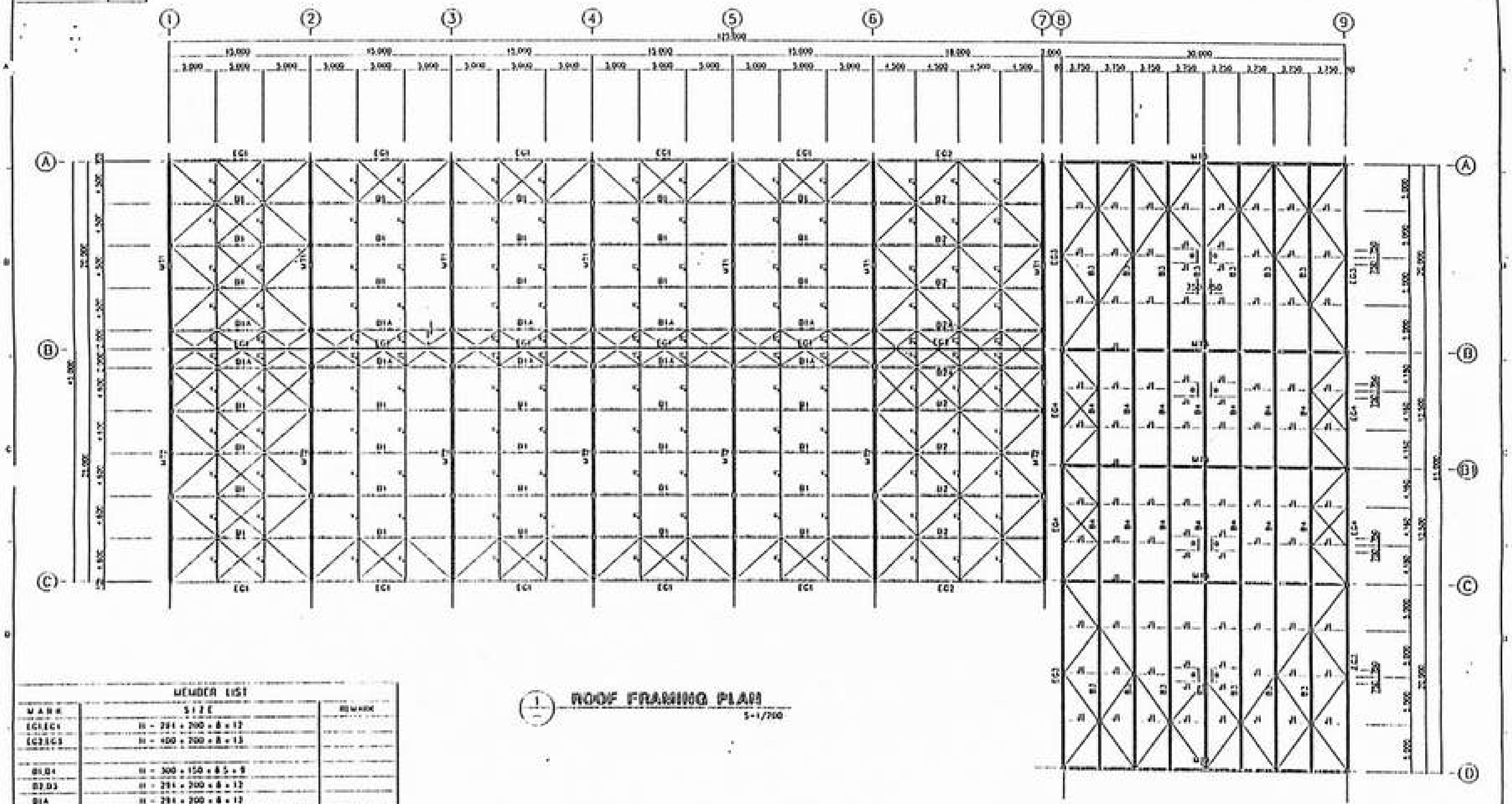


CRANE GIRDER FRAMING PLAN

S=1/200

● : FIX
⊂⊃ : SLOT HOLE

POS-THAI Steel Service Center Co.,Ltd		SCALE	1/200
POSEC		UNIT	mm
PROJECT	POS-THAI STEEL SERVICE CENTER	PROJ. NO.	960030
TITLE	CRANE GIRDER FRAMING PLAN	DWG. NO.	090-CA141-103
		CAD. NO.	



ROOF FRAMING PLAN

S-1/200

MEMBER LIST

MARK	SIZE	REMARK
EG1,EG4	H - 294 x 200 x 8 x 12	
EG2,EG3	H - 400 x 200 x 8 x 13	
D1,D4	H - 300 x 150 x 6.5 x 9	
D2,D3	H - 294 x 200 x 8 x 12	
D1A	H - 294 x 200 x 8 x 12	
D2A	H - 400 x 200 x 8 x 13	
J1	C - 150 x 75 x 6.5 x 10	
BRACING	L - 90 x 90 x 7	
B	L - 90 x 90 x 7	

POS-THAI Steel Service Center Co.,Ltd

POSEC

PROJECT	POS-THAI STEEL SERVICE CENTER	SCALE	1/200	DATE	97.3
TITLE	ROOF FRAMING PLAN	UNIT	mm	PROJECTION	
		PROJ. NO.	960030		
		DWG. NO.	DSO-EA141-104		
		CAD. NO.			

NOTES & REF. DWG

NO	DATE	REVISIONS & DESCRIPTION	DRAWN	CHECKED	REVIEWED	APPROVED

3. DESIGN LOADS

1. DEAD LOAD

1) ROOF

COLOR SHEET(T=0.8)	15kg/㎡
PURLIN	15kg/㎡
JOIST & BRACING	10kg/㎡
TRUSS(10+0.8L)	30kg/㎡
	70kg/㎡

2) WALL

COLOR SHEET(T=0.5)	10kg/㎡
GIRTH	10kg/㎡
SUB COLUMN & BRACING	20kg/㎡
	40kg/㎡

3) CRANE GIRDER

(A - B LINE)	0.4t/m
(B - C LINE)	0.6t/m
(8 - 9 ROW)	0.6t/m

4) BACK GIRDER	0.15t/m
5) WALKWAY	0.15t/m
6) MONITOR(W=4.0M)	0.5t/m

2. LIVE LOAD

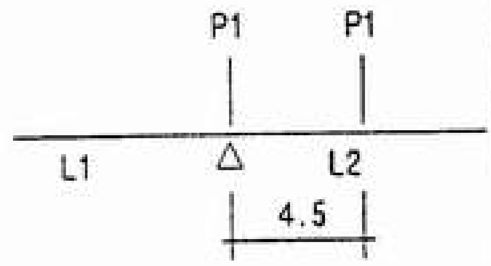
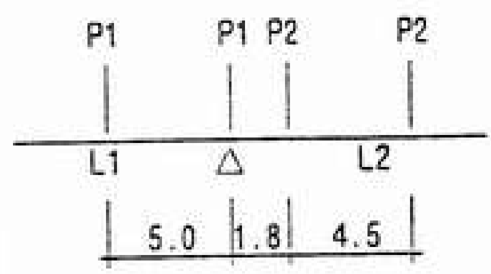
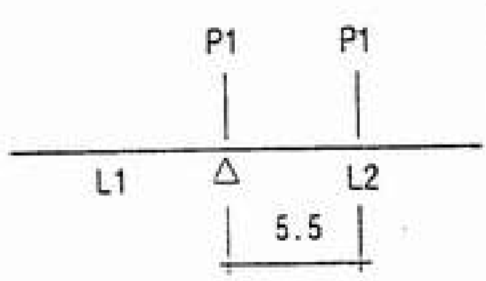
ROOF	50kg/㎡
BACK GIRDER & WALKWAY	200kg/㎡

3. WIND LOAD(DESIGN VELOCITY 35 m/sec)

P = C x A x q

q = 0.06t/㎡(h = 10m)

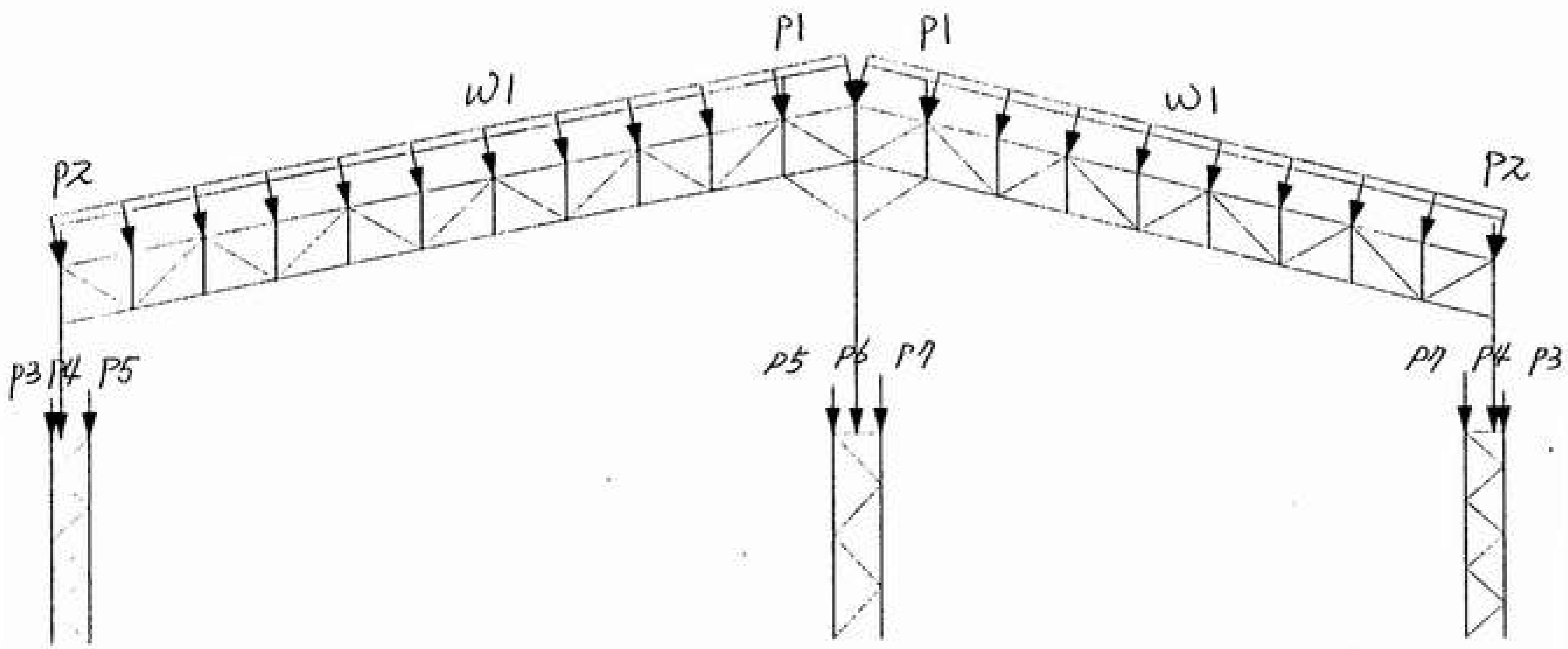
4. CRANE LOAD

NAME OF YARD	LOADING CONDITION	MAXIMUM WHEEL LOAD	SPAN	AXIAL FORCE(t)	HORIZONTAL FORCE(t)
SHEAR LINE 10T(FS)		P1 = 13.8t	L1=15m L2=15m	Pv = 1.2 x 13.8 x 1.7 = 28.2	Ph = 28.2/12 = 2.4 ✓
			L1=15m L2=18m	Pv = 1.2 x 13.8 x 1.75 = 29.0	Ph = 29.0/12 = 2.4
SLITTER LINE 20T(FS) + 10T(ES)		P1 = 26.8t P2 = 11.1t	L1=15m L2=15m	Pv = 1.2 x (26.8 x 1.67 + 11.1 x 1.46) = 73.2	Ph = 73.2/12 = 6.1
			L1=15m L2=18m	Pv = 1.2 x (26.8 x 1.72 + 11.1 x 1.46) = 74.8	Ph = 74.8/12 = 6.2
STORAGE YARD 20T(FS)		P1 = 28.9t	L1=20m L2=25m	Pv = 1.2 x 28.9 x 1.78 = 61.7	Ph = 61.7/12 = 5.1

4. FRAME MODELING & OUTPUT

◇ SHEAR & SLITTER LINE. ① - ⑦ ROW , ( ) IS 6 ROW

DESCRIPTION		LOADING CALCULATION
D.L	W1	-0.07 x 15 = -1.05t/m(-1.16 t/m)
	P1	-0.5/2 x 15 = -3.75t(-4.13t)
	P2	-0.04 x 15 x 4 = -2.4t (-2.64t)
	P3	-0.04 x 15 x 8 = -4.8t (- 5.28t)
	P4	-0.15 x 15 = -2.25t (-2.48t)
	P5	-0.6 x 15 = -9t(-9.9t)
	P6	-2.25t(-2.48t)
	P7	-0.4 x 15 = -6t(-6.6t)
W.L	W1	0.7 x 0.06 x 15 = 0.63t/m(0.69t/m)
	W2	0.8 x 0.06 x 15 = 0.72t/m(0.79t/m)
		-0.6 x 0.06 x 15 = -0.54t/m(-0.59t/m)
	W3	0.6 x 0.06 x 15 = 0.54t/m(0.59t/m)
		-0.8 x 0.06 x 15 = -0.72t/m(-0.79t/m)
C.L	P1	-73.2t(-74.8t)
	P2	-28.2t(-29t)
	P3	6.1t(6.2t)
		-6.1t(-6.2t)
	P4	8.5t(8.6t)
		-8.5t(-8.6t)
	P5	2.4t(2.4t)
		-2.4t(-2.4t)



MIDAS/GEN-GPS
POST-PROCESSOR

PLOT LIMIT

XMAX	45.300
XMIN	-.300
YMAX	.000
YMIN	.000
ZMAX	17.000
ZMIN	.000

FILE : COIL4
UNIT: M,TON
DATE: 02-25-97

VIEW-DIRECTION

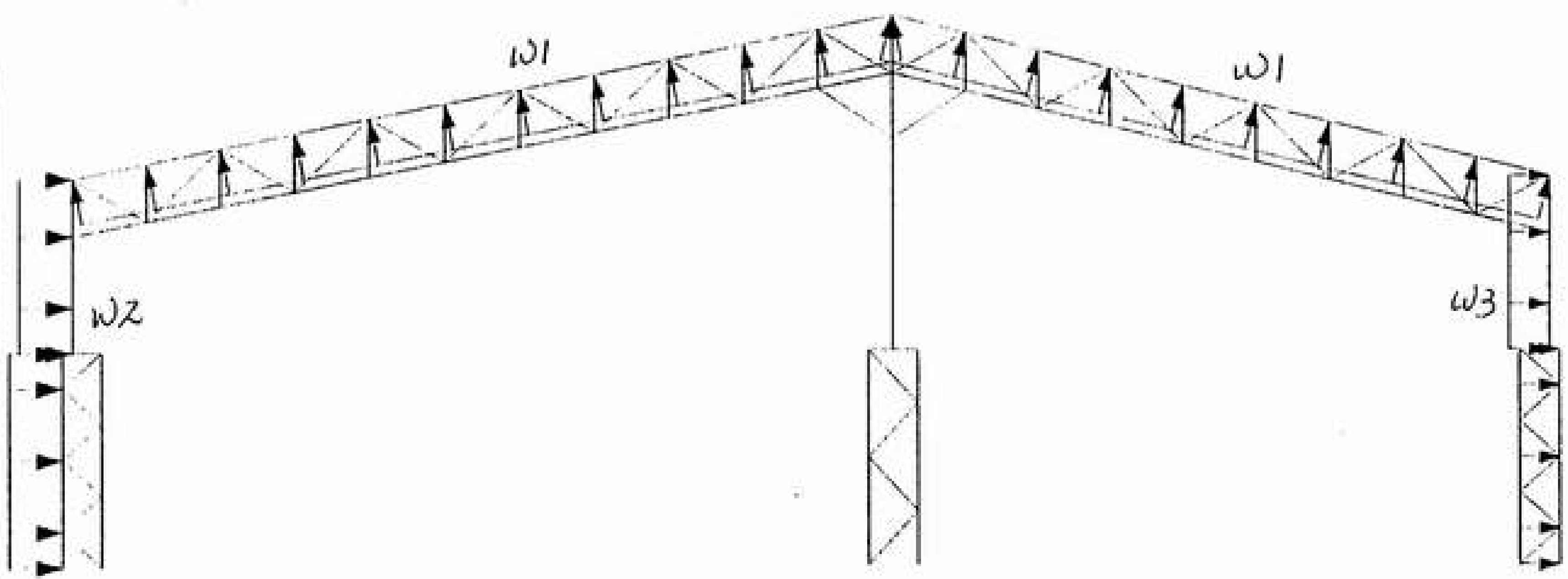
X: .000
Y: -1.000
Z: .000

PROJECT:POS-THAI STEEL SERVICE CENTER

TITLE :SHEAR & SLITTER LINE

:

USER :POSEC



MIDAS/GEN-GPS
POST-PROCESSOR

PLOT LIMIT

XMAX	45.300
XMIN	-.300
YMAX	.000
YMIN	.000
ZMAX	17.000
ZMIN	.000

FILE : COIL4
UNIT: M,TON
DATE: 02-25-97

VIEW-DIRECTION

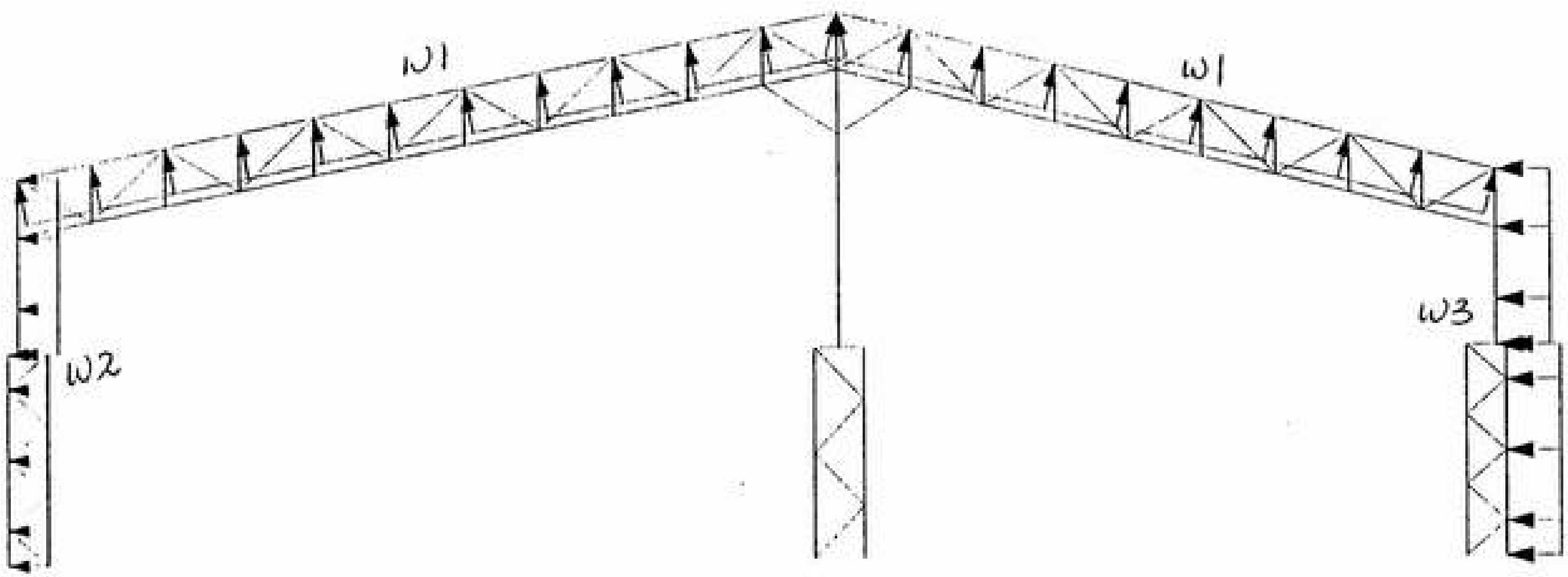
X:	.000
Y:	-1.000
Z:	.000

PROJECT:POS-THAI STEEL SERVICE CENTER

TITLE :SHEAR & SLITTER LINE

:

USER :POSEC



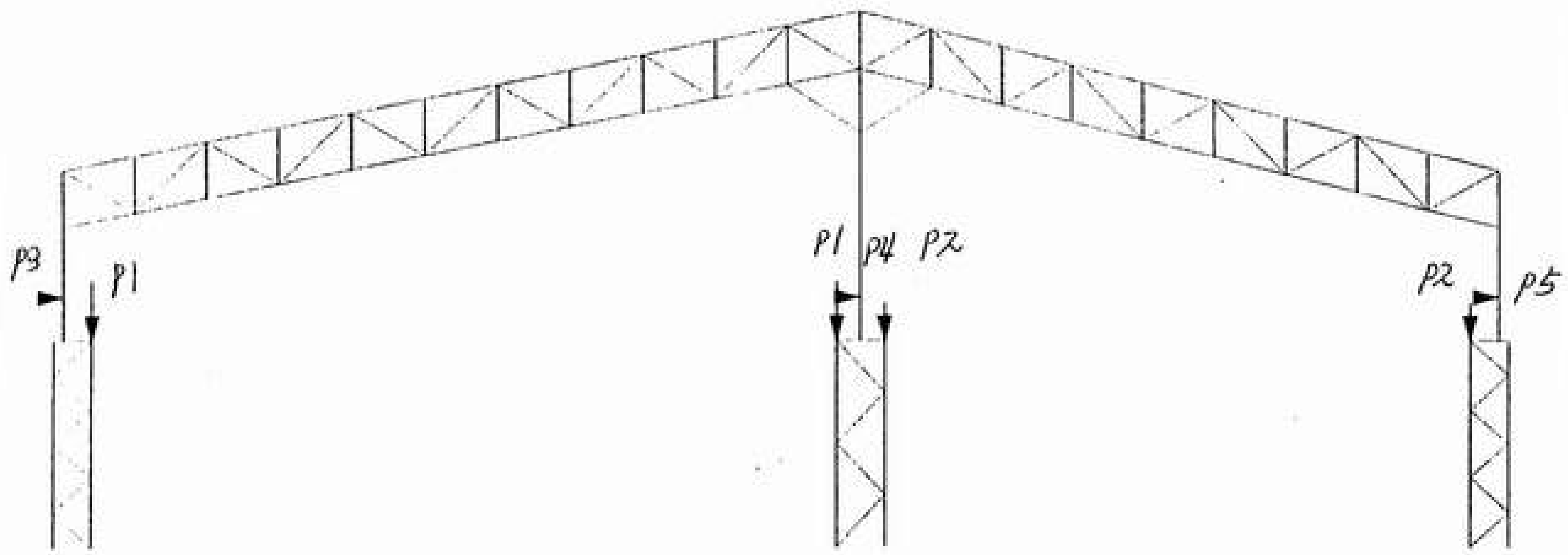
MIDAS/GEN-GPS POST-PROCESSOR	
PLOT LIMIT	
XMAX	45.300
XMIN	-.300
YMAX	.000
YMIN	.000
ZMAX	17.000
ZMIN	.000

FILE : COIL4
UNIT: M,TON
DATE: 02-25-97

PROJECT:POS-THAI STEEL SERVICE CENTER
TITLE :SHEAR & SLITTER LINE
:
USER :POSEC

VIEW-DIRECTION

X:	.000
Y:	-1.000
Z:	.000



MIDAS/GEN-GPS
POST-PROCESSOR

PLOT LIMIT

XMAX	45.300
XMIN	-.300
YMAX	.000
YMIN	.000
ZMAX	17.000
ZMIN	.000

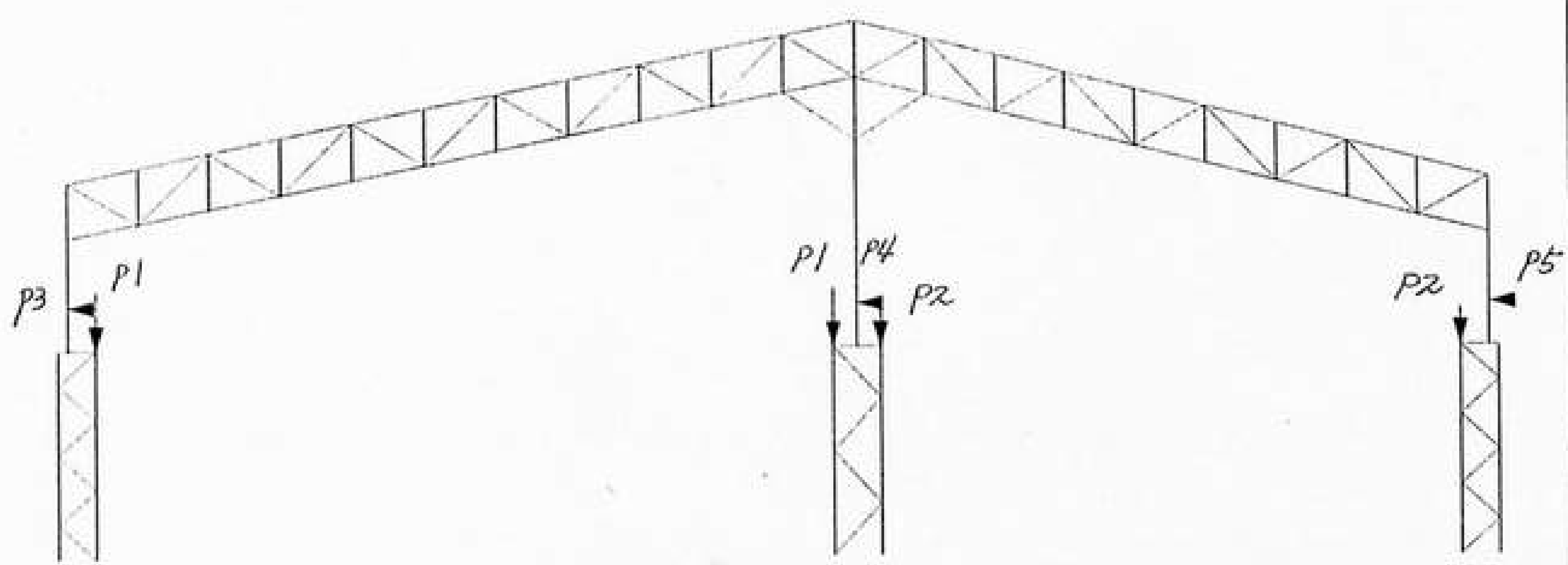
FILE : COIL4
UNIT: M,TON
DATE: 02-25-97

PROJECT:POS-THAI STEEL SERVICE CENTER
TITLE :SHEAR & SLITTER LINE
:
USER :POSEC

VIEW-DIRECTION

X:	.000
Y:	-1.000
Z:	.000

20



MIDAS/GEN-GPS
POST-PROCESSOR

PLOT LIMIT

XMAX	45.300
XMIN	-.300
YMAX	.000
YMIN	.000
ZMAX	17.000
ZMIN	.000

FILE : COIL4
UNIT: M,TON
DATE: 02-25-97

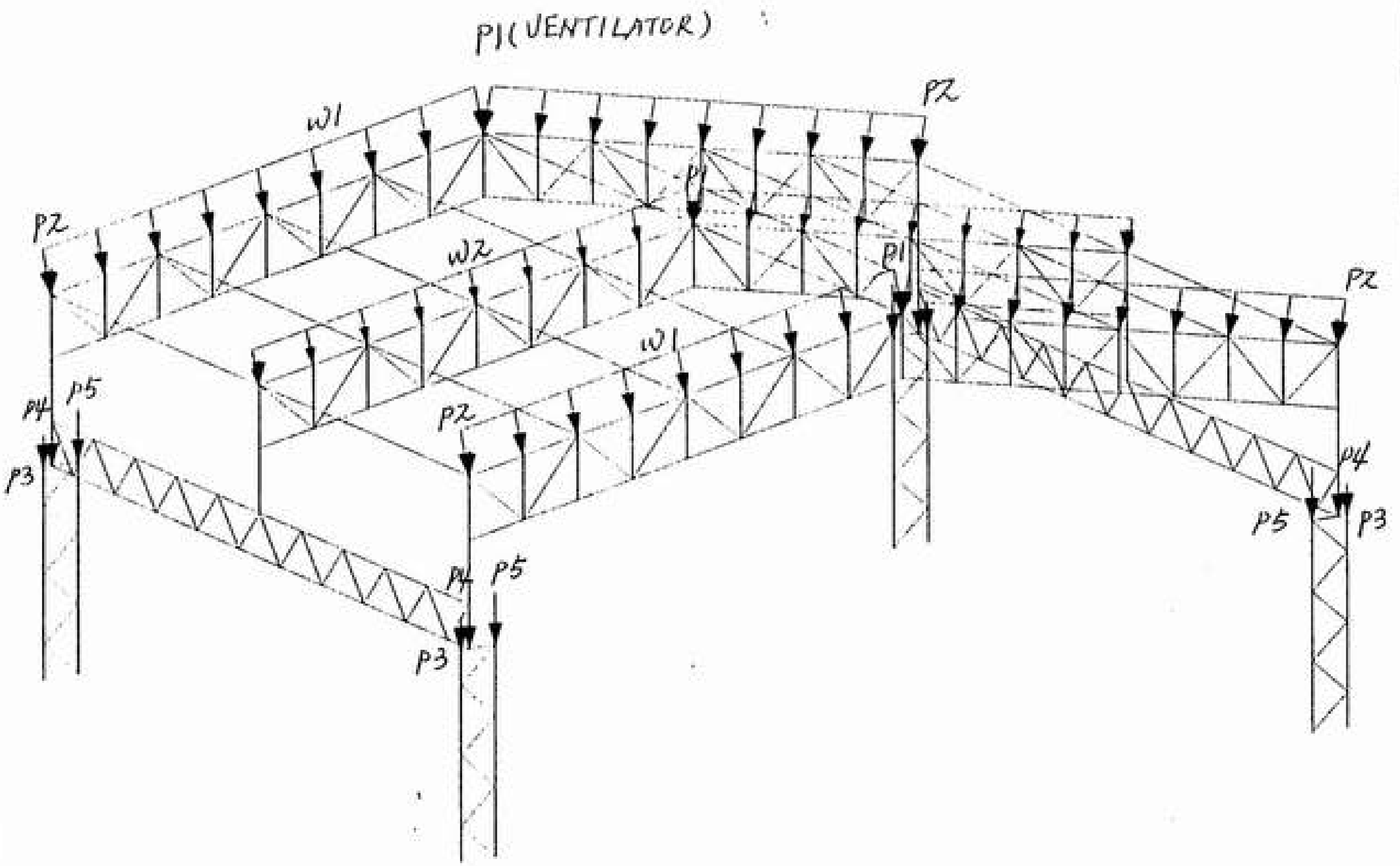
VIEW-DIRECTION

X:	.000
Y:	-1.000
Z:	.000

PROJECT:POS-THAI STEEL SERVICE CENTER
TITLE :SHEAR & SLITTER LINE
:
USER :POSEC

◇ STORAGE YARD ⓐ - ⓓ LINE

DESCRIPTION		LOADING CALCULATION
D.L	W1	-0.07 x 16.3 = -1.14t/m
	W2	-0.07 x 12.5 = -0.88t/m
	P1	-0.5t
	P2	-0.04 x 22.5 x 4 = -3.6t
	P3	-0.04 x 22.5 x 8 = -7.2t
	P4	-0.15 x 22.5 = -3.38t
	P5	-0.6 x 22.5 = 13.5t
W.L	W1	0.7 x 0.06 x 16.3 = 0.69t/m
	W2	0.7 x 0.06 x 12.5 = 0.53t/m
	W3	0.8 x 0.06 x 22.5 = 1.08t/m
		-0.6 x 0.06 x 22.5 = -0.81t/m
	W4	0.6 x 0.06 x 22.5 = 0.81t/m
		-0.8 x 0.06 x 22.5 = -1.08t/m
C.L	P1	-61.7t
	P2	5.1t
		-5.1t



MIDAS/GEN-GPS
POST-PROCESSOR

PLOT LIMIT

XMAX	30.300
XMIN	-.300
YMAX	25.000
YMIN	.000
ZMAX	15.000
ZMIN	.000

FILE : COIL3
UNIT: M,TON
DATE: 02-17-97

VIEW-DIRECTION

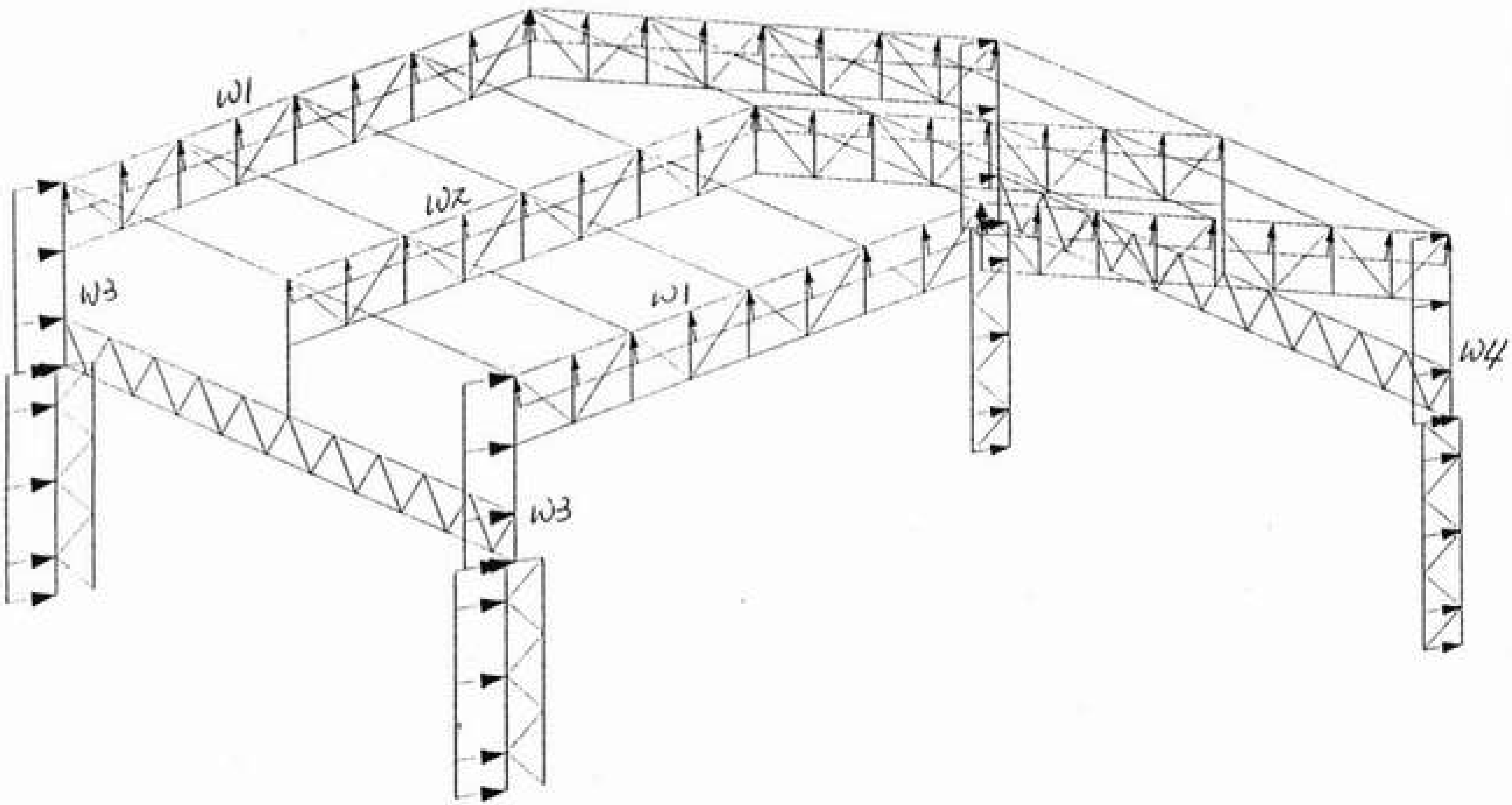
X:	-.483
Y:	-.837
Z:	.259

PROJECT:POS-THAI STEEL SERVICE CENTER

TITLE :STORAGE YARD

: DEAD LOAD

USER :



MIDAS/GEN-GPS
POST-PROCESSOR

PLOT LIMIT

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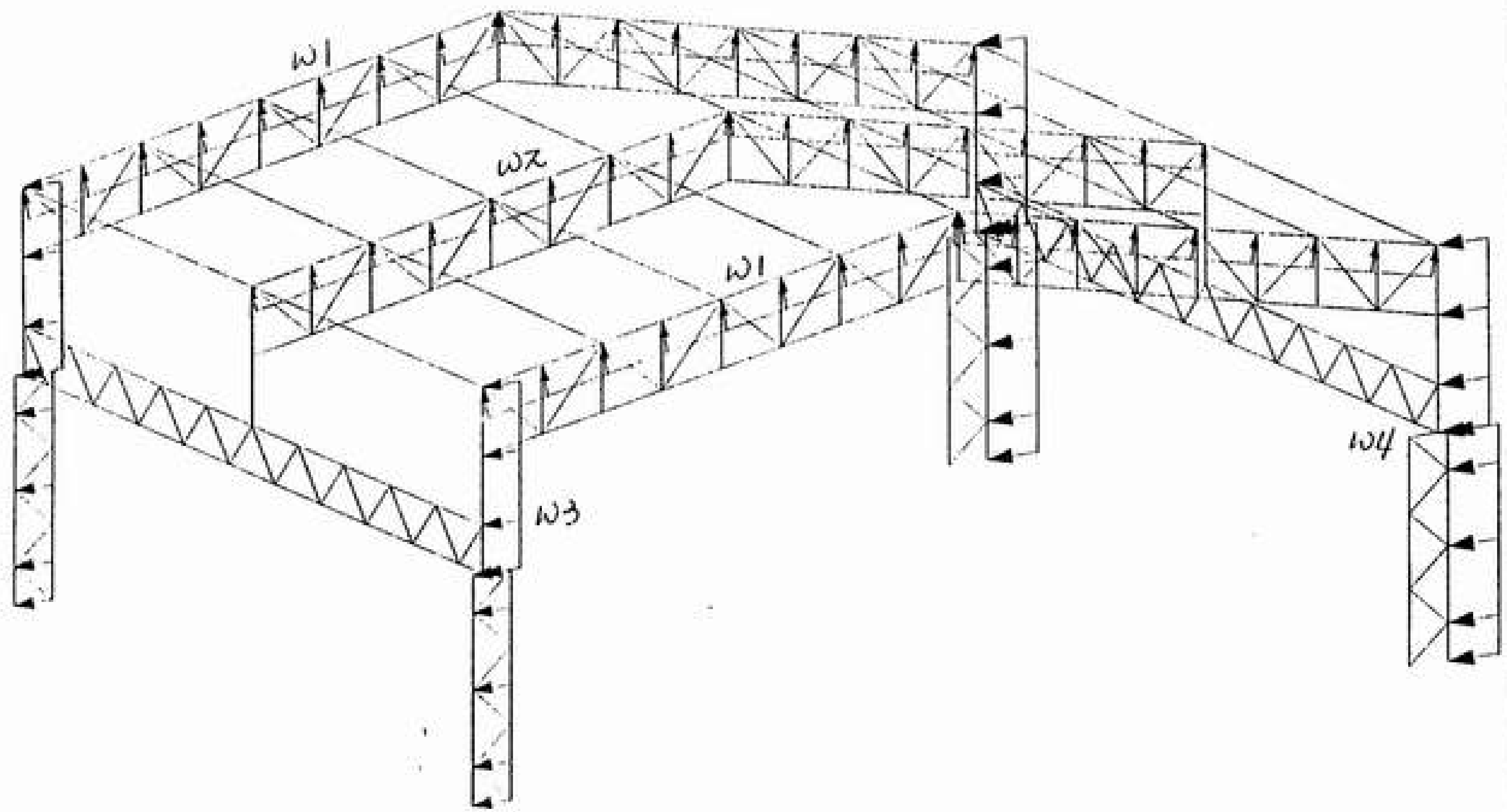
XMIN	-.300
YMAX	25.000
YMIN	.000
ZMAX	15.000
ZMIN	.000

FILE : COIL3
UNIT: M,TON
DATE: 02-17-97

VIEW-DIRECTION

X:	-.483
Y:	-.837
Z:	.259

PROJECT:POS-THAI STEEL SERVICE CENTER
TITLE :STORAGE YARD
: WIND LOAD (→)
USER :



MIDAS/GEN-GPS
POST-PROCESSOR

PLOT LIMIT

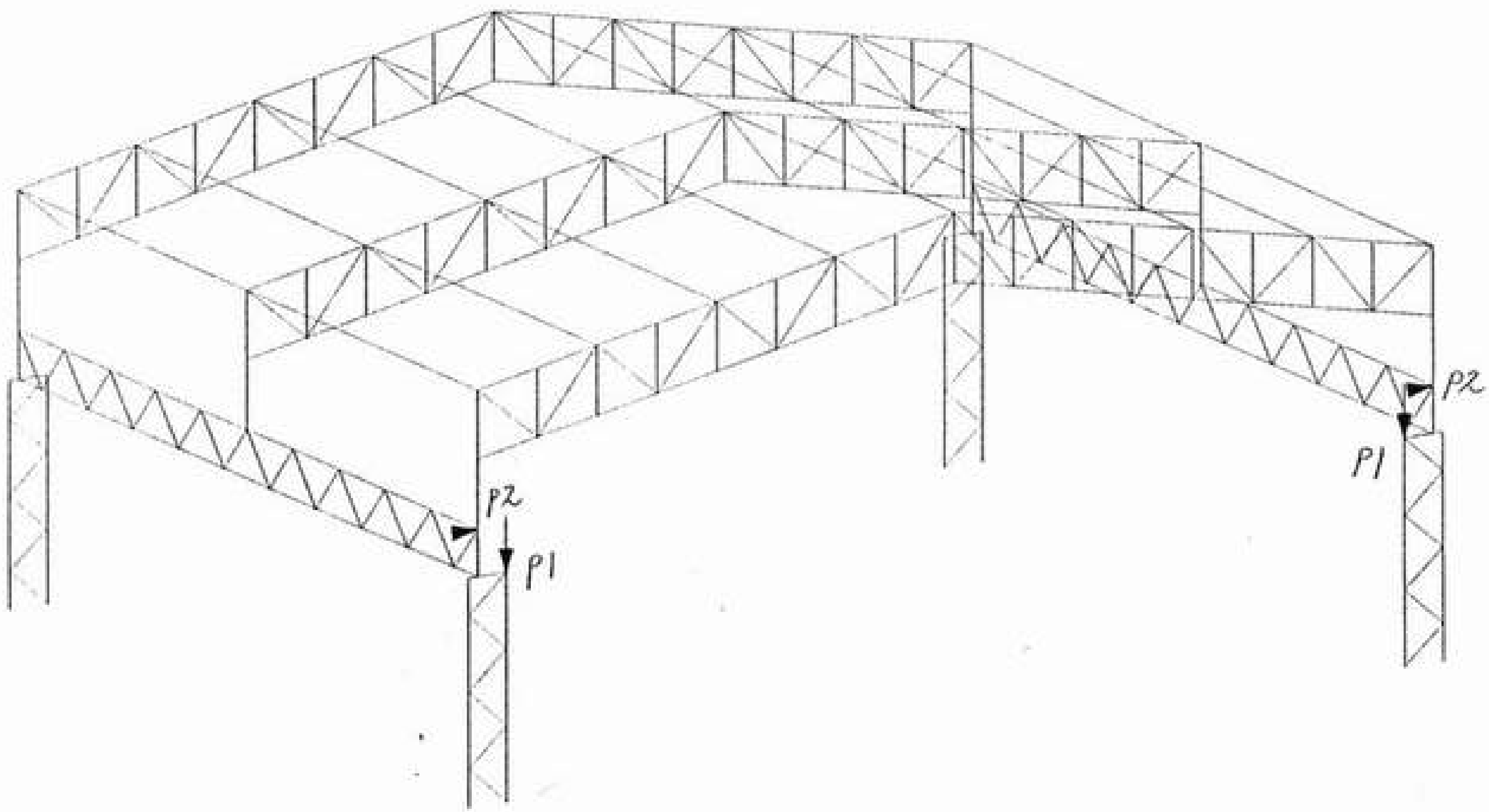
XMAX	30.300
XMIN	-.300
YMAX	25.000
YMIN	.000
ZMAX	15.000
ZMIN	.000

FILE : COIL3
UNIT: M,TON
DATE: 02-17-97

PROJECT:POS-THAI STEEL SERVICE CENTER
TITLE :STORAGE YARD
: WIND LOAD (←)
USER :

VIEW-DIRECTION

X:	-.483
Y:	-.837
Z:	.259



MIDAS/GEN-GPS
POST-PROCESSOR

PLOT LIMIT

XMAX	30.300
XMIN	-.300
YMAX	25.000
YMIN	.000
ZMAX	15.000
ZMIN	.000

FILE : COIL3
UNIT: M,TON
DATE: 02-17-97

VIEW-DIRECTION

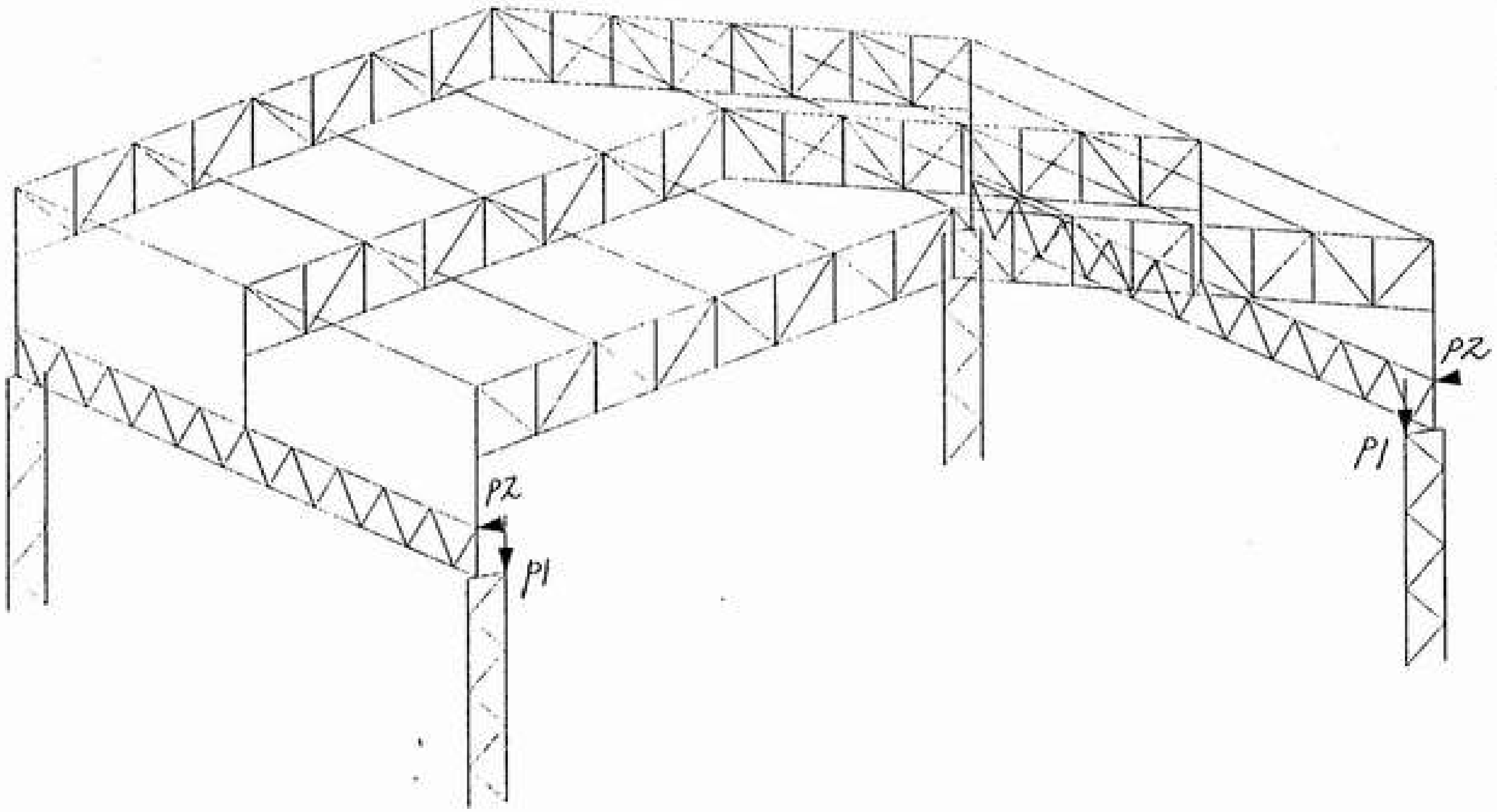
X:	-.483
Y:	-.837
Z:	.259

PROJECT:POS-THAI STEEL SERVICE CENTER
TITLE :STORAGE YARD
: CRANE LOAD (→)
USER :

MIDAS/GEN-GPS
POST-PROCESSOR

PLOT LIMIT

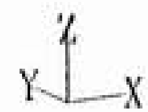
XMAX	30.300
XMIN	-.300
YMAX	25.000
YMIN	.000
ZMAX	15.000
ZMIN	.000



FILE : COIL3
UNIT: M,TON
DATE: 02-17-97

VIEW-DIRECTION

X: -.483
Y: -.837
Z: .259

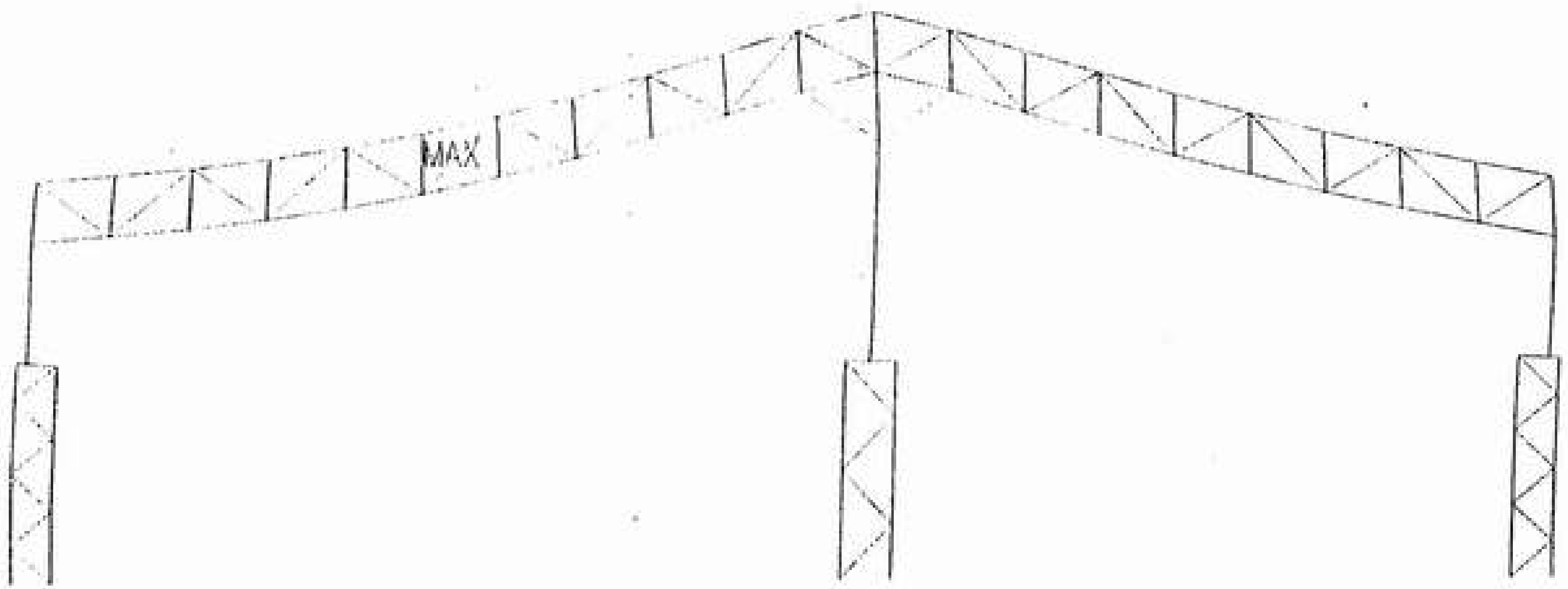


PROJECT:POS-THAI STEEL SERVICE CENTER

TITLE :STORAGE YARD

: CRANE LOAD(←)

USER :



MIDAS/GEN-GPS
POST-PROCESSOR

DISPLACEMENT

SCALE FACTOR
3.606E+01

X-DIR= .0177412
NODE= 51

Y-DIR= 0
NODE= 1

Z-DIR=-.02615195
NODE= 52

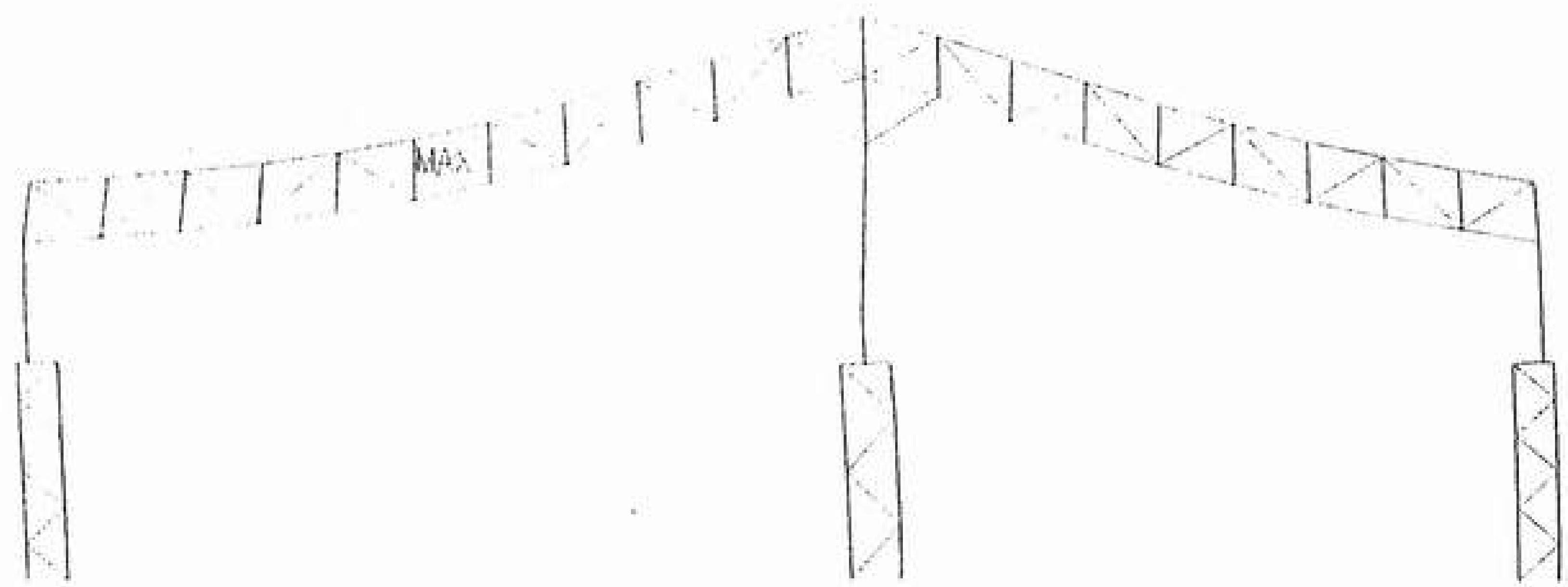
COMB.= .03161735
NODE= 52

LOADCOMB ID.= 1

FILE : COIL1
UNIT: M
DATE: 02-20-97

VIEW-DIRECTION
X: .000
Y: -1.000
Z: .000

PROJECT:POS-THAI STEEL SERVICE CENTER
TITLE :SHEAR & SLITTER LINE ANALYSIS
:1 - 7 ROW
USER :POSEC



MIDAS/GEN-GPS
POST-PROCESSOR

DISPLACEMENT

SCALE FACTOR
4.441E+01

X-DIR=-.01108676
NODE= 71

Y-DIR= 0
NODE= 1

Z-DIR=-.02512587
NODE= 52

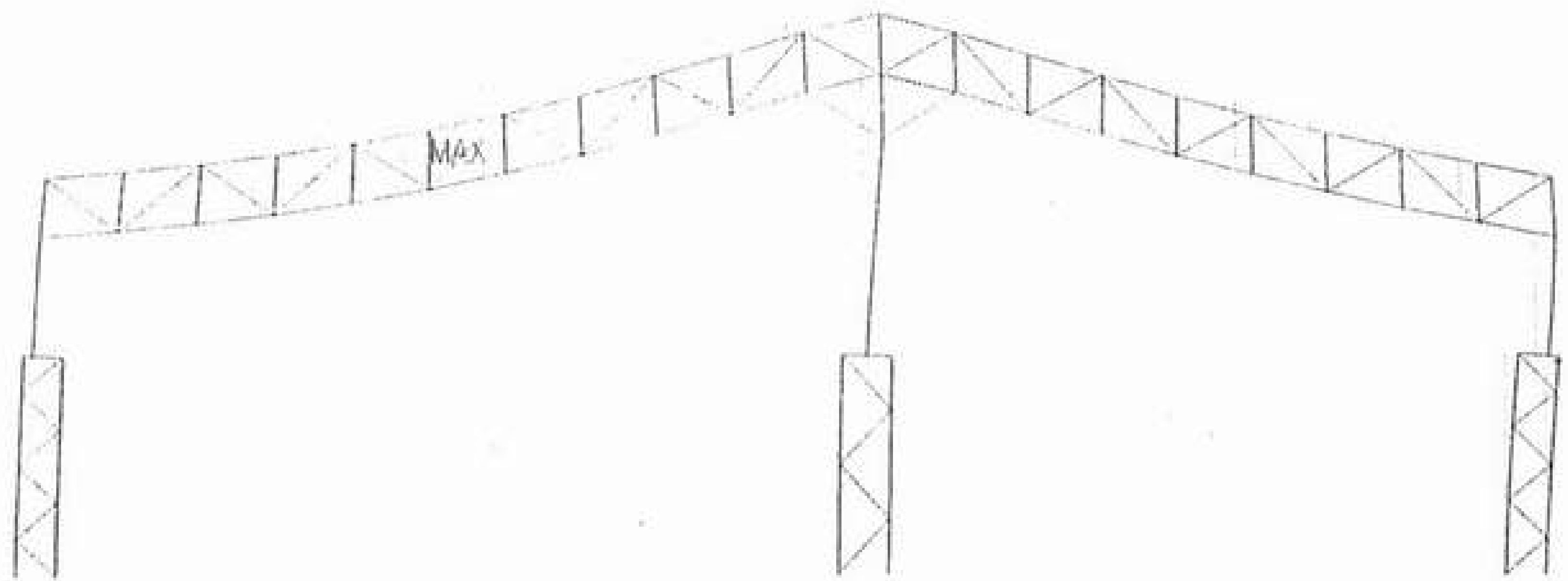
COMB.= .02566771
NODE= 52

LOADCOMB ID.= 2

FILE : COIL1
UNIT: M
DATE: 02-20-97

VIEW-DIRECTION
X: .000
Y: -1.000
Z: .000

PROJECT:POS-THAI STEEL SERVICE CENTER
TITLE :SHEAR & SLITTER LINE ANALYSIS
:1 - 7 ROW
USER :POSEC



MIDAS/GEN-GPS
POST-PROCESSOR

DISPLACEMENT

SCALE FACTOR
8.690E+01

X-DIR=.008467225
NODE= 50

Y-DIR= 0
NODE= 1

Z-DIR=-.01017633
NODE= 52

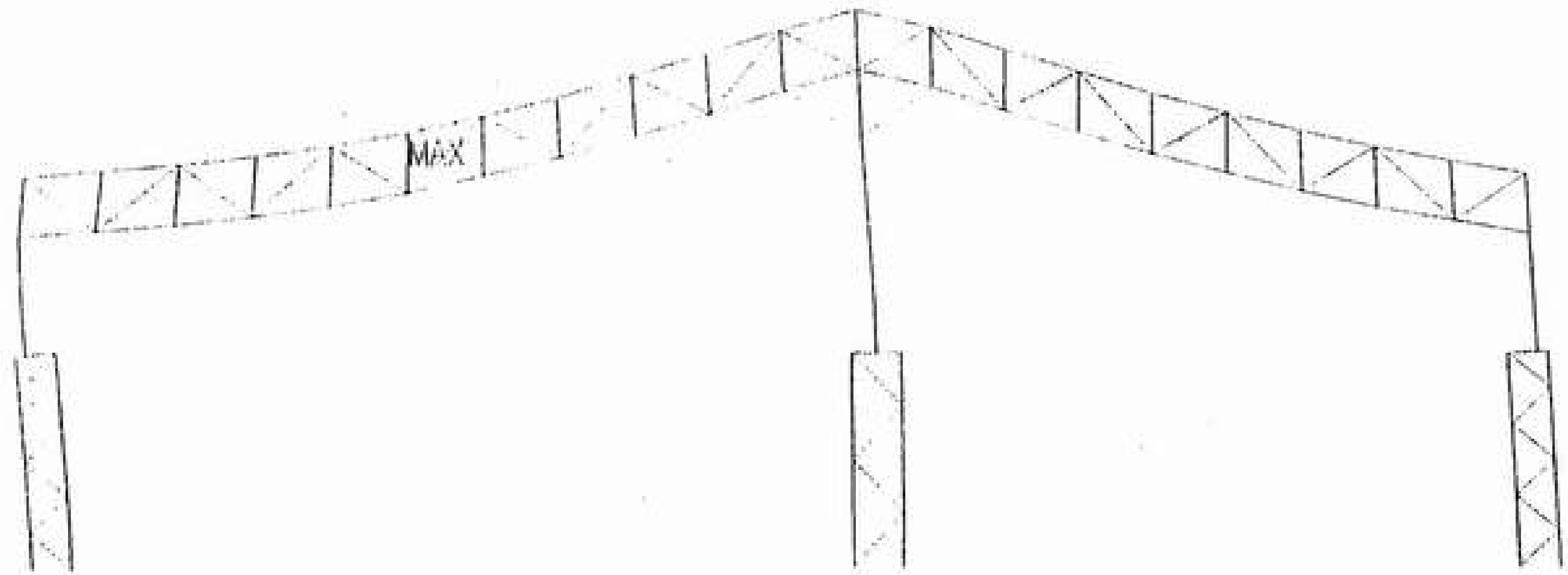
COMB.= .01311924
NODE= 52

LOADCOMB ID.= 3

FILE : COIL4
UNIT: M
DATE: 02-20-97

PROJECT:POS-THAI STEEL SERVICE CENTER
TITLE :SHEAR & SLITTER LINE ANALYSIS
:1 - 7 ROW
USER :POSEC

VIEW-DIRECTION
X: .000
Y: -1.000
Z: .000



MIDAS/GEN-GPS
POST-PROCESSOR

DISPLACEMENT

SCALE FACTOR
1.030E+02

X-DIR=-.00682251
NODE= 71

Y-DIR= 0
NODE= 1

Z-DIR=-.01035911
NODE= 52

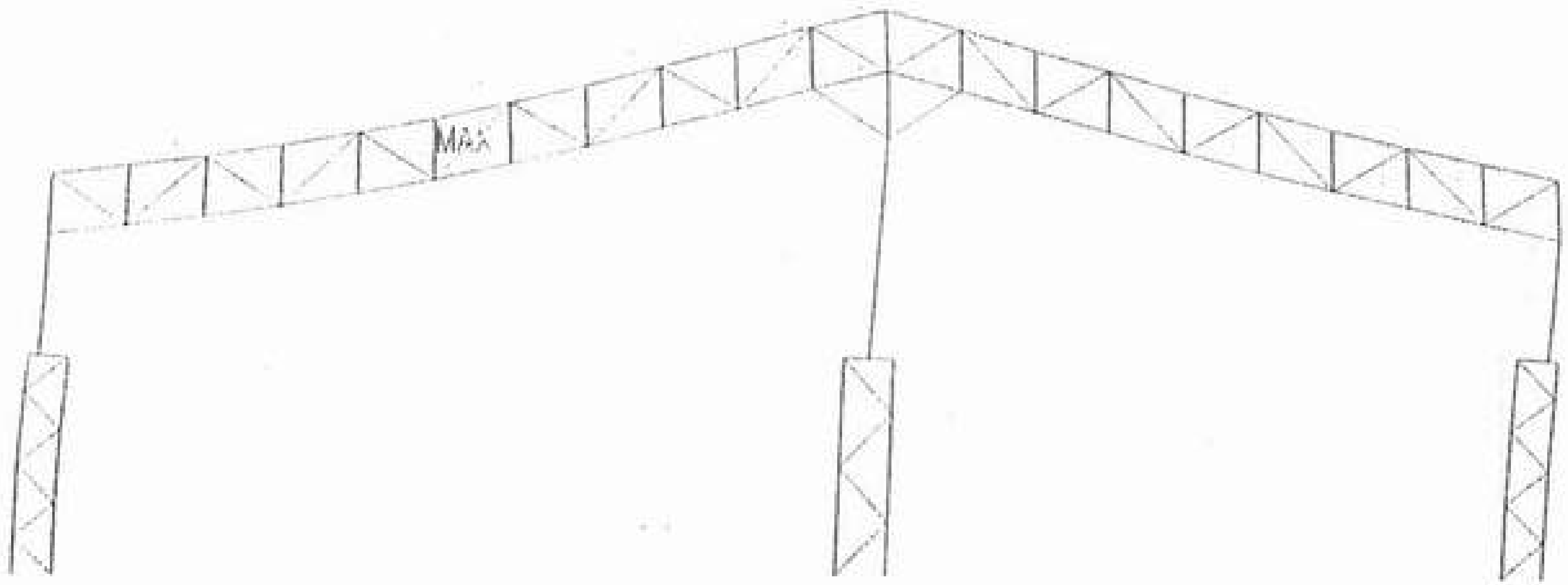
COMB.= .01106612
NODE= 52

LOADCOMB ID.= 4

FILE : COIL4
UNIT: M
DATE: 02-20-97

PROJECT:POS-THAI STEEL SERVICE CENTER
TITLE :SHEAR & SLITTER LINE ANALYSIS
:4 - 7 ROW
USER :POSEC

VIEW-DIRECTION
X: .000
Y: -1.000
Z: .000



MIDAS/GEN-GPS
POST-PROCESSOR

DISPLACEMENT

SCALE FACTOR
6.351E+01

X-DIR= .01473659
NODE= 50

Y-DIR= 0
NODE= 1

Z-DIR=-.01051963
NODE= 52

COMB.= .0179511
NODE= 52

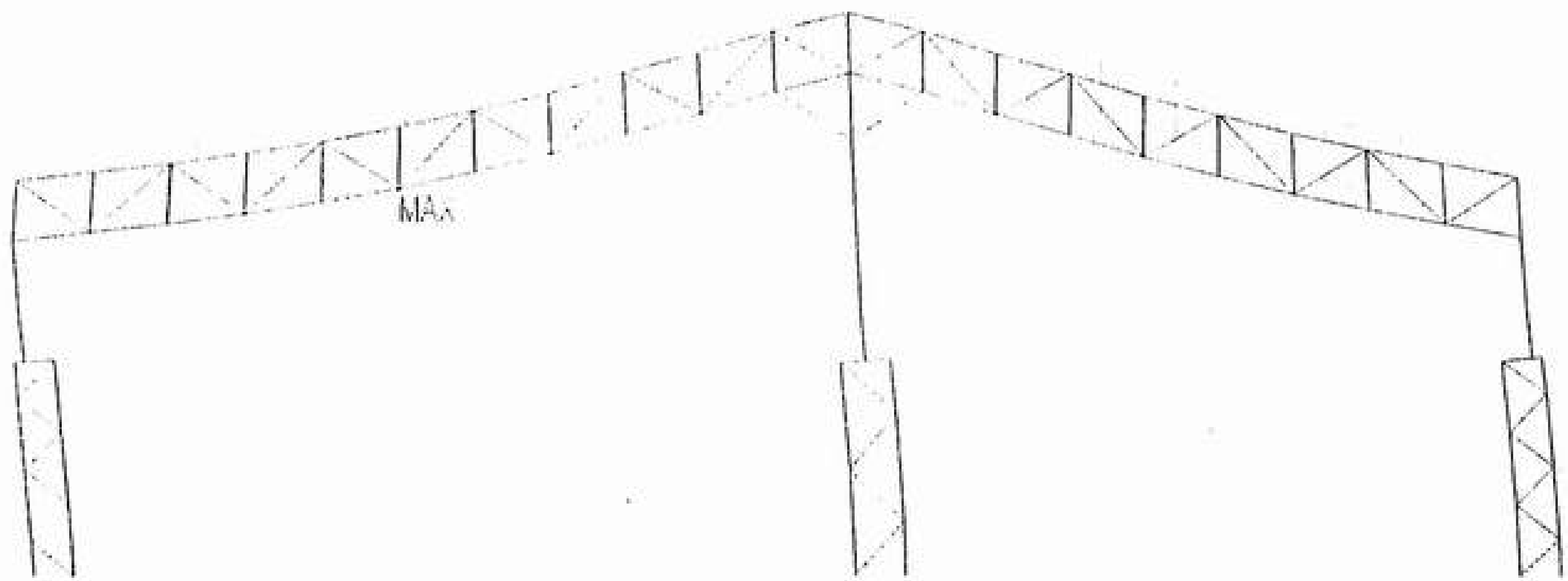
LOADCOMB ID.= 5

FILE : COIL4
UNIT: M
DATE: 02-20-97

PROJECT:POS-THAI STEEL SERVICE CENTER
TITLE :SHEAR & SLITTER LINE ANALYSIS
:1 - 7 ROW
USER :POSEC

VIEW-DIRECTION

X: .000
Y: -1.000
Z: .000



MIDAS/GEN-GPS
POST-PROCESSOR

DISPLACEMENT

SCALE FACTOR
8.429E+01

X-DIR= -.0118021
NODE= 71

Y-DIR= 0
NODE= 1

Z-DIR= -.0101467
NODE= 52

COMB.= .01352459
NODE= 42

LOADCOMB ID.= 6

FILE : COIL4
UNIT: M
DATE: 02-20-97

VIEW-DIRECTION

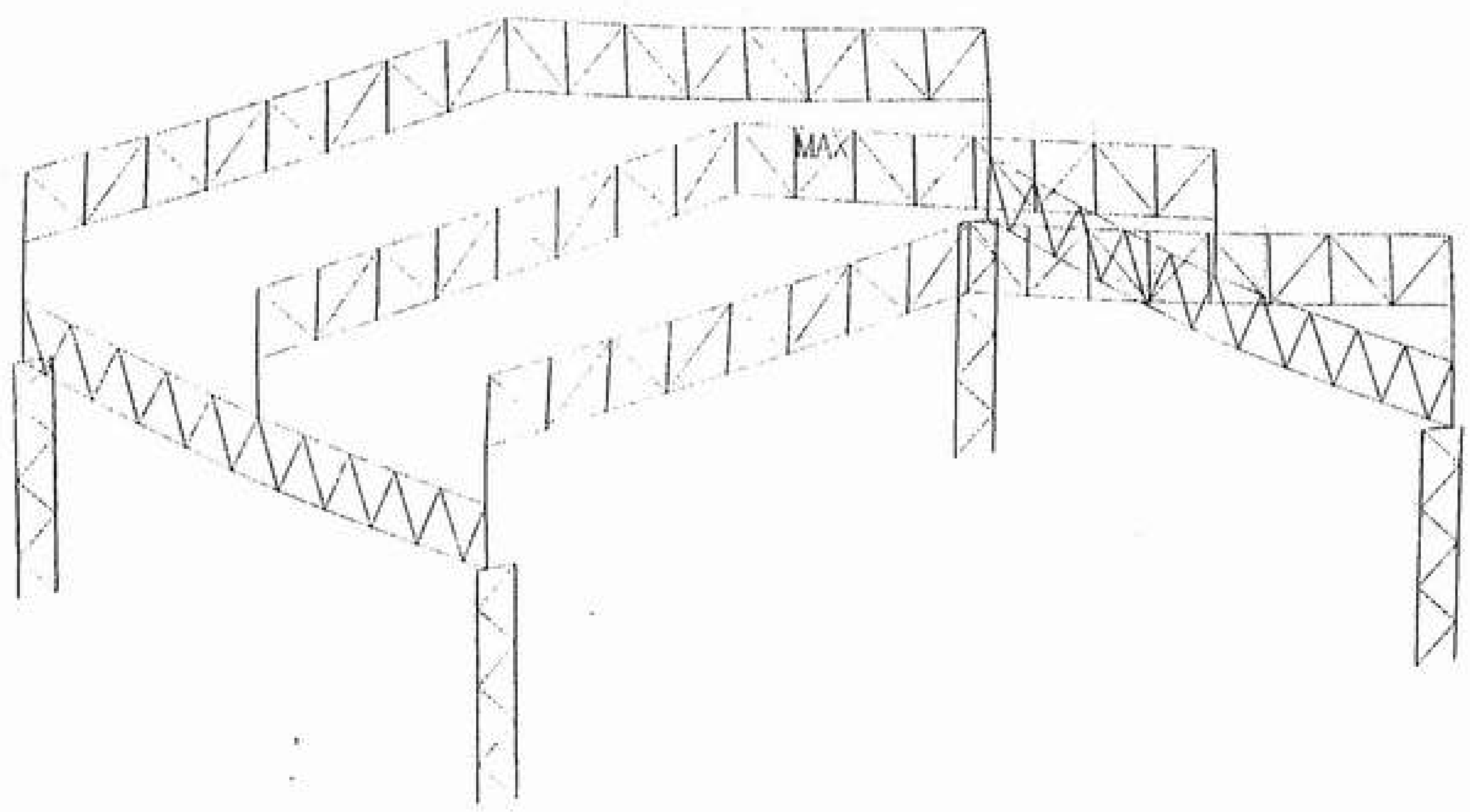
X: .000
Y: -1.000
Z: .000

PROJECT:POS-THAI STEEL SERVICE CENTER

TITLE :SHEAR & SLITTER LINE ANALYSIS

:1 - 7 ROW

USER :POSEC



MIDAS/GEN-GPS
POST-PROCESSOR

DISPLACEMENT

SCALE FACTOR
1.143E+01

X-DIR= .02363724
NODE= 25

Y-DIR=-.00908006
NODE= 83

Z-DIR=-.06695057
NODE= 139

COMB.= .06695331
NODE= 139

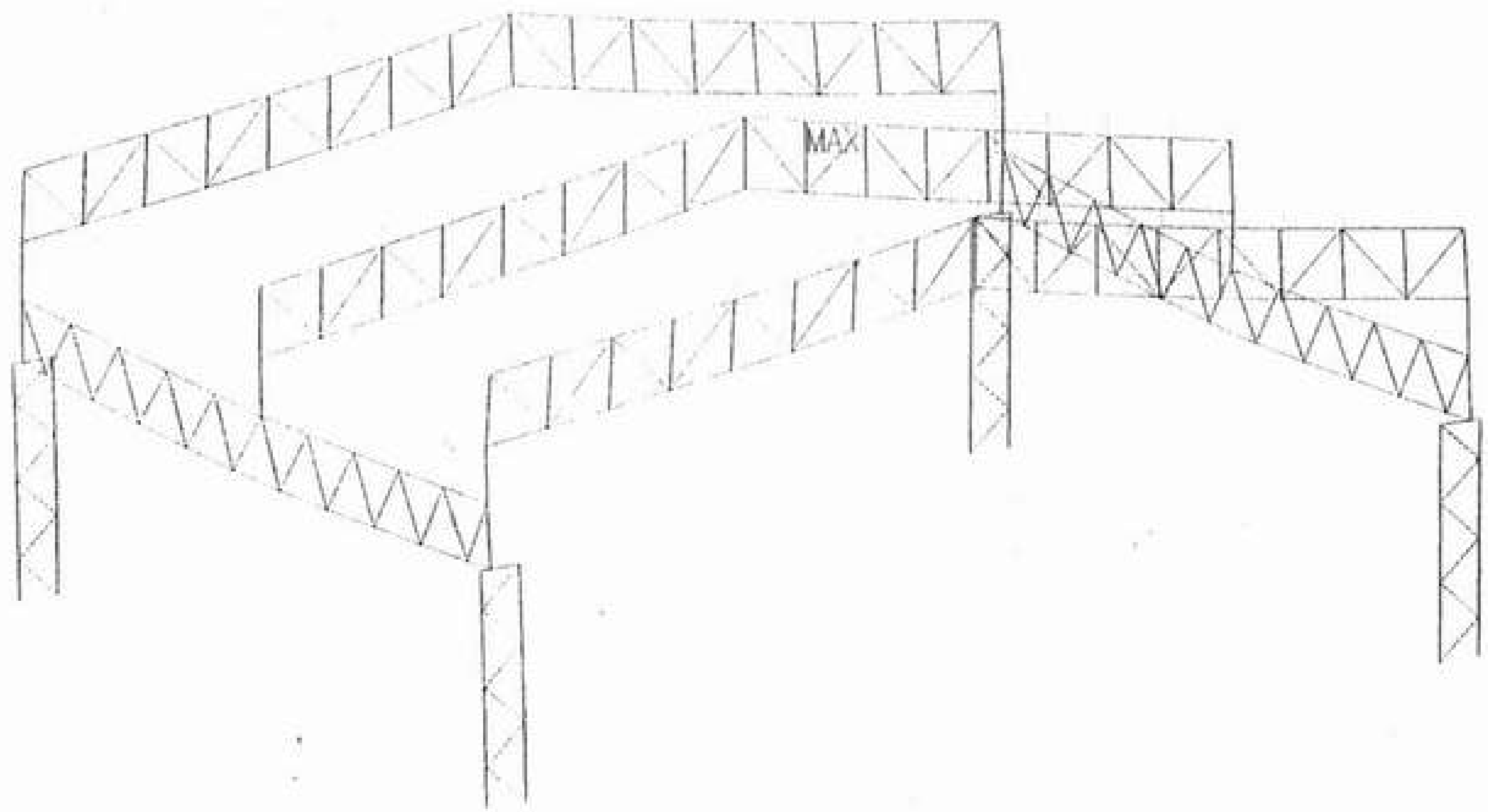
LOADCOMB ID.= 1

FILE : COIL5
UNIT: M
DATE: 02-20-97

VIEW-DIRECTION

X: -.483
Y: -.837
Z: .259

PROJECT:POS-THAI STEEL SERVICE CENTER
TITLE :STORAGE YARD ANALYSIS
:A - D LINE
USER :



MIDAS/GEN-GPS
POST-PROCESSOR

DISPLACEMENT

SCALE FACTOR
1.143E+01

X-DIR= -.023089
NODE= 12

Y-DIR=-.00909364
NODE= 83

Z-DIR=-.06692527
NODE= 139

COMB.= .06692888
NODE= 139

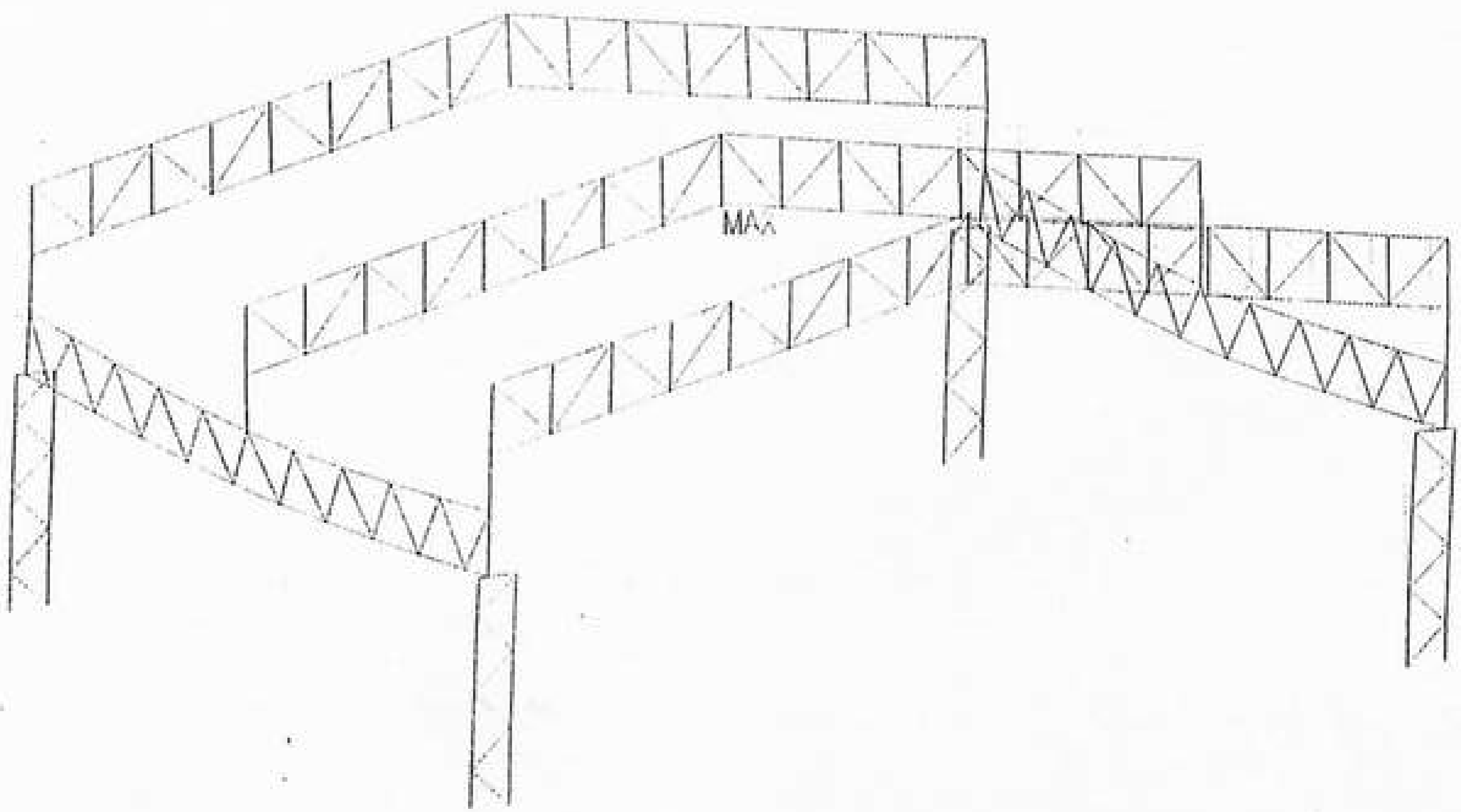
LOADCOMB ID.= 2

FILE : COIL5
UNIT: M
DATE: 02-20-97

PROJECT:POS-THAI STEEL SERVICE CENTER
TITLE :STORAGE YARD ANALYSIS
:A - D LINE
USER :POSEC

VIEW-DIRECTION

X: -.483
Y: -.837
Z: .259



MIDAS/GEN-GPS
POST-PROCESSOR

DISPLACEMENT

SCALE FACTOR
5.896E+01

X-DIR=.009789812
NODE= 41

Y-DIR=.002120896
NODE= 27

Z-DIR=-.01297421
NODE= 153

COMB.= .01297452
NODE= 153

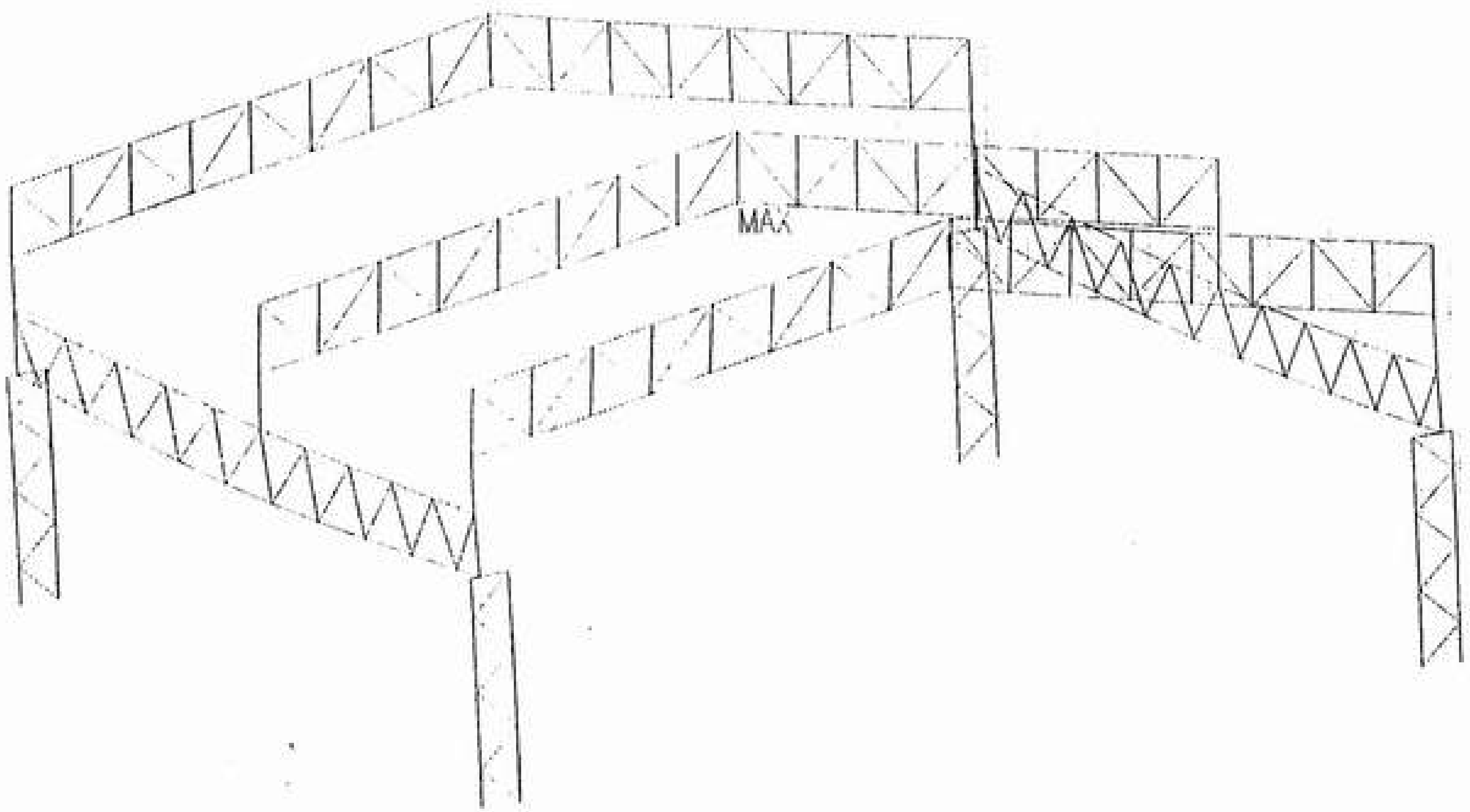
LOADCOMB ID.= 3

FILE : COIL5
UNIT: M
DATE: 02-20-97

VIEW-DIRECTION

X: -.483
Y: -.837
Z: .259

PROJECT:POS-THAI STEEL SERVICE CENTER
TITLE :STORAGE YARD ANALYSIS
:A - D LINE
USER :POSEC



MIDAS/GEN-GPS
POST-PROCESSOR

DISPLACEMENT

SCALE FACTOR
5.896E+01

X-DIR=-.00978152
NODE= 28

Y-DIR=.00242678
NODE= 27

Z-DIR=-.01297391
NODE= 153

COMB.= .01297404
NODE= 153

LOADCOMB.ID.= 4

FILE : COIL5
UNIT: M
DATE: 02-20-97

VIEW-DIRECTION

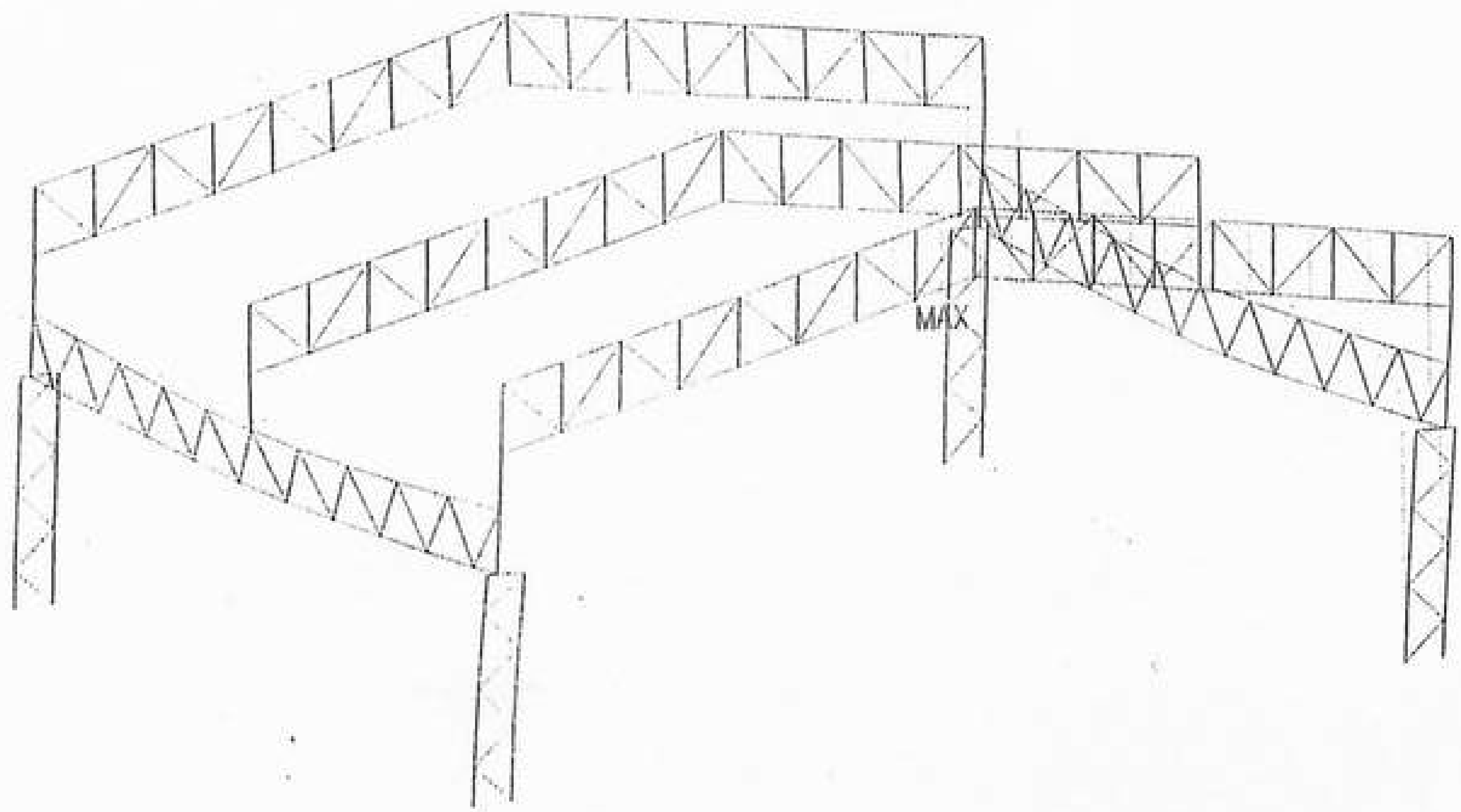
X: -.483
Y: -.837
Z: .259

PROJECT:POS-THAI STEEL SERVICE CENTER

TITLE :STORAGE YARD ANALYSIS

:A - D LINE

USER :POSEC



MIDAS/GEN-GPS
POST-PROCESSOR

DISPLACEMENT

SCALE FACTOR
5.239E+01

X-DIR= .01444978
NODE= 44

Y-DIR=-.00223866
NODE= 83

Z-DIR= -.0131448
NODE= 153

COMB.= .01460339
NODE= 34

LOADCOMB ID.= 5

FILE : COIL5
UNIT: M
DATE: 02-20-97

VIEW-DIRECTION

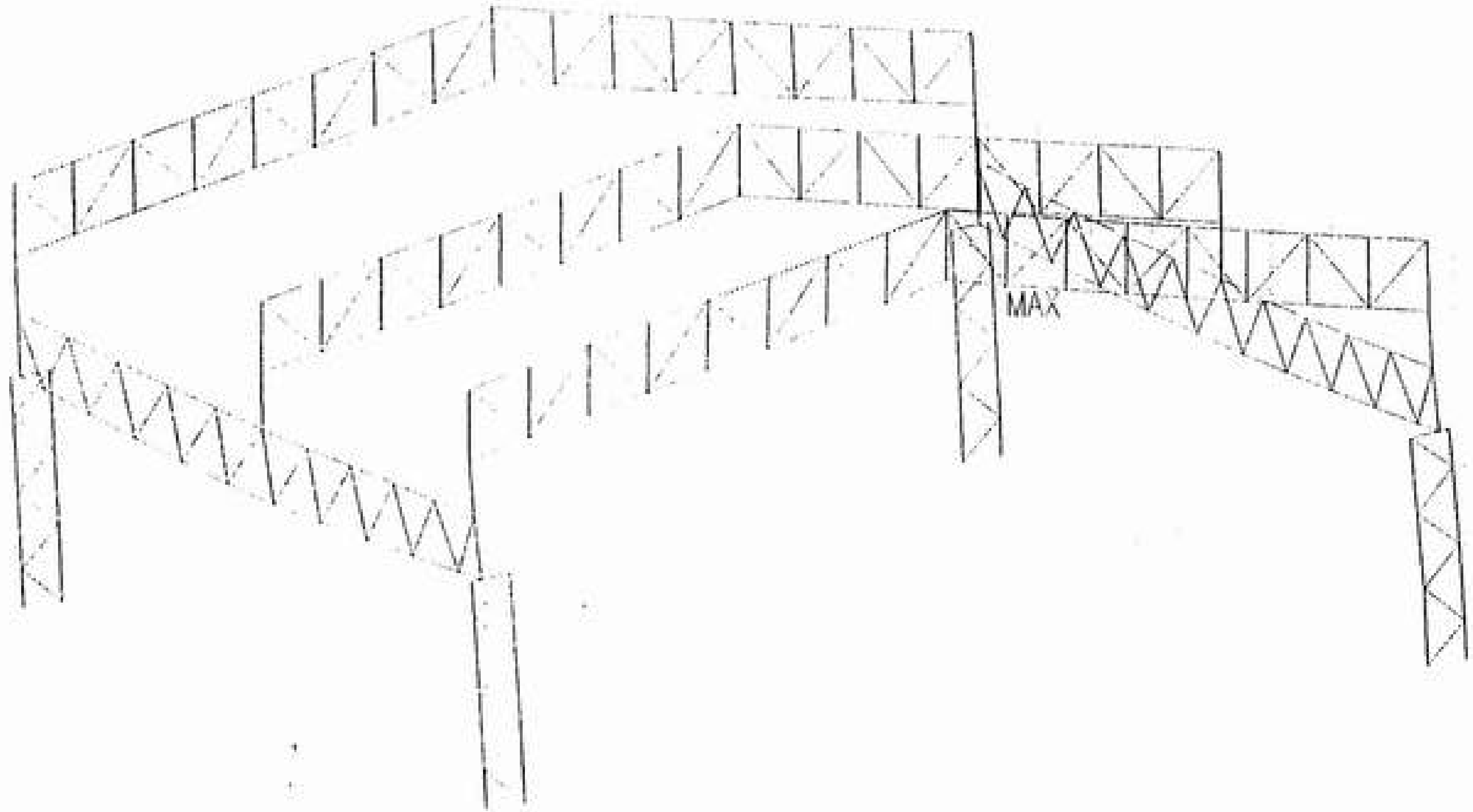
X: -.483
Y: -.837
Z: .259

PROJECT:POS-THAI STEEL SERVICE CENTER

TITLE :STORAGE YARD ANALYSIS

:A - D LINE

USER :



MIDAS/GEN-GPS
POST-PROCESSOR

DISPLACEMENT

SCALE FACTOR
5.355E+01

X-DIR=-.01407208
NODE= 51

Y-DIR=-.00226778
NODE= 83

Z-DIR=-.01314653
NODE= 153

COMB.= .01428678
NODE= 35

LOADCOMB ID.= 6

FILE : COR5
UNIT: M
DATE: 02-20-97

VIEW-DIRECTION

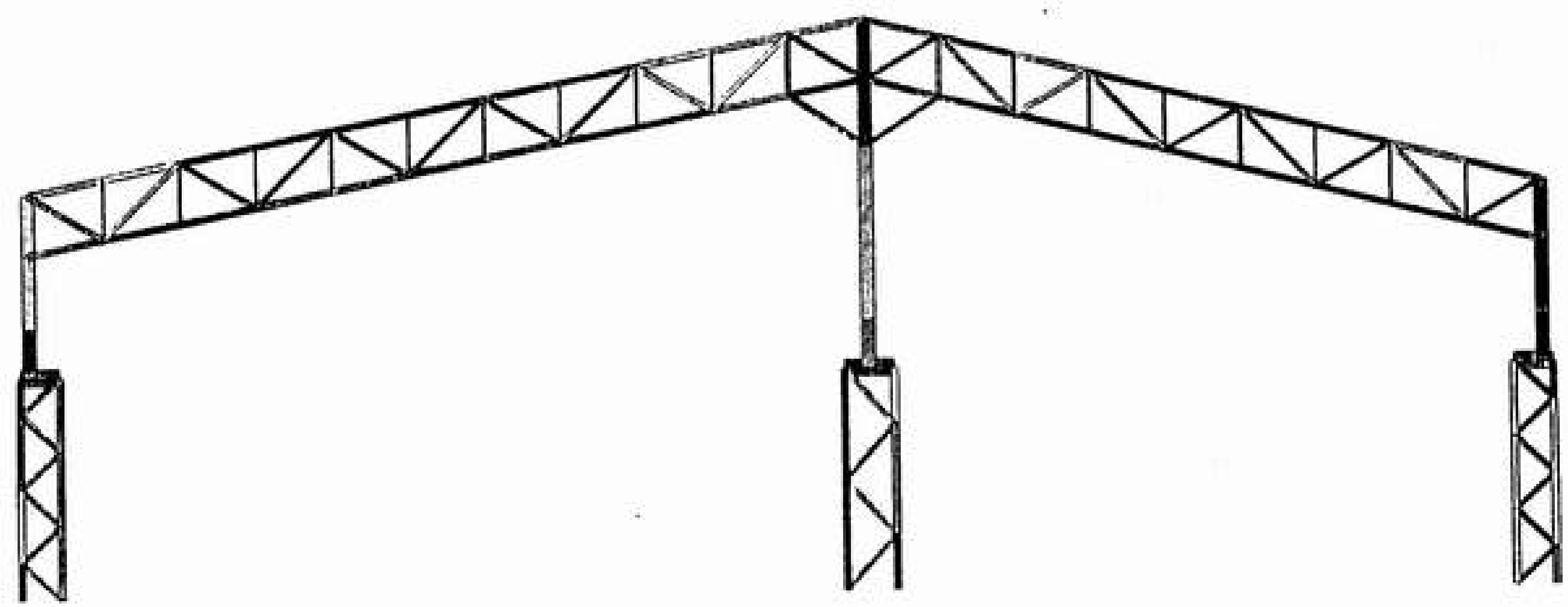
X: -.483
Y: -.837
Z: .259

PROJECT:POS-THAI STEEL SERVICE CENTER

TITLE :STORAGE YARD ANALYSIS

:A - D LINE

USER :POSEC



MIDAS/GEN-GPS
POST-PROCESSOR

CODECHK-RATIO

COMBINED

1.019E+00
9.538E-01
8.590E-01
7.643E-01
6.695E-01
5.748E-01
4.800E-01
3.853E-01
2.905E-01
1.958E-01
1.010E-01
6.299E-03

CODECHK LDC:MAX

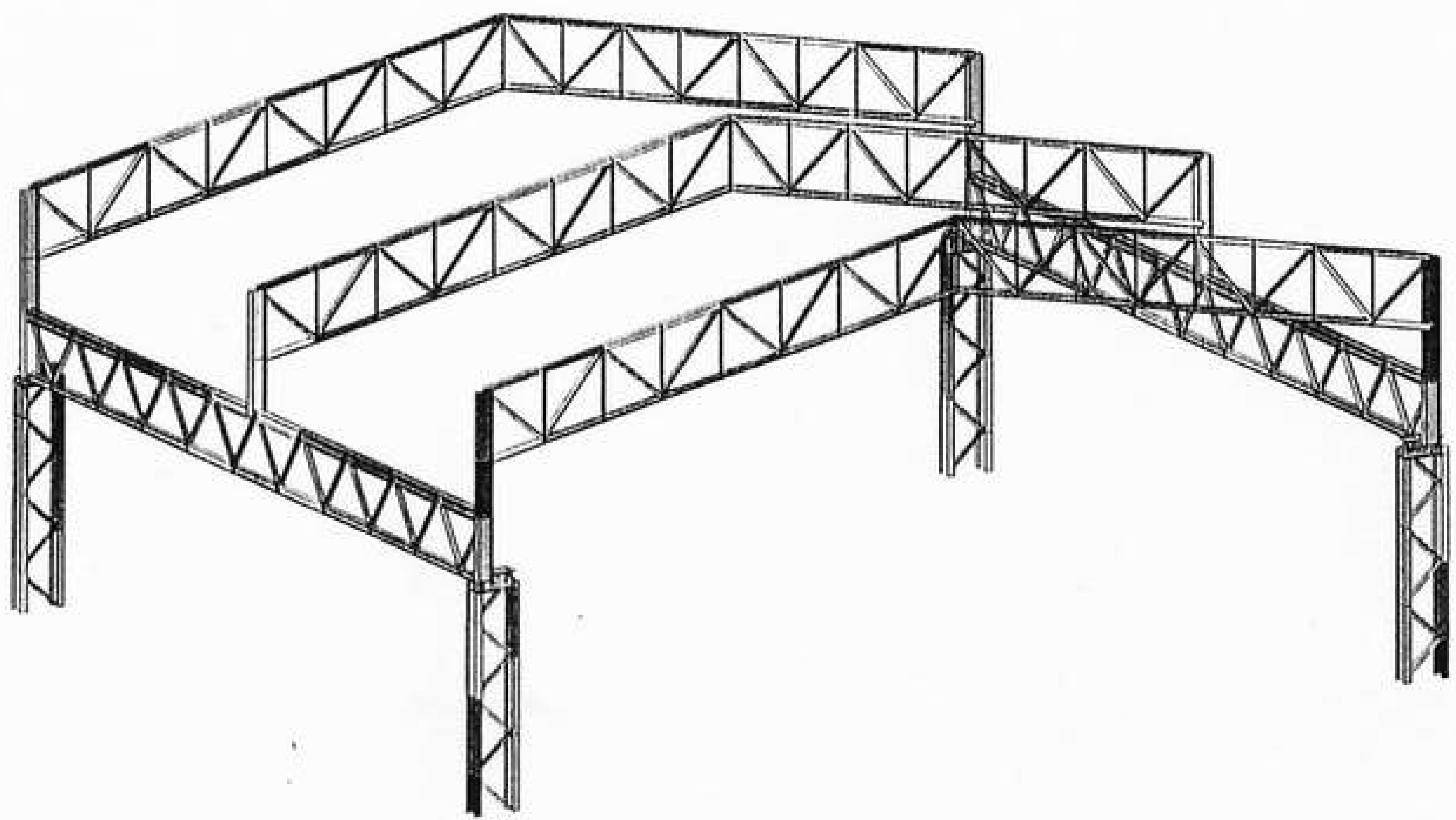
FILE : COIL4
UNIT: M,TON
DATE: 02-20-97

VIEW-DIRECTION

X: .000
Y: -1.000
Z: .000

PROJECT:
TITLE :
:
USER :

17



MIDAS/GEN-GPS
POST-PROCESSOR

CODECHK-RATIO

COMBINED

9.535E-01
8.671E-01
7.807E-01
6.943E-01
6.079E-01
5.215E-01
4.351E-01
3.487E-01
2.623E-01
1.759E-01
8.955E-02
3.163E-03

CODECHK LDC:MAX

FILE : COIL5
UNIT: M,TON
DATE: 02-20-97

VIEW-DIRECTION

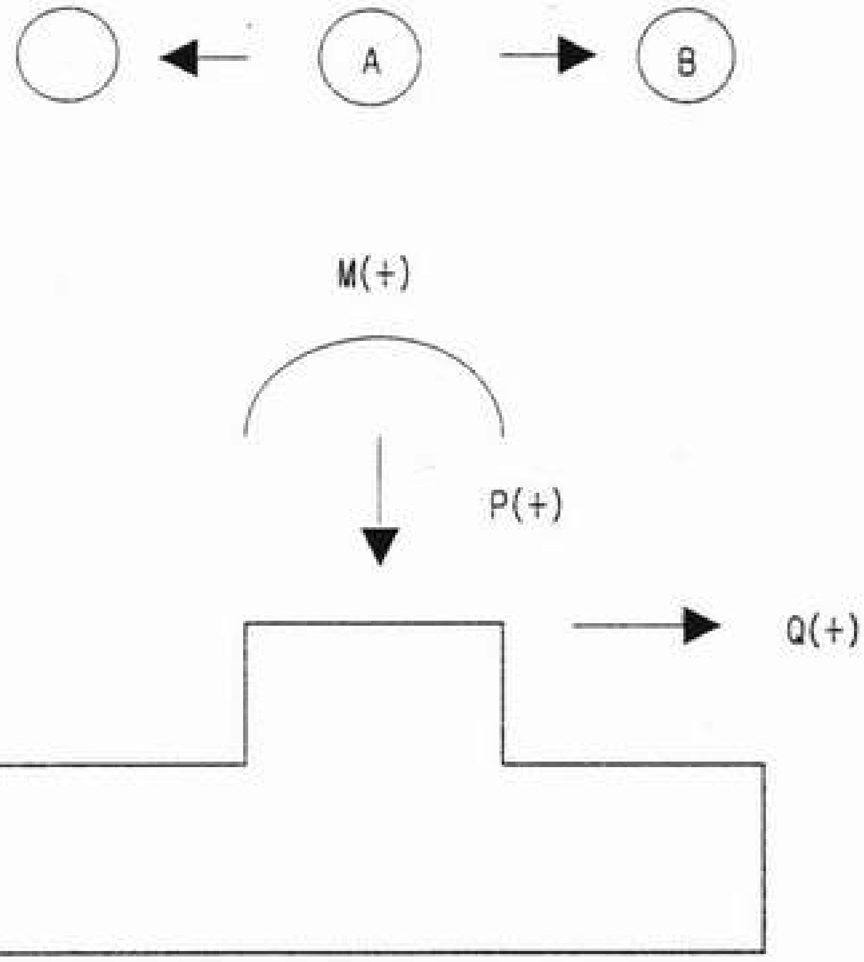
X: -.183
Y: -.837
Z: .259

PROJECT:
TITLE :
:
USER :

5. LIST OF FORCES ON BASE

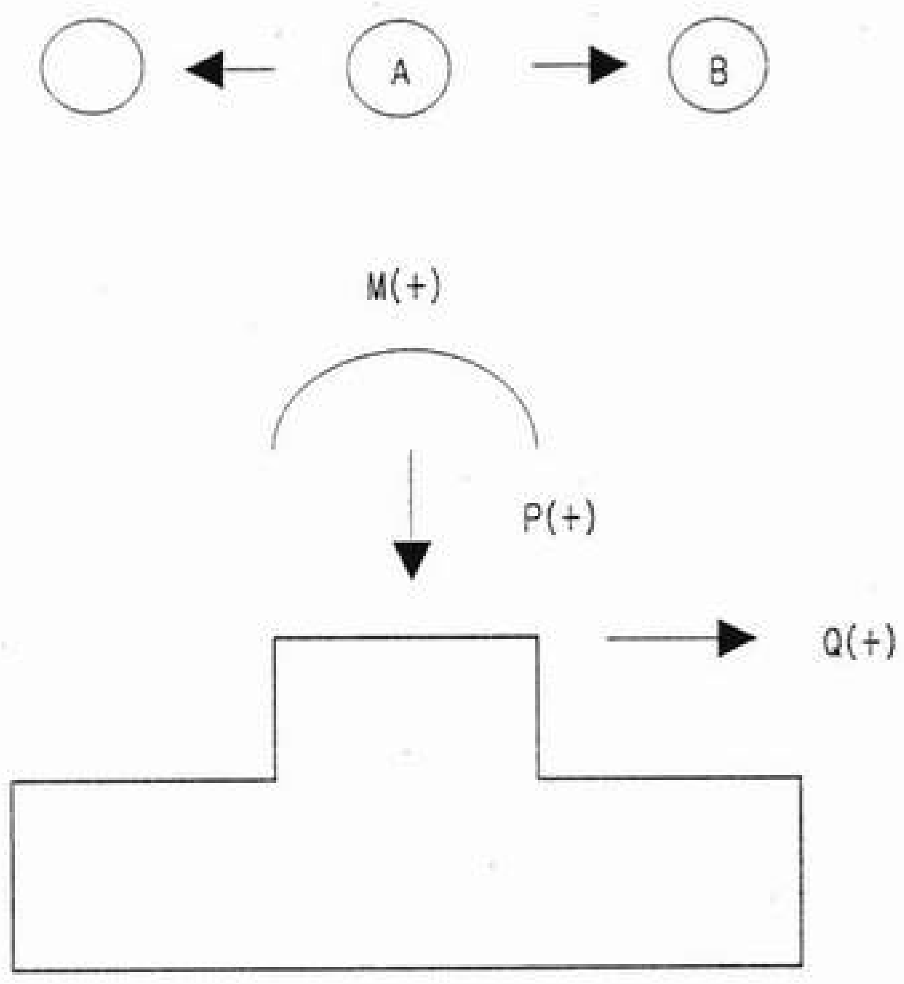
기초설계용 하중데이타

SHEAR & SLITTER LINE



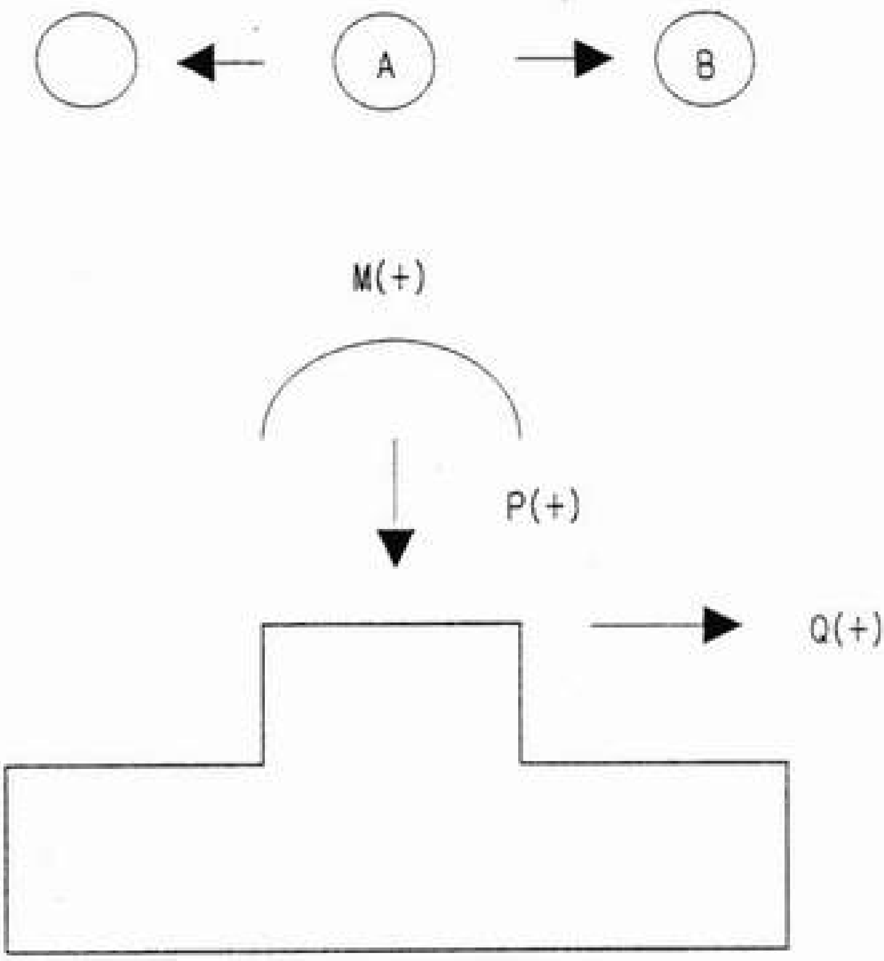
LOAD COMB.	1
P (t)	112.6
Q (t)	-1.6
M (tm)	20.28

기초설계용 하중데이타



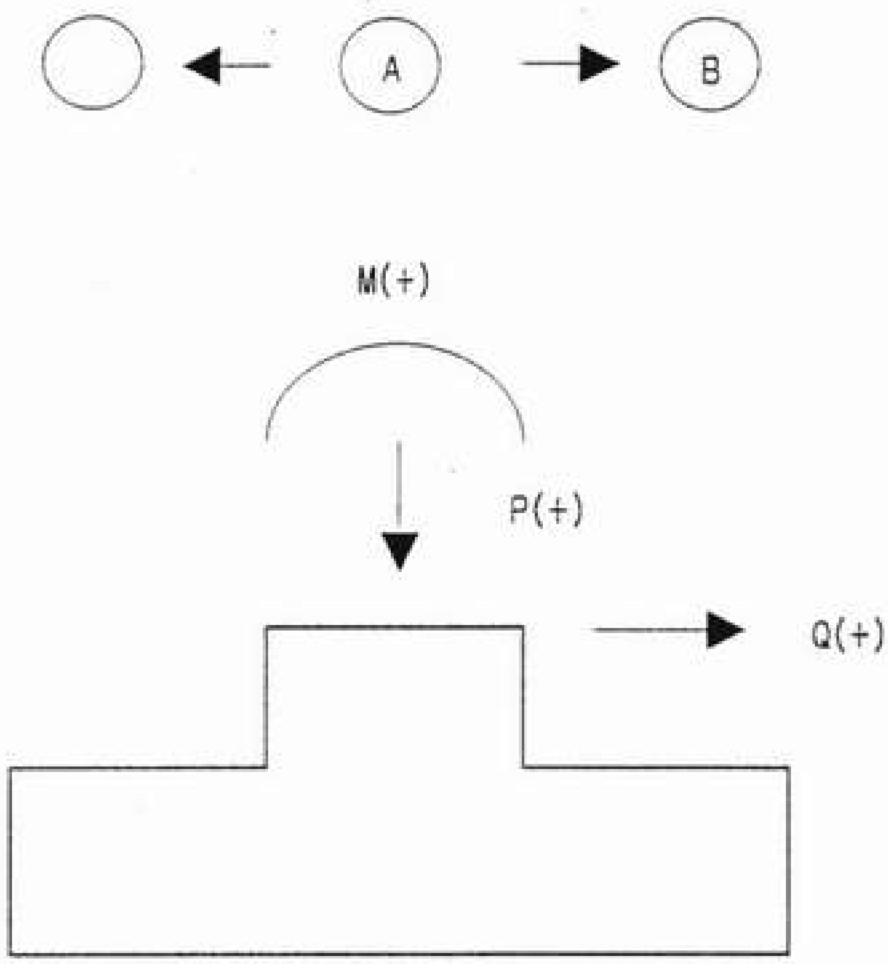
LOAD COMB.	2
P (t)	112.7
Q (t)	-12.9
M (tm)	-64.62

기초설계용 하중데이타



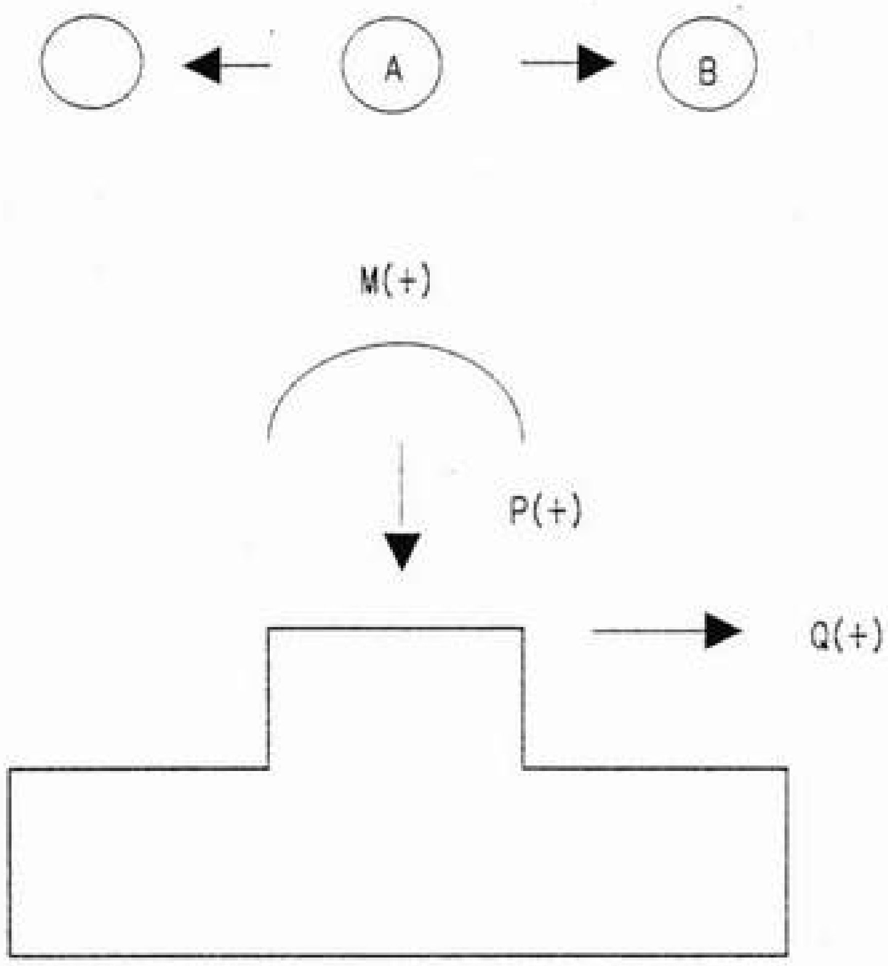
LOAD COMB.	3
P (t)	21.5
Q (t)	3.1
M (tm)	6.78

기초설계용 하중데이타



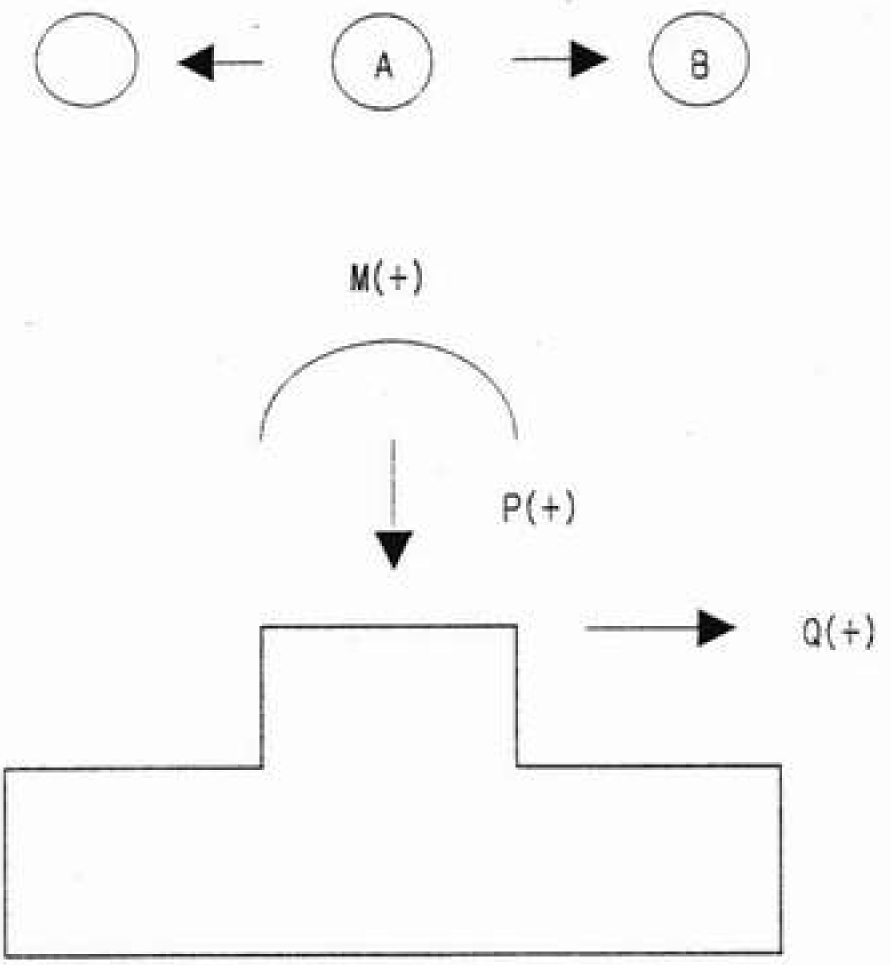
LOAD COMB.	4
P (t)	21.9
Q (t)	-5.6
M (tm)	-35.1

기초설계용 하중데이타



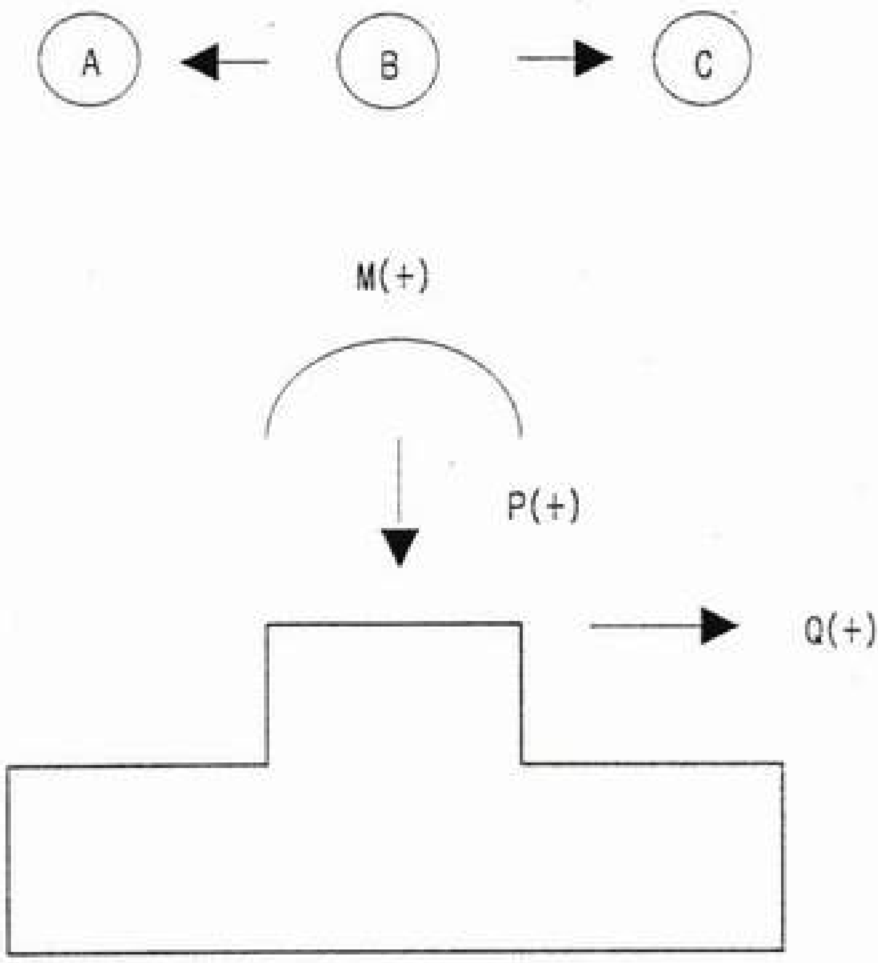
LOAD COMB.	5
P (t)	61.2
Q (t)	4.7
M (tm)	38.88

기초설계용 하중데이타



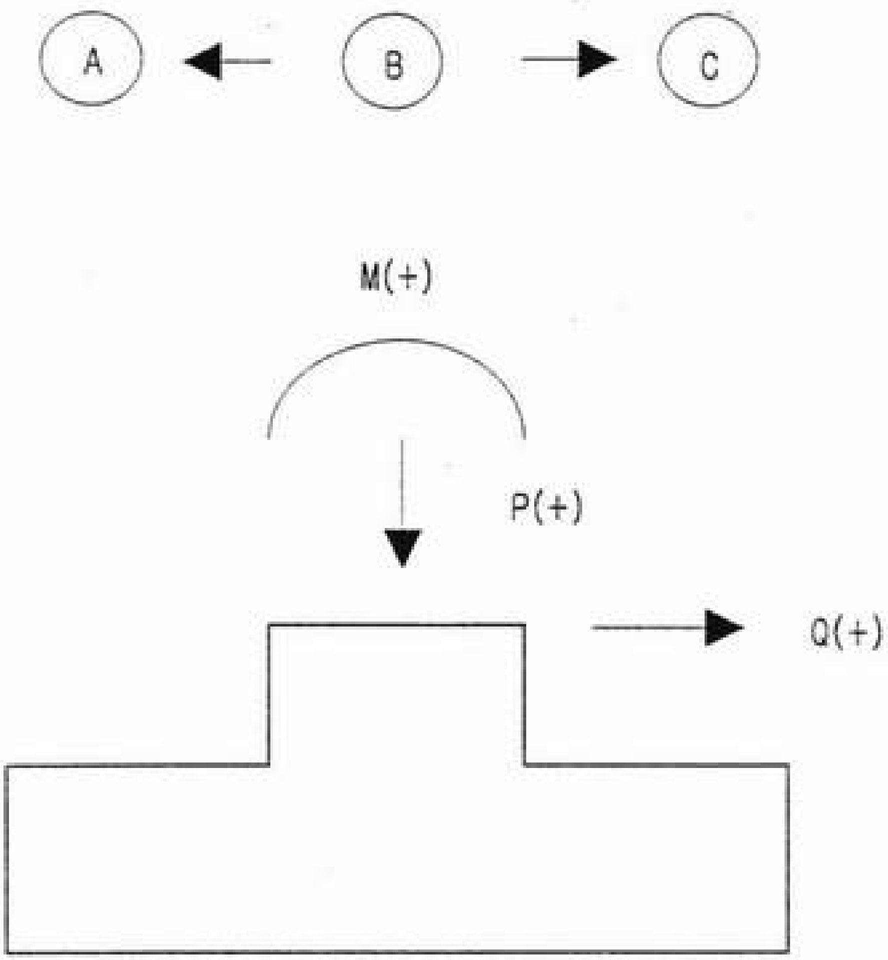
LOAD COMB.	6
P (t)	61.6
Q (t)	-10.3
M (tm)	-48.84

기초설계용 하중데이타



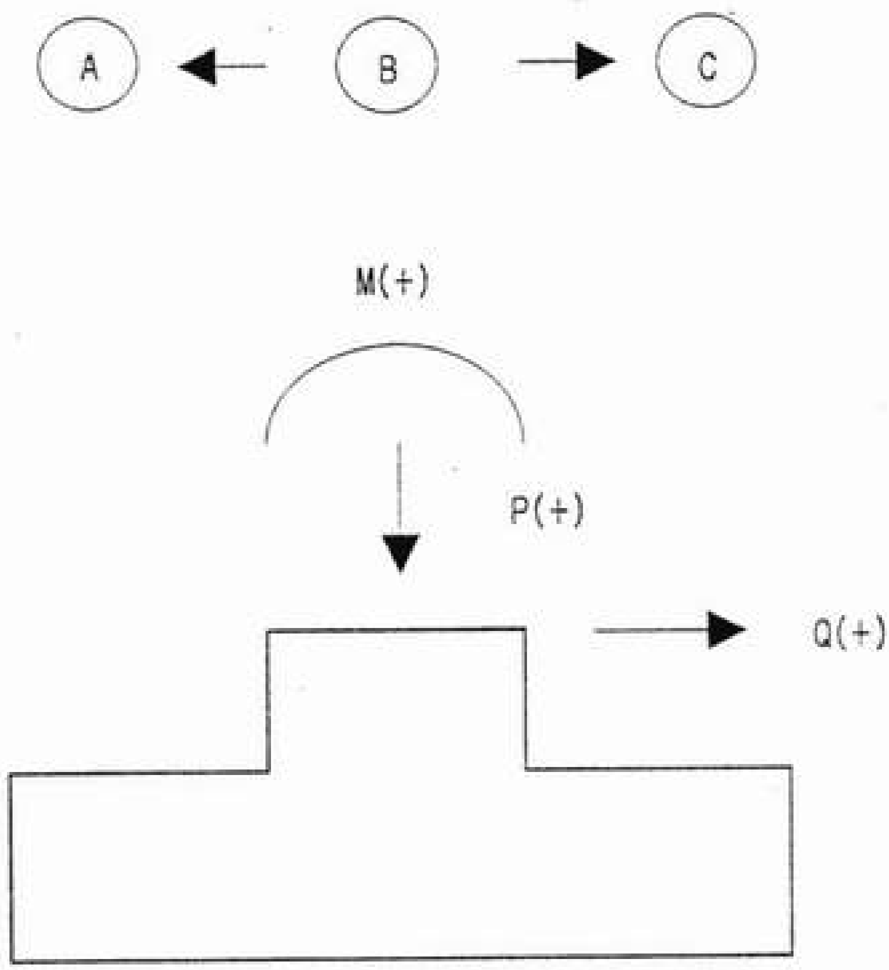
LOAD COMB.	1
P (t)	164.8
Q (t)	11
M (tm)	43.68

기초설계용 하중데이타



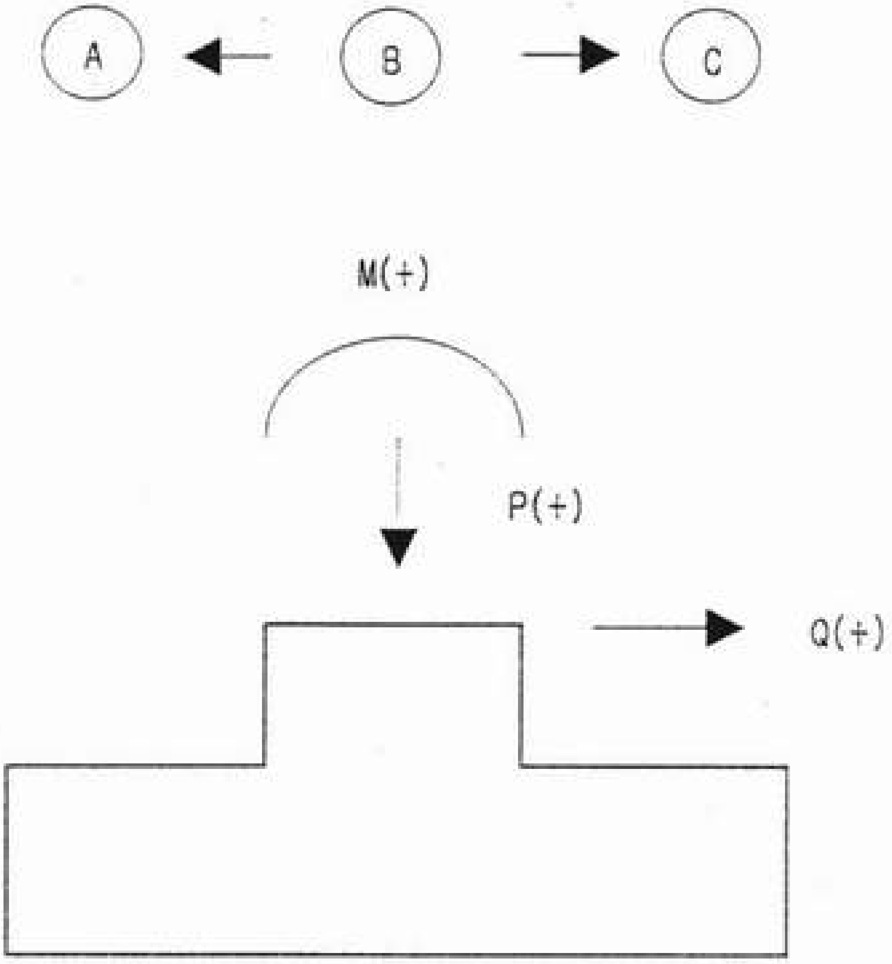
LOAD COMB.	2
P (t)	165.5
Q (t)	-4.3
M (tm)	-47.58

기초설계용 하중데이타



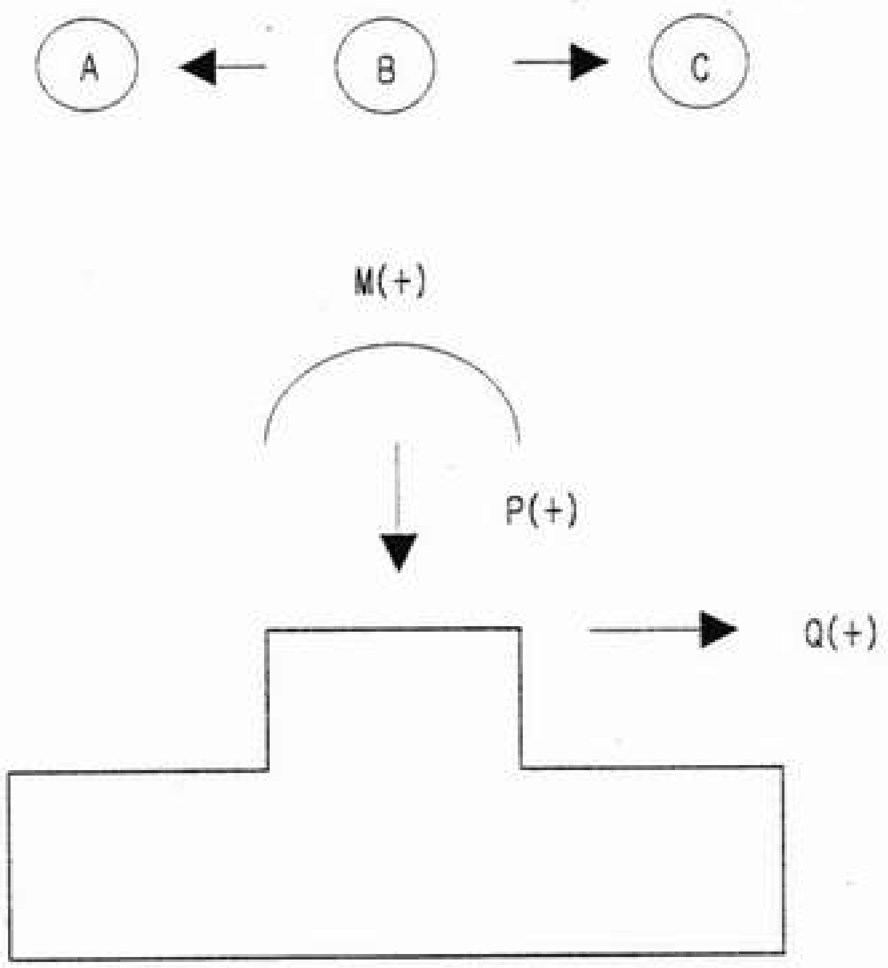
LOAD COMB.	3
P (t)	32
Q (t)	2.4
M (tm)	16.8

기초설계용 하중데이타



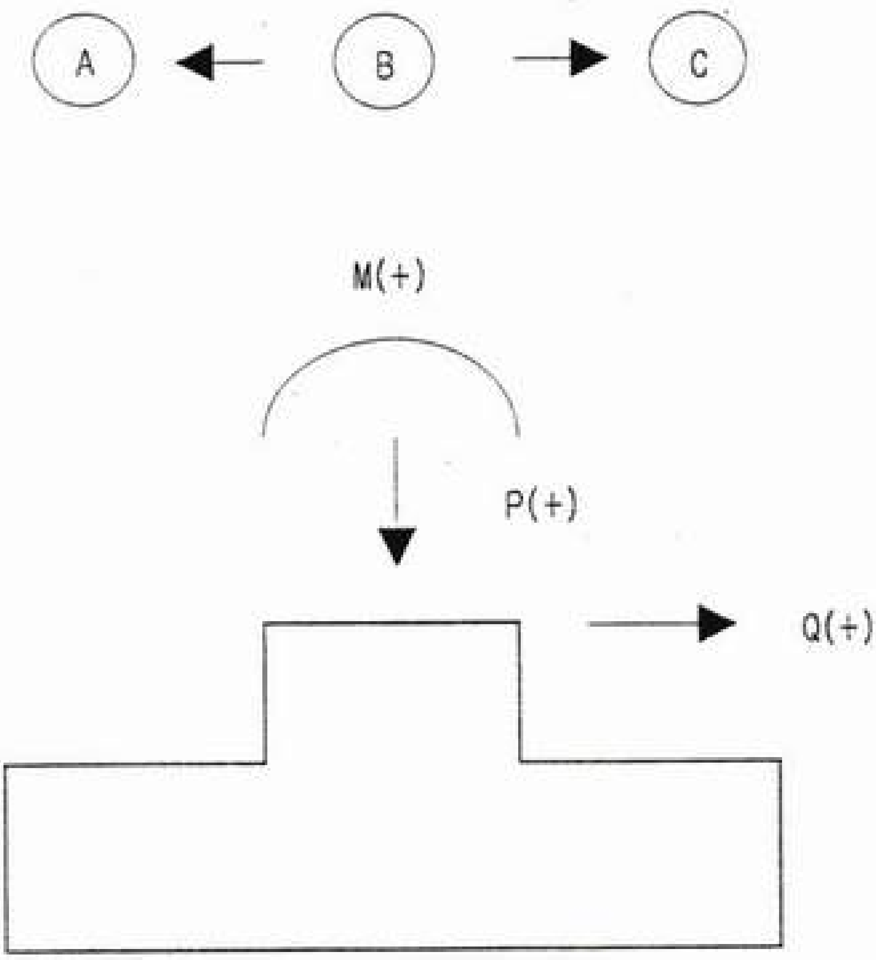
LOAD COMB.	4
P (t)	31.9
Q (t)	-1
M (tm)	-6.06

기초설계용 하중데이타



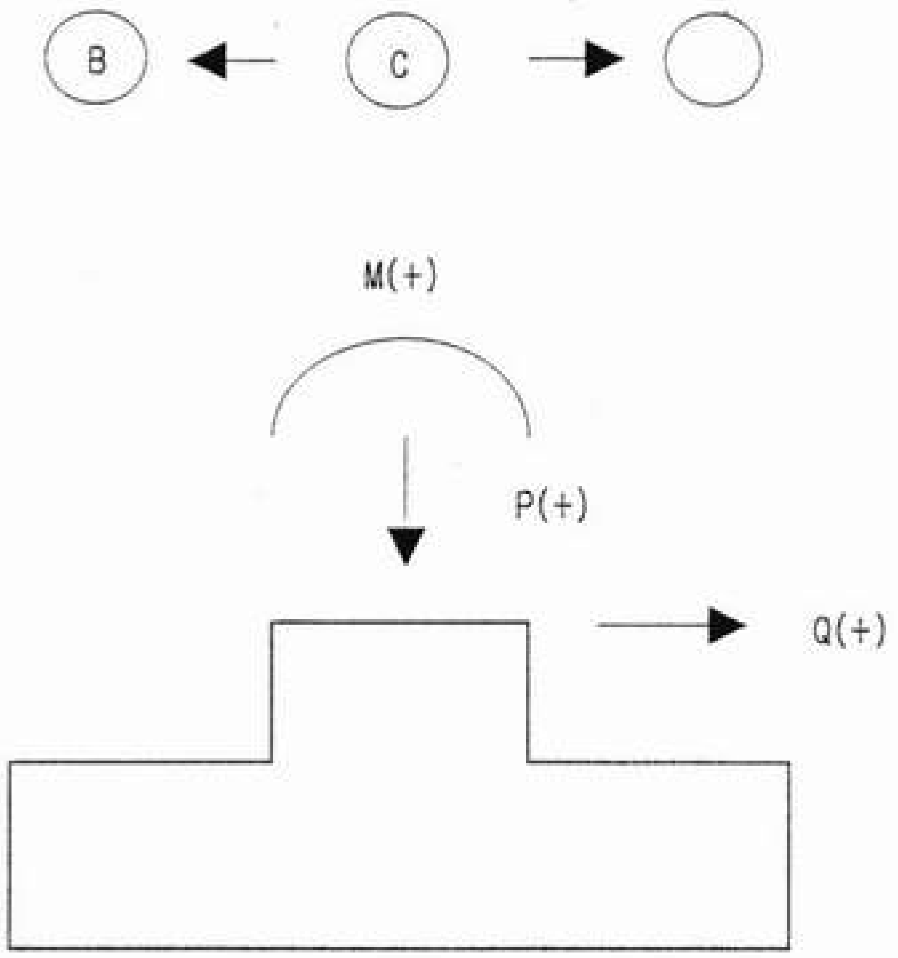
LOAD COMB.	5
P (t)	86.1
Q (t)	7.3
M (tm)	33.3

기초설계용 하중데이타



LOAD COMB.	6
P (t)	86.5
Q (t)	-4.2
M (tm)	-38.82

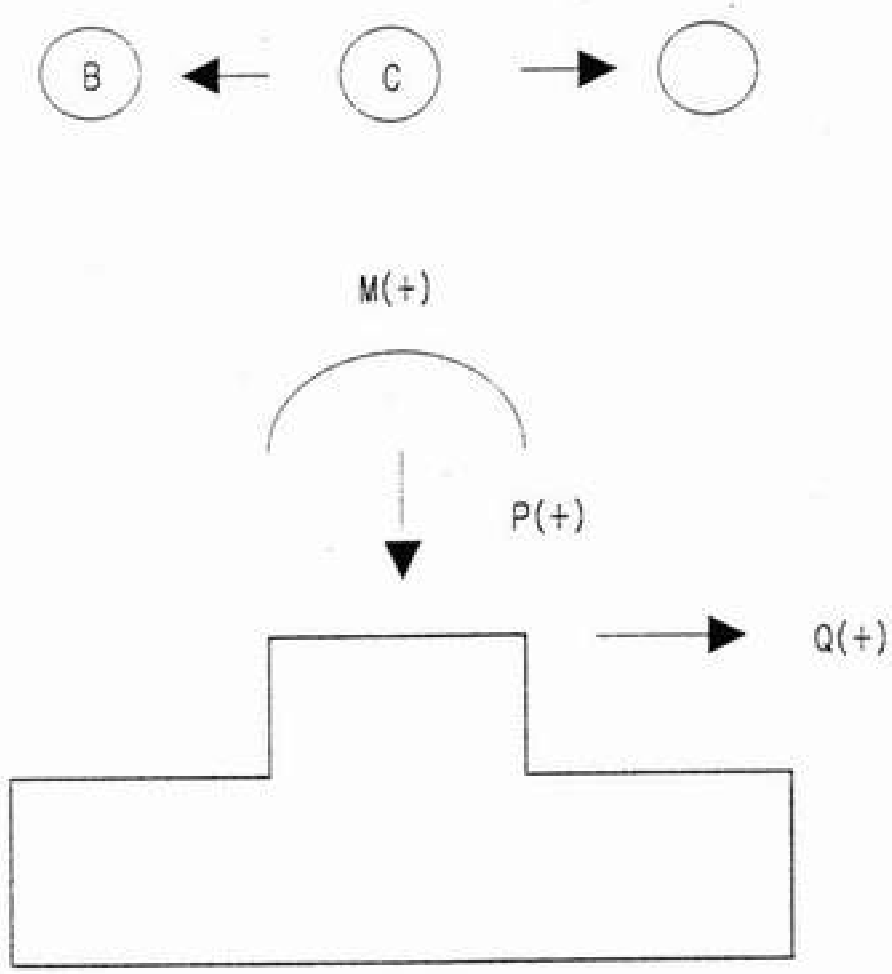
기초설계용 하중데이타



LOAD COMB.	1
P (t)	66.1
Q (t)	7.4
M (tm)	-45.9

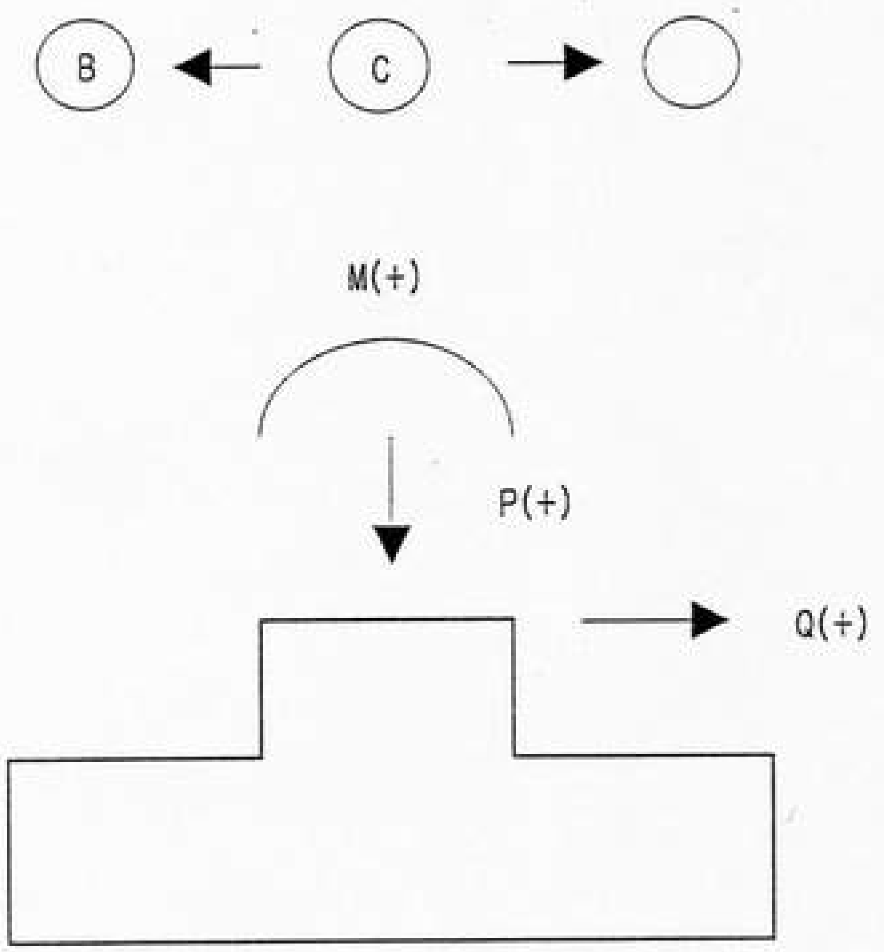
44

기초설계용 하중데이타



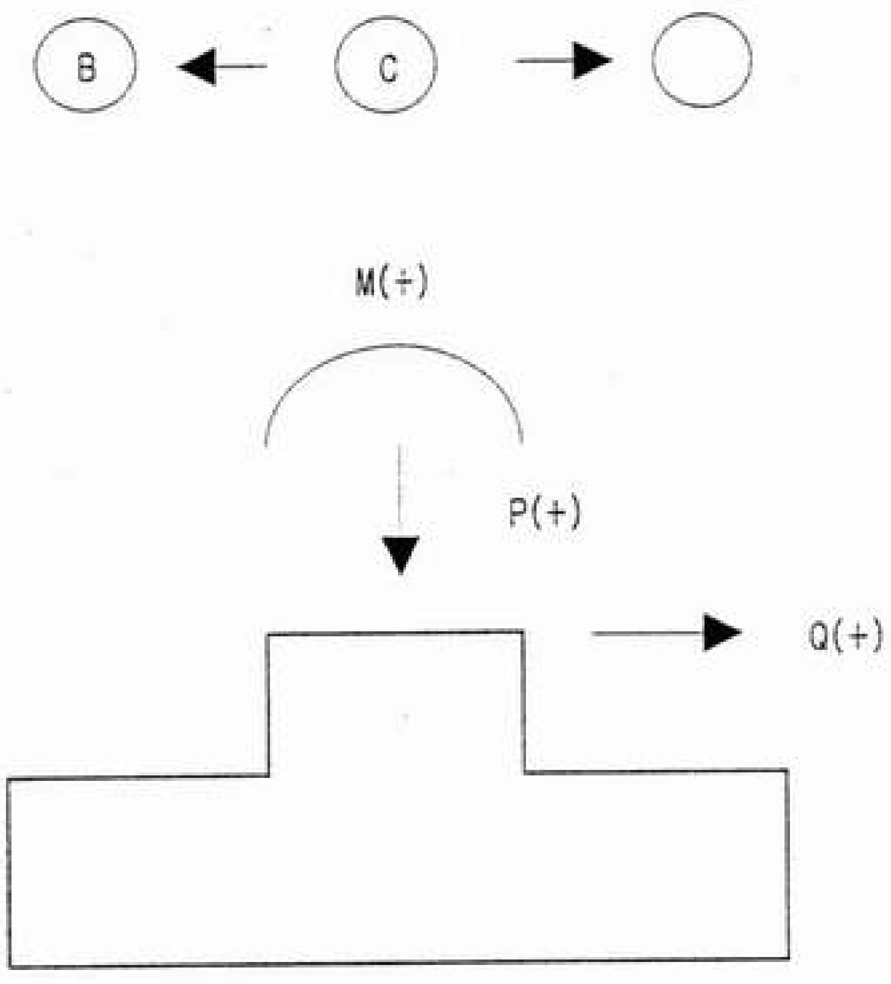
LOAD COMB.	2
P (t)	65.3
Q (t)	0.2
M (tm)	10.38

기초설계용 하중데이타



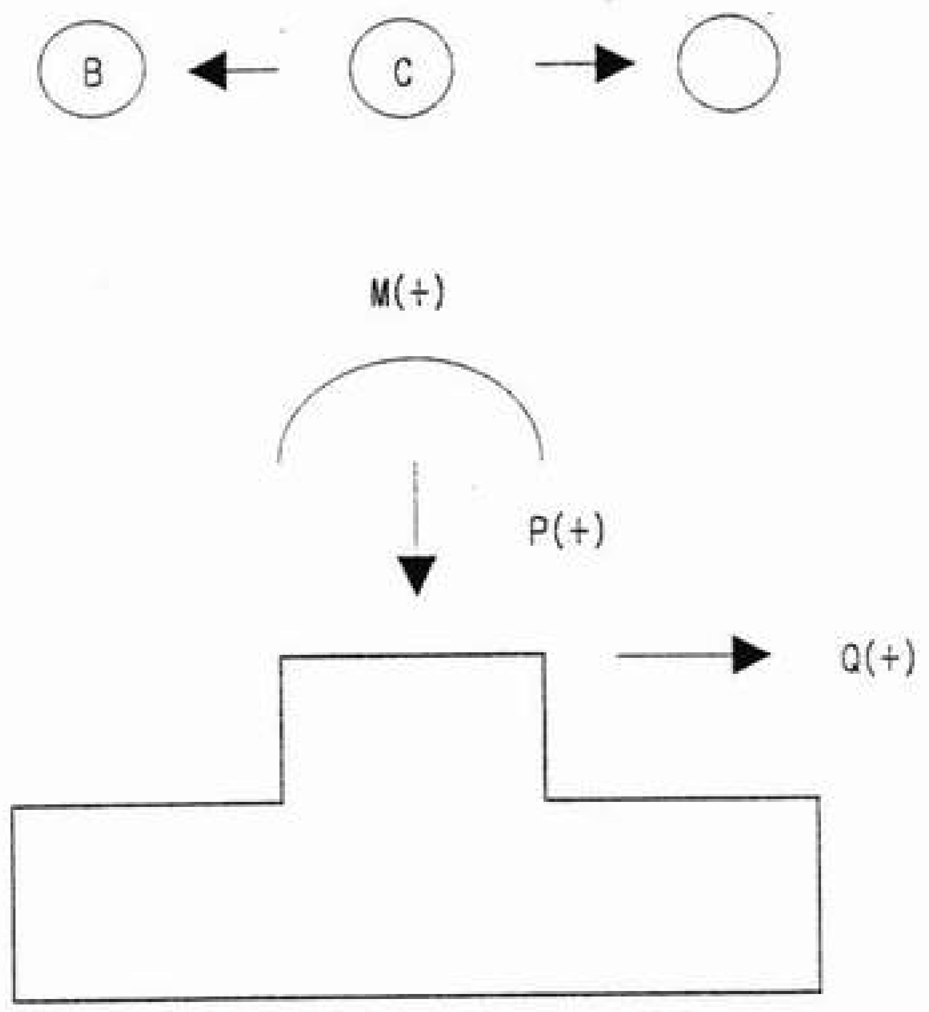
LOAD COMB.	3
P (t)	21.8
Q (t)	4.7
M (tm)	-26.16

기초설계용 하중데이타



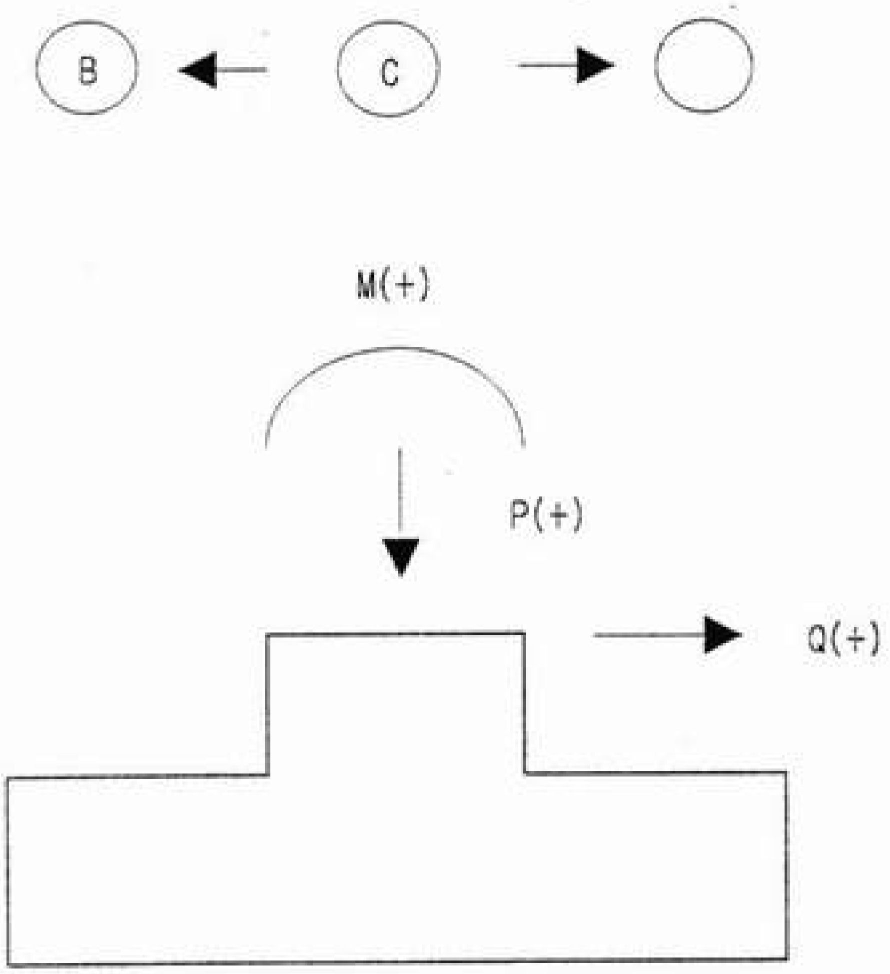
LOAD COMB.	4
P (t)	21.5
Q (t)	-3.5
M (tm)	10.98

기초설계용 하중데이타



LOAD COMB.	5
P (t)	37.4
Q (t)	7.3
M (tm)	-38.64

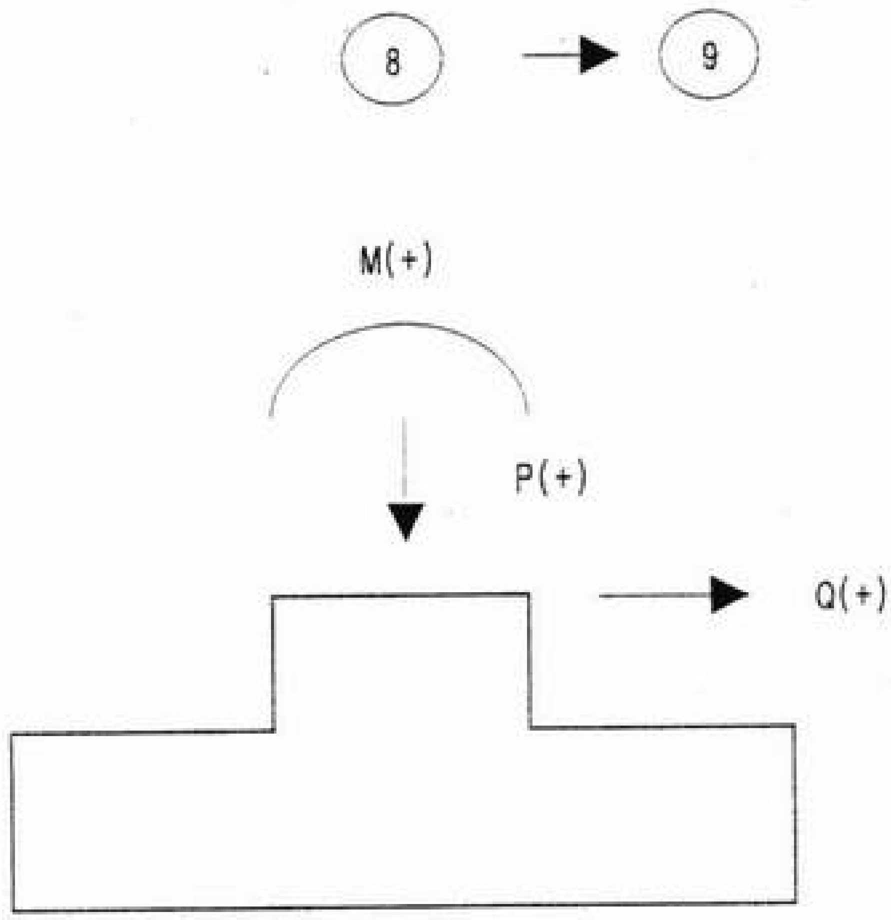
기초설계용 하중데이타



LOAD COMB.	6
P (t)	36.8
Q (t)	-4.8
M (tm)	28.92

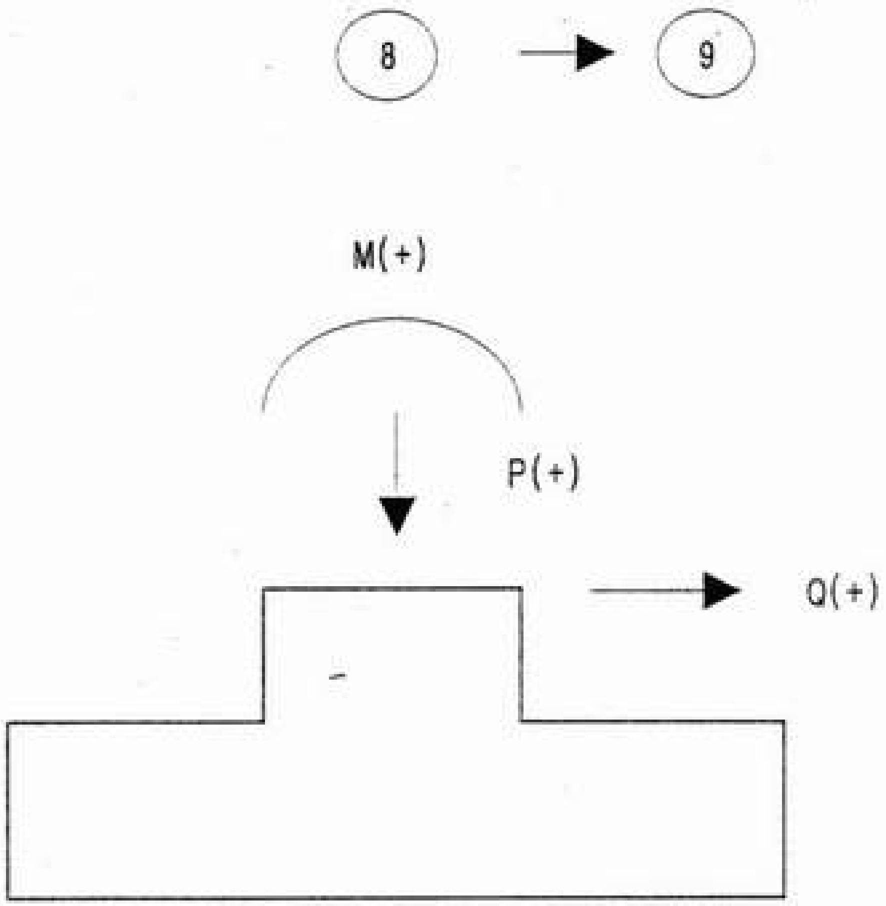
기초설계용 하중데이타

STORAGE YARD



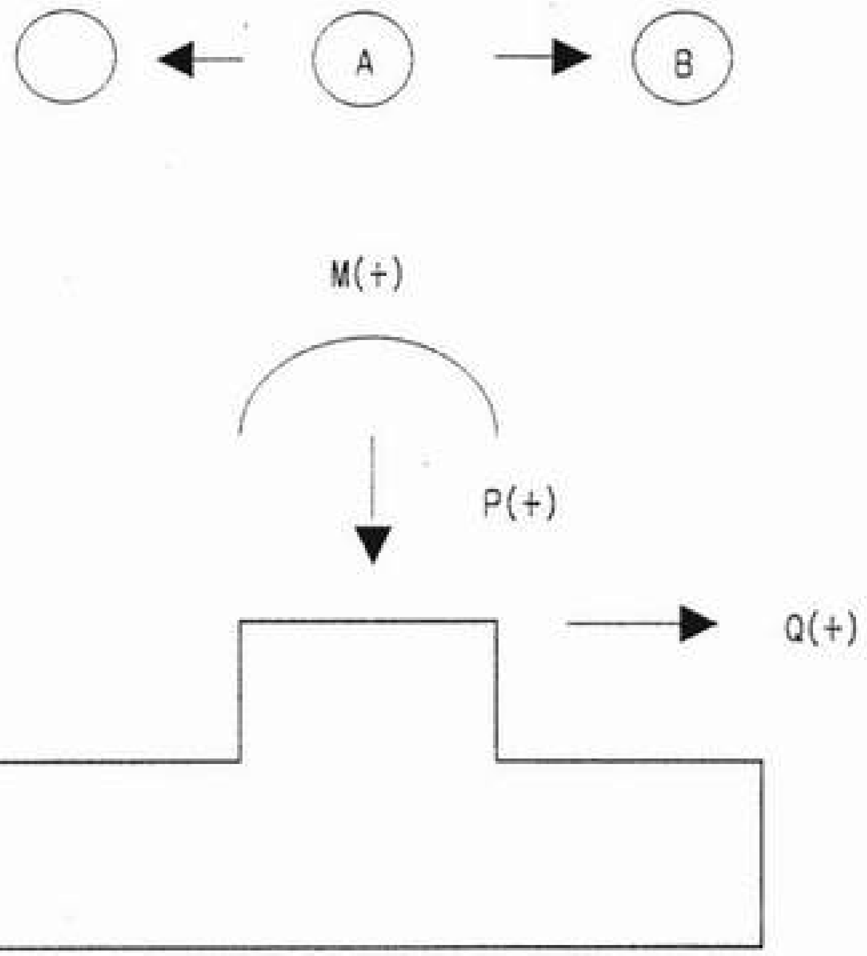
LOAD COMB.	1
P (t)	150.8
Q (t)	-7.98
M (tm)	-31.8

기초설계용 하중데이타



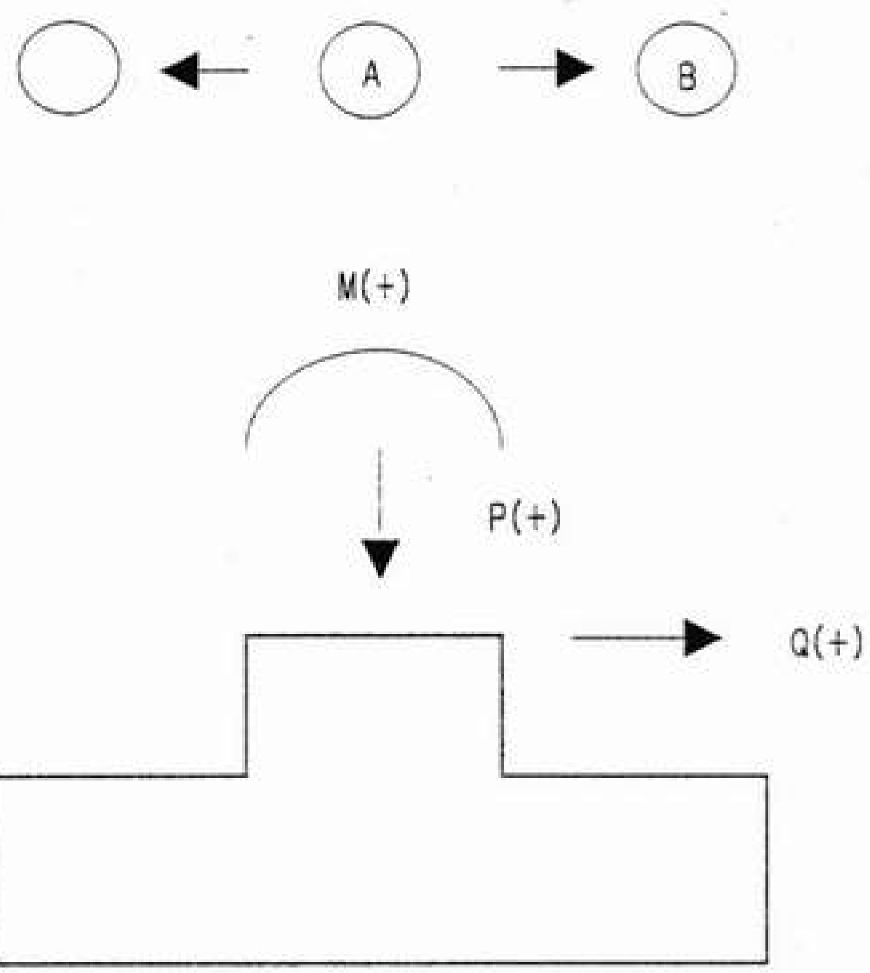
LOAD COMB.	2
P (t)	151.3
Q (t)	-18.1
M (tm)	-105.3

기초설계용 하중데이타



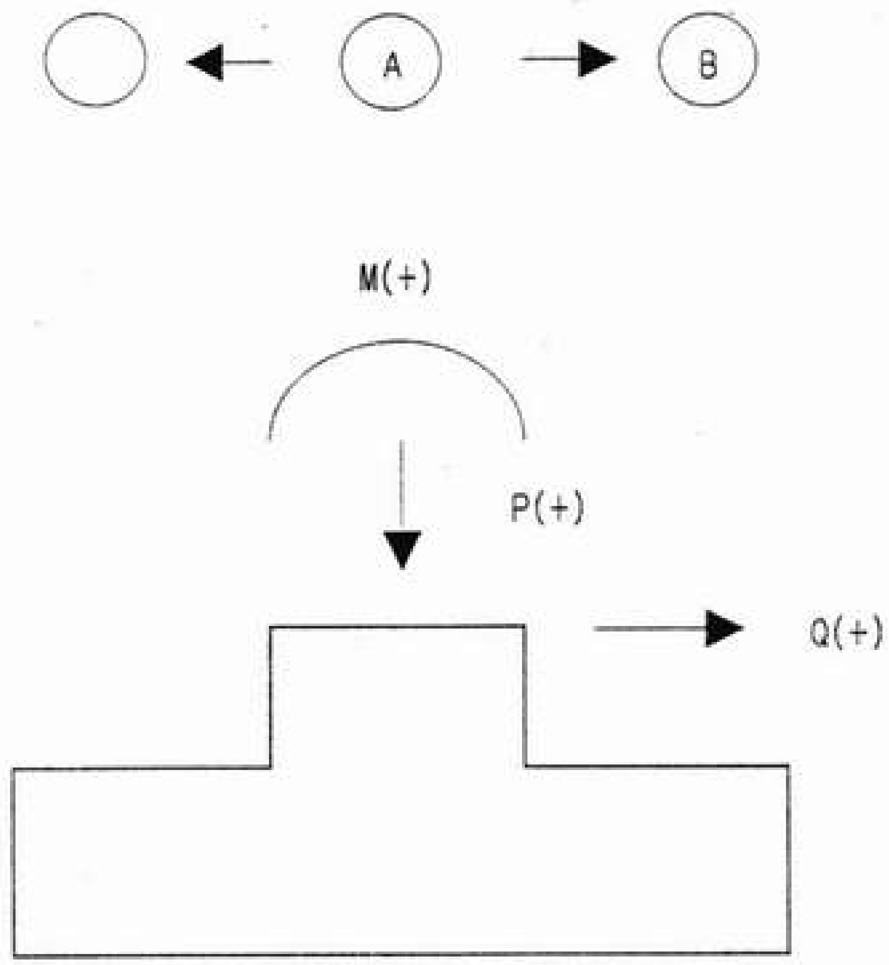
LOAD COMB.	4
P (t)	21.9
Q (t)	-5.6
M (tm)	-35.1

기초설계용 하중데이타



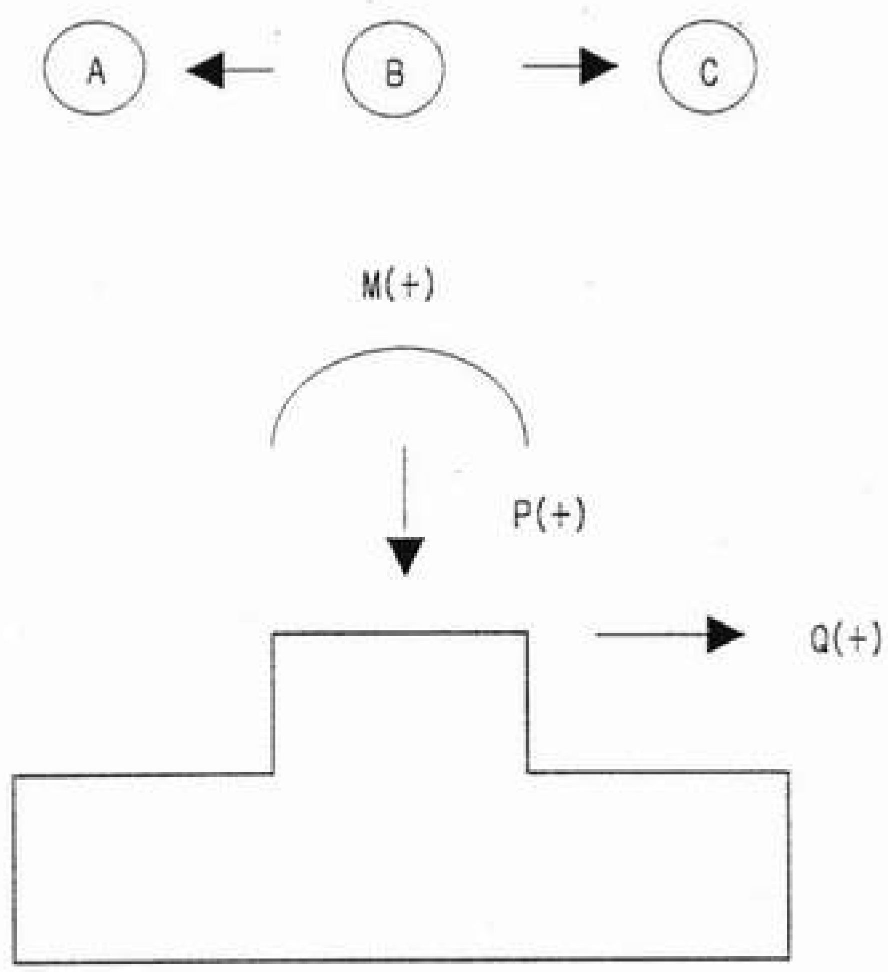
LOAD COMB.	5
P (t)	61.2
Q (t)	4.7
M (tm)	38.88

기초설계용 하중데이타



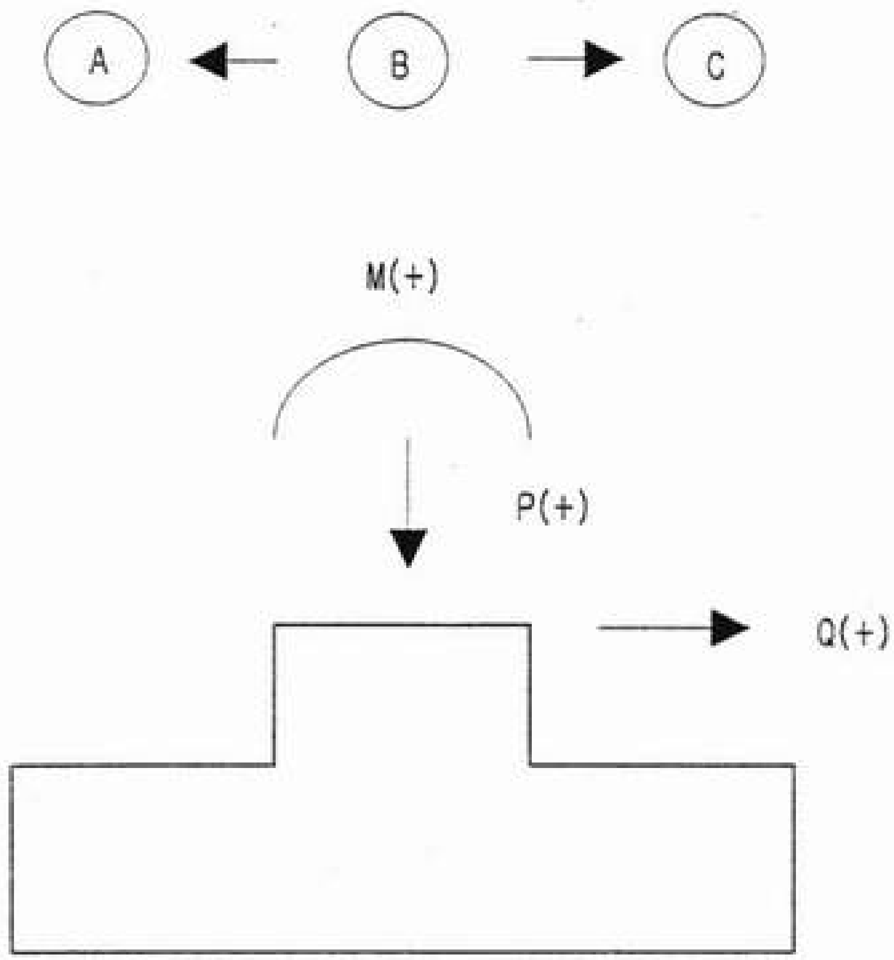
LOAD COMB.	6
P (t)	61.6
Q (t)	-10.3
M (tm)	-48.84

기초설계용 하중데이타



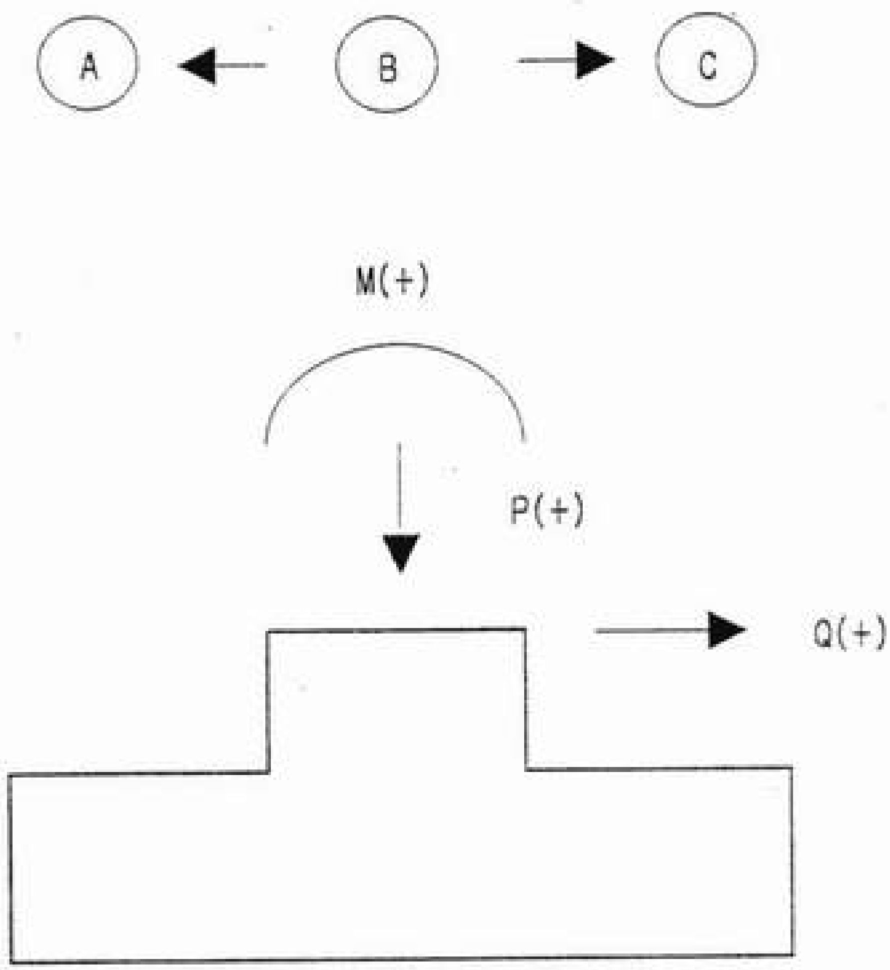
LOAD COMB.	1
P (t)	164.8
Q (t)	11
M (tm)	43.68

기초설계용 하중데이타



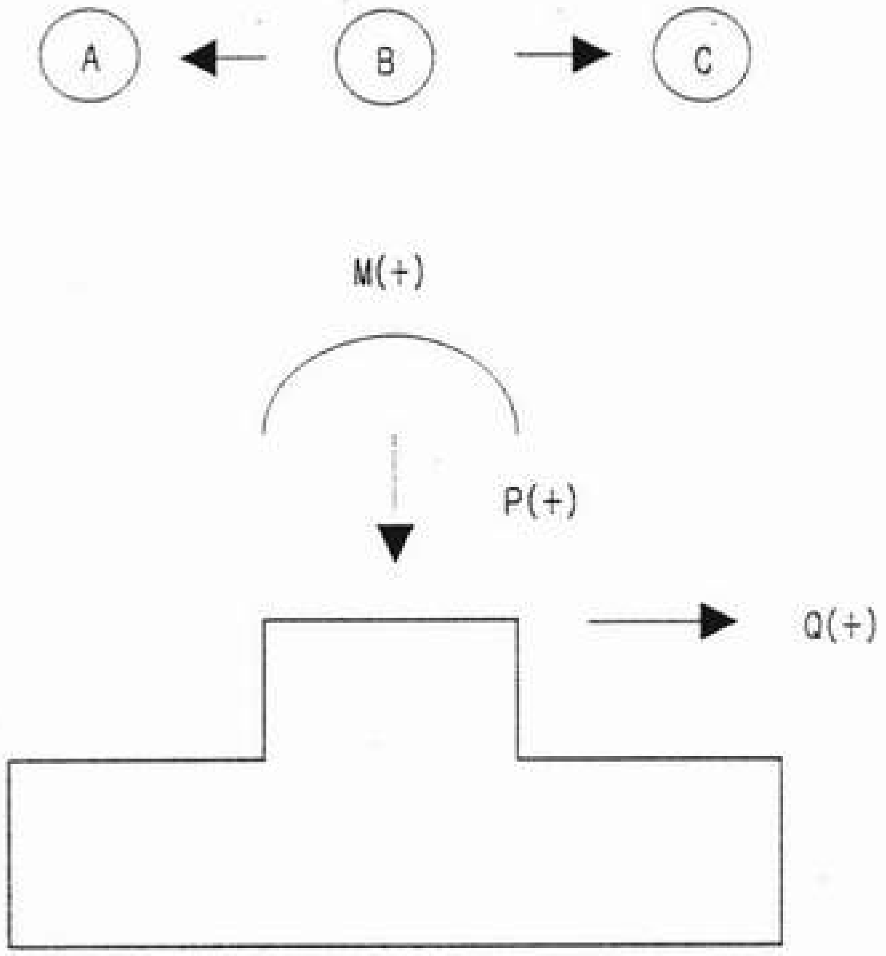
LOAD COMB.	2
P (t)	165.5
Q (t)	-4.3
M (tm)	-47.58

기초설계용 하중데이타



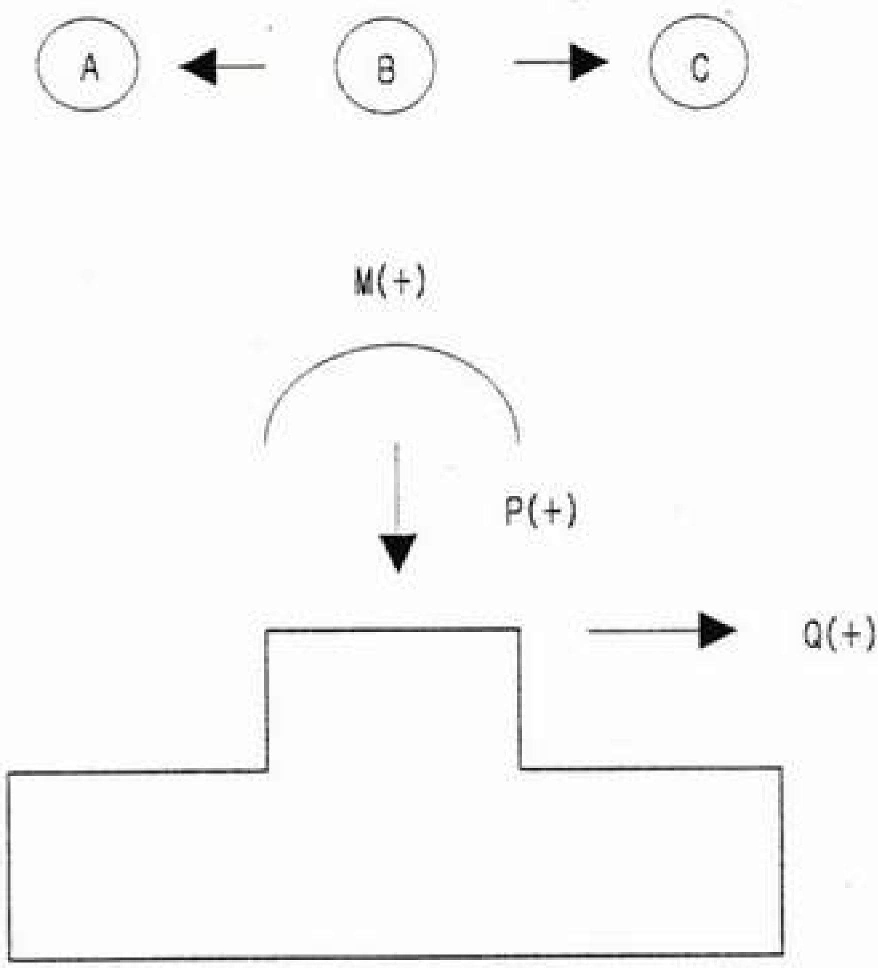
LOAD COMB.	3
P (t)	32
Q (t)	2.4
M (tm)	16.8

기초설계용 하중데이타



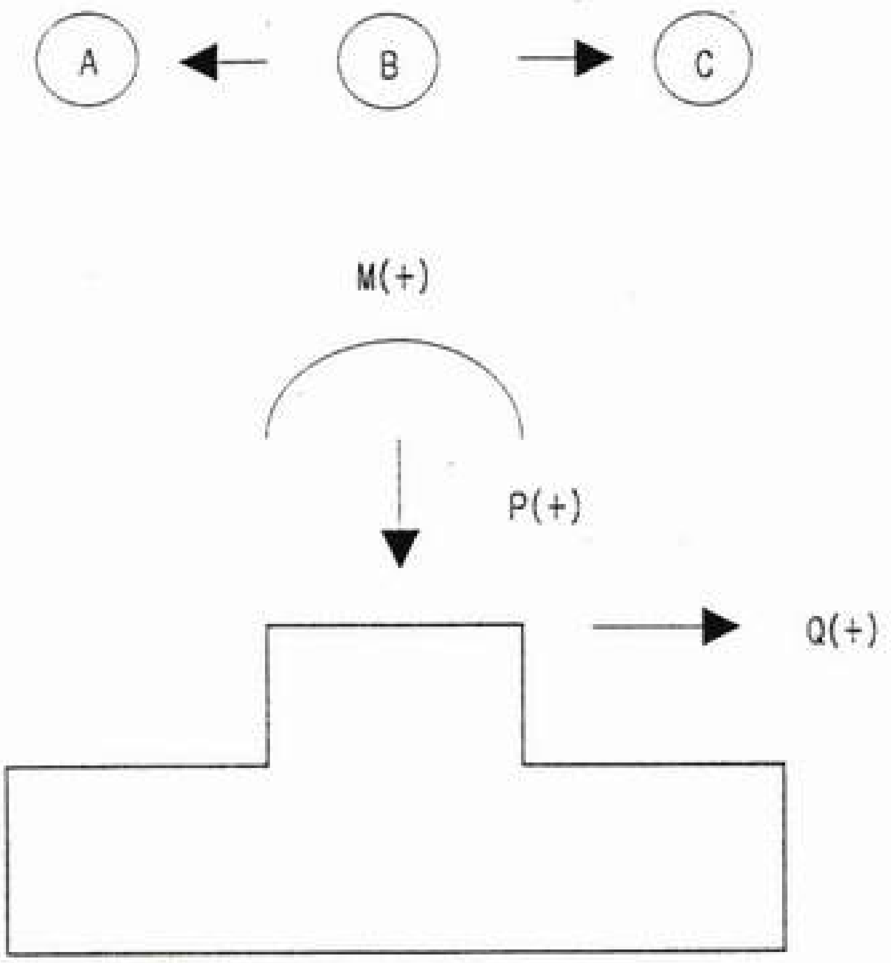
LOAD COMB.	4
P (t)	31.9
Q (t)	-1
M (tm)	-6.06

기초설계용 하중데이타



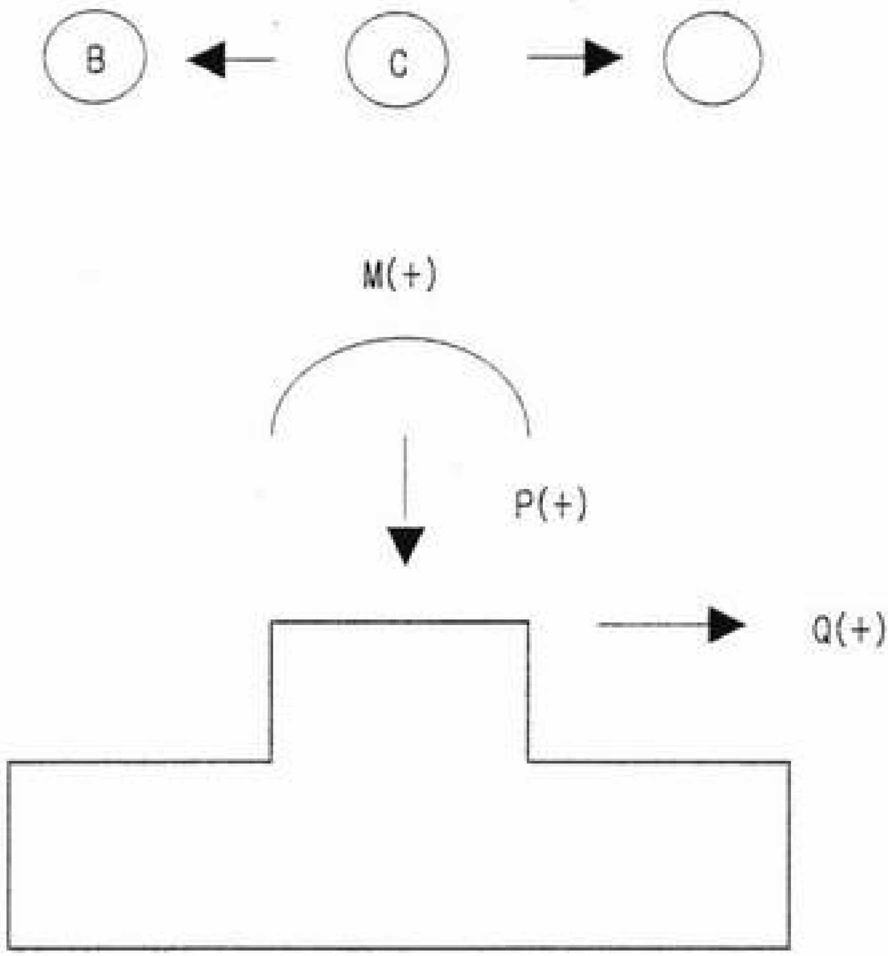
LOAD COMB.	5
P (t)	86.1
Q (t)	7.3
M (tm)	33.3

기초설계용 하중데이타



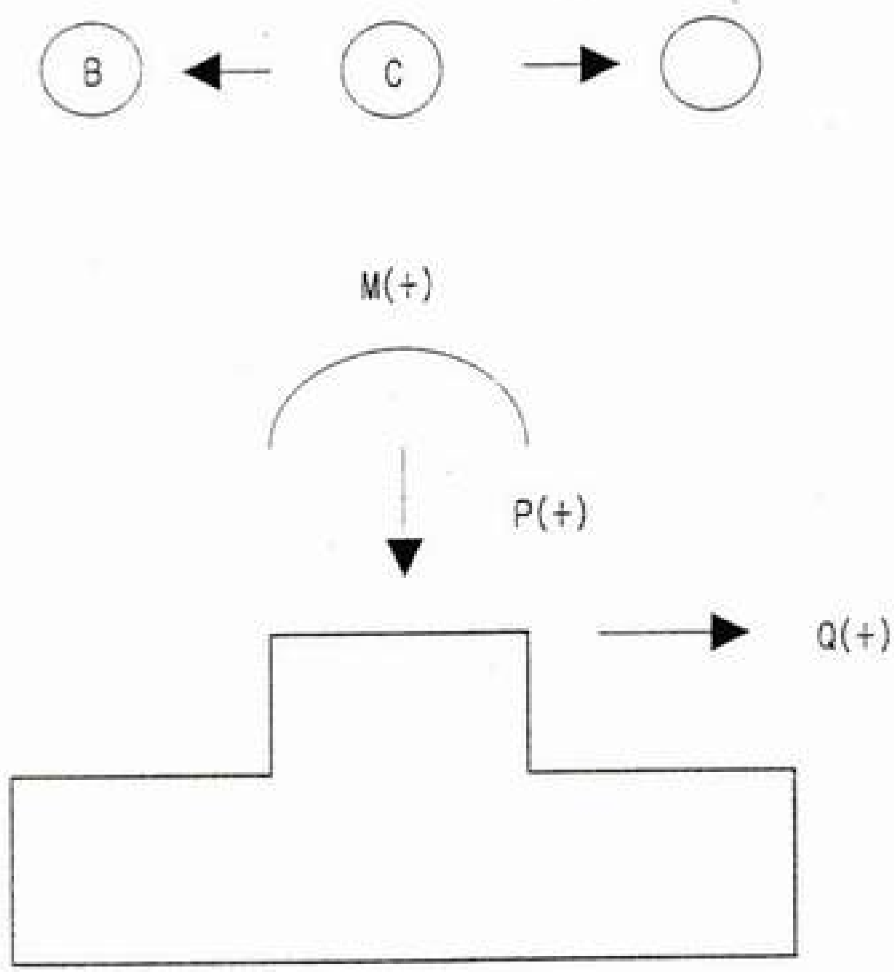
LOAD COMB.	6
P (t)	86.5
Q (t)	-4.2
M (tm)	-38.82

기초설계용 하중데이타



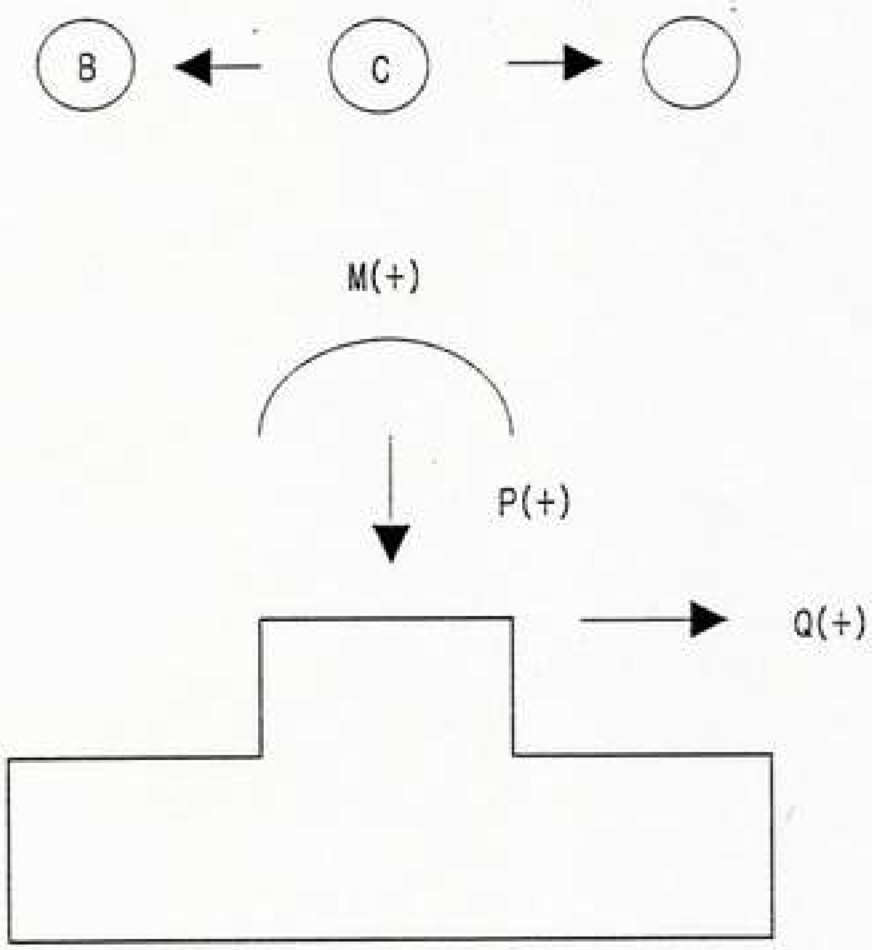
LOAD COMB.	1
P (t)	66.1
Q (t)	7.4
M (tm)	-45.9

기초설계용 하중데이타



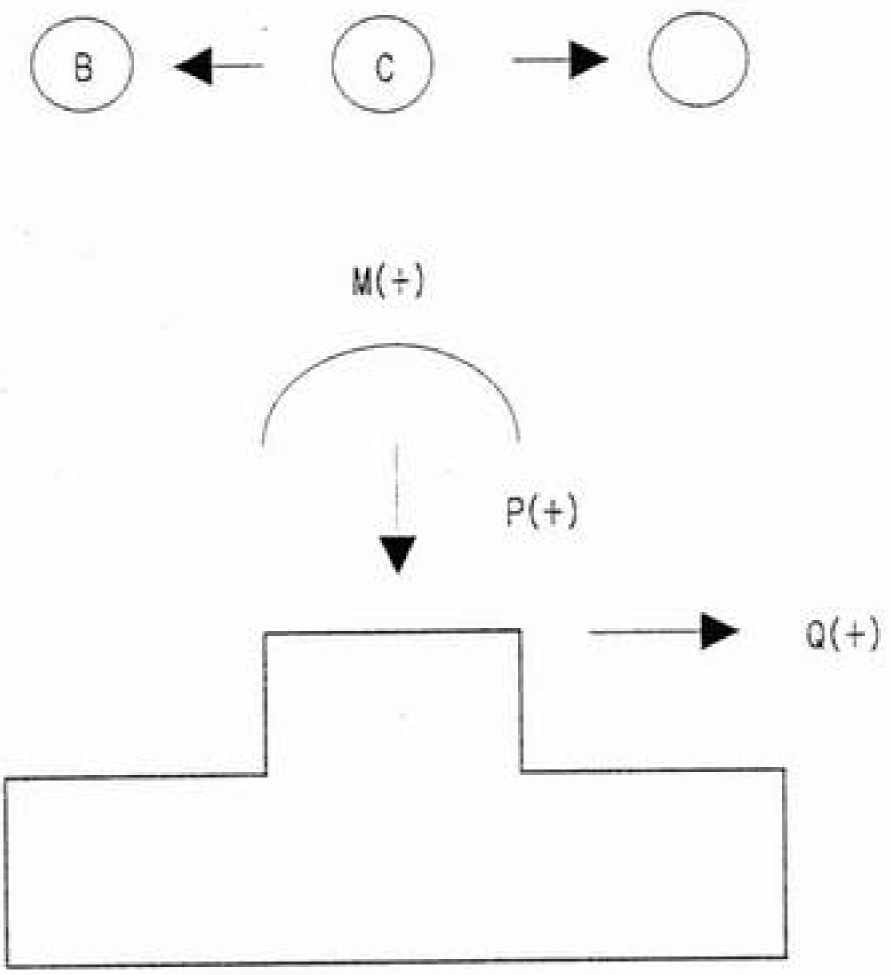
LOAD COMB.	2
P (t)	65.3
Q (t)	0.2
M (tm)	10.38

기초설계용 하중데이타



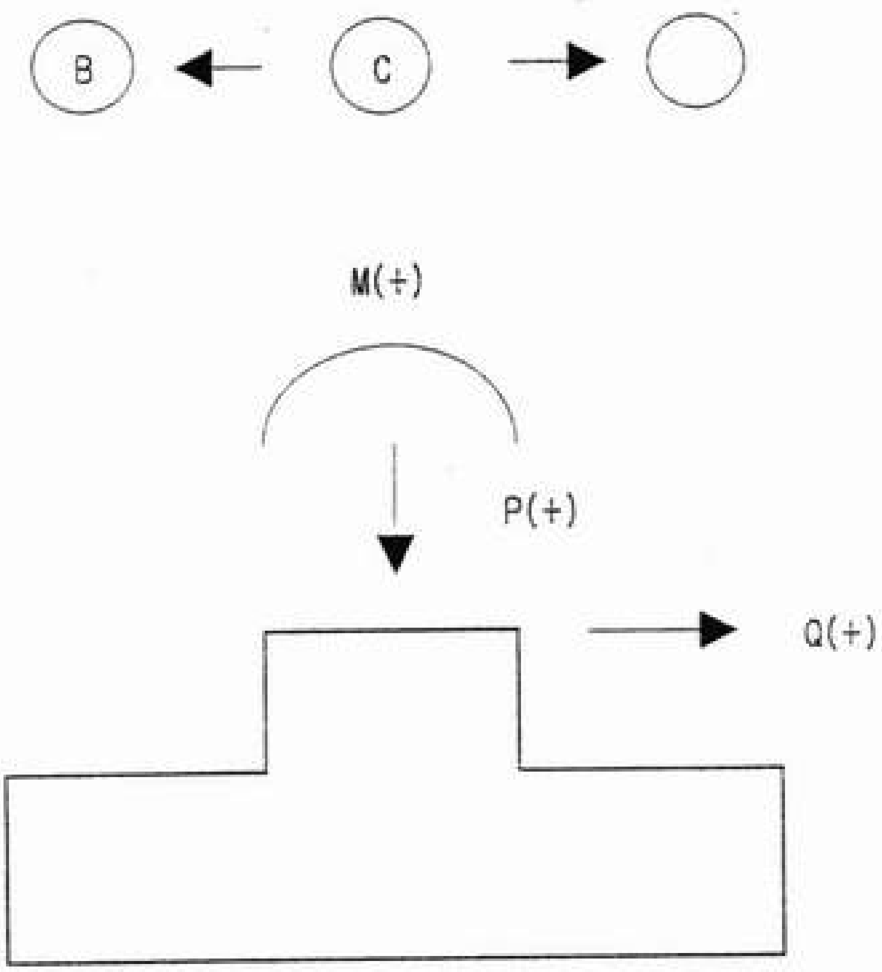
LOAD COMB.	3
P (t)	21.8
Q (t)	4.7
M (tm)	-26.16

기초설계용 하중데이타



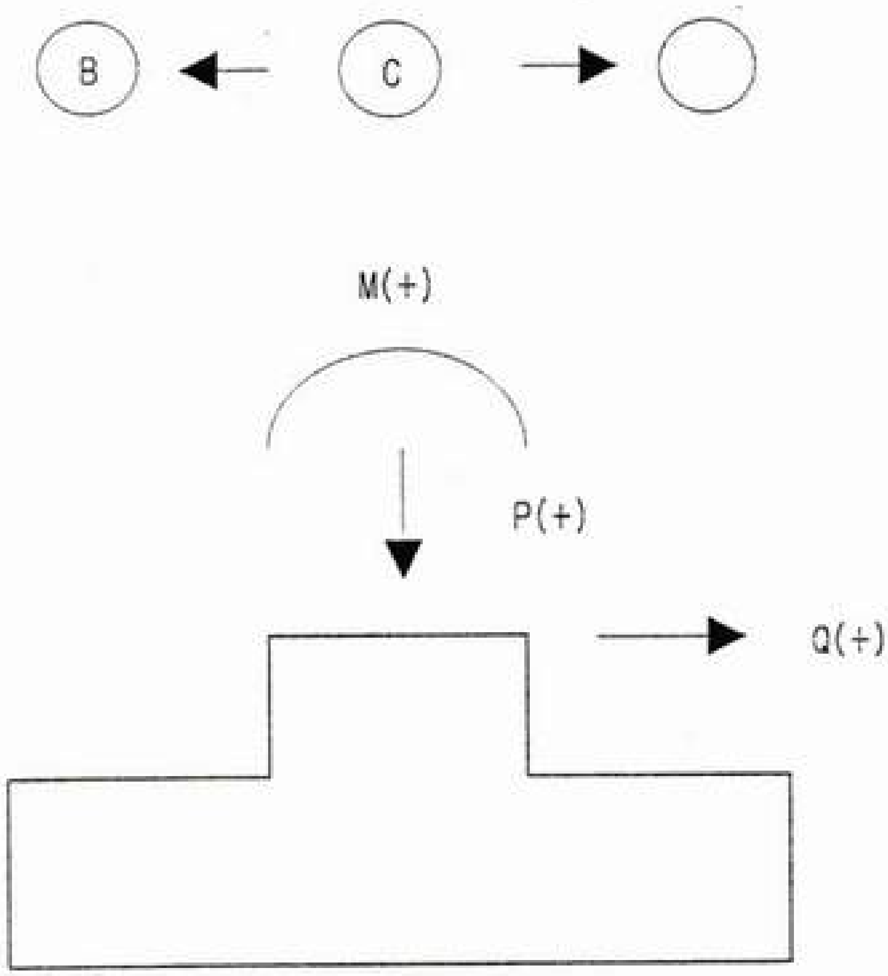
LOAD COMB.	4
P (t)	21.5
Q (t)	-3.5
M (tm)	10.98

기초설계용 하중데이타



LOAD COMB.	5
P (t)	37.4
Q (t)	7.3
M (tm)	-38.64

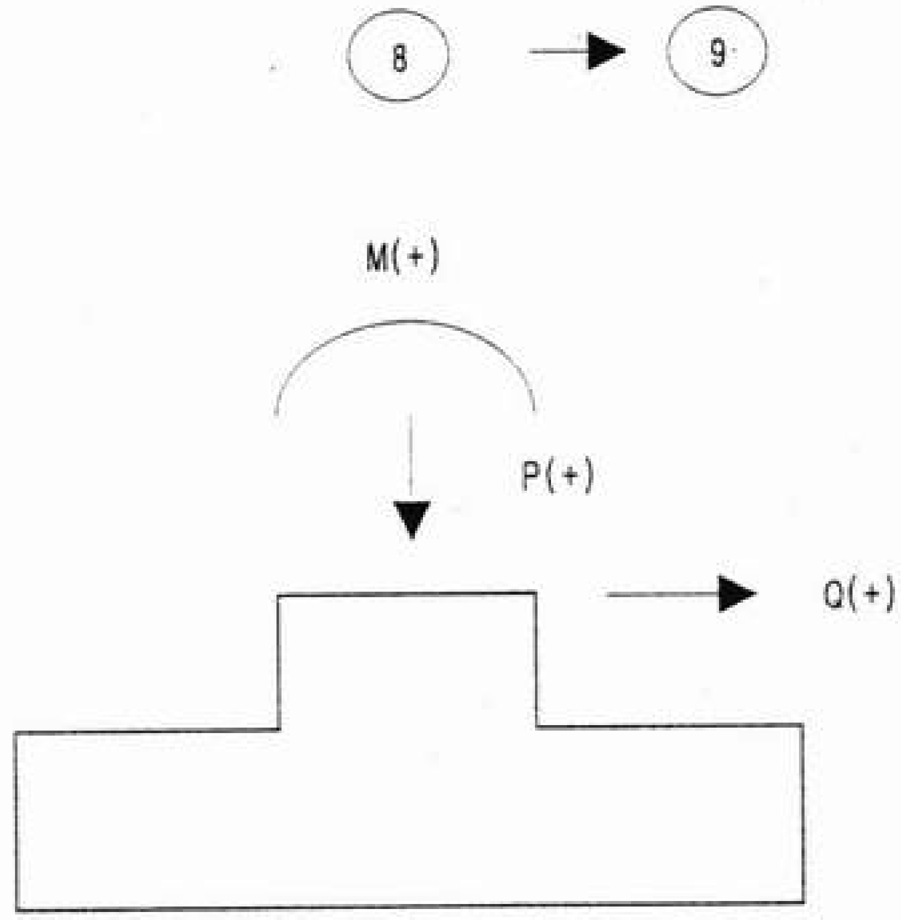
기초설계용 하중데이타



LOAD COMB.	6
P (t)	36.8
Q (t)	-4.8
M (tm)	28.92

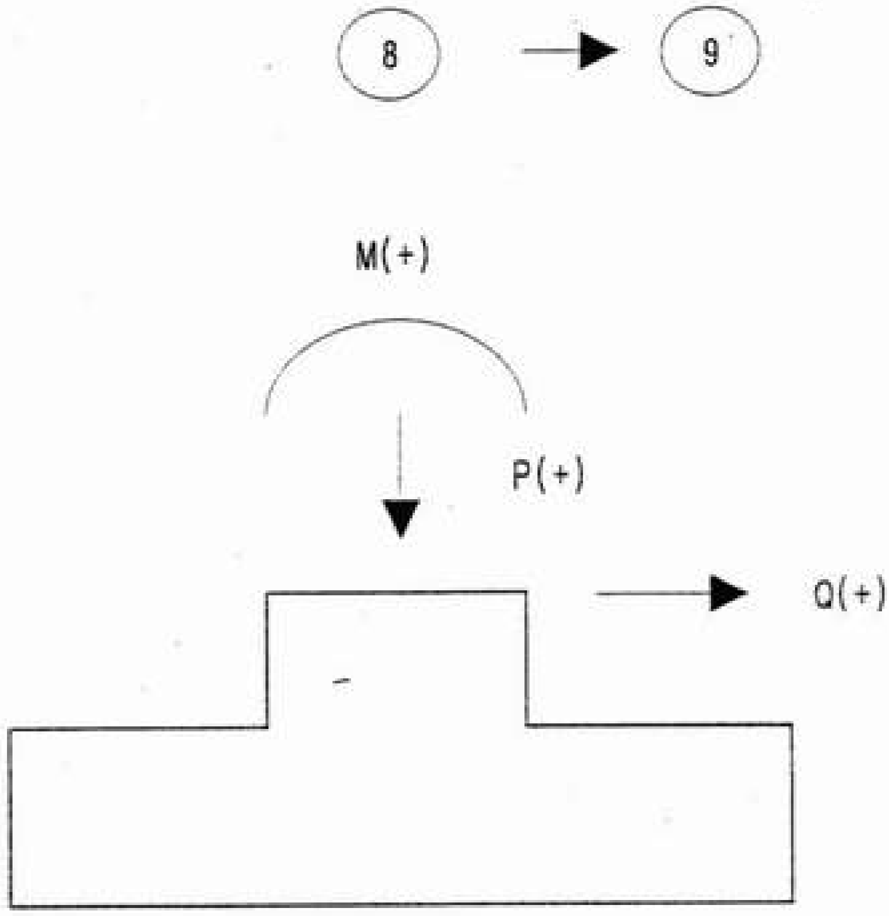
기초설계용 하중데이타

STORAGE YARD



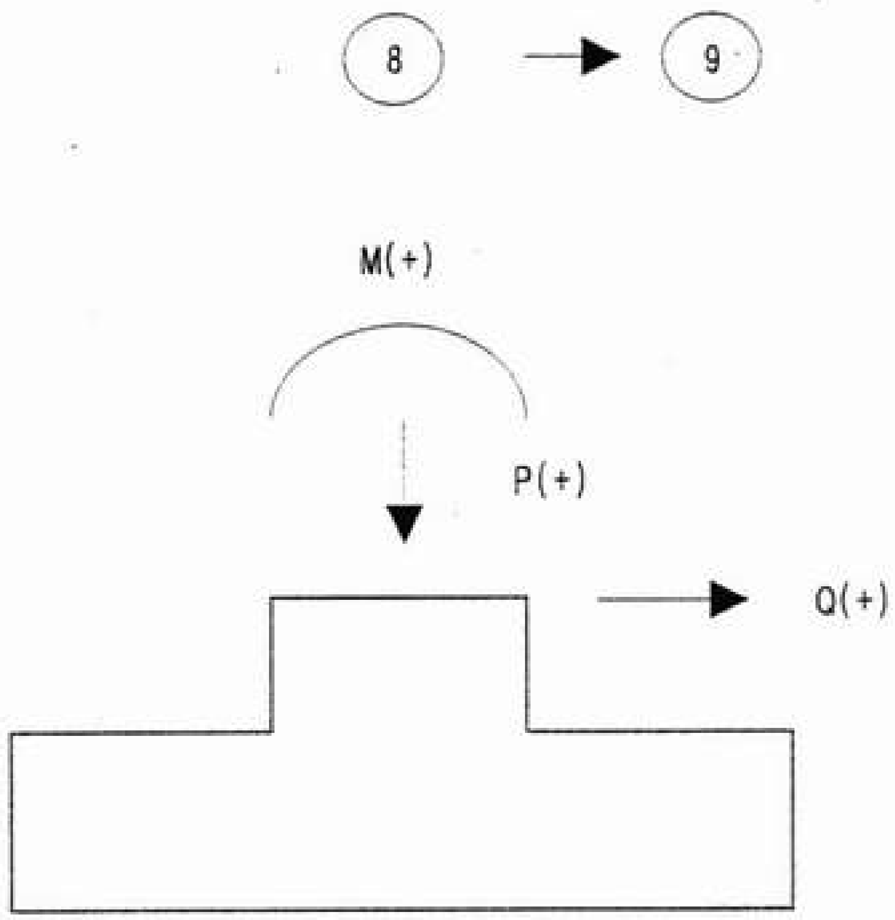
LOAD COMB.	1
P (t)	150.8
Q (t)	-7.98
M (tm)	-31.8

기초설계용 하중데이타



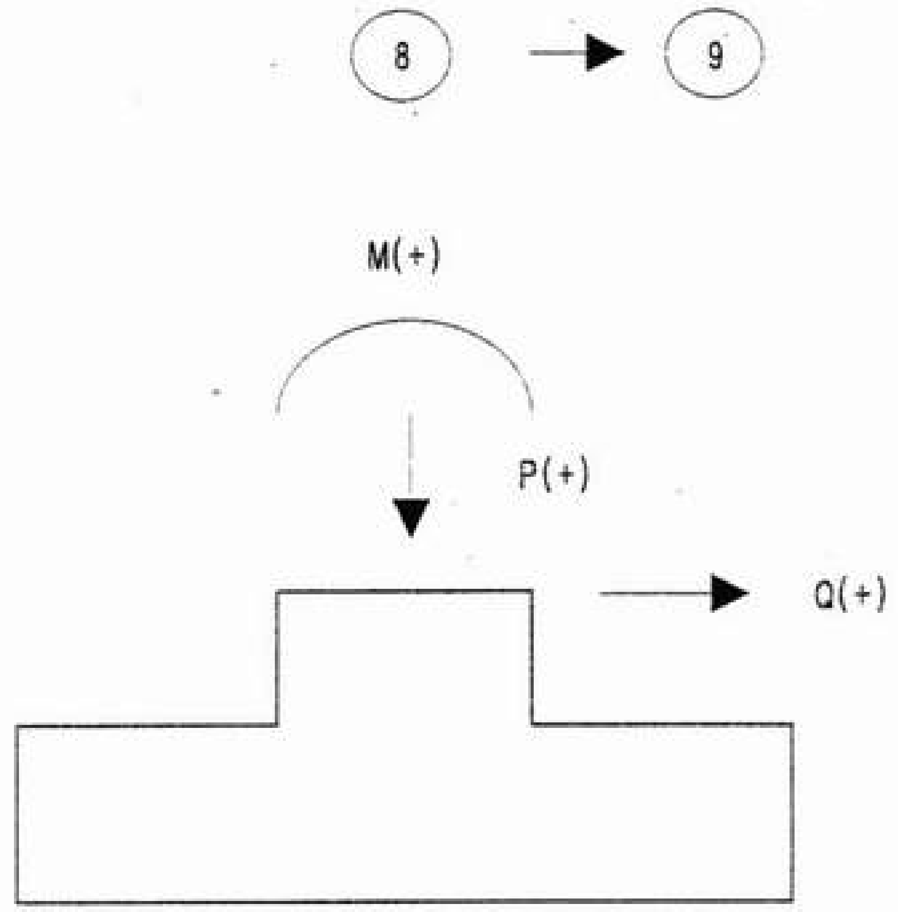
LOAD COMB.	2
P (t)	151.3
Q (t)	-18.1
M (tm)	-105.3

기초설계용 하중데이타



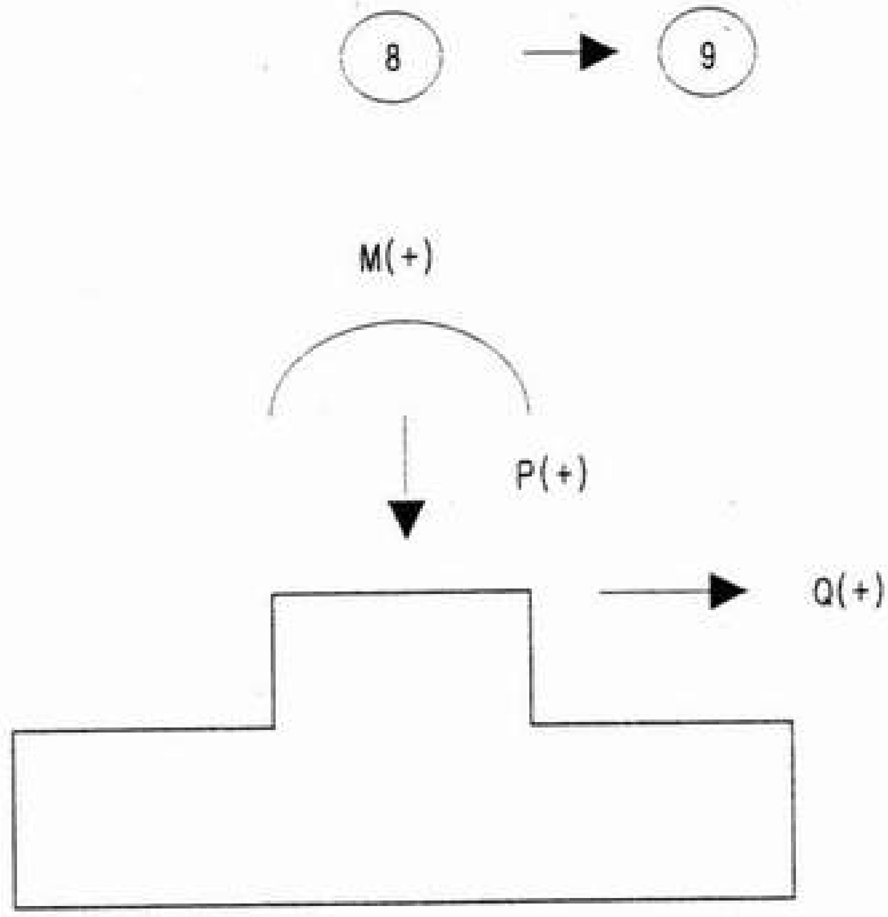
LOAD COMB.	3
P (t)	49.9
Q (t)	3.85
M (tm)	8.46

기초설계용 하중데이타



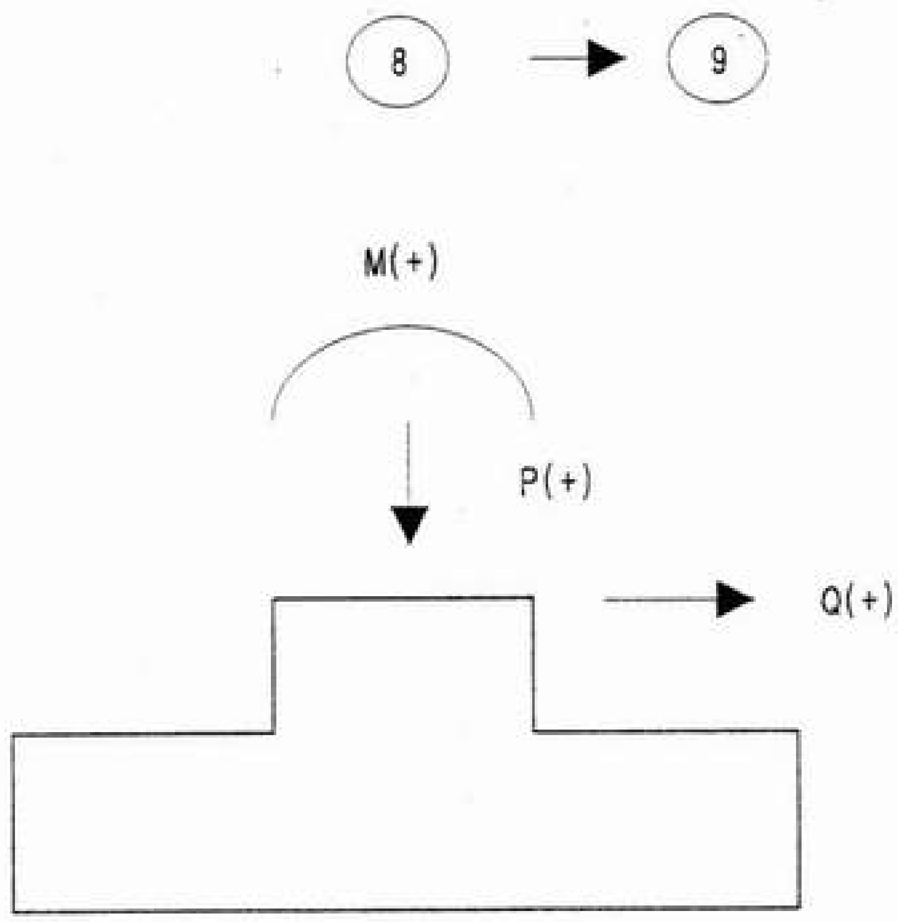
LOAD COMB.	4
P (t)	50.8
Q (t)	-11.33
M (tm)	-70.68

기초설계용 하중데이타



LOAD COMB.	5
P (t)	83.2
Q (t)	5.28
M (tm)	35.16

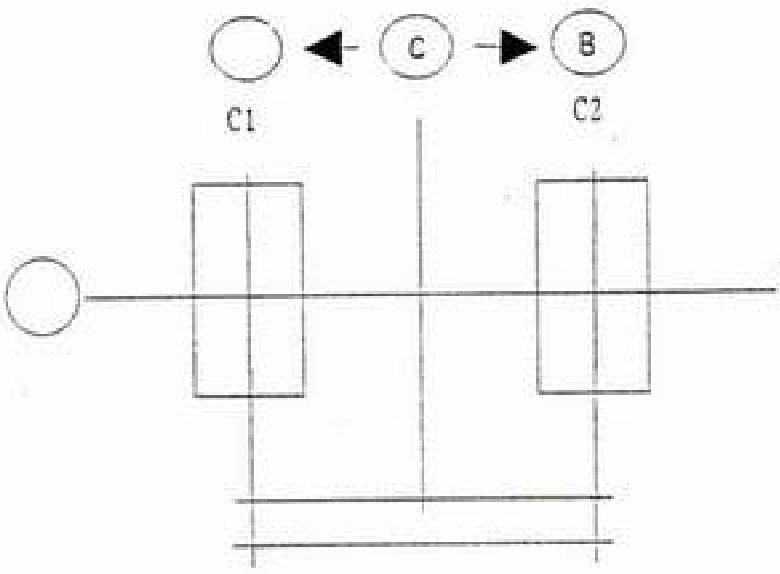
기초설계용 하중데이타



LOAD COMB.	6
P (t)	84.3
Q (t)	-15.36
M (tm)	-83.7

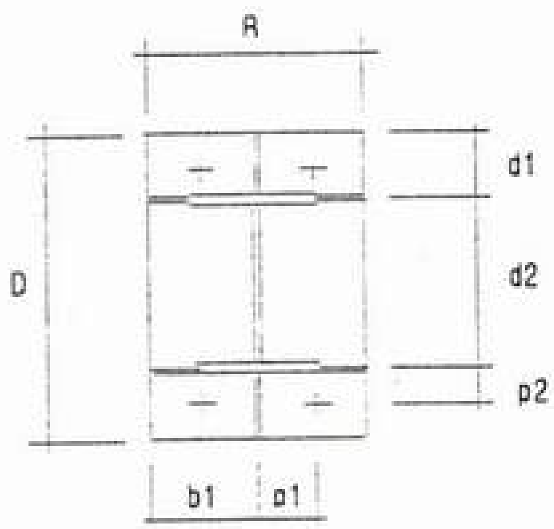
6. DESIGN OF ANCHOR & BASE PLATE

DESIGN OF BASE PLATE



	C1	C2
Pmax	110.2	73.2
Pmin	-1.8	-18.3

BASE TYPE



B	400
D	750
b1	200
d1	150
d2	450
p1	100
p2	75
e	

C1 COLUMN SIZE :

1) ANCHOR BOLT DESIGN

BOLT TRY) Φ 30 (a = 7.07)

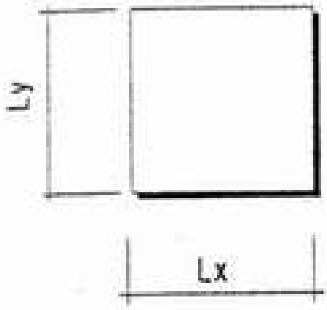
n= 1.8 /(1.2 x 7.07) = 0.2

USE : 4 - Φ 30 X 900

2) BASE PLATE DESIGN

a) CHECK BY COMP.

σc = 110.2 /B x D = 36.73 kg/㎠



$Lx =$ 150 $Ly =$ 200

$\lambda =$ 200/ 150 = 1.33

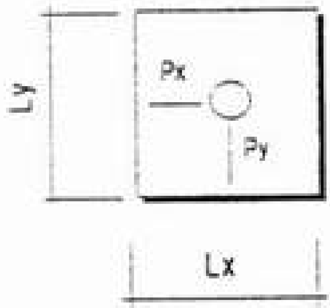
$Mmax =$ $0.36x\ \sigma c\ \ x\ Lx^2 =$ 2975.4

$t = \sqrt{6M\ /\ fb}$ = 3.11

$fb =$ 1.85 t/㎠

b) CHECK BY TENSION

$\sigma t =$ 1.8 t /n = 0.45 t

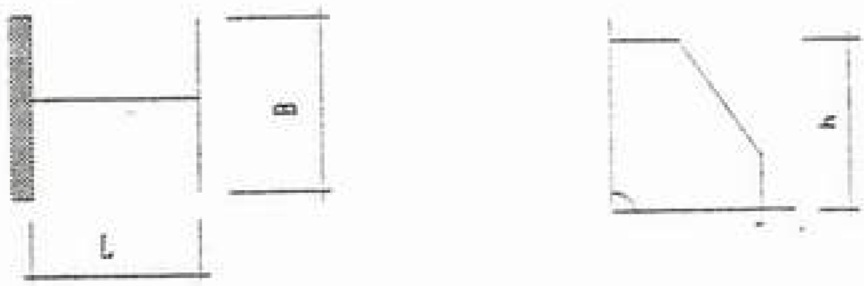


$Mmax = \{\ \sigma t/(1+Px^4 \cdot Lx\ /\ Py^4 \cdot Ly)\}p1 =$ 0.0003

$t = \sqrt{6\ M\ /\ (fb\ x\ Lx)}$ = 0.4

USE : BASE PL - 35 X 400 X 750

3) RIB PLATE DESIGN



USE PLATE : PL - 9

$M = \omega\ x\ L^2\ /2 =$ 165300.0

$h = \sqrt{6M\ /(t\ x\ fb)}$ = 8.3

USE ; RIB PL- 9×150×150 (이하 동일)

C2 COLUMN SIZE :

1) ANCHOR BOLT DESIGN

BOLT TRY) ϕ 30 (a = 7.07)

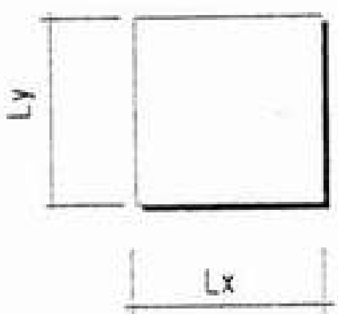
n= 18.3 /(1.2 x 7.07) = 2.2

USE :	4	-	ϕ 30	X	900

2) BASE PLATE DESIGN

a) CHECK BY COMP.

σc = 73.2 /B x D = 24.40 kg/㎠



Lx = 150 Ly = 200

λ = 200/ 150 = 1.33

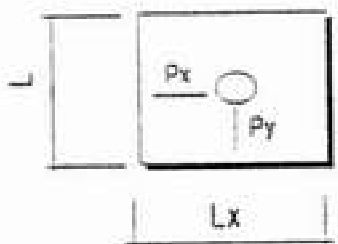
Mmax = 0.36x σc x Lx^2 = 1976.4

t = $\sqrt{6M / fb}$ = 2.5

fb = 1.85 t/㎠

b) CHECK BY TENSION

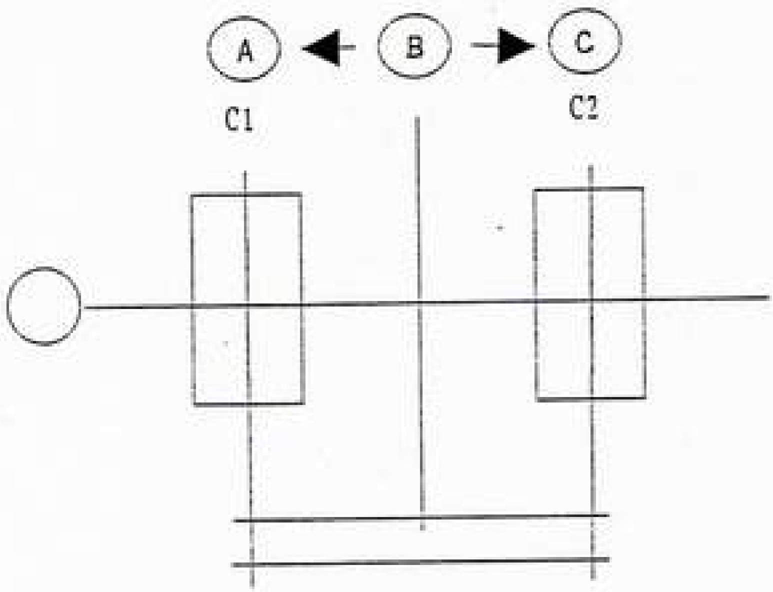
σt = 18.3 t /n = 4.6 t



Mmax = [σt/(1+Px^4 •Lx / Py^4 •Ly)]p1 = 0.0027

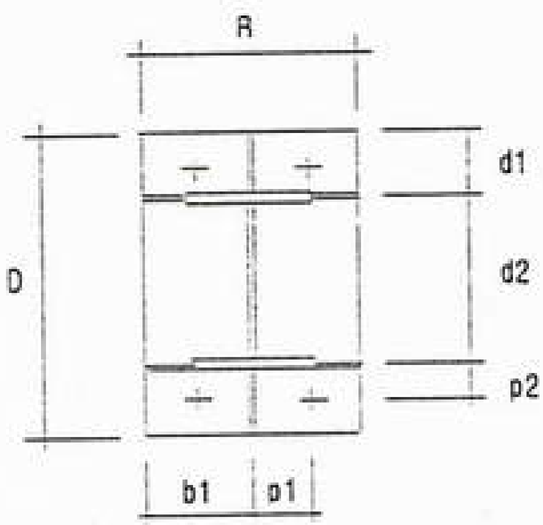
t = $\sqrt{6 M / (fb \times Lx)}$ = 1.1

USE : BASE PL	-	35 X 400 X 750



	C1	C2
Pmax	122.4	118.8
Pmin	2	10.9

BASE TYPE



B	400
D	800
b1	200
d1	150
d2	500
p1	100
p2	75
e	

C1 COLUMN SIZE :

1) ANCHOR BOLT DESIGN

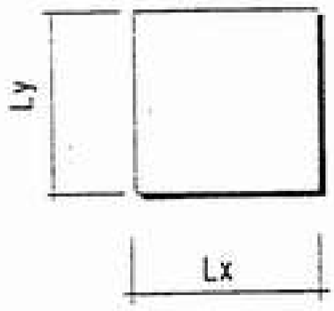
BOLT TRY) Φ 30 (a = 7.07)

USE : 4 - Φ 30 X 900

2) BASE PLATE DESIGN

a) CHECK BY COMP.

σc = 122.4 /B x D = 38.25 kg/㎠



Lx = 150 Ly = 200

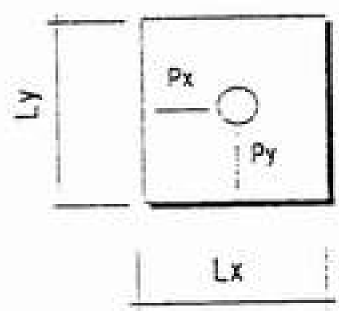
λ = 200/ 150 = 1.33

Mmax = 0.36x σc x Lx² = 3098.3

$t = \sqrt{6M / fb} = 3.17$

fb = 1.85 t/㎠

b) CHECK BY TENSION (NEGLECT)



Mmax = { σt/(1+Px' •Lx / Py' •Ly)}p1 = 0.0000

$t = \sqrt{6 M / (fb \times Lx)} =$ 0.0

∴ USE : BASE PL - 35 X 400 X 800

C2 COLUMN SIZE :

1) ANCHOR BOLT DESIGN

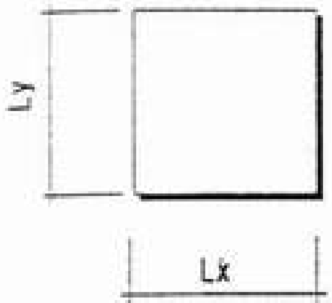
BOLT TRY) Φ 30 (a = 7.07)

USE : 4 - Φ 30 X 900

2) BASE PLATE DESIGN

a) CHECK BY COMP.

σc = 118.8 /B x D = 37.13 kg/㎠



Lx = 150 Ly = 200

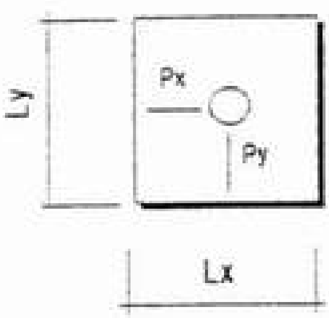
λ = 200/ 150 = 1.33

Mmax = 0.36x σc x Lx² = 3007.1

$t = \sqrt{6M / fb} =$ 3.1

fb = 1.85 t/㎠

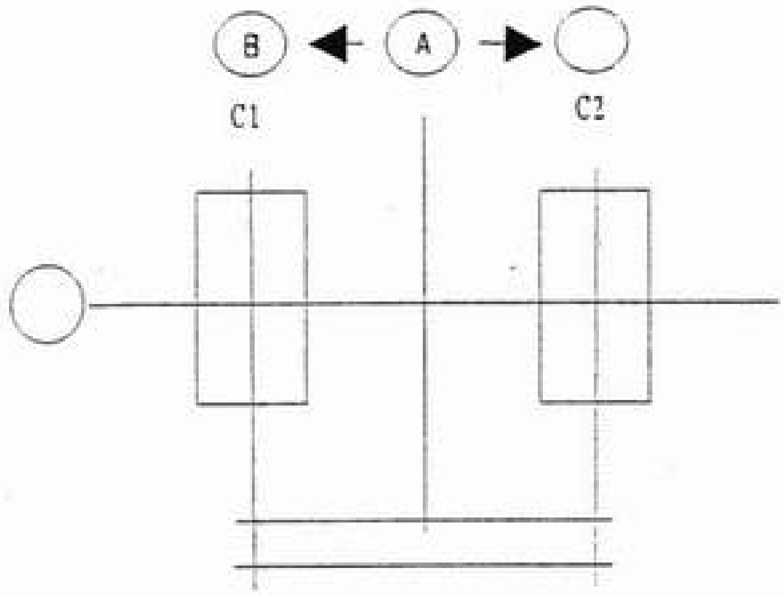
b) CHECK BY TENSION (NEGLECT)



Mmax = [σt/(1+Px' *Lx / Py' *Ly)]p1 = 0.0000

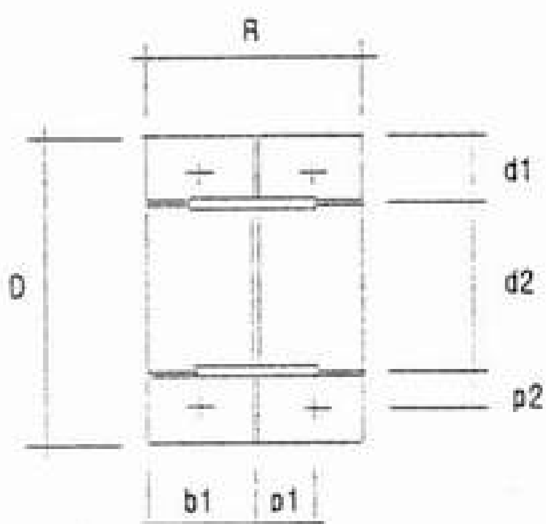
$t = \sqrt{6 M / (fb \times Lx)} =$ 0.0

USE : BASE PL - 35 X 400 X 800



	C1	C2
Pmax	71.3	42.5
Pmin	-5.7	-13.5

BASE TYPE



B	400
D	750
b1	200
d1	150
d2	450
p1	100
p2	75
e	

C1 COLUMN SIZE :

1) ANCHOR BOLT DESIGN

BOLT TRY) Φ 30 (a = 7.07)

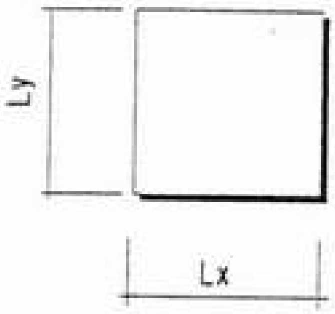
ρ= 5.7 /(1.2 x 7.07) = 0.7

USE : 4 - Φ 30 X 900

2) BASE PLATE DESIGN

a) CHECK BY COMP.

σc = 71.3 /B x D = 23.77 kg/㎠



Lx = 150 Ly = 200

λ = 200/ 150 = 1.33

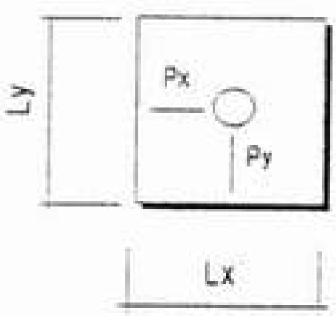
Mmax = 0.36x σc x Lx^2 = 1925.1

t = $\sqrt{6M / fb}$ = 2.50

fb = 1.85 t/㎠

b) CHECK BY TENSION

σt = 5.7 t /n = 1.425 t



Mmax = [σt/(1+Px' *Lx / Py' *Ly)]p1 = 0.0008

t = $\sqrt{6 M / (fb \times Lx)}$ = 0.6

USE : BASE PL - 35 X 400 X 750

C2 COLUMN SIZE :

1) ANCHOR BOLT DESIGN

BOLT TRY) Φ 30 (a = 7.07)

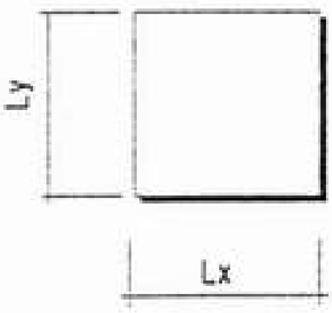
n= 13.5 /(1.2 x 7.07) = 1.6

USE : 4 - Φ 30 X 900

2) BASE PLATE DESIGN

a) CHECK BY COMP.

σc = 42.5 /B x D = 14.17 kg/㎠



Lx =	150	Ly =	200
λ =	200/	150 =	1.33

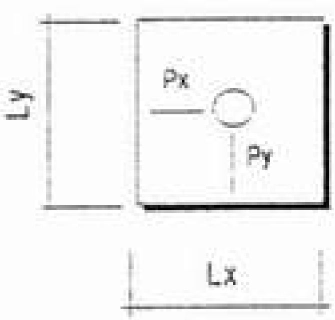
Mmax = 0.36x σc x Lx^2 = 1147.5

$t = \sqrt{6M / fb}$ = 1.9

fb = 1.85 t/㎠

b) CHECK BY TENSION

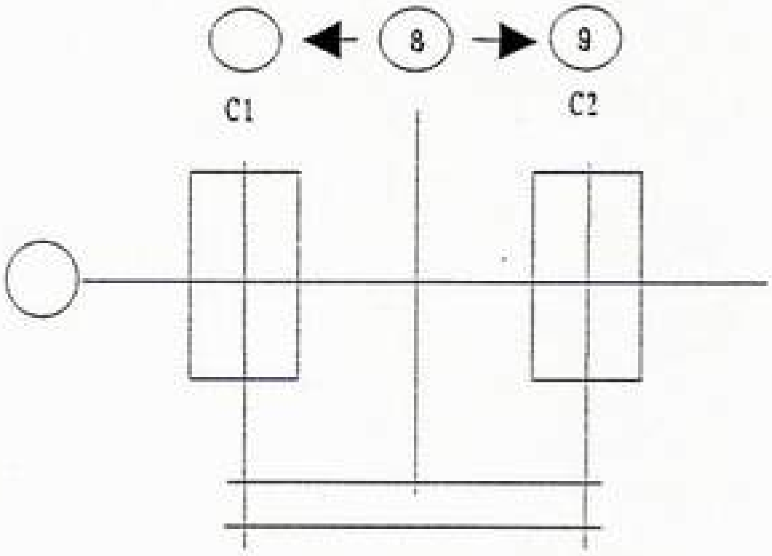
σt = 13.5 t /n = 3.4 t



Mmax = [$\sigma t/(1+Px' \cdot Lx / Py' \cdot Ly)$]p1 = 0.0020

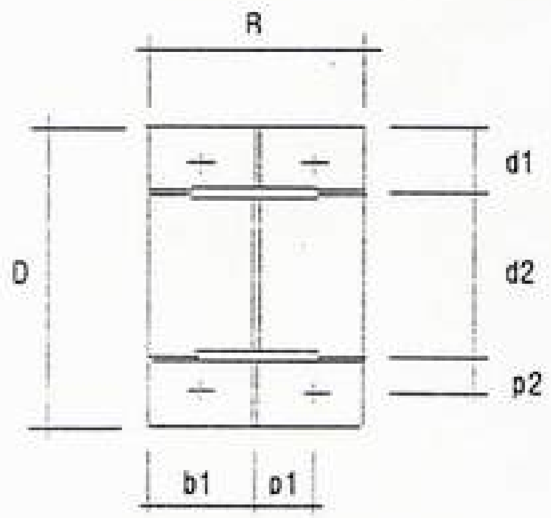
$t = \sqrt{6 M / (fb \times Lx)}$ = 1.0

USE : BASE PL - 35 X 400 X 750



	C1	C2
Pmax	163.4	70.9
Pmin	12	-33.6

BASE TYPE



B	400
D	800
b1	200
d1	150
d2	500
p1	100
p2	75
e	

C1 COLUMN SIZE :

1) ANCHOR BOLT DESIGN

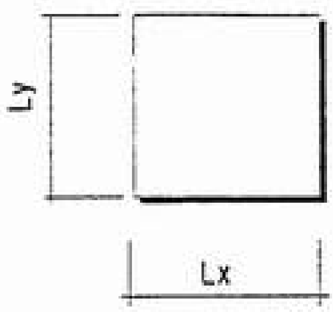
BOLT TRY) Φ 30 (a = 7.07)

USE : 4 - Φ 30 X 900

2) BASE PLATE DESIGN

a) CHECK BY COMP.

σc = 163.4 /B x D = 51.06 kg/㎠



$Lx =$ 150 $Ly =$ 200

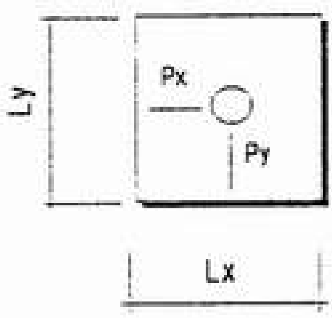
$\lambda =$ 200/ 150 = 1.33

$M_{max} = 0.36x\ \sigma c \ x\ Lx^2 =$ 4136.1

$t = \sqrt{6M / fb} =$ 3.66

$fb =$ 1.85 t/㎠

b) CHECK BY TENSION (NEGLECT)



$M_{max} = [\ \sigma t/(1+Px' * Lx / Py' * Ly)]p1 =$ 0.0000

$t = \sqrt{6 M / (fb \times Lx)} =$ 0.0

USE : BASE PL - 40 X 400 X 800

C2 COLUMN SIZE :

1) ANCHOR BOLT DESIGN

BOLT TRY) Φ 30 (a = 7.07)

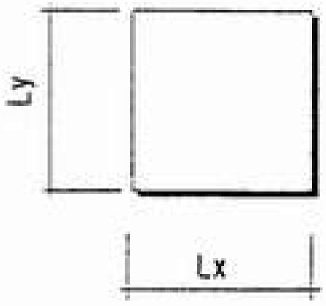
n= 33.6 /(1.2 x 7.07) = 4.0

USE : 4 - Φ 30 X 900

2) BASE PLATE DESIGN

a) CHECK BY COMP.

$\sigma c =$ 70.9 /B x D = 22.16 kg/㎠



$Lx =$ 150 $Ly =$ 200

$\lambda =$ 200/ 150 = 1.33

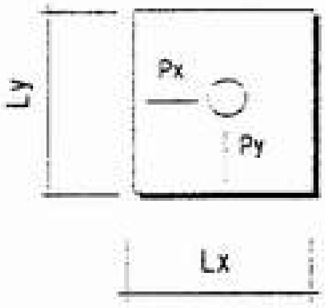
$Mmax =$ 0.36x σc x Lx^2 = 1794.7

$t = \sqrt{6M / fb}$ = 2.4

$fb =$ 1.85 t/㎠

b) CHECK BY TENSION

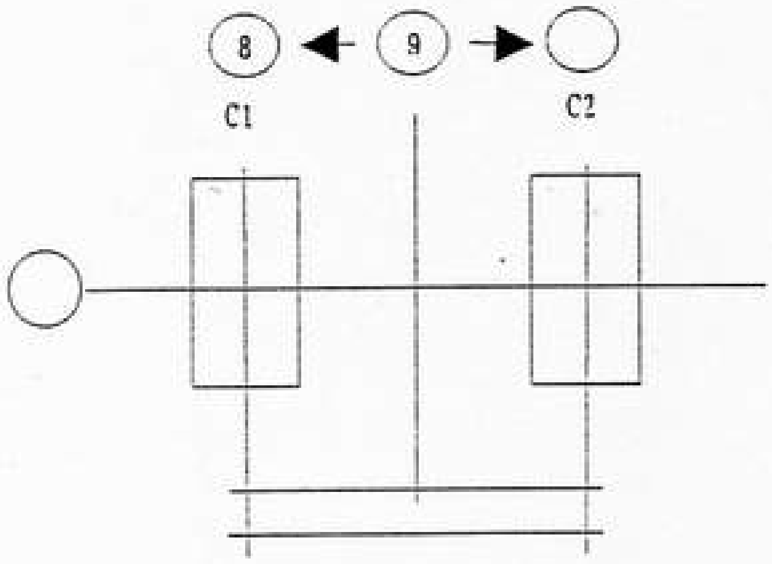
$\sigma t =$ 33.6 t /n = 8.4 t



$Mmax = [\sigma t/(1+Px' * Lx / Py' * Ly)]p1 =$ 0.0050

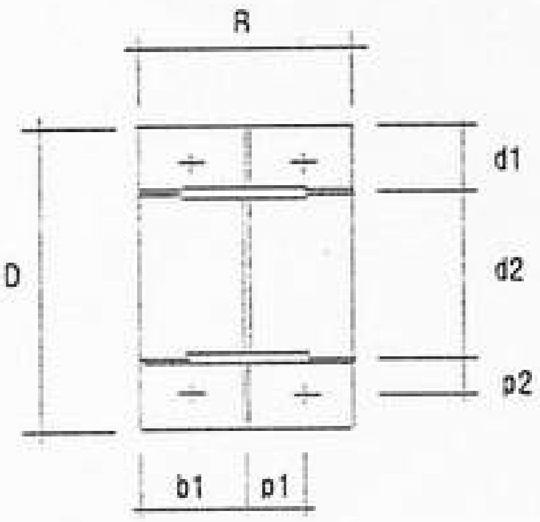
$t = \sqrt{6 M / (fb \times Lx)} =$ 1.6

USE : BASE PL - 40 X 400 X 800



	C1	C2
Pmax	67.6	162
Pmin	-33.7	12.7

BASE TYPE



B	400
D	800
b1	200
d1	150
d2	500
p1	100
p2	75
e	

C1 COLUMN SIZE :

1) ANCHOR BOLT DESIGN

BOLT TRY) Φ 30 (a = 7.07)

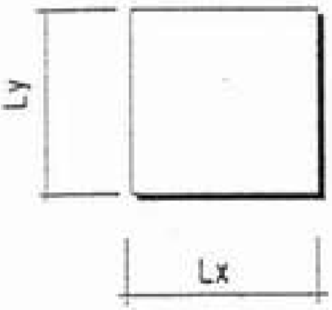
n= 33.7 /(1.2 x 7.07) = 4.0

USE : 4 - Φ 30 X 900

2) BASE PLATE DESIGN

a) CHECK BY COMP.

σc = 67.6 /B x D = 21.13 kg/㎠



Lx = 150 Ly = 200

λ = 200/ 150 = 1.33

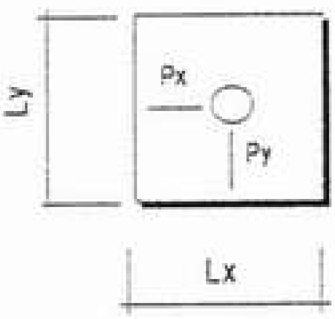
Mmax = 0.36x σc x Lx^2 = 1711.1

t = $\sqrt{6M / fb}$ = 2.36

fb = 1.85 t/㎠

b) CHECK BY TENSION

σt = 33.7 t /n = 8.43 t



Mmax = [$\sigma t/(1+Px^2 *Lx / Py^2 *Ly)$]p1 = 0.0050

t = $\sqrt{6 M / (fb \times Lx)}$ = 1.6

USE : BASE PL - 35 X 400 X 800

C2 COLUMN SIZE :

1) ANCHOR BOLT DESIGN

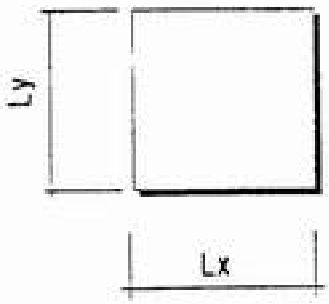
BOLT TRY) Φ 30 (a = 7.07)

USE : 4 - Φ 30 X 900

2) BASE PLATE DESIGN

a) CHECK BY COMP.

σc = 162 /B x D = 50.63 kg/㎠



L_x = 150 L_y = 200

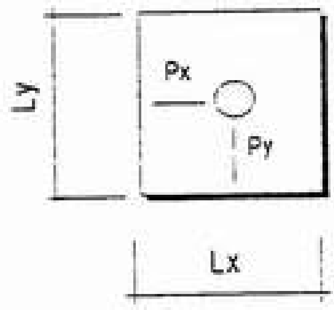
λ = 200 / 150 = 1.33

Mmax = $0.36 \times \sigma c \times L_x^2$ = 4100.6

$t = \sqrt{6M / fb}$ = 3.6

fb = 1.85 t/㎠

b) CHECK BY TENSION (NEGLECT)



Mmax = [$\sigma t / (1 + Px' * Lx / Py' * Ly)$] p1 = 0.0000

$t = \sqrt{6M / (fb \times Lx)}$ = 0.0

USE : BASE PL - 35 X 400 X 800

7. DESIGN OF MAIN COLUMN & ROOF TRUSS

```
MIDAS/GEN - A.C.S   Applicable Code Checking System      Version - 3.1  11:35
================================================================================
```

A- LINE LOWER COLUMN

```
*. MIDAS FILE  : coil4.CAL
*. PROJECT     :  THILAND COIL CETER STRUCTURE ANALYSIS

*. LOADCOMB NO =  1,  ELEMENT NO =   36,  SECTION NO =   6,  MATERIAL NO
*. UNIT SYSTEM : TONF, CM
                                              H-446X199X8X12
*. SECTIONAL PROPERTIES   :  Designation = H 39.6x19.9x.7/1.1
   Depth      =     39.600,  Top F Width =     19.900,  Bot.F Width =
   Web Thick =        .700,  Top F Thick =      1.100,  Bot.F Thick =

   Area = .69960E+02,  Asy  = .36483E+02,  Asz  = .27720E+02
   Ybar = .99500E+01,  Zbar = .19800E+02,  Qyb  = .77682E+03, Qzb  = .49
   Iyy  = .19279E+05,  Izz  = .14458E+04,  Iyz  = .00000E+00
   Roy  = .16600E+02,  Roz  = .45461E+01,  Rop  = .00000E+00

*. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
   BLy  = .68000E+03,  BLz  = .17000E+03,  BLu  = .17000E+03
   Ky   =  1.000,      Kz   =  1.000

*. MATERIAL PROPERTIES :
   Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

*. GIVEN FORCES AND MOMENTS AT (1.0) POINT :
   Axial Force          Fxx  = -.6676E+02
   Shear Forces         Fyy  =  .4355E-01,  Fzz  =  .0000E+00
   Bending Moments      BMy  =  .0000E+00,  BMz  = -.4790E+01
   Moments of i-node    Myyi =  .0000E+00,  Mzzi =  .0000E+00
   Moments of j-node    Myyj =  .0000E+00,  Mzzj = -.4790E+01

================================================================================
  [[[*]]]   CHECK THE AXIAL STRESS.
================================================================================

( ). Check the slenderness ratio of axial compression member (Kl/r).
     [ AISC-ASD89 Specification B7. ]

     -. Kl/r  =    41.0  <   200.0  --->  O.K.

( ). Check the width-thickness ratio of built-up flange (BTR).
     [ AISC-ASD89 Specification B5.1 ]

     -. h/t   =    53.43  <  70.   --->  kc = 1.000

     -. BTR   =  bf / 2tf  =    9.05  <  95/SQRT[Fy/kc]  --->  Qs = 1.000

( ). Check the depth-thickness ratio of web (DTR).
     [ AISC-ASD89 Specification B5.1 ]

     -. DTR   =  Dweb / tw  =   53.43  >  253/SQRT[Fy]  --->  Calculate
```

```
      ( ). Calculate the reduction factor of stiffened elements (Qa).
           [ AISC-ASD89 Specification Appendix B. (A-B5-8) ]

           -. fa  =  Fxx / Area  =   -13.573  ksi

           -. Bel =  (253 tw) / SQRT[Fy]  =  11.934 in.

                     253 x tw     [                44.3              ]
           -. Be2 =  ---------- x [ 1. - ------------------------- ]  =  14.666 in.
                     SQRT[fa]     [         (DTR) x SQRT[fa]      ]

           -. Be  =  MIN[ MAX(Bel,Be2), Dweb ]  =  37.252

                     Area - (Dweb - Be) x tw
           -. Qa  =  -----------------------  =   .999
                              Area

      ( ). Calculate the allowable compressive stress (Fa).
           [ AISC-ASD89 Specification E2. (E2-1) ]

                          [  2 x Pi**2 x Es  ]
           -. Cc  =  SQRT [ ---------------- ]  =    131.52
                          [   Qs x Qa x Fy   ]

           -. Kl/r  <  Cc

                                [           (Kl/r)**2    ]
                     Qs x Qa x  [ 1.  -  -------------   ] x Fy
                                [         (2 x Cc**2)    ]
           -. Fa  =  ------------------------------------------  =     1.281
                        5      3 x (Kl/r)      (Kl/r)**3
                       --- + ------------  -  -----------
                        3      8 x Cc          8 x Cc**3

      ( ). Calculate the axial compressive stress of member (fa).

           -. fa  =  Fxx / Area  =     -.954

      ( ). Check the interaction ratio of axial stress (fa/Fa).

               fa          .954
           -. ----  =  --------  =  .745  <  1.000  --->  O.K.
               Fa         1.281
=================================================================================
   [[[*]]]   CHECK THE BENDING STRESSES ABOUT MINOR AXIS.
=================================================================================

      ( ). Check the width-thickness ratio of flange (BTR).
           [ AISC-ASD89 Specification B5.1 ]

           -. BTR  =  bf / 2tf  =    9.05

           -. BTR  <  65/SQRT[Fy]  --->  COMPACT SECTION !
```

( ). Calculate the allowable bending stresses (FBCz,FBTz).
[AISC-ASD89 Specification F2.1 (F2-1)]

-. FBCz,FBTz = 0.75 x Fy = 1.800

( ). Calculate actual bending stresses of member (fbcz,fbtz).

-. fbcz = (BMz x Ccom) / Izz = -.033

-. fbtz = (BMz x Cten) / Izz = .033

( ). Check the interaction ratio of stresses (fbcz/FBCz,fbtz/FBTz).

-. $\frac{fbcz}{FBCz} = \frac{.033}{1.800} = .018 < 1.000$ ---> O.K.

-. $\frac{fbtz}{FBTz} = \frac{.033}{1.800} = .018 < 1.000$ ---> O.K.

[[[*]]] CHECK THE COMBINED STRESSES.

( ). Check the ratio of combined stresses (Axial compression + bending).
[AISC-ASD89 Specification H1. (H1-1, H1-2)]

-. fa/Fa > 0.15

*. Check the combined stress at member end point.

-. $Rmax = \frac{fa}{Fa} + \frac{fbcy}{FBCy} + \frac{fbcz}{FBCz}$

$= .763 < 1.000$ ---> O.K.

[[[*]]] CHECK THE SHEAR STRESSES.

( ). Calculate the allowable shear stress of local-y direction (Fvy).
[AISC-ASD89 Specification F4]

-. Fvy = 0.40 x Fy = .960

( ). Calculate the shear stress of local-y direction (fvy).

-. fvy = (Fyy x Qzb) / Izz = .001

( ). Check the interaction ratio of shear stress (fvy/Fvy).

```
      fvy          .001
-.  -----  =  --------  =   .002  <  1.000  ---> O.K.
      Fvy          .960
```

B- LINE LOWER COLUMN

```
*. MIDAS FILE   : coil4.CAL
*. PROJECT      :  THILAND COIL CETER STRUCTURE ANALYSIS

*. LOADCOMB NO =   2,  ELEMENT NO =   19,  SECTION NO =   3,  MATERIAL NO
*. UNIT SYSTEM : TONF, CM

*. SECTIONAL PROPERTIES   :  Designation = H 50x20x1/1.6
   Depth      =      50.000,  Top F Width =      20.000,  Bot.F Width =
   Web Thick =        1.000,  Top F Thick =       1.600,  Bot.F Thick =

   Area = .11080E+03,  Asy  = .53333E+02,  Asz  = .50000E+02
   Ybar = .10000E+02,  Zbar = .25000E+02,  Qyb  = .10482E+04, Qzb  = .50
   Iyy  = .46037E+05,  Izz  = .21372E+04,  Iyz  = .00000E+00
   Roy  = .20384E+02,  Roz  = .43919E+01,  Rop  = .00000E+00

*. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
   BLy  = .68000E+03,  BLz  = .17000E+03,  BLu  = .17000E+03
   Ky   =  1.000,      Kz   =  1.000

*. MATERIAL PROPERTIES :
   Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

*. GIVEN FORCES AND MOMENTS AT (1.0) POINT :
   Axial Force          Fxx  = -.1286E+03
   Shear Forces         Fyy  = -.5805E-01,  Fzz  =  .0000E+00
   Bending Moments      BMy  =  .0000E+00,  BMz  =  .1916E+02
   Moments of i-node    Myyi =  .0000E+00,  Mzzi =  .0000E+00
   Moments of j-node    Myyj =  .0000E+00,  Mzzj =  .1916E+02
```

[[[*]]] CHECK THE AXIAL STRESS.

```
( ). Check the slenderness ratio of axial compression member (Kl/r).
     [ AISC-ASD89 Specification B7. ]

     -. Kl/r  =    38.7  <   200.0  ---> O.K.

( ). Check the width-thickness ratio of built-up flange (BTR).
     [ AISC-ASD89 Specification B5.1 ]

     -. h/t  =   46.80  <  70.  --->  kc = 1.000

     -. BTR  =  bf / 2tf  =    6.25  <  95/SQRT[Fy/kc]  --->  Qs = 1.000

( ). Check the depth-thickness ratio of web (DTR).
     [ AISC-ASD89 Specification B5.1 ]

     -. DTR  =  Dweb / tw  =   46.80  >  253/SQRT[Fy]  --->  Calculate
```

```
( ). Calculate the reduction factor of stiffened elements (Qa).
     [ AISC-ASD89 Specification Appendix B. (A-B5-8) ]

     -. fa  =  Fxx / Area  =   -16.507  ksi

     -. Be1 =  (253 tw) / SQRT[Fy]  =  17.048 in.

                253 x tw    [               44.3             ]
     -. Be2 =  ---------- x [ 1. - ------------------------- ]  =  18.804 in.
                SQRT[fa]    [        (DTR) x SQRT[fa]        ]

     -. Be  =  MIN[ MAX(Be1,Be2), Dweb ]  =  46.800

                Area - (Dweb - Be) x tw
     -. Qa  =  -------------------------  =  1.000
                         Area

( ). Calculate the allowable compressive stress (Fa).
     [ AISC-ASD89 Specification E2. (E2-1) ]

                      [   2 x Pi**2 x Es  ]
     -. Cc  =  SQRT [ ---------------- ]  =    131.42
                      [   Qs x Qa x Fy    ]

     -. Kl/r  <  Cc

                               [           (Kl/r)**2    ]
                  Qs x Qa x [ 1. -  ------------- ] x Fy
                               [          (2 x Cc**2)   ]
     -. Fa   =  ----------------------------------------  =     1.294
                   5      3 x (Kl/r)      (Kl/r)**3
                  --- + ------------ - -----------
                   3       8 x Cc        8 x Cc**3

( ). Calculate the axial compressive stress of member (fa).

     -. fa  =  Fxx / Area  =    -1.161

( ). Check the interaction ratio of axial stress (fa/Fa).

        fa          1.161
     -. ----  =   --------  =   .897  <  1.000  ---> O.K.
        Fa          1.294
```

```
================================================================================
  [[[*]]]   CHECK THE BENDING STRESSES ABOUT MINOR AXIS.
================================================================================
```

```
( ). Check the width-thickness ratio of flange (BTR).
     [ AISC-ASD89 Specification B5.1 ]

     -. BTR  =  bf / 2tf  =    6.25

     -. BTR  <  65/SQRT[Fy]   --->  COMPACT SECTION !
```

( ). Calculate the allowable bending stresses (FBCz,FBTz).
[AISC-ASD89 Specification F2.1 (F2-1)]

-. FBCz,FBTz = 0.75 x Fy = 1.800

( ). Calculate actual bending stresses of member (fbcz,fbtz).

-. fbcz = (BMz x Ccom) / Izz = -.090

-. fbtz = (BMz x Cten) / Izz = .090

( ). Check the interaction ratio of stresses (fbcz/FBCz,fbtz/FBTz).

-. $\frac{fbcz}{FBCz} = \frac{.090}{1.800} = .050 < 1.000$ ---> O.K.

-. $\frac{fbtz}{FBTz} = \frac{.090}{1.800} = .050 < 1.000$ ---> O.K.

[[[*]]] CHECK THE COMBINED STRESSES.

( ). Check the ratio of combined stresses (Axial compression + bending).
[AISC-ASD89 Specification H1. (H1-1, H1-2)]

-. fa/Fa > 0.15

*. Check the combined stress at member end point.

-. $Rmax = \frac{fa}{Fa} + \frac{fbcy}{FBCy} + \frac{fbcz}{FBCz}$

$= .946 < 1.000$ ---> O.K.

[[[*]]] CHECK THE SHEAR STRESSES.

( ). Calculate the allowable shear stress of local-y direction (Fvy).
[AISC-ASD89 Specification F4]

-. Fvy = 0.40 x Fy = .960

( ). Calculate the shear stress of local-y direction (fvy).

-. fvy = (Fyy x Qzb) / Izz = .001

( ). Check the interaction ratio of shear stress (fvy/Fvy).

```
        fvy           .001
   -. -----  =  --------  =   .001  <  1.000  --->  O.K.
        Fvy           .960
```

C-LINE LOWER COLUMN

*. MIDAS FILE : coil4.CAL
*. PROJECT : THILAND COIL CETER STRUCTURE ANALYSIS

*. LOADCOMB NO = 2, ELEMENT NO = 1, SECTION NO = 1, MATERIAL NO
*. UNIT SYSTEM : TONF, CM

*. SECTIONAL PROPERTIES : Designation = H 45x20x.9/1.4
Depth = 45.000, Top F Width = 20.000, Bot.F Width =
Web Thick = .900, Top F Thick = 1.400, Bot.F Thick =

Area = .93980E+02, Asy = .46667E+02, Asz = .40500E+02
Ybar = .10000E+02, Zbar = .22500E+02, Qyb = .90083E+03, Qzb = .50
Iyy = .32259E+05, Izz = .18692E+04, Iyz = .00000E+00
Roy = .18527E+02, Roz = .44598E+01, Rop = .00000E+00

*. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
BLy = .68000E+03, BLz = .17000E+03, BLu = .17000E+03
Ky = 1.000, Kz = 1.000

*. MATERIAL PROPERTIES :
Fy = .24000E+01, Es = .21000E+04, MATERIAL NAME = SS41

*. GIVEN FORCES AND MOMENTS AT (1.0) POINT :
Axial Force Fxx = -.9302E+02
Shear Forces Fyy = -.5117E-02, Fzz = .0000E+00
Bending Moments BMy = .0000E+00, BMz = .5629E+00
Moments of i-node Myyi = .0000E+00, Mzzi = .0000E+00
Moments of j-node Myyj = .0000E+00, Mzzj = .5629E+00

[[[*]]] CHECK THE AXIAL STRESS.

( ). Check the slenderness ratio of axial compression member (Kl/r).
[AISC-ASD89 Specification B7.]

-. Kl/r = 38.1 < 200.0 ---> O.K.

( ). Check the width-thickness ratio of built-up flange (BTR).
[AISC-ASD89 Specification B5.1]

-. h/t = 46.89 < 70. ---> kc = 1.000

-. BTR = bf / 2tf = 7.14 < 95/SQRT[Fy/kc] ---> Qs = 1.000

( ). Check the depth-thickness ratio of web (DTR).
[AISC-ASD89 Specification B5.1]

-. DTR = Dweb / tw = 46.89 > 253/SQRT[Fy] ---> Calculate

( ). Calculate the reduction factor of stiffened elements (Qa).
[AISC-ASD89 Specification Appendix B. (A-B5-8)]

-. fa = Fxx / Area = -14.079 ksi

-. Be1 = (253 tw) / SQRT[Fy] = 15.343 in.

$$Be2 = \frac{253 \times tw}{SQRT[fa]} \times \left[1. - \frac{44.3}{(DTR) \times SQRT[fa]} \right] = 17.876 \text{ in.}$$

-. Be = MIN[MAX(Be1,Be2), Dweb] = 42.200

$$Qa = \frac{Area - (Dweb - Be) \times tw}{Area} = 1.000$$

( ). Calculate the allowable compressive stress (Fa).
[AISC-ASD89 Specification E2. (E2-1)]

$$Cc = SQRT \left[\frac{2 \times Pi^{**}2 \times Es}{Qs \times Qa \times Fy} \right] = 131.42$$

-. Kl/r < Cc

$$Fa = \frac{Qs \times Qa \times \left[1. - \frac{(Kl/r)^{**}2}{(2 \times Cc^{**}2)} \right] \times Fy}{\frac{5}{3} + \frac{3 \times (Kl/r)}{8 \times Cc} - \frac{(Kl/r)^{**}3}{8 \times Cc^{**}3}} = 1.297$$

( ). Calculate the axial compressive stress of member (fa).

-. fa = Fxx / Area = -.990

( ). Check the interaction ratio of axial stress (fa/Fa).

$$\frac{fa}{Fa} = \frac{.990}{1.297} = .763 < 1.000 \text{ ---> O.K.}$$

[[[*]]] CHECK THE BENDING STRESSES ABOUT MINOR AXIS.

( ). Check the width-thickness ratio of flange (BTR).
[AISC-ASD89 Specification B5.1]

-. BTR = bf / 2tf = 7.14

-. BTR < 65/SQRT[Fy] ---> COMPACT SECTION !

```
   ( ). Calculate the allowable bending stresses (FBCz,FBTz).
        [ AISC-ASD89 Specification F2.1 (F2-1) ]

        -. FBCz,FBTz  =  0.75 x Fy  =     1.800

   ( ). Calculate actual bending stresses of member (fbcz,fbtz).

        -. fbcz  =  (BMz x Ccom) / Izz  =     -.003

        -. fbtz  =  (BMz x Cten) / Izz  =      .003

   ( ). Check the interaction ratio of stresses (fbcz/FBCz,fbtz/FBTz).

              fbcz          .003
        -.  ------  =  --------  =  .002  <  1.000  --->  O.K.
              FBCz         1.800

              fbtz          .003
        -.  ------  =  --------  =  .002  <  1.000  --->  O.K.
              FBTz         1.800

==============================================================================
  [[[*]]]  CHECK THE COMBINED STRESSES.
==============================================================================

   ( ). Check the ratio of combined stresses (Axial compression + bending).
        [ AISC-ASD89 Specification H1. (H1-1, H1-2) ]

        -. fa/Fa  >  0.15

        *. Check the combined stress at member end point.

                        fa      fbcy      fbcz
        -. Rmax   =   ---- + ------ + ------
                        Fa      FBCy      FBCz

                  =   .765  <  1.000  --->  O.K.

==============================================================================
  [[[*]]]  CHECK THE SHEAR STRESSES.
==============================================================================

   ( ). Calculate the allowable shear stress of local-y direction (Fvy).
        [ AISC-ASD89 Specification F4 ]

        -. Fvy  =  0.40 x Fy  =      .960

   ( ). Calculate the shear stress of local-y direction (fvy).

        -. fvy  =  (Fyy x Qzb) / Izz  =      .000
```

( ). Check the interaction ratio of shear stress (fvy/Fvy).

-. $\frac{fvy}{Fvy} = \frac{.000}{.960} = .000 < 1.000$ ---> O.K.

B-LINE UPPER COLUMN

```
*. MIDAS FILE  : coil4.CAL
*. PROJECT     :  THILAND COIL CETER STRUCTURE ANALYSIS

*. LOADCOMB NO =   1,  ELEMENT NO =    26,  SECTION NO =   8,  MATERIAL NO
*. UNIT SYSTEM : TONF, CM

*. SECTIONAL PROPERTIES  :  Designation = H 39x30x1/1.6
   Depth      =     39.000,  Top F Width =     30.000,  Bot.F Width =
   Web Thick =       1.000,  Top F Thick =       1.600,  Bot.F Thick =

   Area = .13180E+03,  Asy  = .80000E+02,  Asz  = .39000E+02
   Ybar = .15000E+02,  Zbar = .19500E+02,  Qyb  = .10578E+04, Qzb  = .11
   Iyy  = .37414E+05,  Izz  = .72030E+04,  Iyz  = .00000E+00
   Roy  = .16848E+02,  Roz  = .73926E+01,  Rop  = .00000E+00

*. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
   BLy  = .44000E+03,  BLz  = .22000E+03,  BLu  = .22000E+03
   Ky   =  1.000,      Kz   =  1.000

*. MATERIAL PROPERTIES :
   Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

*. GIVEN FORCES AND MOMENTS AT (0.0) POINT :
   Axial Force          Fxx  = -.4874E+02
   Shear Forces         Fyy  =  .0000E+00,  Fzz  = -.9582E+01
   Bending Moments      BMy  =  .1345E+04,  BMz  =  .0000E+00
   Moments of i-node    Myyi =  .1345E+04,  Mzzi =  .0000E+00
   Moments of j-node    Myyj =  .3538E+01,  Mzzj =  .0000E+00
```

```
==============================================================================
  [[[*]]]   CHECK THE AXIAL STRESS.
==============================================================================

   ( ). Check the slenderness ratio of axial compression member (Kl/r).
        [ AISC-ASD89 Specification B7. ]

        -. Kl/r  =     29.8  <   200.0  ---> O.K.

   ( ). Check the width-thickness ratio of built-up flange (BTR).
        [ AISC-ASD89 Specification B5.1 ]

        -. h/t   =    35.80  <  70.  ---> kc = 1.000

        -. BTR   =  bf / 2tf  =    9.37  <  95/SQRT[Fy/kc]  ---> Qs = 1.000

   ( ). Check the depth-thickness ratio of web (DTR).
        [ AISC-ASD89 Specification B5.1 ]

        -. DTR   =  Dweb / tw  =   35.80  <  253/SQRT[Fy]  ---> Qa = 1.000
```

```
( ). Calculate the allowable compressive stress (Fa).
     [ AISC-ASD89 Specification E2. (E2-1) ]

     -. Cc  =  SQRT [   2 x Pi**2 x Es   ]
                    [ ---------------- ]  =    131.42
                    [   Qs x Qa x Fy     ]

     -. Kl/r  <  Cc

                              [            (Kl/r)**2    ]
                 Qs x Qa x [ 1. -  ------------- ] x Fy
                              [          (2 x Cc**2)   ]
     -. Fa  =  ----------------------------------------  =     1.336
                      5      3 x (Kl/r)      (Kl/r)**3
                     --- + ------------ - -----------
                      3        8 x Cc        8 x Cc**3

( ). Calculate the axial compressive stress of member (fa).

     -. fa  =  Fxx / Area  =     -.370

( ). Check the interaction ratio of axial stress (fa/Fa).

          fa          .370
     -. ----  =  --------  =   .277  <  1.000  --->  O.K.
          Fa         1.336

==========================================================================
  [[[*]]]   CHECK THE BENDING STRESSES ABOUT MAJOR AXIS.
==========================================================================

( ). Check the laterally unbraced length of the compression flange (BLu)
     [ AISC-ASD89 Specification F1.1 (F1-2) ]

     -. Lcr1  =  (76 x bf) / SQRT[Fy]  =    153.64 in.

     -. Lcr2  =  20000 / (Dweb/Af)Fy   =    283.90 in.

     -. Lcr  =  MIN[ Lcr1, Lcr2 ]  =    153.64 in.

     -. BLu  =     86.61  <  Lcr  --->  COMPACT SECTION !

( ). Check the depth-thickness ratio of web (DTR).
     [ AISC-ASD89 Specification B5.1 ]

     -. DTR  =  Dweb / tw  =   39.00

     -. axial stress : fa  =     -.370
```

```
            -. fa/Fy   =     .154  <  0.16

                             640                  fa
            -. DTR   <   ---------- [1. - 3.74 ----]   --->  COMPACT SECTION !
                          SQRT[Fy]                 Fy

        ( ). Check the width-thickness ratio of flange (BTR).
             [ AISC-ASD89 Specification B5.1 ]

            -. BTR   =  bf / 2tf  =     9.37

            -. BTR   <  65/SQRT[Fy]   --->  COMPACT SECTION !

        ( ). Calculate the allowable bending stresses (FBCy,FBTy).
             [ AISC-ASD89 Specification F1.1 (F1-1) ]

            -. FBCy,FBTy   =  0.66 x Fy   =      1.584

        ( ). Calculate actual bending stresses of member (fbcy,fbty).

            -. fbcy   =  (BMy x Ccom) / Iyy   =      -.701

            -. fbty   =  (BMy x Cten) / Iyy   =       .701

        ( ). Check the interaction ratio of stresses (fbcy/FBCy,fbty/FBTy).

                fbcy           .701
            -. ------   =   --------   =    .443  <  1.000   --->  O.K.
                FBCy          1.584

                fbty           .701
            -. ------   =   --------   =    .443  <  1.000   --->  O.K.
                FBTy          1.584
=====================================================================================
   [[[*]]]   CHECK THE COMBINED STRESSES.
=====================================================================================

        ( ). Check the ratio of combined stresses (Axial compression + bending).
             [ AISC-ASD89 Specification H1. (H1-1, H1-2) ]

            -. fa/Fa   >  0.15

            *. Check the combined stress at member end point.

                            fa       fbcy       fbcz
            -. Rmax   =   ---- +  ------ +  ------
                            Fa       FBCy       FBCz

                      =    .719  <  1.000   --->  O.K.
```

[[[*]]] CHECK THE SHEAR STRESSES.

( ). Calculate the allowable shear stress of local-z direction (Fvz).
[AISC-ASD89 Specification F4]

-. DTR = h / tw = 35.80 < 380/SQRT[Fy]

-. Fvz = 0.40 x Fy = .960

( ). Calculate the shear stress of local-z direction (fvz).

-. fvz = (Fzz x Qyb) / Iyy = .271

( ). Check the interaction ratio of shear stress (fvz/Fvz).

```
     fvz          .271
-. -----  =  --------  =   .282  <  1.000  --->  O.K.
     Fvz          .960
```

```
--------------------------------------------------------------------------------------
MIDAS/GEN - A.C.S   Applicable Code Checking System       Version - 3.1  11:35
======================================================================================
       A. C-LINE UPPER COLUMN
     *. MIDAS FILE   : coil4.CAL
     *. PROJECT      :  THILAND COIL CETER STRUCTURE ANALYSIS

     *. LOADCOMB NO =  2,  ELEMENT NO =   11,  SECTION NO =   7,  MATERIAL NO
     *. UNIT SYSTEM : TONF, CM

     *. SECTIONAL PROPERTIES   :  Designation = H 39x30x1/1.6
        Depth       =        39.000,  Top F Width =      30.000,  Bot.F Width =
        Web Thick =          1.000,  Top F Thick =       1.600,  Bot.F Thick =

        Area = .13180E+03,  Asy  = .80000E+02,  Asz  = .39000E+02
        Ybar = .15000E+02,  Zbar = .19500E+02,  Qyb  = .10578E+04, Qzb  = .11
        Iyy  = .37414E+05,  Izz  = .72030E+04,  Iyz  = .00000E+00
        Roy  = .16848E+02,  Roz  = .73926E+01,  Rop  = .00000E+00

     *. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
        BLy  = .44000E+03,  BLz  = .22000E+03,  BLu  = .22000E+03
        Ky   =  1.000,      Kz   =  1.000

     *. MATERIAL PROPERTIES :
        Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

     *. GIVEN FORCES AND MOMENTS AT (1.0) POINT :
        Axial Force         Fxx  = -.2007E+02
        Shear Forces        Fyy  =  .0000E+00,  Fzz  =  .4480E+01
        Bending Moments     BMy  =  .1362E+04,  BMz  =  .0000E+00
        Moments of i-node   Myyi =  .3763E+03,  Mzzi =  .0000E+00
        Moments of j-node   Myyj =  .1362E+04,  Mzzj =  .0000E+00

======================================================================================
  [[[*]]]   CHECK THE AXIAL STRESS.
======================================================================================

     ( ). Check the slenderness ratio of axial compression member (Kl/r).
          [ AISC-ASD89 Specification B7. ]

          -. Kl/r  =     29.8  <   200.0  ---> O.K.

     ( ). Check the width-thickness ratio of built-up flange (BTR).
          [ AISC-ASD89 Specification B5.1 ]

          -. h/t   =   35.80  <  70.   --->  kc = 1.000

          -. BTR   =  bf / 2tf  =    9.37  <  95/SQRT[Fy/kc]  --->  Qs = 1.000

     ( ). Check the depth-thickness ratio of web (DTR).
          [ AISC-ASD89 Specification B5.1 ]

          -. DTR   =  Dweb / tw  =   35.80  <  253/SQRT[Fy]  --->  Qa = 1.000
```

```
  ( ). Calculate the allowable compressive stress (Fa).
       [ AISC-ASD89 Specification E2. (E2-1) ]

                    [   2 x Pi**2 x Es   ]
       -. Cc  =  SQRT [ ---------------- ]  =   131.42
                    [    Qs x Qa x Fy    ]

       -. Kl/r  <  Cc

                              [          (Kl/r)**2    ]
                 Qs x Qa x [ 1. -  ------------ ] x Fy
                              [          (2 x Cc**2)  ]
       -. Fa  =  -----------------------------------------  =    1.336
                   5      3 x (Kl/r)      (Kl/r)**3
                  --- + ------------ - -----------
                   3        8 x Cc        8 x Cc**3

  ( ). Calculate the axial compressive stress of member (fa).

       -. fa  =  Fxx / Area  =     -.152

  ( ). Check the interaction ratio of axial stress (fa/Fa).

           fa          .152
       -. ----  =  --------  =   .114  <  1.000  --->  O.K.
           Fa         1.336

================================================================================
   [[[*]]]   CHECK THE BENDING STRESSES ABOUT MAJOR AXIS.
================================================================================

  ( ). Check the laterally unbraced length of the compression flange (BLū)
       [ AISC-ASD89 Specification F1.1 (F1-2) ]

       -. Lcr1  =  (76 x bf) / SQRT[Fy]  =    153.64 in.

       -. Lcr2  =  20000 / (Dweb/Af)Fy   =    283.90 in.

       -. Lcr  =  MIN[ Lcr1, Lcr2 ]  =    153.64 in.

       -. BLu  =     86.61  <  Lcr  --->  COMPACT SECTION !

  ( ). Check the depth-thickness ratio of web (DTR).
       [ AISC-ASD89 Specification B5.1 ]

       -. DTR  =  Dweb / tw  =   39.00

       -. axial stress : fa  =     -.152
```

```
-. fa/Fy  =    .063  <  0.16

                 640                       fa
-. DTR  <  ---------- [1. - 3.74 ----]  ---> COMPACT SECTION !
              SQRT[Fy]                     Fy

( ). Check the width-thickness ratio of flange (BTR).
     [ AISC-ASD89 Specification B5.1 ]

-. BTR  =  bf / 2tf  =    9.37

-. BTR  <  65/SQRT[Fy]  --->  COMPACT SECTION !

( ). Calculate the allowable bending stresses (FBCy,FBTy).
     [ AISC-ASD89 Specification F1.1 (F1-1) ]

-. FBCy,FBTy  =  0.66 x Fy  =     1.584

( ). Calculate actual bending stresses of member (fbcy,fbty).

-. fbcy  =  (BMy x Ccom) / Iyy  =      -.710

-. fbty  =  (BMy x Cten) / Iyy  =       .710

( ). Check the interaction ratio of stresses (fbcy/FBCy,fbty/FBTy).

      fbcy          .710
-.  ------  =  --------  =   .448  <  1.000  --->  O.K.
      FBCy         1.584

      fbty          .710
-.  ------  =  --------  =   .448  <  1.000  --->  O.K.
      FBTy         1.584
```

```
=============================================================================
  [[[*]]]   CHECK THE COMBINED STRESSES.
=============================================================================
```

```
( ). Check the ratio of combined stresses (Axial compression + bending).
     [ AISC-ASD89 Specification H1. (H1-3) ]

-. fa/Fa  <  0.15

*. Check the combined stress at member end point.

                   fa     fbcy     fbcz
-. Rmax   =      ---- + ------ + ------
                   Fa     FBCy     FBCz

          =   .562  <  1.000  --->  O.K.
```

```
[[[*]]]   CHECK THE SHEAR STRESSES.

( ). Calculate the allowable shear stress of local-z direction (Fvz).
     [ AISC-ASD89 Specification F4 ]

     -. DTR  =  h / tw  =   35.80  <  380/SQRT[Fy]

     -. Fvz  =  0.40 x Fy  =      .960

( ). Calculate the shear stress of local-z direction (fvz).

     -. fvz  =  (Fzz x Qyb) / Iyy  =      .127

( ). Check the interaction ratio of shear stress (fvz/Fvz).

          fvz           .127
     -. -----  =  --------  =   .132  <  1.000  ---> O.K.
          Fvz           .960
```

B.9 ROW LOWER COLUMN (INTERNAL)

```
*. MIDAS FILE   : coil5.CAL
*. PROJECT      :  THILAND COIL CETER STRUCTURE ANALYSIS

*. LOADCOMB NO =  1,  ELEMENT NO =    7,  SECTION NO =   2,  MATERIAL NO
*. UNIT SYSTEM : TONF, CM

*. SECTIONAL PROPERTIES   :  Designation = H 49.6x19.9x.9/1.4
   Depth      =      49.600,  Top F Width =      19.900,  Bot.F Width =
   Web Thick =         .900,  Top F Thick =       1.400,  Bot.F Thick =

   Area = .97840E+02,  Asy  = .46433E+02,  Asz  = .44640E+02
   Ybar = .99500E+01,  Zbar = .24800E+02,  Qyb  = .10198E+04, Qzb  = .49
   Iyy  = .40060E+05,  Izz  = .18416E+04,  Iyz  = .00000E+00
   Roy  = .20235E+02,  Roz  = .43386E+01,  Rop  = .00000E+00

*. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
   BLy  = .68000E+03,  BLz  = .17000E+03,  BLu  = .17000E+03
   Ky   =  1.000,      Kz   =  1.000

*. MATERIAL PROPERTIES :
   Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

*. GIVEN FORCES AND MOMENTS AT (1.0) POINT :
   Axial Force          Fxx  = -.8552E+02
   Shear Forces         Fyy  =  .3822E-01,  Fzz  =  .1370E+00
   Bending Moments      BMy  =  .1115E+02,  BMz  = -.1313E+02
   Moments of i-node    Myyi = -.1898E+02,  Mzzi = -.4725E+01
   Moments of j-node    Myyj =  .1115E+02,  Mzzj = -.1313E+02
```

[[[*]]]   CHECK THE AXIAL STRESS.

```
( ). Check the slenderness ratio of axial compression member (Kl/r).
     [ AISC-ASD89 Specification B7. ]

     -. Kl/r  =    39.2  <   200.0  ---> O.K.

( ). Check the width-thickness ratio of built-up flange (BTR).
     [ AISC-ASD89 Specification B5.1 ]

     -. h/t   =   52.00  <  70.  --->  kc = 1.000

     -. BTR   =  bf / 2tf  =    7.11  <  95/SQRT[Fy/kc]  --->  Qs = 1.000

( ). Check the depth-thickness ratio of web (DTR).
     [ AISC-ASD89 Specification B5.1 ]

     -. DTR   =  Dweb / tw  =   52.00  >  253/SQRT[Fy]  --->  Calculate
```

( ). Calculate the reduction factor of stiffened elements (Qa).
[AISC-ASD89 Specification Appendix B. (A-B5-8)]

-. fa = Fxx / Area = -12.433 ksi

-. Be1 = (253 tw) / SQRT[Fy] = 15.343 in.

-. Be2 = $\dfrac{253 \times tw}{SQRT[fa]} \times \left[1. - \dfrac{44.3}{(DTR) \times SQRT[fa]} \right]$ = 19.281 in.

-. Be = MIN[MAX(Be1,Be2), Dweb] = 46.800

-. Qa = $\dfrac{Area - (Dweb - Be) \times tw}{Area}$ = 1.000

( ). Calculate the allowable compressive stress (Fa).
[AISC-ASD89 Specification E2. (E2-1)]

-. Cc = SQRT $\left[\dfrac{2 \times Pi^{**}2 \times Es}{Qs \times Qa \times Fy} \right]$ = 131.42

-. Kl/r < Cc

-. Fa = $\dfrac{Qs \times Qa \times \left[1. - \dfrac{(Kl/r)^{**}2}{(2 \times Cc^{**}2)} \right] \times Fy}{\dfrac{5}{3} + \dfrac{3 \times (Kl/r)}{8 \times Cc} - \dfrac{(Kl/r)^{**}3}{8 \times Cc^{**}3}}$ = 1.292

( ). Calculate the axial compressive stress of member (fa).

-. fa = Fxx / Area = -.874

( ). Check the interaction ratio of axial stress (fa/Fa).

-. $\dfrac{fa}{Fa} = \dfrac{.874}{1.292}$ = .677 < 1.000 ---> O.K.

[[[*]]] CHECK THE BENDING STRESSES ABOUT MAJOR AXIS.

( ). Check the laterally unbraced length of the compression flange (BLu)
[AISC-ASD89 Specification F1.1 (F1-2)]

-. Lcr1 = (76 x bf) / SQRT[Fy] = 101.91 in.

-. Lcr2 = 20000 / (Dweb/Af)Fy = 129.56 in.

```
    -. Lcr   =  MIN[ Lcr1, Lcr2 ]  =    101.91 in.

    -. BLu   =     66.93  <  Lcr  --->  COMPACT SECTION !

( ). Check the depth-thickness ratio of web (DTR).
    [ AISC-ASD89 Specification B5.1 ]

    -. DTR  =  Dweb / tw  =   55.11

    -. axial stress : fa  =     -.874

    -. fa/Fy  =    .364  >  0.16

    -. DTR  >  257/SQRT[Fy]  --->  NON-COMPACT SECTION !

( ). Calculate the bending coefficient (Cb).
    [ AISC-ASD89 Specification F1.3 ]

    -. User defined or default value of Cb   =   1.000

( ). Calculate the radius of gyration (rT)
    [ AISC-ASD89 Specification F1.3 ]

    -. Azz  =  Bf*tf + tw*(Ccom-tf)/3  =     34.9

    -. Izz  =  tf*Bf**3/12 + ((Ccom-tf)/3)*tw**3/12  =          919.9

    -. rT   =  SQRT[Izz/Azz]  =   5.135

( ). Check the ratio of BLu-rT (BLu/rT).
    [ AISC-ASD89 Specification F1.3 ]

    -. CRrog1  =  SQRT[ (102000 x Cb) / Fy ]  =    54.663

    -. BLu/rT  =    33.103  <  CRrog1

( ). Calculate the allowable compressive bending stresses (FBC).
    [ AISC-ASD89 Specification F1.3 ]

    -. FBC  =  0.6 x Fy  =      1.440

( ). Check the width-thickness ratio of built-up flange (BTR).
    [ AISC-ASD89 Specification B5.1 ]

    -. h/t  =    55.11  <  70.  --->  kc = 1.000

    -. BTR  =  bf / 2tf  =     7.11  <  95/SQRT[Fy/kc]  --->  Qs = 1.000
```

( ). Calculate the allowable bending stresses (FBCy,FBTy).

-. FBTy = 0.6 x Fy = 1.440

-. FBCy = MIN[FBC, Qs x 0.6 x Fy] = 1.440

( ). Calculate actual bending stresses of member (fbcy,fbty).

-. fbcy = (BMy x Ccom) / Iyy = -.007

-. fbty = (BMy x Cten) / Iyy = .007

( ). Check the interaction ratio of stresses (fbcy/FBCy,fbty/FBTy).

-. $\frac{\text{fbcy}}{\text{FBCy}} = \frac{.007}{1.440} = .005 < 1.000$ ---> O.K.

-. $\frac{\text{fbty}}{\text{FBTy}} = \frac{.007}{1.440} = .005 < 1.000$ ---> O.K.

[[[*]]] CHECK THE BENDING STRESSES ABOUT MINOR AXIS.

( ). Check the width-thickness ratio of flange (BTR).
[AISC-ASD89 Specification B5.1]

-. BTR = bf / 2tf = 7.11

-. BTR < 65/SQRT[Fy] ---> COMPACT SECTION !

( ). Calculate the allowable bending stresses (FBCz,FBTz).
[AISC-ASD89 Specification F2.1 (F2-1)]

-. FBCz,FBTz = 0.75 x Fy = 1.800

( ). Calculate actual bending stresses of member (fbcz,fbtz).

-. fbcz = (BMz x Ccom) / Izz = -.071

-. fbtz = (BMz x Cten) / Izz = .071

( ). Check the interaction ratio of stresses (fbcz/FBCz,fbtz/FBTz).

-. $\frac{\text{fbcz}}{\text{FBCz}} = \frac{.071}{1.800} = .039 < 1.000$ ---> O.K.

-. $\frac{\text{fbtz}}{\text{FBTz}} = \frac{.071}{1.800} = .039 < 1.000$ ---> O.K.

```
=============================================================================
   [[[*]]]   CHECK THE COMBINED STRESSES.
=============================================================================

      ( ). Check the ratio of combined stresses (Axial compression + bending).
           [ AISC-ASD89 Specification H1. (H1-1, H1-2) ]

           -. fa/Fa  >  0.15

           *. Check the combined stress at member end point.

                          fa      fbcy      fbcz
           -. Rmax   =   ---- + ------ + ------
                          Fa      FBCy      FBCz

                     =    .721  <  1.000  ---> O.K.

=============================================================================
   [[[*]]]   CHECK THE SHEAR STRESSES.
=============================================================================

      ( ). Calculate the allowable shear stress of local-y direction (Fvy).
           [ AISC-ASD89 Specification F4 ]

           -. Fvy  =  0.40 x Fy  =       .960

      ( ). Calculate the shear stress of local-y direction (fvy).

           -. fvy  =  (Fyy x Qzb) / Izz  =       .001

      ( ). Check the interaction ratio of shear stress (fvy/Fvy).

                fvy           .001
           -. -----  =  --------  =   .001  <  1.000  ---> O.K.
                Fvy           .960

      ( ). Calculate the allowable shear stress of local-z direction (Fvz).
           [ AISC-ASD89 Specification F4 ]

           -. DTR  =  h / tw  =   52.00  <  380/SQRT[Fy]

           -. Fvz  =  0.40 x Fy  =       .960

      ( ). Calculate the shear stress of local-z direction (fvz).

           -. fvz  =  (Fzz x Qyb) / Iyy  =       .003

      ( ). Check the interaction ratio of shear stress (fvz/Fvz).

                fvz           .003
           -. -----  =  --------  =   .004  <  1.000  ---> O.K.
                Fvz           .960
```

8.9 ROW LOWER COLUMN (EXTERNAL)

```
 * MIDAS FILE      : coil5.CAL
 *. PROJECT       :  THILAND COIL CETER STRUCTURE ANALYSIS

 *. LOADCOMB NO =   1,  ELEMENT NO =   22,  SECTION NO =   4,  MATERIAL NO
 *. UNIT SYSTEM : TONF, CM

 *. SECTIONAL PROPERTIES  :  Designation = H 50x20x1/1.6
    Depth       =    50.000,  Top F Width =     20.000,  Bot.F Width =
    Web Thick =       1.000,  Top F Thick =      1.600,  Bot.F Thick =

    Area = .11080E+03,  Asy  = .53333E+02,  Asz  = .50000E+02
    Ybar = .10000E+02,  Zbar = .25000E+02,  Qyb  = .10482E+04, Qzb  = .50
    Iyy  = .46037E+05,  Izz  = .21372E+04,  Iyz  = .00000E+00
    Roy  = .20384E+02,  Roz  = .43919E+01,  Rop  = .00000E+00

 *. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
    BLy  = .68000E+03,  BLz  = .17000E+03,  BLu  = .17000E+03
    Ky   =  1.000,      Kz   =  1.000

 *. MATERIAL PROPERTIES :
    Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

 *. GIVEN FORCES AND MOMENTS AT (1.0) POINT :
    Axial Force          Fxx  = -.1235E+03
    Shear Forces         Fyy  =  .5994E-01,  Fzz  =  .3899E+00
    Bending Moments      BMy  = -.1767E+03,  BMz  = -.6594E+01
    Moments of i-node    Myyi = -.2196E+03,  Mzzi =  .0000E+00
    Moments of j-node    Myyj = -.1767E+03,  Mzzj = -.6594E+01

================================================================================
   [[[*]]]   CHECK THE AXIAL STRESS.
================================================================================

     ( ). Check the slenderness ratio of axial compression member (Kl/r).
          [ AISC-ASD89 Specification B7. ]

          -. Kl/r  =    38.7  <   200.0  ---> O.K.

     ( ). Check the width-thickness ratio of built-up flange (BTR).
          [ AISC-ASD89 Specification B5.1 ]

          -. h/t  =    46.80  <  70.  ---> kc = 1.000

          -. BTR  =  bf / 2tf  =    6.25  <  95/SQRT[Fy/kc]  ---> Qs = 1.000

     ( ). Check the depth-thickness ratio of web (DTR).
          [ AISC-ASD89 Specification B5.1 ]

          -. DTR  =  Dweb / tw  =   46.80  >  253/SQRT[Fy]  ---> Calculate
```

```
   ( ). Calculate the reduction factor of stiffened elements (Qa).
        [ AISC-ASD89 Specification Appendix B. (A-B5-8) ]

        -. fa  =  Fxx / Area  =   -15.857  ksi

        -. Be1 =  (253 tw) / SQRT[Fy]  =  17.048 in.

                   253 x tw    [             44.3            ]
        -. Be2 =  ---------- x [ 1. - ------------------ ]  =  19.068 in.
                  SQRT[fa]     [        (DTR) x SQRT[fa]   ]

        -. Be  =  MIN[ MAX(Be1,Be2), Dweb ]  =  46.800

                   Area - (Dweb - Be) x tw
        -. Qa  =  -------------------------  =  1.000
                           Area

   ( ). Calculate the allowable compressive stress (Fa).
        [ AISC-ASD89 Specification E2. (E2-1) ]

                        [  2 x Pi**2 x Es  ]
        -. Cc  =  SQRT [ ---------------- ]  =    131.42
                        [   Qs x Qa x Fy    ]

        -. Kl/r  <  Cc

                                [          (Kl/r)**2    ]
                   Qs x Qa x [ 1. -  ------------- ] x Fy
                                [          (2 x Cc**2)  ]
        -. Fa  =  ---------------------------------------  =     1.294
                    5      3 x (Kl/r)      (Kl/r)**3
                   --- + ------------ - -----------
                    3       8 x Cc        8 x Cc**3

   ( ). Calculate the axial compressive stress of member (fa).

        -. fa  =  Fxx / Area  =    -1.115

   ( ). Check the interaction ratio of axial stress (fa/Fa).

            fa        1.115
        -. ----  =  --------  =  .861  <  1.000  ---> O.K.
            Fa        1.294
```

[[[*]]] CHECK THE BENDING STRESSES ABOUT MAJOR AXIS.

```
   ( ). Check the laterally unbraced length of the compression flange (BLu)
        [ AISC-ASD89 Specification F1.1 (F1-2) ]

        -. Lcr1  =  (76 x bf) / SQRT[Fy]  =    102.42 in.

        -. Lcr2  =  20000 / (Dweb/Af)Fy   =    147.63 in.
```

```
        -. Lcr   =  MIN[ Lcr1, Lcr2 ]  =    102.42 in.

        -. BLu   =      66.93  <  Lcr   --->  COMPACT SECTION !

   ( ). Check the depth-thickness ratio of web (DTR).
        [ AISC-ASD89 Specification B5.1 ]

        -. DTR   =  Dweb / tw  =   50.00

        -. axial stress : fa  =    -1.115

        -. fa/Fy   =    .465  >  0.16

        -. DTR  >  257/SQRT[Fy]  --->  NON-COMPACT SECTION !

   ( ). Calculate the bending coefficient (Cb).
        [ AISC-ASD89 Specification F1.3 ]

        -. User defined or default value of Cb   =   1.000

   ( ). Calculate the radius of gyration (rT)
        [ AISC-ASD89 Specification F1.3 ]

        -. Azz   =  Bf*tf + tw*(Ccom-tf)/3  =     39.8

        -. Izz   =  tf*Bf**3/12 + ((Ccom-tf)/3)*tw**3/12  =         1067.3

        -. rT    =  SQRT[Izz/Azz]  =   5.179

   ( ). Check the ratio of BLu-rT (BLu/rT).
        [ AISC-ASD89 Specification F1.3 ]

        -. CRrog1   =  SQRT[ (102000 x Cb) / Fy ]  =    54.663

        -. BLu/rT   =    32.828  <  CRrog1

   ( ). Calculate the allowable compressive bending stresses (FBC).
        [ AISC-ASD89 Specification F1.3 ]

        -. FBC   =  0.6 x Fy   =      1.440

   ( ). Check the width-thickness ratio of built-up flange (BTR).
        [ AISC-ASD89 Specification B5.1 ]

        -. h/t   =    50.00  <  70.   --->  kc = 1.000

        -. BTR   =  bf / 2tf   =    6.25  <  95/SQRT[Fy/kc]  --->  Qs = 1.000
```

///

( ). Calculate the allowable bending stresses (FBCy,FBTy).

-. FBTy = 0.6 x Fy = 1.440

-. FBCy = MIN[FBC, Qs x 0.6 x Fy] = 1.440

( ). Calculate actual bending stresses of member (fbcy,fbty).

-. fbcy = (BMy x Ccom) / Iyy = -.096

-. fbty = (BMy x Cten) / Iyy = .096

( ). Check the interaction ratio of stresses (fbcy/FBCy,fbty/FBTy).

-. $\frac{fbcy}{FBCy} = \frac{.096}{1.440} = .067 < 1.000$ ---> O.K.

-. $\frac{fbty}{FBTy} = \frac{.096}{1.440} = .067 < 1.000$ ---> O.K.

[[[*]]] CHECK THE BENDING STRESSES ABOUT MINOR AXIS.

( ). Check the width-thickness ratio of flange (BTR).
[AISC-ASD89 Specification B5.1]

-. BTR = bf / 2tf = 6.25

-. BTR < 65/SQRT[Fy] ---> COMPACT SECTION !

( ). Calculate the allowable bending stresses (FBCz,FBTz).
[AISC-ASD89 Specification F2.1 (F2-1)]

-. FBCz,FBTz = 0.75 x Fy = 1.800

( ). Calculate actual bending stresses of member (fbcz,fbtz).

-. fbcz = (BMz x Ccom) / Izz = -.031

-. fbtz = (BMz x Cten) / Izz = .031

( ). Check the interaction ratio of stresses (fbcz/FBCz,fbtz/FBTz).

-. $\frac{fbcz}{FBCz} = \frac{.031}{1.800} = .017 < 1.000$ ---> O.K.

-. $\frac{fbtz}{FBTz} = \frac{.031}{1.800} = .017 < 1.000$ ---> O.K.

```
=============================================================================
  [[[*]]]   CHECK THE COMBINED STRESSES.
=============================================================================

   ( ). Check the ratio of combined stresses (Axial compression + bending).
        [ AISC-ASD89 Specification H1. (H1-1, H1-2) ]

        -. fa/Fa  >  0.15

        *. Check the combined stress at member end point.

                       fa       fbcy       fbcz
        -. Rmax   =   ---- +  ------ +  ------
                       Fa       FBCy       FBCz

                  =   .945  <  1.000  --->  O.K.

=============================================================================
  [[[*]]]   CHECK THE SHEAR STRESSES.
=============================================================================

   ( ). Calculate the allowable shear stress of local-y direction (Fvy).
        [ AISC-ASD89 Specification F4 ]

        -. Fvy  =  0.40 x Fy  =      .960

   ( ). Calculate the shear stress of local-y direction (fvy).

        -. fvy  =  (Fyy x Qzb) / Izz  =      .001

   ( ). Check the interaction ratio of shear stress (fvy/Fvy).

             fvy          .001
        -. -----  =  --------  =   .001  <  1.000  --->  O.K.
             Fvy          .960

   ( ). Calculate the allowable shear stress of local-z direction (Fvz).
        [ AISC-ASD89 Specification F4 ]

        -. DTR  =  h / tw  =   46.80  <  380/SQRT[Fy]

        -. Fvz  =  0.40 x Fy  =      .960

   ( ). Calculate the shear stress of local-z direction (fvz).

        -. fvz  =  (Fzz x Qyb) / Iyy  =      .009

   ( ). Check the interaction ratio of shear stress (fvz/Fvz).

             fvz          .009
        -. -----  =  --------  =   .009  <  1.000  --->  O.K.
             Fvz          .960
```

8.9 ROW UPPER COLUMN

```
*. MIDAS FILE   : coil5.CAL
*. PROJECT      :  THILAND COIL CETER STRUCTURE ANALYSIS

*. LOADCOMB NO =  1,  ELEMENT NO =   29,  SECTION NO =   5,  MATERIAL NO
*. UNIT SYSTEM : TONF, CM

*. SECTIONAL PROPERTIES   :  Designation = H 44x30x1.1/1.8
   Depth        =      44.000,  Top F Width =      30.000,  Bot.F Width =
   Web Thick =          1.100,  Top F Thick =       1.800,  Bot.F Thick =

   Area = .15244E+03,  Asy  = .90000E+02,  Asz  = .48400E+02
   Ybar = .15000E+02,  Zbar = .22000E+02,  Qyb  = .12398E+04, Qzb  = .11
   Iyy  = .54156E+05,  Izz  = .81045E+04,  Iyz  = .00000E+00
   Roy  = .18848E+02,  Roz  = .72914E+01,  Rop  = .00000E+00

*. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
   BLy  = .44000E+03,  BLz  = .22000E+03,  BLu  = .22000E+03
   Ky   =  1.000,      Kz   =  1.000

*. MATERIAL PROPERTIES :
   Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

*. GIVEN FORCES AND MOMENTS AT (1.0) POINT :
   Axial Force         Fxx  = -.1713E+02
   Shear Forces        Fyy  = -.7117E+00,  Fzz  = -.8561E+01
   Bending Moments     BMy  = -.2210E+04,  BMz  = -.1424E+03
   Moments of i-node   Myyi = -.8404E+03,  Mzzi = -.2562E+03
   Moments of j-node   Myyj = -.2210E+04,  Mzzj = -.1424E+03

==============================================================================
 [[[*]]]   CHECK THE AXIAL STRESS.
==============================================================================

   ( ). Check the slenderness ratio of axial compression member (Kl/r).
        [ AISC-ASD89 Specification B7. ]

        -. Kl/r  =    30.2  <   200.0  ---> O.K.

   ( ). Check the width-thickness ratio of built-up flange (BTR).
        [ AISC-ASD89 Specification B5.1 ]

        -. h/t  =    36.73  <  70.  --->  kc = 1.000

        -. BTR  =  bf / 2tf  =    8.33  <  95/SQRT[Fy/kc]  --->  Qs = 1.000

   ( ). Check the depth-thickness ratio of web (DTR).
        [ AISC-ASD89 Specification B5.1 ]

        -. DTR  =  Dweb / tw  =   36.73  <  253/SQRT[Fy]  --->  Qa = 1.000
```

```
( ). Calculate the allowable compressive stress (Fa).
     [ AISC-ASD89 Specification E2. (E2-1) ]

                    [   2 x Pi**2 x Es   ]
     -. Cc   =  SQRT [ ---------------- ]  =    131.42
                    [   Qs x Qa x Fy    ]

     -. Kl/r  <  Cc

                                [           (Kl/r)**2     ]
                  Qs x Qa x [ 1. -  ------------- ] x Fy
                                [         (2 x Cc**2)   ]
     -. Fa   =  ------------------------------------------  =     1.334
                      5       3 x (Kl/r)       (Kl/r)**3
                     --- + ------------ - -----------
                      3        8 x Cc         8 x Cc**3

( ). Calculate the axial compressive stress of member (fa).

     -. fa   =  Fxx / Area   =      -.112

( ). Check the interaction ratio of axial stress (fa/Fa).

          fa            .112
     -. ----   =   --------   =   .084  <  1.000  --->  O.K.
          Fa           1.334
```

===

[[[*]]]   CHECK THE BENDING STRESSES ABOUT MAJOR AXIS.

===

```
( ). Check the laterally unbraced length of the compression flange (BLu)
     [ AISC-ASD89 Specification F1.1 (F1-2) ]

     -. Lcr1   =   (76 x bf) / SQRT[Fy]   =     153.64 in.

     -. Lcr2   =   20000 / (Dweb/Af)Fy    =     283.09 in.

     -. Lcr   =   MIN[ Lcr1, Lcr2 ]   =     153.64 in.

     -. BLu   =      86.61  <  Lcr  --->  COMPACT SECTION !

( ). Check the depth-thickness ratio of web (DTR).
     [ AISC-ASD89 Specification B5.1 ]

     -. DTR   =   Dweb / tw   =    40.00

     -. axial stress : fa   =      -.112
```

```
       -. fa/Fy   =     .047  <  0.16

                    640                  fa
       -. DTR  <  ---------- [1. - 3.74 ----]  --->  COMPACT SECTION !
                   SQRT[Fy]               Fy

    ( ). Check the width-thickness ratio of flange (BTR).
         [ AISC-ASD89 Specification B5.1 ]

       -. BTR  =  bf / 2tf  =    8.33

       -. BTR  <  65/SQRT[Fy]  --->  COMPACT SECTION !

    ( ). Calculate the allowable bending stresses (FBCy,FBTy).
         [ AISC-ASD89 Specification F1.1 (F1-1) ]

       -. FBCy,FBTy  =  0.66 x Fy  =     1.584

    ( ). Calculate actual bending stresses of member (fbcy,fbty).

       -. fbcy  =  (BMy x Ccom) / Iyy  =      -.898

       -. fbty  =  (BMy x Cten) / Iyy  =       .898

    ( ). Check the interaction ratio of stresses (fbcy/FBCy,fbty/FBTy).

           fbcy          .898
       -. ------  =  --------  =   .567  <  1.000  --->  O.K.
           FBCy         1.584

           fbty          .898
       -. ------  =  --------  =   .567  <  1.000  --->  O.K.
           FBTy         1.584

==========================================================================
  [[[*]]]  CHECK THE BENDING STRESSES ABOUT MINOR AXIS.
==========================================================================

    ( ). Check the width-thickness ratio of flange (BTR).
         [ AISC-ASD89 Specification B5.1 ]

       -. BTR  =  bf / 2tf  =    8.33

       -. BTR  <  65/SQRT[Fy]  --->  COMPACT SECTION !

    ( ). Calculate the allowable bending stresses (FBCz,FBTz).
         [ AISC-ASD89 Specification F2.1 (F2-1) ]

       -. FBCz,FBTz  =  0.75 x Fy  =     1.800

    ( ). Calculate actual bending stresses of member (fbcz,fbtz).

       -. fbcz  =  (BMz x Ccom) / Izz  =      -.263

       -. fbtz  =  (BMz x Cten) / Izz  =       .263
```

```
( ). Check the interaction ratio of stresses (fbcz/FBCz,fbtz/FBTz).

        fbcz          .263
    -. ------  =  --------  =   .146  <  1.000  ---> O.K.
        FBCz         1.800

        fbtz          .263
    -. ------  =  --------  =   .146  <  1.000  ---> O.K.
        FBTz         1.800

================================================================================
[[[*]]]   CHECK THE COMBINED STRESSES.
================================================================================

( ). Check the ratio of combined stresses (Axial compression + bending).
     [ AISC-ASD89 Specification H1. (H1-3) ]

    -. fa/Fa  <  0.15

    *. Check the combined stress at member end point.

                      fa       fbcy       fbcz
    -. Rmax   =     ---- +  ------ +  ------
                      Fa       FBCy       FBCz

              =     .797  <  1.000  --->  O.K.

================================================================================
[[[*]]]   CHECK THE SHEAR STRESSES.
================================================================================

( ). Calculate the allowable shear stress of local-y direction (Fvy).
     [ AISC-ASD89 Specification F4 ]

    -. Fvy  =  0.40 x Fy  =       .960

( ). Calculate the shear stress of local-y direction (fvy).

    -. fvy  =  (Fyy x Qzb) / Izz  =       .010

( ). Check the interaction ratio of shear stress (fvy/Fvy).

        fvy           .010
    -. -----  =  --------  =   .010  <  1.000  ---> O.K.
        Fvy           .960

( ). Calculate the allowable shear stress of local-z direction (Fvz).
     [ AISC-ASD89 Specification F4 ]

    -. DTR  =  h / tw  =   36.73  <  380/SQRT[Fy]

    -. Fvz  =  0.40 x Fy  =       .960
```

( ). Calculate the shear stress of local-z direction (fvz).

-. fvz = (Fzz x Qyb) / Iyy = .196

( ). Check the interaction ratio of shear stress (fvz/Fvz).

$$-.\ \frac{fvz}{Fvz} = \frac{.196}{.960} = .204 < 1.000 \longrightarrow O.K.$$

```
 A-B TRUSS TOP & BOTTOM CHORD
 *. MIDAS FILE   : coil4.CAL
 *. PROJECT      :  THILAND COIL CETER STRUCTURE ANALYSIS

 *. LOADCOMB NO =   2,  ELEMENT NO =    76,  SECTION NO =  11,  MATERIAL NO
 *. UNIT SYSTEM : TONF, CM

 *. SECTIONAL PROPERTIES   :  Designation = T 17x25x.9/1.4
    Depth       =      17.000,  Top F Width =      25.000
    Web Thick =          .900,  Top F Thick =       1.400

    Area = .49040E+02,  Asy  = .29167E+02,  Asz  = .15300E+02
    Ybar = .12500E+02,  Zbar = .13866E+02,  Qyb  = .96140E+02, Qzb  = .78
    Iyy  = .10144E+04,  Izz  = .18239E+04,  Iyz  = .00000E+00
    Roy  = .45481E+01,  Roz  = .60985E+01,  Rop  = .00000E+00

 *. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
    BLy  = .35000E+03,  BLz  = .17500E+03,  BLu  = .17500E+03
    Ky   =  1.000,      Kz   =  1.000

 *. MATERIAL PROPERTIES :
    Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

 *. GIVEN FORCES AND MOMENTS AT (0.0) POINT :
    Axial Force           Fxx  = -.1744E+02
    Shear Forces          Fyy  =  .0000E+00,  Fzz  =  .1738E+01
    Bending Moments       BMy  = -.7540E+02,  BMz  =  .0000E+00
    Moments of i-node     Myyi = -.7540E+02,  Mzzi =  .0000E+00
    Moments of j-node     Myyj = -.4166E+02,  Mzzj =  .0000E+00

==========================================================================
  [[[*]]]   CHECK THE AXIAL STRESS.
==========================================================================

 ( ). Check the slenderness ratio of axial compression member (Kl/r).
      [ AISC-ASD89 Specification B7. ]

      -. Kl/r  =    77.0  <   200.0  ---> O.K.

 ( ). Check the width-thickness ratio of flange (BTRf).
      [ AISC-ASD89 Specification B5.1 ]

      -. BTRf  =  bf / 2tf  =    8.93  <  95/SQRT[Fy]  --->  Qsf = 1.000

 ( ). Check the depth-thickness ratio of stem (BTRs).
      [ AISC-ASD89 Specification B5.1 ]

      -. BTRs  =  H / tw  =   18.89  <  127/SQRT[Fy]  --->  Qss = 1.000

 ( ). The reduction factor of tee (Qs).

      -. Qs  =  MIN[ Qsf, Qss ]  =  1.000
```

( ). Calculate the allowable compressive stress (Fa).
[AISC-ASD89 Specification E2. (E2-1)]

-. Cc = SQRT $\left[\dfrac{2 \times Pi^{2} \times Es}{Qs \times Qa \times Fy} \right]$ = 131.42

-. Kl/r < Cc

-. Fa = $\dfrac{Qs \times Qa \times \left[1. - \dfrac{(Kl/r)^{2}}{(2 \times Cc^{2})} \right] \times Fy}{\dfrac{5}{3} + \dfrac{3 \times (Kl/r)}{8 \times Cc} - \dfrac{(Kl/r)^{3}}{8 \times Cc^{3}}}$ = 1.068

( ). Check the interaction ratio of axial stress (fa/Fa).

-. $\dfrac{fa}{Fa} = \dfrac{.356}{1.068}$ = .333 < 1.000 ---> O.K.

[[[*]]]   CHECK THE BENDING STRESSES ABOUT MAJOR AXIS.

( ). Calculate the allowable compressive bending stresses -
in case of compressive stress in stem (FBC)

-. Gs = Es/(2*(1 + Por)) = 807.7

-. Rxx = (H*tw**3 + Bf*tf**3)/3 = 27.0

-. Rtf = (Bf**3*tf)/12 = 1822.9

-. Syy = Iyy/Ccom = 73.2

-. AAA = (Pi**2*Es*H)/(2*Syy*BLu**2) = 46.553

-. BBB = 1 + (4*Gs*Rxx*BLu**2)/(Pi**2*Izz*Es*H**2) = 1.245

-. FBCi = [AAA * (Izz*SQRT(BBB) - Rtf)]/1.5 = 11.100

( ). Calculate the allowable bending stresses (FBCy,FBTy).
[AISC-ASD89 Specification F1.3]

-. FBCy = MIN[0.6 x Fy, FBCi] = 1.440

-. FBTy = 0.6 x Fy = 1.440

```
   ( ). Calculate actual bending stresses of member (fbcy,fbty).

        -. fbcy  =  (BMy x Ccom) / Iyy  =    -1.031

        -. fbty  =  (BMy x Cten) / Iyy  =      .233

   ( ). Check the interaction ratio of stresses (fbcy/FBCy,fbty/FBTy).

            fbcy        1.031
        -. ------  =  --------  =  .716  <  1.000  --->  O.K.
            FBCy        1.440

            fbty         .233
        -. ------  =  --------  =  .162  <  1.000  --->  O.K.
            FBTy        1.440

==============================================================================
  [[[*]]]  CHECK THE COMBINED STRESSES.
==============================================================================

   ( ). Check the ratio of combined stresses (Axial compression + bending).
        [ AISC-ASD89 Specification H1. (H1-1, H1-2) ]

        -. fa/Fa  >  0.15

        *. Check the combined stress at member end point.

                           fa     fbcy     fbcz
        -. Rmax    =     ---- + ------ + ------
                           Fa     FBCy     FBCz

                   =  1.049  >  1.000  --->  NOT ACCEPTABLE !

==============================================================================
  [[[*]]]  CHECK THE SHEAR STRESSES.
==============================================================================

   ( ). Calculate the allowable shear stress of local-y direction (Fvz).
        [ AISC-ASD89 Specification F4 ]

        -. Fvz  =  0.40 x Fy  =      .960

   ( ). Calculate the shear stress of local-z direction (fvz).

        -. fvz  =  (Fzz x Qyb) / Iyy  =      .165

   ( ). Check the interaction ratio of shear stress (fvz/Fvz).

            fvz          .165
        -. -----  =  --------  =  .172  <  1.000  --->  O.K.
            Fvz          .960
```

```
===============================================================================

       A-B TRUSS DIAGONAL
     *. MIDAS FILE   : coil4.CAL
     *. PROJECT      :  THILAND COIL CETER STRUCTURE ANALYSIS

     *. LOADCOMB NO =  2,  ELEMENT NO =  113,  SECTION NO =  15,  MATERIAL NO
     *. UNIT SYSTEM : TONF, CM

     *. SECTIONAL PROPERTIES  :  Designation = T 12.2x17.5x.7/1.1
        Depth      =      12.200,  Top F Width =      17.500
        Web Thick =        .700,  Top F Thick =       1.100

        Area = .27020E+02,  Asy  = .16042E+02,  Asz  = .85400E+01
        Ybar = .87500E+01,  Zbar = .98959E+01,  Qyb  = .48964E+02, Qzb  = .38
        Iyy  = .28770E+03,  Izz  = .49159E+03,  Iyz  = .00000E+00
        Roy  = .32631E+01,  Roz  = .42654E+01,  Rop  = .00000E+00

     *. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
        BLy  = .32383E+03,  BLz  = .32383E+03,  BLu  = .32383E+03
        Ky   =  1.000,      Kz   =  1.000

     *. MATERIAL PROPERTIES :
        Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

     *. GIVEN FORCES AND MOMENTS AT (2/4) POINT :
        Axial Force          Fxx  =  .2585E+02
        Shear Forces         Fyy  =  .0000E+00,  Fzz  =  .2475E-01
        Bending Moments      BMy  =  .2003E+01,  BMz  =  .0000E+00
        Moments of i-node    Myyi =  .0000E+00,  Mzzi =  .0000E+00
        Moments of j-node    Myyj =  .0000E+00,  Mzzj =  .0000E+00

===============================================================================
   [[[*]]]   CHECK THE AXIAL STRESS.
===============================================================================

     ( ). Check the slenderness ratio of axial tension member (l/r).
          [ AISC-ASD89 Specification B7. ]

          -. l/r  =    99.2  <   300.0  ---> O.K.

     ( ). Calculate the allowable tensile stress (Ft).
          [ AISC-ASD89 Specification D1. ]

          -. Ft  =  0.6 x Fy  =      1.440

     ( ). Calculate the axial tensile stress of member (ft).

          -. ft  =  Fxx / Area  =       .957

     ( ). Check the interaction ratio of axial stress (ft/Ft).

               ft          .957
          -.  ----  =  --------  =   .664  <  1.000  ---> O.K.
               Ft         1.440
```

```
[[[*]]]   CHECK THE BENDING STRESSES ABOUT MAJOR AXIS.

   ( ). Calculate the radius of gyration (rT)
        [ AISC-ASD89 Specification F1.3 ]

        -. Azz  =  Bf*tf + tw*(Ccom-tf)/3  =     19.5

        -. Izz  =  tf*Bf**3/12 + ((Ccom-tf)/3)*tw**3/12  =           491.3

        -. rT   =  SQRT[Izz/Azz]  =   5.015

   ( ). Calculate the bending coefficient (Cb).
        [ AISC-ASD89 Specification F1.3 ]

        -. User defined or default value of Cb    =   1.000

   ( ). Check the ratio of BLu-rT (BLu/rT).
        [ AISC-ASD89 Specification F1.3 ]

        -. CRrog2  =  SQRT[ (510000 x Cb) / Fy ]  =   122.230

        -. BLu/rT  =    64.567  <  CRrog2

   ( ). Calculate the allowable compressive bending stresses (FBC).
        [ AISC-ASD89 Specification F1.3 (F1-6,F1-8) ]

                        12000 x Cb
        -. FBCi  =  ----------------  =     4.111
                     (BLu x d) / Af

        -. FBCi  >  0.6 x Fy  --->  FBCi = 0.6 x Fy  =      1.440

                       2      Fy x (BLu/rT)**2
        -. FBCj  =  [ --- - ------------------ ] Fy  =      1.377
                       3       1530000 x Cb

        -. FBC  =  MAX( FBCi, FBCj )  =     1.440

   ( ). Calculate the allowable bending stresses (FBCy,FBTy).

        -. FBTy  =  0.6 x Fy  =      1.440

        -. FBCy  =  MIN[ FBC, Qs x 0.6 x Fy ]  =      1.440

   ( ). Calculate actual bending stresses of member (fbcy,fbty).

        -. fbcy  =  (BMy x Ccom) / Iyy  =      -.016

        -. fbty  =  (BMy x Cten) / Iyy  =       .069
```

```
    ( ). Check the interaction ratio of stresses (fbcy/FBCy,fbty/FBTy).

           fbcy          .016
       -. ------  =  --------  =   .011  <  1.000  ---> O.K.
           FBCy         1.440

           fbty          .069
       -. ------  =  --------  =   .048  <  1.000  ---> O.K.
           FBTy         1.440

===================================================================================
  [[[*]]]   CHECK THE COMBINED STRESSES.
===================================================================================

    ( ). Check the ratio of combined stresses (Axial tension + bending).
         [ AISC-ASD89 Specification H2. (H2-1) ]

                          ft       fbty      fbtz
       -. Rmax1   =     ---- +  ------ +  ------  (H2-1)
                          Ft       FBTy      FBTz

                  =     .712  <  1.000  --->  O.K.

                         fbcy      fbcz
       -. Rmax2   =     ------ +  ------
                         FBCy      FBCz

                  =     .011  <  1.000  --->  O.K.

===================================================================================
  [[[*]]]   CHECK THE SHEAR STRESSES.
===================================================================================

    ( ). Calculate the allowable shear stress of local-y direction (Fvz).
         [ AISC-ASD89 Specification F4 ]

       -. Fvz   =   0.40 x Fy   =        .960

    ( ). Calculate the shear stress of local-z direction (fvz).

       -. fvz   =   (Fzz x Qyb) / Iyy   =       .004

    ( ). Check the interaction ratio of shear stress (fvz/Fvz).

           fvz           .004
       -. -----   =   --------   =   .004  <  1.000  --->  O.K.
           Fvz           .960
```

B-C TRUSS VERTICAL

```
*. MIDAS FILE   : coil4.CAL
*. PROJECT      :  THILAND COIL CETER STRUCTURE ANALYSIS

*. LOADCOMB NO =  2,  ELEMENT NO =  104,  SECTION NO =  14,  MATERIAL NO
*. UNIT SYSTEM : TONF, CM

*. SECTIONAL PROPERTIES  :  Designation = T 7.4x10x.6/.9
   Depth      =       7.400,  Top F Width =     10.000
   Web Thick =         .600,  Top F Thick =       .900

   Area = .12900E+02,  Asy  = .75000E+01,  Asz  = .44400E+01
   Ybar = .50000E+01,  Zbar = .58314E+01,  Qyb  = .17003E+02, Qzb  = .12
   Iyy  = .51588E+02,  Izz  = .75117E+02,  Iyz  = .00000E+00
   Roy  = .19998E+01,  Roz  = .24131E+01,  Rop  = .00000E+00

*. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
   BLy  = .18000E+03,  BLz  = .18000E+03,  BLu  = .18000E+03
   Ky   =  1.000,      Kz   =  1.000

*. MATERIAL PROPERTIES :
   Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

*. GIVEN FORCES AND MOMENTS AT (0.0) POINT :
   Axial Force          Fxx  = -.3269E+01
   Shear Forces         Fyy  =  .0000E+00,  Fzz  =  .0000E+00
   Bending Moments      BMy  =  .0000E+00,  BMz  =  .0000E+00
   Moments of i-node    Myyi =  .0000E+00,  Mzzi =  .0000E+00
   Moments of j-node    Myyj =  .0000E+00,  Mzzj =  .0000E+00

==============================================================================
  [[[*]]]   CHECK THE AXIAL STRESS.
==============================================================================

   ( ). Check the slenderness ratio of axial compression member (Kl/r).
        [ AISC-ASD89 Specification B7. ]

        -. Kl/r  =     90.0  <   200.0  ---> O.K.

   ( ). Check the width-thickness ratio of flange (BTRf).
        [ AISC-ASD89 Specification B5.1 ]

        -. BTRf  =  bf / 2tf  =    5.56  <  95/SQRT[Fy]  --->  Qsf = 1.000

   ( ). Check the depth-thickness ratio of stem (BTRs).
        [ AISC-ASD89 Specification B5.1 ]

        -. BTRs  =  H / tw  =   12.33  <  127/SQRT[Fy]  --->  Qss = 1.000

   ( ). The reduction factor of tee (Qs).

        -. Qs  =  MIN[ Qsf, Qss ]  =  1.000
```

```
( ). Calculate the allowable compressive stress (Fa).
     [ AISC-ASD89 Specification E2. (E2-1) ]

     -. Cc  =  SQRT [   2 x Pi**2 x Es   ]
                    [ ---------------- ]  =    131.42
                    [   Qs x Qa x Fy     ]

     -. Kl/r  <  Cc

                              [           (Kl/r)**2     ]
                 Qs x Qa x [ 1. -  -------------  ] x Fy
                              [          (2 x Cc**2)    ]
     -. Fa  =  ------------------------------------------  =      .975
                    5      3 x (Kl/r)      (Kl/r)**3
                   --- + ------------ - -----------
                    3       8 x Cc        8 x Cc**3

( ). Check the interaction ratio of axial stress (fa/Fa).

         fa         .253
     -. ----  =  --------  =   .260  <  1.000  ---> O.K.
         Fa         .975
```

B-C TRUSS TOP & BOTTOM CHORD

```
*. MIDAS FILE   : coil4.CAL
*. PROJECT      :  THILAND COIL CETER STRUCTURE ANALYSIS

*. LOADCOMB NO =   1,  ELEMENT NO =   56,  SECTION NO =   9,  MATERIAL NO
*. UNIT SYSTEM : TONF, CM

*. SECTIONAL PROPERTIES   :  Designation = T 19.5x30x1/1.6
   Depth       =       19.500,  Top F Width =     30.000
   Web Thick =          1.000,  Top F Thick =      1.600

   Area = .65900E+02,  Asy  = .40000E+02,  Asz  = .19500E+02
   Ybar = .15000E+02,  Zbar = .16052E+02,  Qyb  = .12883E+03, Qzb  = .11
   Iyy  = .17276E+04,  Izz  = .36015E+04,  Iyz  = .00000E+00
   Roy  = .51201E+01,  Roz  = .73926E+01,  Rop  = .00000E+00

*. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
   BLy  = .35000E+03,  BLz  = .17500E+03,  BLu  = .17500E+03
   Ky   =  1.000,      Kz   =  1.000

*. MATERIAL PROPERTIES :
   Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

*. GIVEN FORCES AND MOMENTS AT (1.0) POINT :
   Axial Force           Fxx  = -.4322E+02
   Shear Forces          Fyy  =  .0000E+00,  Fzz  =  .1753E+01
   Bending Moments       BMy  = -.6554E+02,  BMz  =  .0000E+00
   Moments of i-node     Myyi = -.3609E+02,  Mzzi =  .0000E+00
   Moments of j-node     Myyj = -.6554E+02,  Mzzj =  .0000E+00

==============================================================================
 [[[*]]]   CHECK THE AXIAL STRESS.
==============================================================================

   ( ). Check the slenderness ratio of axial compression member (Kl/r).
        [ AISC-ASD89 Specification B7. ]

        -. Kl/r  =    68.4  <   200.0  ---> O.K.

   ( ). Check the width-thickness ratio of flange (BTRf).
        [ AISC-ASD89 Specification B5.1 ]

        -. BTRf  =  bf / 2tf  =    9.37  <  95/SQRT[Fy]  ---> Qsf = 1.000

   ( ). Check the depth-thickness ratio of stem (BTRs).
        [ AISC-ASD89 Specification B5.1 ]

        -. BTRs  =  H / tw  =   19.50  <  127/SQRT[Fy]  ---> Qss = 1.000

   ( ). The reduction factor of tee (Qs).

        -. Qs  =  MIN[ Qsf, Qss ]  =  1.000
```

```
   ( ). Calculate the allowable compressive stress (Fa).
        [ AISC-ASD89 Specification E2. (E2-1) ]

                     [  2 x Pi**2 x Es   ]
        -. Cc  =  SQRT [ ---------------- ]  =    131.42
                     [   Qs x Qa x Fy    ]

        -. Kl/r  <  Cc

                              [           (Kl/r)**2    ]
                    Qs x Qa x [ 1.  -   ------------  ] x Fy
                              [         (2 x Cc**2)   ]
        -. Fa  =  ----------------------------------------  =      1.125
                     5       3 x (Kl/r)      (Kl/r)**3
                    --- +  ------------  -  ----------
                     3       8 x Cc         8 x Cc**3

   ( ). Check the interaction ratio of axial stress (fa/Fa).

           fa          .656
        -. ----  =  --------  =   .583  <  1.000  ---> O.K.
           Fa         1.125
```

```
================================================================================
  [[[*]]]   CHECK THE BENDING STRESSES ABOUT MAJOR AXIS.
================================================================================
```

```
   ( ). Calculate the allowable compressive bending stresses -
        in case of compressive stress in stem (FBC)

        -. Gs   =  Es/(2*(1 + Por))          =          807.7

        -. Rxx = (H*tw**3 + Bf*tf**3)/3      =           47.5

        -. Rtf = (Bf**3*tf)/12               =         3600.0

        -. Syy =  Iyy/Ccom                   =          107.6

        -. AAA = (Pi**2*Es*H)/(2*Syy*BLu**2)                     =   36.296

        -. BBB = 1 + (4*Gs*Rxx*BLu**2)/(Pi**2*Izz*Es*H**2) =    1.165

        -. FBCi =  [ AAA * (Izz*SQRT(BBB) - Rtf) ]/1.5        =   11.772

   ( ). Calculate the allowable bending stresses (FBCy,FBTy).
        [ AISC-ASD89 Specification F1.3 ]

        -. FBCy  =  MIN[ 0.6 x Fy, FBCi ]  =      1.440

        -. FBTy  =  0.6 x Fy               =      1.440
```

( ). Calculate actual bending stresses of member (fbcy,fbty).

-. fbcy = (BMy x Ccom) / Iyy = -.609

-. fbty = (BMy x Cten) / Iyy = .131

( ). Check the interaction ratio of stresses (fbcy/FBCy,fbty/FBTy).

-. $\frac{fbcy}{FBCy} = \frac{.609}{1.440} = .423 < 1.000$ ---> O.K.

-. $\frac{fbty}{FBTy} = \frac{.131}{1.440} = .091 < 1.000$ ---> O.K.

[[[*]]] CHECK THE COMBINED STRESSES.

( ). Check the ratio of combined stresses (Axial compression + bending).
[AISC-ASD89 Specification H1. (H1-1, H1-2)]

-. fa/Fa > 0.15

*. Check the combined stress at member end point.

-. $Rmax = \frac{fa}{Fa} + \frac{fbcy}{FBCy} + \frac{fbcz}{FBCz}$

$= 1.006 > 1.000$ ---> NOT ACCEPTABLE !

[[[*]]] CHECK THE SHEAR STRESSES.

( ). Calculate the allowable shear stress of local-y direction (Fvz).
[AISC-ASD89 Specification F4]

-. Fvz = 0.40 x Fy = .960

( ). Calculate the shear stress of local-z direction (fvz).

-. fvz = (Fzz x Qyb) / Iyy = .131

( ). Check the interaction ratio of shear stress (fvz/Fvz).

-. $\frac{fvz}{Fvz} = \frac{.131}{.960} = .136 < 1.000$ ---> O.K.

B-C TRUSS DIAGONAL

```
*. MIDAS FILE   : coil4.CAL
*. PROJECT      :  THILAND COIL CETER STRUCTURE ANALYSIS

*. LOADCOMB NO =   1,  ELEMENT NO =  131,  SECTION NO =  13,  MATERIAL NO
*. UNIT SYSTEM : TONF, CM

*. SECTIONAL PROPERTIES   :  Designation = T 14.7x20x.8/1.2
   Depth       =     14.700,  Top F Width =     20.000
   Web Thick =        .800,   Top F Thick =      1.200

   Area = .34800E+02,  Asy  = .20000E+02,  Asz  = .11760E+02
   Ybar = .10000E+02,  Zbar = .11819E+02,  Qyb  = .69844E+02, Qzb  = .50
   Iyy  = .56928E+03,  Izz  = .80058E+03,  Iyz  = .00000E+00
   Roy  = .40446E+01,  Roz  = .47964E+01,  Rop  = .00000E+00

*. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
   BLy  = .26504E+03,  BLz  = .26504E+03,  BLu  = .26504E+03
   Ky   =  1.000,      Kz   =  1.000

*. MATERIAL PROPERTIES :
   Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

*. GIVEN FORCES AND MOMENTS AT (1.0) POINT :
   Axial Force          Fxx  = -.2258E+02
   Shear Forces         Fyy  =  .0000E+00,  Fzz  =  .1733E+00
   Bending Moments      BMy  = -.2291E+02,  BMz  =  .0000E+00
   Moments of i-node    Myyi =  .1459E+02,  Mzzi =  .0000E+00
   Moments of j-node    Myyj = -.2291E+02,  Mzzj =  .0000E+00
```

===

[[[*]]]   CHECK THE AXIAL STRESS.

===

```
( ). Check the slenderness ratio of axial compression member (Kl/r).
     [ AISC-ASD89 Specification B7. ]

     -. Kl/r  =    65.5  <   200.0  ---> O.K.

( ). Check the width-thickness ratio of flange (BTRf).
     [ AISC-ASD89 Specification B5.1 ]

     -. BTRf  =  bf / 2tf  =    8.33  <  95/SQRT[Fy]  --->  Qsf = 1.000

( ). Check the depth-thickness ratio of stem (BTRs).
     [ AISC-ASD89 Specification B5.1 ]

     -. BTRs  =  H / tw  =   18.37  <  127/SQRT[Fy]  --->  Qss = 1.000

( ). The reduction factor of tee (Qs).

     -. Qs  =  MIN[ Qsf, Qss ]  =  1.000
```

```
 ( ). Calculate the allowable compressive stress (Fa).
      [ AISC-ASD89 Specification E2. (E2-1) ]

                       [  2 x Pi**2 x Es  ]
      -. Cc   =  SQRT  [ ---------------- ]   =     131.42
                       [   Qs x Qa x Fy   ]

      -. Kl/r  <  Cc

                            [           (Kl/r)**2     ]
                Qs x Qa x   [ 1.  -   ------------    ] x Fy
                            [          (2 x Cc**2)    ]
      -. Fa  =  --------------------------------------------   =     1.143
                   5     3 x (Kl/r)      (Kl/r)**3
                  --- + ------------  - -----------
                   3       8 x Cc        8 x Cc**3

 ( ). Check the interaction ratio of axial stress (fa/Fa).

          fa         .649
      -. ----  =  --------  =   .567  <  1.000   --->  O.K.
          Fa        1.143

================================================================================
  [[[*]]]   CHECK THE BENDING STRESSES ABOUT MAJOR AXIS.
================================================================================

 ( ). Calculate the allowable compressive bending stresses -
      in case of compressive stress in stem (FBC)

      -. Gs   =  Es/(2*(1 + Por))             =          807.7

      -. Rxx = (H*tw**3 + Bf*tf**3)/3         =           14.0

      -. Rtf = (Bf**3*tf)/12                  =          800.0

      -. Syy =  Iyy/Ccom                      =           48.2

      -. AAA = (Pi**2*Es*H)/(2*Syy*BLu**2)                          =    26.655

      -. BBB = 1 + (4*Gs*Rxx*BLu**2)/(Pi**2*Izz*Es*H**2) =     1.888

      -. FBCi =  [ AAA * (Izz*SQRT(BBB) - Rtf) ]/1.5          =     9.005

 ( ). Calculate the allowable bending stresses (FBCy,FBTy).
      [ AISC-ASD89 Specification F1.3 ]

      -. FBCy  =  MIN[ 0.6 x Fy, FBCi ]   =       1.440

      -. FBTy  =  0.6 x Fy                =       1.440
```

```
( ). Calculate actual bending stresses of member (fbcy,fbty).

     -. fbcy  =  (BMy x Ccom) / Iyy  =     -.476

     -. fbty  =  (BMy x Cten) / Iyy  =      .116

( ). Check the interaction ratio of stresses (fbcy/FBCy,fbty/FBTy).

          fbcy           .476
     -. ------  =  --------  =   .330  <  1.000  ---> O.K.
          FBCy          1.440

          fbty           .116
     -. ------  =  --------  =   .081  <  1.000  ---> O.K.
          FBTy          1.440
```

```
==========================================================================
 [[[*]]]   CHECK THE COMBINED STRESSES.
==========================================================================

( ). Check the ratio of combined stresses (Axial compression + bending).
     [ AISC-ASD89 Specification H1. (H1-1, H1-2) ]

     -. fa/Fa  >  0.15

     *. Check the combined stress at member end point.

                       fa      fbcy      fbcz
     -. Rmax   =    ---- + ------ + ------
                       Fa      FBCy      FBCz

               =    .898  <  1.000  ---> O.K.
```

```
==========================================================================
 [[[*]]]   CHECK THE SHEAR STRESSES.
==========================================================================

( ). Calculate the allowable shear stress of local-y direction (Fvz).
     [ AISC-ASD89 Specification F4 ]

     -. Fvz  =  0.40 x Fy  =       .960

( ). Calculate the shear stress of local-z direction (fvz).

     -. fvz  =  (Fzz x Qyb) / Iyy  =      .021

( ). Check the interaction ratio of shear stress (fvz/Fvz).

          fvz           .021
     -. -----  =  --------  =   .022  <  1.000  ---> O.K.
          Fvz           .960
```

A-B TRUSS VERTICAL

```
*. MIDAS FILE   : coil4.CAL
*. PROJECT      :  THILAND COIL CETER STRUCTURE ANALYSIS

*. LOADCOMB NO =   1,  ELEMENT NO =  128,  SECTION NO =  16,  MATERIAL NO
*. UNIT SYSTEM : TONF, CM

*. SECTIONAL PROPERTIES   :  Designation = T 7.4x10x.6/.9
   Depth       =       7.400,  Top F Width =     10.000
   Web Thick =          .600,  Top F Thick =       .900

   Area = .12900E+02,  Asy  = .75000E+01,  Asz  = .44400E+01
   Ybar = .50000E+01,  Zbar = .58314E+01,  Qyb  = .17003E+02, Qzb  = .12
   Iyy  = .51588E+02,  Izz  = .75117E+02,  Iyz  = .00000E+00
   Roy  = .19998E+01,  Roz  = .24131E+01,  Rop  = .00000E+00

*. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
   BLy  = .18000E+03,  BLz  = .18000E+03,  BLu  = .18000E+03
   Ky   =  1.000,      Kz   =  1.000

*. MATERIAL PROPERTIES :
   Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

*. GIVEN FORCES AND MOMENTS AT (0.0) POINT :
   Axial Force         Fxx  = -.3219E+01
   Shear Forces        Fyy  =  .0000E+00,  Fzz  =  .0000E+00
   Bending Moments     BMy  =  .0000E+00,  BMz  =  .0000E+00
   Moments of i-node   Myyi =  .0000E+00,  Mzzi =  .0000E+00
   Moments of j-node   Myyj =  .0000E+00,  Mzzj =  .0000E+00

===========================================================================
 [[[*]]]   CHECK THE AXIAL STRESS.
===========================================================================

   ( ). Check the slenderness ratio of axial compression member (Kl/r).
        [ AISC-ASD89 Specification B7. ]

        -. Kl/r  =    90.0  <   200.0  ---> O.K.

   ( ). Check the width-thickness ratio of flange (BTRf).
        [ AISC-ASD89 Specification B5.1 ]

        -. BTRf  =  bf / 2tf  =    5.56  <  95/SQRT[Fy]  ---> Qsf = 1.000

   ( ). Check the depth-thickness ratio of stem (BTRs).
        [ AISC-ASD89 Specification B5.1 ]

        -. BTRs  =  H / tw  =   12.33  <  127/SQRT[Fy]  ---> Qss = 1.000

   ( ). The reduction factor of tee (Qs).

        -. Qs  =  MIN[ Qsf, Qss ]  =  1.000
```

```
( ). Calculate the allowable compressive stress (Fa).
     [ AISC-ASD89 Specification E2. (E2-1) ]

                   [  2 x Pi**2 x Es   ]
 -. Cc   =  SQRT [ ----------------- ]  =    131.42
                   [   Qs x Qa x Fy    ]

 -. Kl/r  <  Cc

                         [              (Kl/r)**2     ]
              Qs x Qa x [ 1.  -    ------------- ] x Fy
                         [            (2 x Cc**2)     ]
 -. Fa   =   ----------------------------------------   =      .975
                 5       3 x (Kl/r)        (Kl/r)**3
                --- + ------------  -  -----------
                 3        8 x Cc          8 x Cc**3

( ). Check the interaction ratio of axial stress (fa/Fa).

       fa          .250
 -.  ----  =   --------   =   .256  <  1.000  ---> O.K.
       Fa          .975
```

8-9 TRUSS TOP & BOTTOM CHORD

```
*. MIDAS FILE    : coil5.CAL
*. PROJECT       :  THILAND COIL CETER STRUCTURE ANALYSIS

*. LOADCOMB NO =   1,  ELEMENT NO =  143,  SECTION NO =   6,  MATERIAL NO
*. UNIT SYSTEM : TONF, CM

*. SECTIONAL PROPERTIES   :  Designation = T 17x25x.9/1.4
   Depth      =      17.000,  Top F Width =      25.000
   Web Thick =         .900,  Top F Thick =       1.400

   Area = .49040E+02,  Asy  = .29167E+02,  Asz  = .15300E+02
   Ybar = .12500E+02,  Zbar = .13866E+02,  Qyb  = .96140E+02, Qzb  = .78
   Iyy  = .10144E+04,  Izz  = .18239E+04,  Iyz  = .00000E+00
   Roy  = .45481E+01,  Roz  = .60985E+01,  Rop  = .00000E+00

*. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
   BLy  = .38000E+03,  BLz  = .19000E+03,  BLu  = .19000E+03
   Ky   =  1.000,      Kz   =  1.000

*. MATERIAL PROPERTIES :
   Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

*. GIVEN FORCES AND MOMENTS AT (1.0) POINT :
   Axial Force          Fxx  = -.3274E+02
   Shear Forces         Fyy  =  .0000E+00,  Fzz  =  .7293E+00
   Bending Moments      BMy  = -.2197E+02,  BMz  =  .0000E+00
   Moments of i-node    Myyi = -.8589E+01,  Mzzi =  .0000E+00
   Moments of j-node    Myyj = -.2197E+02,  Mzzj =  .0000E+00

===========================================================================
 [[[*]]]   CHECK THE AXIAL STRESS.
===========================================================================

  ( ). Check the slenderness ratio of axial compression member (Kl/r).
       [ AISC-ASD89 Specification B7. ]

       -. Kl/r  =    83.6  <   200.0  ---> O.K.

  ( ). Check the width-thickness ratio of flange (BTRf).
       [ AISC-ASD89 Specification B5.1 ]

       -. BTRf  =  bf / 2tf  =    8.93  <  95/SQRT[Fy]  ---> Qsf = 1.000

  ( ). Check the depth-thickness ratio of stem (BTRs).
       [ AISC-ASD89 Specification B5.1 ]

       -. BTRs  =  H / tw  =   18.89  <  127/SQRT[Fy]  ---> Qss = 1.000

  ( ). The reduction factor of tee (Qs).

       -. Qs  =  MIN[ Qsf, Qss ]  =  1.000
```

```
( ). Calculate the allowable compressive stress (Fa).
     [ AISC-ASD89 Specification E2. (E2-1) ]

                  [  2 x Pi**2 x Es   ]
  -. Cc   =  SQRT [ ----------------- ]   =     131.42
                  [   Qs x Qa x Fy    ]

  -. Kl/r  <  Cc

                           [          (Kl/r)**2     ]
              Qs x Qa x [ 1. -   -------------  ] x Fy
                           [         (2 x Cc**2)    ]
  -. Fa   =  -------------------------------------------   =     1.022
                 5      3 x (Kl/r)       (Kl/r)**3
                --- + ------------- - -----------
                 3       8 x Cc         8 x Cc**3

( ). Check the interaction ratio of axial stress (fa/Fa).

       fa          .668
  -. ----   =   --------   =   .653  <  1.000  ---> O.K.
       Fa         1.022
```

[[[*]]]   CHECK THE BENDING STRESSES ABOUT MAJOR AXIS.

```
( ). Calculate the allowable compressive bending stresses -
     in case of compressive stress in stem (FBC)

  -. Gs   =  Es/(2*(1 + Por))          =          807.7

  -. Rxx = (H*tw**3 + Bf*tf**3)/3   =           27.0

  -. Rtf = (Bf**3*tf)/12              =         1822.9

  -. Syy =  Iyy/Ccom                   =           73.2

  -. AAA = (Pi**2*Es*H)/(2*Syy*BLu**2)                  =    39.493

  -. BBB = 1 + (4*Gs*Rxx*BLu**2)/(Pi**2*Izz*Es*H**2) =     1.288

  -. FBCi =  [ AAA * (Izz*SQRT(BBB) - Rtf) ]/1.5       =    10.992

( ). Calculate the allowable bending stresses (FBCy,FBTy).
     [ AISC-ASD89 Specification F1.3 ]

  -. FBCy  =  MIN[ 0.6 x Fy, FBCi ]  =      1.440

  -. FBTy  =  0.6 x Fy                =      1.440
```

( ). Calculate actual bending stresses of member (fbcy,fbty).

-. fbcy = (BMy x Ccom) / Iyy = -.300

-. fbty = (BMy x Cten) / Iyy = .068

( ). Check the interaction ratio of stresses (fbcy/FBCy,fbty/FBTy).

-. $\frac{fbcy}{FBCy} = \frac{.300}{1.440} = .209 < 1.000$ ---> O.K.

-. $\frac{fbty}{FBTy} = \frac{.068}{1.440} = .047 < 1.000$ ---> O.K.

[[[*]]] CHECK THE COMBINED STRESSES.

( ). Check the ratio of combined stresses (Axial compression + bending).
[AISC-ASD89 Specification H1. (H1-1, H1-2)]

-. fa/Fa > 0.15

*. Check the combined stress at member end point.

-. $Rmax = \frac{fa}{Fa} + \frac{fbcy}{FBCy} + \frac{fbcz}{FBCz}$

$= .862 < 1.000$ ---> O.K.

[[[*]]] CHECK THE SHEAR STRESSES.

( ). Calculate the allowable shear stress of local-y direction (Fvz).
[AISC-ASD89 Specification F4]

-. Fvz = 0.40 x Fy = .960

( ). Calculate the shear stress of local-z direction (fvz).

-. fvz = (Fzz x Qyb) / Iyy = .069

( ). Check the interaction ratio of shear stress (fvz/Fvz).

-. $\frac{fvz}{Fvz} = \frac{.069}{.960} = .072 < 1.000$ ---> O.K.

8-9 TRUSS DIAGONAL

```
*. MIDAS FILE   : coil5.CAL
*. PROJECT      :  THILAND COIL CETER STRUCTURE ANALYSIS

*. LOADCOMB NO =   1,  ELEMENT NO =  182,  SECTION NO =    8,  MATERIAL NO
*. UNIT SYSTEM : TONF, CM

*. SECTIONAL PROPERTIES   :  Designation = T 12.2x17.5x.7/1.1
   Depth      =      12.200,  Top F Width =      17.500
   Web Thick =         .700,  Top F Thick =       1.100

   Area = .27020E+02,  Asy  = .16042E+02,  Asz  = .85400E+01
   Ybar = .87500E+01,  Zbar = .98959E+01,  Qyb  = .48964E+02, Qzb  = .38
   Iyy  = .28770E+03,  Izz  = .49159E+03,  Iyz  = .00000E+00
   Roy  = .32631E+01,  Roz  = .42654E+01,  Rop  = .00000E+00

*. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
   BLy  = .30259E+03,  BLz  = .30259E+03,  BLu  = .30259E+03
   Ky   =  1.000,      Kz   =  1.000

*. MATERIAL PROPERTIES :
   Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

*. GIVEN FORCES AND MOMENTS AT (2/4) POINT :
   Axial Force          Fxx  = -.1406E+02
   Shear Forces         Fyy  =  .0000E+00,  Fzz  =  .2088E-01
   Bending Moments      BMy  =  .1579E+01,  BMz  =  .0000E+00
   Moments of i-node    Myyi =  .0000E+00,  Mzzi =  .0000E+00
   Moments of j-node    Myyj =  .0000E+00,  Mzzj =  .0000E+00

==============================================================================
 [[[*]]]   CHECK THE AXIAL STRESS.
==============================================================================

   ( ). Check the slenderness ratio of axial compression member (Kl/r).
        [ AISC-ASD89 Specification B7. ]

        -. Kl/r  =    92.7  <   200.0  ---> O.K.

   ( ). Check the width-thickness ratio of flange (BTRf).
        [ AISC-ASD89 Specification B5.1 ]

        -. BTRf  =  bf / 2tf  =    7.95  <  95/SQRT[Fy]  --->  Qsf = 1.000

   ( ). Check the depth-thickness ratio of stem (BTRs).
        [ AISC-ASD89 Specification B5.1 ]

        -. BTRs  =  H / tw  =   17.43  <  127/SQRT[Fy]  --->  Qss = 1.000

   ( ). The reduction factor of tee (Qs).

        -. Qs  =  MIN[ Qsf, Qss ]  =  1.000
```

( ). Calculate the allowable compressive stress (Fa).
[AISC-ASD89 Specification E2. (E2-1)]

$$-.\ Cc = SQRT\left[\frac{2 \times Pi^{**}2 \times Es}{Qs \times Qa \times Fy}\right] = 131.42$$

-. Kl/r < Cc

$$-.\ Fa = \frac{Qs \times Qa \times \left[1. - \frac{(Kl/r)^{**}2}{(2 \times Cc^{**}2)}\right] \times Fy}{\frac{5}{3} + \frac{3 \times (Kl/r)}{8 \times Cc} - \frac{(Kl/r)^{**}3}{8 \times Cc^{**}3}} = .955$$

( ). Check the interaction ratio of axial stress (fa/Fa).

$$-.\ \frac{fa}{Fa} = \frac{.520}{.955} = .545 < 1.000 \text{ ---> O.K.}$$

[[[*]]] CHECK THE BENDING STRESSES ABOUT MAJOR AXIS.

( ). Calculate the radius of gyration (rT)
[AISC-ASD89 Specification F1.3]

-. Azz = Bf*tf + tw*(Ccom-tf)/3 = 19.5

-. Izz = tf*Bf**3/12 + ((Ccom-tf)/3)*tw**3/12 = 491.3

-. rT = SQRT[Izz/Azz] = 5.015

( ). Calculate the bending coefficient (Cb).
[AISC-ASD89 Specification F1.3]

-. User defined or default value of Cb = 1.000

( ). Check the ratio of BLu-rT (BLu/rT).
[AISC-ASD89 Specification F1.3]

-. CRrog2 = SQRT[(510000 x Cb) / Fy] = 122.230

-. BLu/rT = 60.333 < CRrog2

( ). Calculate the allowable compressive bending stresses (FBC).
[AISC-ASD89 Specification F1.3 (F1-6,F1-8)]

$$-.\ FBCi = \frac{12000 \times Cb}{(BLu \times d) / Af} = 4.399$$

```
        -. FBCi   >   0.6 x Fy   --->  FBCi = 0.6 x Fy   =      1.440

                       2       Fy x (BLu/rT)**2
        -. FBCj   =  [ --- - ------------------ ] Fy   =      1.405
                       3       1530000 x Cb

        -. FBC   =  MAX( FBCi, FBCj )   =      1.440

    ( ). Calculate the allowable bending stresses (FBCy,FBTy).

        -. FBTy   =   0.6 x Fy   =      1.440

        -. FBCy   =  MIN[ FBC, Qs x 0.6 x Fy ]   =      1.440

    ( ). Calculate actual bending stresses of member (fbcy,fbty).

        -. fbcy   =  (BMy x Ccom) / Iyy   =     -.013

        -. fbty   =  (BMy x Cten) / Iyy   =      .054

    ( ). Check the interaction ratio of stresses (fbcy/FBCy,fbty/FBTy).

            fbcy            .013
        -. ------   =   --------   =   .009  <  1.000  --->  O.K.
            FBCy           1.440

            fbty            .054
        -. ------   =   --------   =   .038  <  1.000  --->  O.K.
            FBTy           1.440
```

```
==============================================================================
  [[[*]]]   CHECK THE COMBINED STRESSES.
==============================================================================
```

```
    ( ). Check the ratio of combined stresses (Axial compression + bending)
         [ AISC-ASD89 Specification H1. (H1-1, H1-2) ]

        -. fa/Fa   >   0.15

        -. User defined or default value of Cmy   =    1.000

        -. User defined or default value of Cmz   =    1.000

                        12 x Pi**2 x Es
        -. Fe'y   =   ------------------   =      1.258
                        23 x (Kl/r)**2

                          Cmy
        -. SFy   =   -------------   =    1.705
                      1. - fa/F'ey

                       fa          Cmy x fbcy                Cmz x fbcz
        -. Rmax1   =   ---- + --------------------- + ---------------------
                       Fa      (1 - fa/Fe'y) x FBCy     (1 - fa/Fe'z) x FBCz
```

$$= \frac{fa}{Fa} + \frac{SFy \times fbcy}{FBCy} + \frac{SFz \times fbcz}{FBCz} \quad \text{(H1-1)}$$

$$= .560 < 1.000 \longrightarrow \text{O.K.}$$

-. Rmax2 $= \frac{fa}{0.6 \times Fy} + \frac{fbcy}{FBCy} + \frac{fbcz}{FBCz}$ (H1-2)

$$= .370 < 1.000 \longrightarrow \text{O.K.}$$

[[[*]]] CHECK THE SHEAR STRESSES.

( ). Calculate the allowable shear stress of local-y direction (Fvz).
[AISC-ASD89 Specification F4]

-. Fvz = 0.40 x Fy = .960

( ). Calculate the shear stress of local-z direction (fvz).

-. fvz = (Fzz x Qyb) / Iyy = .004

( ). Check the interaction ratio of shear stress (fvz/Fvz).

-. $\frac{fvz}{Fvz} = \frac{.004}{.960} = .004 < 1.000 \longrightarrow$ O.K.

```
----------------------------------------------------------------------------------------
MIDAS/GEN - A.C.S   Applicable Code Checking System       Version - 3.1   13:38
========================================================================================

     8-9 TRUSS  VERTICAL

  *. MIDAS FILE   : coil5.CAL
  *. PROJECT      :  THILAND COIL CETER STRUCTURE ANALYSIS

  *. LOADCOMB NO =  1,  ELEMENT NO =  191,  SECTION NO =   9,  MATERIAL NO
  *. UNIT SYSTEM : TONF, CM

  *. SECTIONAL PROPERTIES   :  Designation = T 7.4x10x.6/.9
     Depth        =         7.400,  Top F Width =      10.000
     Web Thick =         .600,  Top F Thick =        .900

     Area = .12900E+02,  Asy  = .75000E+01,  Asz  = .44400E+01
     Ybar = .50000E+01,  Zbar = .58314E+01,  Qyb  = .17003E+02, Qzb  = .12
     Iyy  = .51588E+02,  Izz  = .75117E+02,  Iyz  = .00000E+00
     Roy  = .19998E+01,  Roz  = .24131E+01,  Rop  = .00000E+00

  *. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
     BLy  = .20000E+03,  BLz  = .20000E+03,  BLu  = .20000E+03
     Ky   =  1.000,      Kz   =  1.000

  *. MATERIAL PROPERTIES :
     Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

  *. GIVEN FORCES AND MOMENTS AT (0.0) POINT :
     Axial Force         Fxx  =  .9297E+01
     Shear Forces        Fyy  =  .0000E+00,  Fzz  =  .0000E+00
     Bending Moments     BMy  =  .0000E+00,  BMz  =  .0000E+00
     Moments of i-node   Myyi =  .0000E+00,  Mzzi =  .0000E+00
     Moments of j-node   Myyj =  .0000E+00,  Mzzj =  .0000E+00

========================================================================================
  [[[*]]]   CHECK THE AXIAL STRESS.
========================================================================================

  ( ). Check the slenderness ratio of axial tension member (l/r).
       [ AISC-ASD89 Specification B7. ]

       -. l/r  =   100.0  <   300.0  ---> O.K.

  ( ). Calculate the allowable tensile stress (Ft).
       [ AISC-ASD89 Specification D1. ]

       -. Ft  =  0.6 x Fy  =     1.440

  ( ). Calculate the axial tensile stress of member (ft).

       -. ft  =  Fxx / Area  =      .721

  ( ). Check the interaction ratio of axial stress (ft/Ft).

           ft          .721
       -. ----  =  --------  =   .500  <  1.000  ---> O.K.
           Ft         1.440
```

8. DESIGN OF CRANE RUNWAY GIRDER & BACK GIRDER

*** C R A N E   R U N W A Y   G I R D E R   D E S I G N ***

1) DESIGN DATA

* GIRDER NAME = [10T SHOCK 20%] 15.0M
* cr. girder length = 15 (m)
* no of wheel = 2
* 1 wheel load = 13.8 (t)
* 2 wheel load = 13.8 (t)
* 1 - 2 wheel dist.= 4.5 (m)
* girder self weight= .3 (t/m)

	MAX. Ra(t)	MAX. Rb(t)	MAX. M (tm)
VERTICAL	30.4	30.4	98.17
HORIZONTAL	2.35	2.35	7.48
REQ' Ix(cm)			569793.3

* deflection limite =(L/ 800)
* back girder width = 1.2 (m)
* steel type = SS41
* yielding strength = 2.4 (t/cm2)
* 피로허용응력 = 1.49 (t/cm2)

2)MEMBER ASSUMPTION

if=7.62 cm	Zf=360 cm3
Yu=58.16 cm	Zxu=11342.9 cm3
Yb=61.84 cm	Zxb=10666.8 cm3
Yu'=55.76 cm	Zxu'=11831.2 cm3
Yb'=59.44 cm	Zxb'=11097.5 cm3
Yh1=15.16 cm	Zh1=43522.7 cm3
Xu=15.00 cm	Zyu=897.5 cm3
Xb=15.00 cm	Zyb=897.5 cm3

flange width/thk. = 6
df/tf< 24/ $\sqrt{Fy}$(15.49)
web width/thk. = 96
dw/tw> 110/ $\sqrt{Fy}$ (71)

3) STRESS CHECK OF BEAM-COLUMN
* Lb (m) = 2.5
* λp = $\sqrt{(3.14^2 * E /0.6 * Fy)}$ = 119.9
* fbx1= [1 - 0.4*(Lb/iy)^2 / (C*λp^2)] * ft= 1.55 (t/cm^2)
* fbx2= 900*Af/(Lb*h) = 27.93 (t/cm^2)
  피로허용응력이 1.49 (t/cm^2)이므로

$\therefore$ fbx = 1.49 (t/cm^2)
* σb = 100*Mmax/Zx = .86 (t/cm2)
(σb/fbx) = .58
* Lk (buckl. span) = 2.5 (m)
* iy(flange) = 7.61 (cm)
* λ = (Lk/iy) = 32.82 (t/cm^2)
* $\lambda < \lambda p$ 이므로
* fc = $[1-0.4(\lambda / \lambda p)^2]$Fy/ n = 1.59 ($t/cm^2$)
피로허용응력이 1.49 (t/cm^2)이므로 $\therefore$ fc = 1.49 (t/cm^2)

* Ph = max Mxh/back gird.(1.2) = 6.23 (t)
* σc = Ph/ Af = .06 (t/cm^2)
$\therefore$(σb/ fbx) + (σc/ fc) = .62 - O K. !! -

* σt = 100 * Mmax /Zxb = .92
* ft = 1.49 (t/cm2)
$\therefore$(σt/ft)= .61 - O K. ! ! -

4) PLATE BUCKLING CHECK

a) 'A' part check
* compressive flexural plate buckling
* α = (1- σmin / σmax) = .72
* k_1 = $(1 + \alpha/6)(\alpha^3 + 3\alpha^2 + 4)$= 6.7
* C_1 = $\sqrt{}$(Fy/k_1) = .59
* 56/C_1 = 93.5
* d/t = 33.3
* σ0 = 1.59
---> 피로허용응력 1.49 적용
* σ = .82
* (σ / σ0)= .55

b) 'B' part check
* compressive flexural plate buckling
* α = (1- σmin / σmax) = 1.25
* k_1 = $(1 + \alpha/6)(\alpha^3 + 3\alpha^2 + 4)$= 12.93
* C_1 = $\sqrt{}$(Fy/k_1) = .43
* 56/C_1 = 130
* d/t = 61.6
* σ0 = 1.59
---> 피로허용응력 1.49 적용
* σ = .22
* (σ / σ0)= .15

c) plate shear buckling
* a (stiffener span)= 2.5 (m)
* β = a / d = 2.17
* k_2 = 13.58
* C_2 = $\sqrt{}$(Fy/k_2) = .42
* 74/C_2 = 176
* d/t = 95.9

* $\tau 0$ = .92

****** between support point ********

* τ = Pwheel/Aw = .11
$\sqrt{((\sigma/\sigma 0)^2 + (\tau/\tau 0)^2)}$ = .67

****** at support point ************

* τ = Rmax/Aw = .24
$\sqrt{((\sigma/\sigma 0)^2 + (\tau/\tau 0)^2)}$ = .26

5) LOCAL BUCKLING CHECK

a) local buckling check under wheel load
* rail 의 높이를 10cm 로 가정하면
* k =5+rail+flange thk.+welding neck= 33.7
* web area (cm^2)= W1 = k * tw = 40.56
* σ1(t/cm^2) = Pwheel/W1 = .3
* f1 (t/cm^2) = 1.84
---> 피로허용응력 1.49 적용
* σ1/f1 = .22

b) local buckling check at end
* area(cm^2) = 93.9
* σC (t/cm^2) = Rmax/Ae = .32
* iye = 6.49
* Le =0.75 * h = .9 (m)
* λ =(Le/iye) = 13.84
* fc (t/cm^2) = 1.59
---> 피로허용응력 1.49 적용
* σC/fc = .21
- O.K -

6) STIFFENER CHECK
* (req'd vert.) Ist =0.55*d*t^3 = 109.48
* vIst = 1984.76
- O.K -

******** SUMMARY ********
* NAME = [10T SHOCK 20%] 15.0M
* 강 재 = SS41

$$\text{USE} \quad \text{WH} - 1200 * \left(\frac{300}{300}\right) * 12 * \left(\frac{24}{24}\right)$$

* horzontal stiffener thickness(mm)= 12
* vertical stiffener thickness(mm)= 9

*** C R A N E   R U N W A Y   G I R D E R   D E S I G N ***

1) DESIGN DATA

* GIRDER NAME = [10T+20T SHOCK 20%] 15.0M
* cr. girder length = 15 (m)
* no of wheel = 4
* 1 wheel load = 15.8 (t)
* 2 wheel load = 15.8 (t)
* 3 wheel load = 26.8 (t)
* 4 wheel load = 26.8 (t)
* 1 - 2 wheel dist.= 4.5 (m)
* 2 - 3 wheel dist.= 1.8 (m)
* 3 - 4 wheel dist.= 5 (m)
* girder self weight= .5 (t/m)

	MAX. Ra(t)	MAX. Rb(t)	MAX. M (tm)
VERTICAL	68.59	72.39	240.28
HORIZONTAL	5.4	5.72	18.85
REQ' Ix(cm)			1327205.0

* deflection limite =(L/ 800)
* back girder width = 1.2 (m)
* steel type = SS41
* yielding strength = 2.4 (t/cm2)
* 피로허용응력 = 1.49 (t/cm2)

2)MEMBER ASSUMPTION

if=8.76 cm	Zf=511 cm3
Yu=76.27 cm	Zxu=19763.3 cm3
Yb=83.73 cm	Zxb=18003.8 cm3
Yu'=73.77 cm	Zxu'=20433.1 cm3
Yb'=81.23 cm	Zxb'=18557.9 cm3
Yh1=33.17 cm	Zh1=45440.9 cm3
Xu=17.50 cm	Zyu=1267.1 cm3
Xb=17.50 cm	Zyb=1267.1 cm3

flange width/thk. = 6.7
df/tf< 24/ $\sqrt{Fy}$(15.49)
web width/thk. = 129.1
dw/tw> 110/ $\sqrt{Fy}$ (71)

3) STRESS CHECK OF BEAM-COLUMN

* Lb (m) = 2.5
* $\lambda p = \sqrt{(3.14^2 * E / 0.6 * Fy)} = 119.9$

* fbx1= [1 - 0.4*(Lb/iy)^2 / (C*λp^2)] * ft= 1.56 (t/cm^2)
* fbx2= 900*Af/(Lb*h) = 26.21 (t/cm^2)
피로허용응력이 1.49 (t/cm^2)이므로
∴ fbx = 1.49 (t/cm^2)
* σb = 100*Mmax/Zx = 1.21 (t/cm2)
(σb/fbx) = .81
* Lk (buckl. span) = 2.5 (m)
* iy(flange) = 8.75 (cm)
* λ = (Lk/iy) = 28.54 (t/cm^2)
* $\lambda < \lambda p$ 이므로
* fc = {1-0.4(λ / λp)^2 }Fy/ n = 1.59 (t/cm^2)
피로허용응력이 1.49 (t/cm^2)이므로 ∴ fc = 1.49 (t/cm^2)

* Ph = max Mxh/back gird.(1.2) = 15.7 (t)
* σc = Ph/ Af = .13 (t/cm^2)
∴(σb/ fbx) + (σc/ fc) = .9 - O.K. !! -

* σt = 100 * Mmax /Zxb = 1.33
* ft = 1.49 (t/cm2)
∴(σt/ft)= .89 - O.K. ! ! -

4) PLATE BUCKLING CHECK

a) 'A' part check
* compressive flexural plate buckling
* α = (1- σmin / σmax) = .55
* k_1 = (1 + α/6)(α^3 +3α^2 + 4)= 5.54
* C_1 = $\sqrt{}$(Fy/k_1) = .65
* 56/C_1 = 85
* d/t = 33.3
* σ0 = 1.59
---> 피로허용응력 1.49 적용
* σ = 1.17
* (σ/ σ0)= .78

b) 'B' part check
* compressive flexural plate buckling
* α = (1- σmin / σmax) = 1.4
* k_1 = (1 + α/6)(α^3 +3α^2 + 4)= 15.73
* C_1 = $\sqrt{}$(Fy/k_1) = .39
* 56/C_1 = 143.3
* d/t = 94.8
* σ0 = 1.59
---> 피로허용응력 1.49 적용
* σ = .52
* (σ/ σ0)= .35

c) plate shear buckling
* a (stiffener span)= 2.5 (m)
* β = a / d = 1.61
* k_2 = 20.91
* C_2 = $\sqrt{}$(Fy/k_2) = .33
* 74/C_2 = 218.4

* d/t = 129.1
* $\tau 0$ = .92

****** between support point ********

* τ = Pwheel/Aw = .16
$\sqrt{((\sigma/\sigma 0)^2 + (\tau/\tau 0)^2)}$ = .96

****** at support point ************

* τ = Rmax/Aw = .42
$\sqrt{((\sigma/\sigma 0)^2 + (\tau/\tau 0)^2)}$ = .45

5) LOCAL BUCKLING CHECK

a) local buckling check under wheel load
* rail 의 높이를 10cm 로 가정하면
* k =5+rail+flange thk.+welding neck= 34
* web area (cm^2)= Wl = k * tw = 40.8
* σl(t/cm^2) = Pwheel/Wl = .6
* fl (t/cm^2) = 1.84
---> 피로허용응력 1.49 적용
* σl/fl = .44

b) local buckling check at end
* area(cm^2) = 180
* σC (t/cm^2) = Rmax/Ae = .38
* iye = 8.9
* Le =0.75 * h = 1.2 (m)
* λ =(Le/iye) = 13.47
* fc (t/cm^2) = 1.59
---> 피로허용응력 1.49 적용
* σC/fc = .25
\- O.K -

6) STIFFENER CHECK
* (req'd vert.) Ist =0.55*d*t^3 = 147.31
* vIst = 7145.83
\- O.K -

******** SUMMARY ********
* NAME = [10T+20T SHOCK 20%] 15.0M
* 강 재 = SS41

USE WH - 1600 * {350 / 350} * 12 * {25 / 25}

* horzontal stiffener thickness(mm)= 12
* vertical stiffener thickness(mm)= 20

*** C R A N E   R U N W A Y   G I R D E R   D E S I G N ***

1) DESIGN DATA

* GIRDER NAME = [20T SHOCK 20%] 20.0M
* cr. girder length = 20 (m)
* no of wheel = 2
* 1 wheel load = 28.9 (t)
* 2 wheel load = 28.9 (t)
* 1 - 2 wheel dist.= 5.5 (m)
* girder self weight= .6 (t/m)

	MAX. Ra(t)	MAX. Rb(t)	MAX. M (tm)
VERTICAL	65.82	65.82	287.99
HORIZONTAL	4.99	4.99	21.5
REQ' Ix(cm)			2213118.0

* deflection limite =(L/ 800)
* back girder width = 1.2 (m)
* steel type = SS41
* yielding strength = 2.4 (t/cm2)
* 피로허용응력 = 1.49 (t/cm2)

2)MEMBER ASSUMPTION

if=8.47 cm	Zf=511 cm3
Yu=94.18 cm	Zxu=27429.6 cm3
Yb=105.82 cm	Zxb=24414.6 cm3
Yu'=91.68 cm	Zxu'=28177.5 cm3
Yb'=103.32 cm	Zxb'=25005.4 cm3
Yh1=51.08 cm	Zh1=50571.9 cm3
Xu=17.50 cm	Zyu=1388.1 cm3
Xb=17.50 cm	Zyb=1388.1 cm3

flange width/thk. = 6.7
df/tf< 24/ $\sqrt{Fy}$(15.49)
web width/thk. = 162.5
dw/tw> 110/ $\sqrt{Fy}$ (71)

3) STRESS CHECK OF BEAM-COLUMN
* Lb (m) = 2.5
* $\lambda p = \sqrt{(3.14^2 * E / 0.6 * Fy)} = 119.9$
* $fbx1 = [\ 1 - 0.4*(Lb/iy)^2 \ / \ (\ C*\lambda p^2\ )\ ] * ft = 1.56\ (t/cm^2)$
* $fbx2 = 900*Af/(Lb*h) = 22.41\ (t/cm^2)$

피로허용응력이 1.49 (t/cm^2)이므로

$\therefore$ fbx = 1.49 (t/cm^2)
* σb = 100*Mmax/Zx = 1.04 (t/cm2)
(σb/fbx) = .7
* Lk (buckl. span) = 2.5 (m)
* iy(flange) = 8.47 (cm)
* λ = (Lk/iy) = 29.5 (t/cm^2)
* $\lambda < \lambda p$ 이므로
* fc = $[1-0.4(\lambda/\lambda p)^2]$Fy/ n = 1.59 ($t/cm^2$)
피로허용응력이 1.49 (t/cm^2)이므로 $\therefore$ fc = 1.49 (t/cm^2)

* Ph = max Mxh/back gird.(1.2) = 17.91 (t)
* σc = Ph/ Af = .14 (t/cm^2)
$\therefore$(σb/ fbx) + (σc/ fc) = .8 - OK. !! -

* σt = 100 * Mmax /Zxb = 1.17
* ft = 1.49 (t/cm2)
$\therefore$(σt/ft)= .79 - OK. !! -

4) PLATE BUCKLING CHECK

a) 'A' part check
* compressive flexural plate buckling
* α = (1- σmin / σmax) = .44
* k_1 = $(1 + \alpha/6)(\alpha^3 + 3\alpha^2 + 4)$= 5.02
* C_1 = $\sqrt{(Fy/k_1)}$ = .69
* $56/C_1$ = 80.9
* d/t = 33.3
* $\sigma 0$ = 1.59
---> 피로허용응력 1.49 적용
* σ = 1.02
* ($\sigma/\sigma 0$)= .68

b) 'B' part check
* compressive flexural plate buckling
* α = (1- σmin / σmax) = 1.49
* k_1 = $(1 + \alpha/6)(\alpha^3 + 3\alpha^2 + 4)$= 17.53
* C_1 = $\sqrt{(Fy/k_1)}$ = .36
* $56/C_1$ = 151.3
* d/t = 128.1
* $\sigma 0$ = 1.59
---> 피로허용응력 1.49 적용
* σ = .56
* ($\sigma/\sigma 0$)= .38

c) plate shear buckling
* a (stiffener span)= 2.5 (m)
* β = a / d = 1.28
* k_2 = 19.27
* C_2 = $\sqrt{(Fy/k_2)}$ = .35
* $74/C_2$ = 209.7
* d/t = 162.5

* $\tau 0$ = .79

****** between support point ********

* τ = Pwheel/Aw = .14
$\sqrt{((\sigma/\sigma 0)^2 + (\tau/\tau 0)^2)}$ = .86

****** at support point ************

* τ = Rmax/Aw = .32
$\sqrt{((\sigma/\sigma 0)^2 + (\tau/\tau 0)^2)}$ = .4

5) LOCAL BUCKLING CHECK

a) local buckling check under wheel load
* rail 의 높이를 10cm 로 가정하면
* k =5+rail+flange thk.+welding neck= 34
* web area (cm^2)= Wl = k * tw = 40.8
* σl(t/cm^2) = Pwheel/Wl = .7
* fl (t/cm^2) = 1.84
---> 피로허용응력 1.49 적용
* σl/fl = .47

b) local buckling check at end
* area(cm^2) = 114.7
* σC (t/cm^2) = Rmax/Ae = .57
* iye = 9.14
* Le =0.75 * h = 1.5 (m)
* λ =(Le/iye) = 16.39
* fc (t/cm^2) = 1.59
---> 피로허용응력 1.49 적용
* σC/fc = .38
- O.K -

6) STIFFENER CHECK
* (req'd vert.) Ist =0.55*d*t^3 = 185.32
* vIst = 4800
- O.K -

******** SUMMARY ********
* NAME = [20T SHOCK 20%] 20.0M
* 강 재 = SS41

USE WH - 2000 * $\left(\frac{350}{350}\right)$ * 12 * $\left(\frac{25}{25}\right)$

* horzontal stiffener thickness(mm)= 12
* vertical stiffener thickness(mm)= 9

*** C R A N E   R U N W A Y   G I R D E R   D E S I G N ***

1) DESIGN DATA

* GIRDER NAME = [20T SHOCK 20%] 25M
* cr. girder length = 25 (m)
* no of wheel = 2
* 1 wheel load = 28.9 (t)
* 2 wheel load = 28.9 (t)
* 1 - 2 wheel dist.= 5.5 (m)
* girder self weight= .6 (t/m)

	MAX. Ra(t)	MAX. Rb(t)	MAX. M (tm)
VERTICAL	69.23	69.23	390.25
HORIZONTAL	5.14	5.14	28.61
REQ' Ix(cm)			3674045.0

* deflection limite =(L/ 800)
* back girder width = 1.2 (m)
* steel type = SS41
* yielding strength = 2.4 (t/cm2)
* 피로허용응력 = 1.49 (t/cm2)

2)MEMBER ASSUMPTION

if=9.89 cm	Zf=747 cm3
Yu=104.13 cm	Zxu=36646.6 cm3
Yb=115.87 cm	Zxb=32930.8 cm3
Yu'=101.33 cm	Zxu'=37659.3 cm3
Yb'=113.07 cm	Zxb'=33746.2 cm3
Yh1=60.73 cm	Zh1=62837.8 cm3
Xu=20.00 cm	Zyu=1814.9 cm3
Xb=20.00 cm	Zyb=1814.9 cm3

flange width/thk. = 6.9
$df/tf < 24/\sqrt{Fy}$ (15.49)
web width/thk. = 178.6
$dw/tw > 110/\sqrt{Fy}$ (71)

3) STRESS CHECK OF BEAM-COLUMN
* Lb (m) = 2.5
* $\lambda p = \sqrt{(3.14^2 * E / 0.6 * Fy)} = 119.9$
* $fbx1 = [\ 1 - 0.4*(Lb/iy)^2 / (\ C*\lambda p^2\ )\ ]$ * ft= 1.57 (t/cm²)
* fbx2= 900*Af/(Lb*h) = 24.97 (t/cm²)

피로허용응력이 1.49 (t/cm²)이므로

$\therefore$ fbx = 1.49 (t/cm^2)
* σb = 100*Mmax/Zx = 1.06 (t/cm2)
(σb/fbx) = .71
* Lk (buckl. span) = 2.5 (m)
* iy(flange) = 9.89 (cm)
* λ = (Lk/iy) = 25.27 (t/cm^2)
* $\lambda < \lambda p$ 이므로
* fc = $[1-0.4(\lambda/\lambda p)^2]$Fy/ n = 1.59 ($t/cm^2$)
피로허용응력이 1.49 (t/cm^2)이므로 $\therefore$ fc = 1.49 (t/cm^2)

* Ph = max Mxh/back gird.(1.2) = 23.84 (t)
* σc = Ph/ Af = .15 (t/cm^2)
$\therefore$(σb/ fbx) + (σc/ fc) = .81 - OK. !! -

* σt = 100 * Mmax /Zxb = 1.18
* ft = 1.49 (t/cm2)
$\therefore$(σt/ft)= .79 - OK. ! ! -

4) PLATE BUCKLING CHECK

a) 'A' part check
* compressive flexural plate buckling
* α = (1- σmin / σmax) = .4
* k_1 = (1 + α/6)(α^3 +3α^2 + 4)= 4.84
* C_1 = $\sqrt{}$(Fy/k_1) = .7
* 56/C_1 = 79.6
* d/t = 33.3
* σ0 = 1.59
---> 피로허용응력 1.49 적용
* σ = 1.03
* (σ/ σ0)= .69

b) 'B' part check
* compressive flexural plate buckling
* α = (1- σmin / σmax) = 1.53
* k_1 = (1 + α/6)(α^3 +3α^2 + 4)= 18.48
* C_1 = $\sqrt{}$(Fy/k_1) = .36
* 56/C_1 = 155.4
* d/t = 144.3
* σ0 = 1.1
* σ = .62
* (σ/ σ0)= .56

c) plate shear buckling
* a (stiffener span)= 2.5 (m)
* β = a / d = 1.16
* k_2 = 19.78
* C_2 = $\sqrt{}$(Fy/k_2) = .34
* 74/C_2 = 212.4
* d/t = 178.6
* τ0 = .72

****** between support point ********

* τ = Pwheel/Aw = .12
$\sqrt{((\sigma/\sigma 0)^2 + (\tau/\tau 0)^2)}$ = .87

****** at support point ************

* τ = Rmax/Aw = .33
$\sqrt{((\sigma/\sigma 0)^2 + (\tau/\tau 0)^2)}$ = .46

5) LOCAL BUCKLING CHECK

a) local buckling check under wheel load
* rail 의 높이를 10cm 로 가정하면
* k =5+rail+flange thk.+welding neck= 34.6
* web area (cm^2)= Wl = k * tw = 41.52
* σl(t/cm^2) = Pwheel/Wl = .6
* fl (t/cm^2) = 1.84
---> 피로허용응력 1.49 적용
* σl/fl = .46

b) local buckling check at end
* area(cm^2) = 114.7
* σC (t/cm^2) = Rmax/Ae = .6
* iye = 9.14
* Le =0.75 * h = 1.5 (m)
* λ =(Le/iye) = 16.39
* fc (t/cm^2) = 1.59
---> 피로허용응력 1.49 적용
* σC/fc = .4
- O.K -

6) STIFFENER CHECK
* (req'd vert.) Ist =0.55*d*t^3 = 203.76
* vIst = 4800
- O.K -

******** SUMMARY ********
* NAME = [20T SHOCK 20%] 25M
* 강 재 = SS41

USE	WH - 2200 * $\left(\frac{400}{400}\right)$ * 12 * $\left(\frac{28}{28}\right)$

* horzontal stiffener thickness(mm)= 12
* vertical stiffener thickness(mm)= 9

-

*** C R A N E   R U N W A Y   G I R D E R   D E S I G N ***

1) DESIGN DATA

* GIRDER NAME = [10T SHOCK 20%] 18.0M
* cr. girder length = 18 (m)
* no of wheel = 2
* 1 wheel load = 13.8 (t)
* 2 wheel load = 13.8 (t)
* 1 - 2 wheel dist.= 4.5 (m)
* girder self weight= .5 (t/m)

	MAX. Ra(t)	MAX. Rb(t)	MAX. M (tm)
VERTICAL	33.48	33.48	134.36
HORIZONTAL	2.42	2.42	9.51
REQ' Ix(cm)			923110.9

* deflection limite =(L/ 800)
* back girder width = 1.2 (m)
* steel type = SS41
* yielding strength = 2.4 (t/cm2)
* 피로허용응력 = 1.49 (t/cm2)

2)MEMBER ASSUMPTION

if=7.46 cm	Zf=360 cm3
Yu=67.26 cm	Zxu=14145.6 cm3
Yb=72.74 cm	Zxb=13080.6 cm3
Yu'=64.86 cm	Zxu'=14669.0 cm3
Yb'=70.34 cm	Zxb'=13527.0 cm3
Yh1=24.26 cm	Zh1=39216.1 cm3
Xu=15.00 cm	Zyu=901.3 cm3
Xb=15.00 cm	Zyb=901.3 cm3

flange width/thk. = 6
df/tf< 24/ $\sqrt{Fy}$(15.49)
web width/thk. = 112.6
dw/tw> 110/ $\sqrt{Fy}$ (71)

3) STRESS CHECK OF BEAM-COLUMN

* Lb (m) = 2.5
* $\lambda p = \sqrt{(3.14^2 * E / 0.6 * Fy)} = 119.9$
* fbx1= [1 - 0.4*(Lb/iy)^2 / (C*λp^2)] * ft= 1.55 (t/cm^2)
* fbx2= 900*Af/(Lb*h) = 24.97 (t/cm^2)

피로허용응력이 1.49 (t/cm^2)이므로

$\therefore$ fbx = 1.49 (t/cm^2)
* σb = 100*Mmax/Zx = .94 (t/cm2)
(σb/fbx) = .63
* Lk (buckl. span) = 2.5 (m)
* iy(flange) = 7.45 (cm)
* λ = (Lk/iy) = 33.51 (t/cm^2)
* $\lambda < \lambda p$ 이므로
* fc = $\{1-0.4(\lambda/\lambda p)^2\}$Fy/ n = 1.59 ($t/cm^2$)
피로허용응력이 1.49 (t/cm^2)이므로 $\therefore$ fc = 1.49 (t/cm^2)

* Ph = max Mxh/back gird.(1.2) = 7.92 (t)
* σc = Ph/ Af = .08 (t/cm^2)
$\therefore$(σb/ fbx) + (σc/ fc) = .69 - OK. !! -

* σt = 100 * Mmax /Zxb = 1.02
* ft = 1.49 (t/cm2)
$\therefore$(σt/ft)= .68 - OK. ! ! -

4) PLATE BUCKLING CHECK

a) 'A' part check
* compressive flexural plate buckling
* α = (1- σmin / σmax) = .62
* k_1 = $(1 + \alpha/6)(\alpha^3 + 3\alpha^2 + 4)$= 5.98
* C_1 = $\sqrt{(Fy/k_1)}$ = .63
* $56/C_1$ = 88.4
* d/t = 33.3
* $\sigma 0$ = 1.59
---> 피로허용응력 1.49 적용
* σ = .91
* ($\sigma/\sigma 0$)= .61

b) 'B' part check
* compressive flexural plate buckling
* α = (1- σmin / σmax) = 1.34
* k_1 = $(1 + \alpha/6)(\alpha^3 + 3\alpha^2 + 4)$= 14.51
* C_1 = $\sqrt{(Fy/k_1)}$ = .4
* $56/C_1$ = 137.7
* d/t = 78.3
* $\sigma 0$ = 1.59
---> 피로허용응력 1.49 적용
* σ = .34
* ($\sigma/\sigma 0$)= .22

c) plate shear buckling
* a (stiffener span)= 2.5 (m)
* β = a / d = 1.84
* k_2 = 13.98
* C_2 = $\sqrt{(Fy/k_2)}$ = .41
* $74/C_2$ = 178.6
* d/t = 112.6

* $\tau 0$ = .92

****** between support point ********

* τ = Pwheel/Aw = .09

$\sqrt{((\sigma/\sigma 0)^2 + (\tau/\tau 0)^2)}$ = .71

****** at support point ************

* τ = Rmax/Aw = .27

$\sqrt{((\sigma/\sigma 0)^2 + (\tau/\tau 0)^2)}$ = .29

5) LOCAL BUCKLING CHECK

a) local buckling check under wheel load
* rail 의 높이를 10cm 로 가정하면
* k =5+rail+flange thk.+welding neck= 33.7
* web area (cm^2)= Wl = k * tw = 40.56
* $\sigma l(t/cm^2)$ = Pwheel/Wl = .3
* fl (t/cm^2) = 1.84
---> 피로허용응력 1.49 적용
* $\sigma l/fl$ = .22

b) local buckling check at end
* area(cm^2) = 94.3
* σC (t/cm^2) = Rmax/Ae = .35
* iye = 6.55
* Le =0.75 * h = .9 (m)
* λ =(Le/iye) = 13.73
* fc (t/cm^2) = 1.59
---> 피로허용응력 1.49 적용
* $\sigma C/fc$ = .23
- O.K -

6) STIFFENER CHECK
* (req'd vert.) Ist =0.55*d*t^3 = 128.49
* vIst = 2025
- O.K -

******** SUMMARY ********
* NAME = [10T SHOCK 20%] 18.0M
* 강 재 = SS41

USE WH - 1400 * $\left(\frac{300}{300}\right)$ * 12 * $\left(\frac{24}{24}\right)$

* horzontal stiffener thickness(mm)= 12
* vertical stiffener thickness(mm)= 9

*** C R A N E   R U N W A Y   G I R D E R   D E S I G N ***

1) DESIGN DATA

* GIRDER NAME = [10T+20T SHOCK 20%] 18.0M
* cr. girder length = 18 (m)
* no of wheel = 4
* 1 wheel load = 15.8 (t)
* 2 wheel load = 15.8 (t)
* 3 wheel load = 26.8 (t)
* 4 wheel load = 26.8 (t)
* 1 - 2 wheel dist.= 4.5 (m)
* 2 - 3 wheel dist.= 1.8 (m)
* 3 - 4 wheel dist.= 5 (m)
* girder self weight= .6 (t/m)

	MAX. Ra(t)	MAX. Rb(t)	MAX. M (tm)
VERTICAL	73.31	79.64	327.2
HORIZONTAL	5.66	6.19	25.24
REQ' Ix(cm)			2189030.0

* deflection limite =(L/ 800)
* back girder width = 1.2 (m)
* steel type = SS41
* yielding strength = 2.4 (t/cm2)
* 피로허용응력 = 1.49 (t/cm2)

2)MEMBER ASSUMPTION

if=8.47 cm　　Zf=511 cm3
Yu=94.87 cm　　Zxu=27065.2 cm3
Yb=105.13 cm　　Zxb=24422.0 cm3
Yu'=92.37 cm　　Zxu'=27797.7 cm3
Yb'=102.63 cm　　Zxb'=25016.9 cm3
Yh1=51.77 cm　　Zh1=49599.3 cm3
Xu=17.50 cm　　Zyu=1267.4 cm3
Xb=17.50 cm　　Zyb=1267.4 cm3

flange width/thk. = 6.7
df/tf< 24/ $\sqrt{Fy}$(15.49)
web width/thk. = 162.5
dw/tw> 110/ $\sqrt{Fy}$ (71)

3) STRESS CHECK OF BEAM-COLUMN
* Lb (m) = 2.5
* $\lambda p = \sqrt{(3.14^2 * E / 0.6 * Fy)} = 119.9$
* $fbx1 = [1 - 0.4*(Lb/iy)^2 / (C*\lambda p^2)] * ft = 1.56$ (t/cm^2)

* fbx2= 900*Af/(Lb*h) = 22.41 (t/cm^2)
  피로허용응력이 1.49 (t/cm^2)이므로
∴ fbx = 1.49 (t/cm^2)
* σb = 100*Mmax/Zx = 1.2 (t/cm2)
  (σb/fbx) = .81
* Lk (buckl. span) = 2.5 (m)
* iy(flange) = 8.47 (cm)
* λ = (Lk/iy) = 29.5 (t/cm^2)
  * $\lambda < \lambda p$ 이므로
* fc = $\{1-0.4(\lambda/\lambda p)^2\}$Fy/ n = 1.59 ($t/cm^2$)
  피로허용응력이 1.49 (t/cm^2)이므로 ∴ fc = 1.49 (t/cm^2)

* Ph = max Mxh/back gird.(1.2) = 21.03 (t)
* σc = Ph/ Af = .16 (t/cm^2)
∴(σb/ fbx) + (σc/ fc) = .92 - OK. !! -

* σt = 100 * Mmax /Zxb = 1.33
* ft = 1.49 (t/cm2)
  ∴(σt/ft)= .89 - OK. ! ! -

4) PLATE BUCKLING CHECK

a) 'A' part check
* compressive flexural plate buckling
* α = (1- σmin / σmax) = .43
* k_1 = $(1 + \alpha/6)(\alpha^3 + 3\alpha^2 + 4)$= 5
* C_1 = $\sqrt{}$(Fy/k_1) = .69
* 56/C_1 = 80.8
* d/t = 33.3
* $\sigma 0$ = 1.59
  ---> 피로허용응력 1.49 적용
* σ = 1.17
* ($\sigma / \sigma 0$)= .78

b) 'B' part check
* compressive flexural plate buckling
* α = (1- σmin / σmax) = 1.5
* k_1 = $(1 + \alpha/6)(\alpha^3 + 3\alpha^2 + 4)$= 17.75
* C_1 = $\sqrt{}$(Fy/k_1) = .36
* 56/C_1 = 152.3
* d/t = 128.1
* $\sigma 0$ = 1.59
  ---> 피로허용응력 1.49 적용
* σ = .65
* ($\sigma / \sigma 0$)= .44

c) plate shear buckling
* a (stiffener span)= 2.5 (m)
* β = a / d = 1.28
* k_2 = 17.18
* C_2 = $\sqrt{}$(Fy/k_2) = .37
* 74/C_2 = 198
* d/t = 162.5
* $\tau 0$ = .74

****** between support point ********

* τ = Pwheel/Aw = .13
$\sqrt{((\sigma/\sigma 0)^2 + (\tau/\tau 0)^2)}$ = .96

****** at support point ************

* τ = Rmax/Aw = .44
$\sqrt{((\sigma/\sigma 0)^2 + (\tau/\tau 0)^2)}$ = .6

5) LOCAL BUCKLING CHECK

a) local buckling check under wheel load
* rail 의 높이를 10cm 로 가정하면
* k =5+rail+flange thk.+welding neck= 34
* web area (cm^2)= Wl = k * tw = 40.8
* σl(t/cm^2) = Pwheel/Wl = .6
* fl (t/cm^2) = 1.84
---> 피로허용응력 1.49 적용
* σl/fl = .44

b) local buckling check at end
* area(cm^2) = 105.7
* σC (t/cm^2) = Rmax/Ae = .69
* iye = 7.79
* Le =0.75 * h = 1.2 (m)
* λ =(Le/iye) = 15.38
* fc (t/cm^2) = 1.59
---> 피로허용응력 1.49 적용
* σC/fc = .46
- O.K -

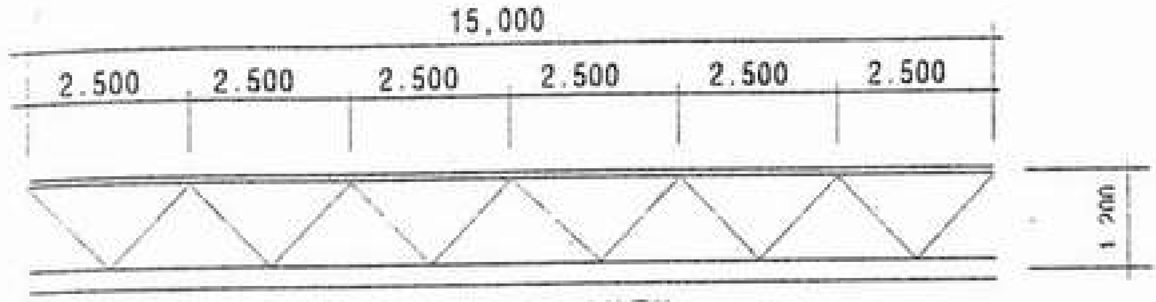
6) STIFFENER CHECK
* (req'd vert.) Ist =0.55*d*t^3 = 185.32
* vIst = 3215.62
- O.K -

******** SUMMARY ********
* NAME = [10T+20T SHOCK 20%] 18.0M
* 강 재 = SS41

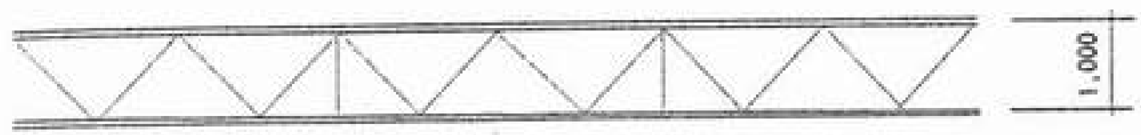
USE	WH -	2000 *	(350 / 350)	* 12 *	(25 / 25)	

* horzontal stiffener thickness(mm)= 12
* vertical stiffener thickness(mm)= 9

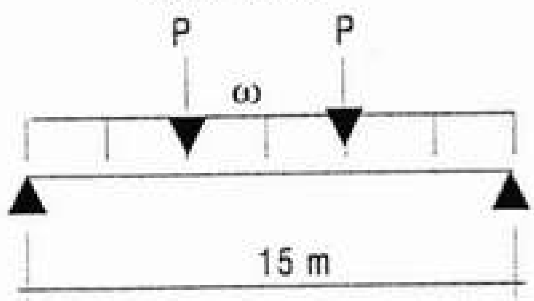
BCG1(15M SPAN , A LINE)



TOP &BOTTOM VIEW



SIDE VIEW



1) DEAD LOAD

w = 0.6 /2 = 0.3 t/m

P= 0.04 x 5 x 8 = 1.6 t

Ra= Rb= 3.85 t

Md= 0.3 x 15^2 / 8 + 1.6 x15 / 3 = 16.4 tm

2) WIND LOAD

㉠ TOP CHORD

Pw= 0.06 x 5 x 2 x 0.8 = 0.48 t

Ra= Rb= 0.48 t

Mw= 0.48 x15 / 3 = 2.4 tm

㉡ BOTTOM CHORD

Pw= 0.06 x 5 x 4 x 0.8 = 0.96 t

Ra= Rb= 0.96 t

Mw= 0.96 x15 / 3 = 4.8 tm

3) CRANE LOAD

Mh= 7.5 tm

Qh= 2.4 t

4) MEMBER DESIGN

㉠ TOP CHORD

N = 16.4 /1.0 + 7.5 /1.2 = 22.7 t

TRY : CT - 150 X 150 X 6.5 X 9

A= 23.4 cm² ix= 4.45 cm iy= 3.29 cm

Lk= 250 cm

λ= 250 / 3.29 = 76

fc= 1.14 t/cm²

σc= 22.7 / 23.4 = 0.97 t/cm²

σc /fc = 0.97 /1.14 = 0.85 < 1.0 O.K

㉡ BOTTOM CHORD

N = 16.4 /1.0 = 16.4 t

TRY : CT - 150 X 150 X 6.5 X 9

A= 23.4 cm² ix= 4.45 cm iy= 3.29 cm

Lk= 250 cm

λ= 250 / 3.29 = 76

fc= 1.14 t/cm²

σc= 16.4 / 23.4 = 0.7 t/cm²

σc /fc = 0.7 /1.14 = 0.62 < 1.0 O.K

㉢ TOP DIAGONAL MEMBER

N= 2.4 x 1.73 /1.2 = 3.5 t

TRY : L - 75 X 75 X 6

A= 8.7 cm² iv= 1.47 cm

Lk= $\sqrt{(1.25^2 + 1.2^2)}$ = 173 cm

λ= 173 / 1.47 = 118

fc= 0.69 t/cm²

σc= 3.5 / 8.7 = 0.4 t/cm²

σc /fc = 0.4 /0.69 = 0.58 < 1.0 O.K

㉣ BOTTOM DIAGONAL MEMBER

N= 0.96 x 1.73 /1.2 = 1.4 t (short term)

TRY : L - 60 X 60 X 5

A= 5.8 cm² iv= 1.18 cm

Lk= $\sqrt{(1.25^2 + 1.2^2)}$ = 173 cm

λ= 173 / 1.18 = 147

fc= 0.44 t/cm²

σc= 1.4 / 5.8 = 0.24 t/cm²

σc /fc = 0.24 /0.44 = 0.55 < 1.0 x1.5 O.K

⊜ SIDE DIAGONAL MEMBER

N= 3.85 x 1.6 /1.0 = 6.2 t

TRY : L - 75 X 75 X 6

A= 8.7 ㎠ iv= 1.47 cm

Lk= $\sqrt{(1.25^2 + 1.0^2)}$ = 160 cm

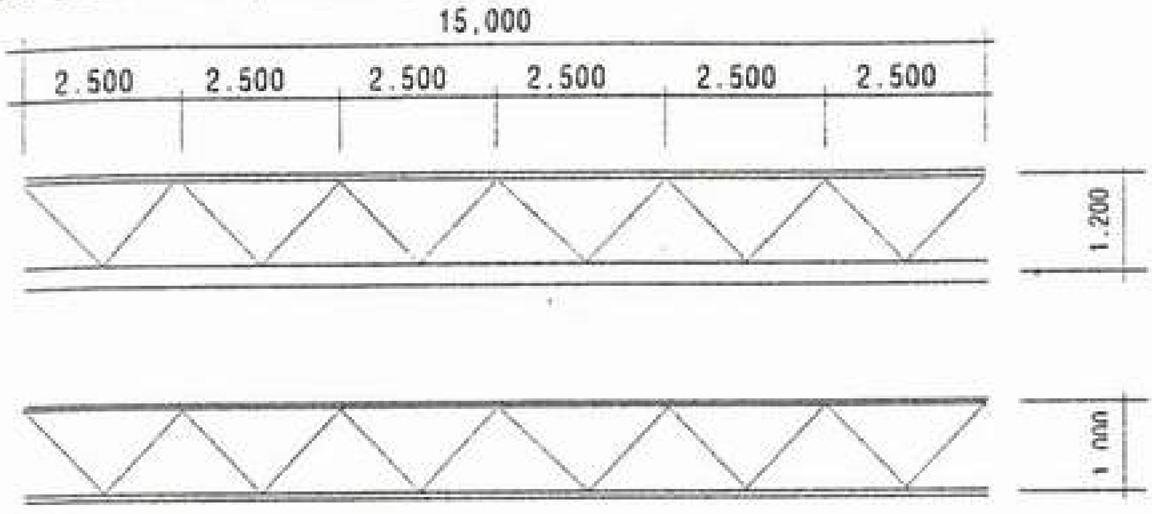
λ= 160 / 1.47 = 109

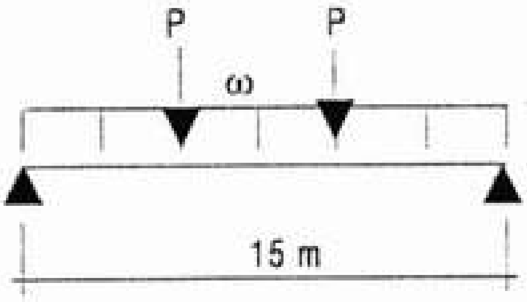
fc= 0.78 t/㎠

σc= 6.2 / 8.7 = 0.71 t/㎠

σc /fc = 0.71 /0.78 = 0.91 < 1.0 O.K

BCG3 (15M SPAN , C LINE)





1) DEAD LOAD

w = 0.6 /2 = 0.3 t/m

P= 0.04 x 5 x 8 = 1.6 t

Ra= Rb= 3.85 t

Md= 0.3 x 15^2 / 8 + 1.6 x15 / 3 = 16.4 tm

2) WIND LOAD

㉠ TOP CHORD

Pw= 0.06 x 5 x 2 x 0.8 = 0.48 t

Ra= Rb= 0.48 t

Mw= 0.48 x15 / 3 = 2.4 tm

㉡ BOTTOM CHORD

Pw= 0.06 x 5 x 4 x 0.8 = 0.96 t

Ra= Rb= 0.96 t

Mw= 0.96 x15 / 3 = 4.8 tm

3) CRANE LOAD

Mh= 18.9 tm

Qh= 5.7 t

4) MEMBER DESIGN

㉠ TOP CHORD

N = 16.4 /1.0 + 18.9 /1.2 = 32.2 t

TRY : CT - 175 X 175 X 7 X 11

A= 31.6 ㎠ ix= 5.08 cm iy= 3.95 cm

Lk= 250 cm

λ = 250 / 3.95 = 63.3

fc= 1.27 t/㎠

σc= 32.2 / 31.6 = 1.02 t/㎠

σc /fc = 1.02 /1.27 = 0.8 < 1.0 O.K

㉡ BOTTOM CHORD

N = 16.4 /1.0 = 16.4 t

TRY : CT - 150 X 150 X 6.5 X 9

A= 23.4 ㎠ ix= 4.45 cm iy= 3.29 cm

Lk= 250 cm

λ = 250 / 3.29 = 76

fc= 1.14 t/㎠

σc= 16.4 / 23.4 = 0.7 t/㎠

σc /fc = 0.7 /1.14 = 0.62 < 1.0 O.K

㉢ TOP DIAGONAL MEMBER

N= 5.7 x 1.73 /1.2 = 8.2 t

TRY : L - 90 X 90 X 7

A= 12.2 ㎠ iv= 1.77 cm

Lk= $\sqrt{(1.25^2 + 1.2^2)}$ = 173 cm

λ = 173 / 1.77 = 97.7

fc= 0.91 t/㎠

σc= 8.2 / 12.2 = 0.67 t/㎠

σc /fc = 0.67 /0.91 = 0.74 < 1.0 O.K

㉣ BOTTOM DIAGONAL MEMBER

N= 0.96 x 1.73 /1.2 = 1.4 t (short term)

TRY : L - 60 X 60 X 5 X 5

A= 5.8 ㎠ iv= 1.18 cm

Lk= $\sqrt{(1.25^2 + 1.2^2)}$ = 173 cm

λ = 173 / 1.18 = 147

fc= 0.44 t/㎠

σc= 1.4 / 5.8 = 0.24 t/㎠

$\sigma c\ /fc\ =\ 0.24/0.44\ =\ 0.55\ <\ 1.0\times1.5$ O.K

⊖ SIDE DIAGONAL MEMBER

$N=\ 3.85\ \times\ 1.6/1.0\ =\ 6.2\ t$

TRY : L - 75 X 75 X 6 X 6

$A=\ 8.7\ cm^2$ $\quad iv=\ 1.47\ cm$

$Lk=\sqrt{(1.25^2+1.0^2)}\ =\ 160\ cm$

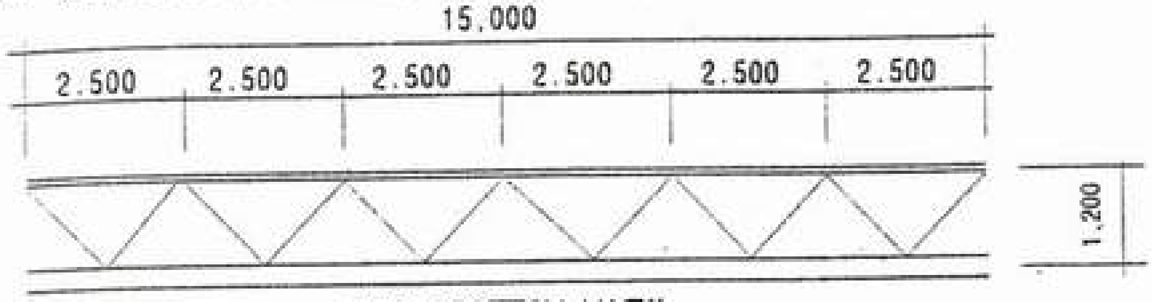
$\lambda=\ 160\ /\ 1.47\ =\ 109$

$fc=\ 0.78\ t/cm^2$

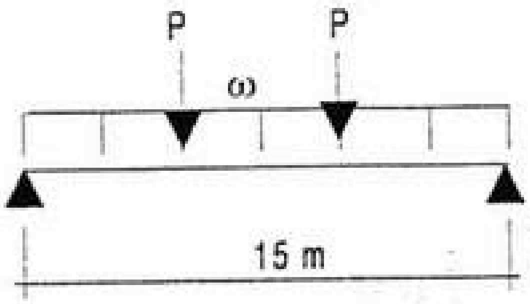
$\sigma c=\ 6.2\ /\ 8.7\ =\ 0.71\ t/cm^2$

$\sigma c\ /fc\ =\ 0.71/0.78\ =\ 0.91\ <\ 1.0$ O.K

BCG2 (15M SPAN , B LINE)



TOP &BOTTOM VIEW



1) DEAD LOAD

$w = 0.75 / 2 = 0.38$ t/m

Ra= Rb= 2.85 t

Md= $0.38 \times 15^2 / 8 = 10.7$ tm

2) CRANE LOAD

Mh= 26.4 tm

Qh= 8.1 t

3) MEMBER DESIGN

㉠ TOP DIAGONAL MEMBER

N= $8.1 \times 1.95 / 1.5 = 10.5$ t

TRY : L - 100 X 100 X 7

A= 13.6 ㎠ iv= 1.97 cm

Lk= $\sqrt{(1.25^2 + 1.5^2)} = 195$ cm

$\lambda = 195 / 1.97 = 99$

fc= 0.89 t/㎠

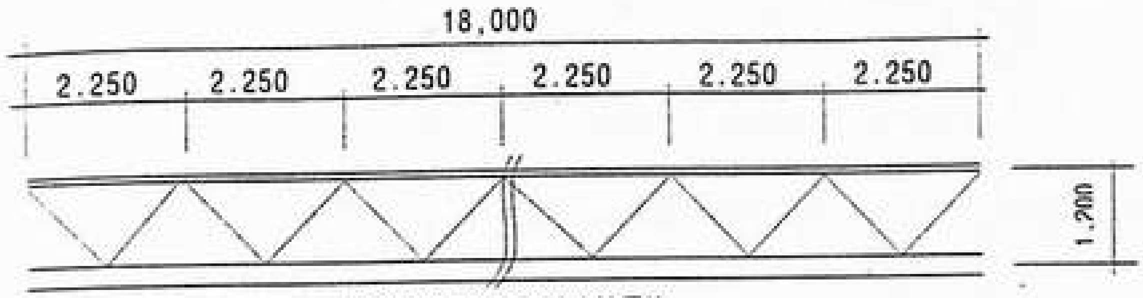
$\sigma c = 10.5 / 13.6 = 0.77$ t/㎠

$\sigma c / fc = 0.77 / 0.89 = 0.87 < 1.0$ O.K

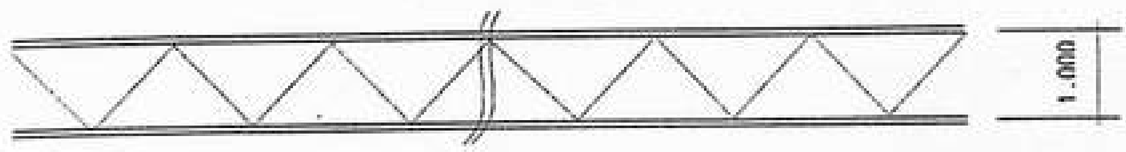
㉡ BOTTOM DIAGONAL MEMBER

TRY : L - 60 X 60 X 5

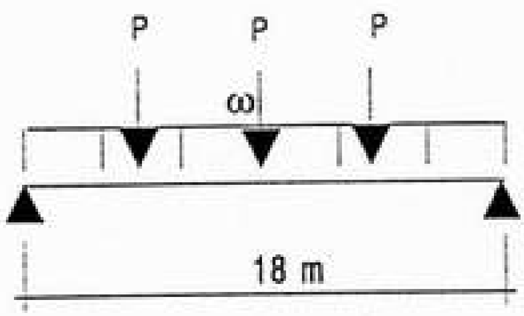
DCG4 (18M SPAN. A LINE)



TOP &BOTTOM VIEW



SIDE VIEW



1) DEAD LOAD

w = 0.6 /2 = 0.3 t/m

P= 0.04 x4.5 x 8 = 1.44 t

Ra= Rb= 4.86 t

Md= 0.3 x 18^2 / 8 + 1.44 x18 / 2 = 25.1 tm

2) WIND LOAD

㉠ TOP CHORD

Pw= 0.06 x4.5 x 2 x 0.8 = 0.43 t

Ra= Rb= 0.65 t

Mw= 0.43 x18 / 2 = 2.4 tm

㉡ BOTTOM CHORD

Pw= 0.06 x4.5 x 4 x 0.8 = 0.86 t

Ra= Rb= 1.3 t

Mw= 0.86 x18 / 2 = 5.18 tm

3) CRANE LOAD

Mh= 9.5 tm

Qh= 2.4 t

4) MEMBER DESIGN

㉠ TOP CHORD

N = 25.1 /1.0 + 9.5 /1.2 = 33 t

TRY : CT - 175 X 175 X 7 X 11

A= 31.6 ㎠ ix= 5.08 cm iy= 3.95 cm

Lk= 225 cm

λ= 225 / 3.95 = 57

fc= 1.32 t/㎠

σc= 33 / 31.6 = 1.05 t/㎠

σc /fc = 1.05 /1.32 = 0.79 < 1.0 O.K

㉡ BOTTOM CHORD

N = 25.1 /1.0 = 25.1 t

TRY : CT - 150 X 150 X 6.5 X 9

A= 23.4 ㎠ ix= 4.45 cm iy= 3.29 cm

Lk= 225 cm

λ= 225 / 3.29 = 68.4

fc= 1.22 t/㎠

σc= 25.1 / 23.4 = 1.07 t/㎠

σc /fc = 1.07 /1.22 = 0.88 < 1.0 O.K

㉢ TOP DIAGONAL MEMBER

N= 2.4 x 1.65 /1.2 = 3.3 t

TRY : L - 75 X 75 X 6

A= 8.7 ㎠ iv= 1.47 cm

Lk= $\sqrt{(1.125^2 + 1.2^2)}$ = 165 cm

λ= 165 / 1.47 = 112

fc= 0.75 t/㎠

σc= 3.3 / 8.7 = 0.38 t/㎠

σc /fc = 0.38 /0.75 = 0.51 < 1.0 O.K

㉣ BOTTOM DIAGONAL MEMBER

N= 1.3 x 1.65 /1.2 = 1.8 t (short term)

TRY : L - 60 X 60 X 5

A= 5.8 ㎠ iv= 1.18 cm

Lk= $\sqrt{(1.125^2 + 1.2^2)}$ = 165 cm

λ= 165 / 1.18 = 140

fc= 0.49 t/㎠

σc= 1.8 / 5.8 = 0.31 t/㎠

σc / fc = 0.31 / 0.49 = 0.63 < 1.0 x1.5 O.K

㊂ SIDE DIAGONAL MEMBER

N= 4.86 x 1.51 /1.0 = 7.3 t

TRY : L - 90 X 90 X 7

A= 12.2 ㎠ iv= 1.77 cm

Lk= $\sqrt{(1.125^2 + 1.0^2)}$ = 151 cm

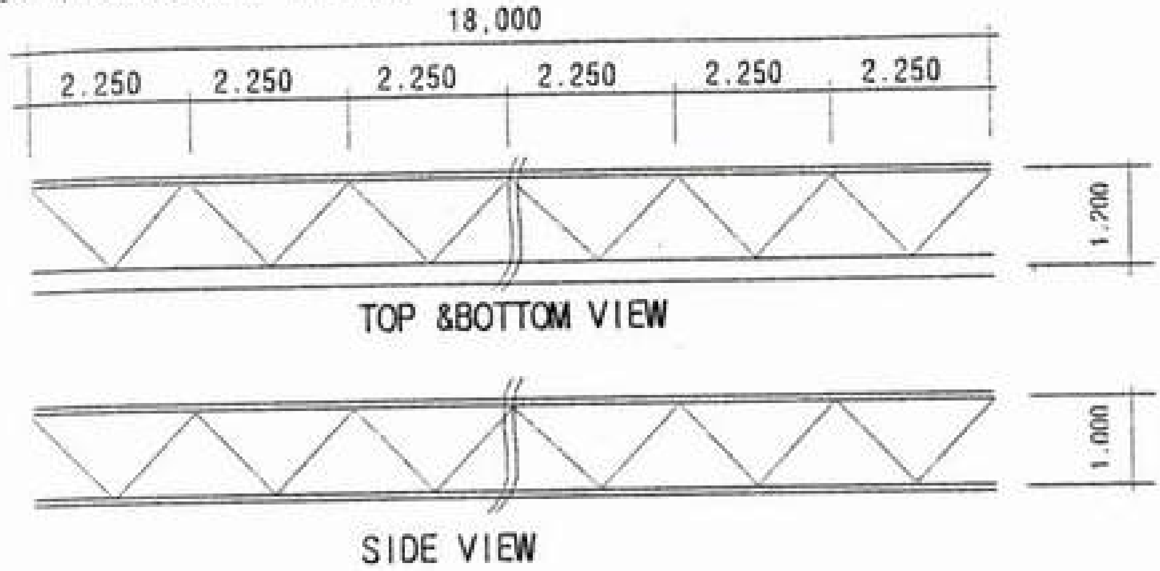
λ = 151 / 1.77 = 85.3

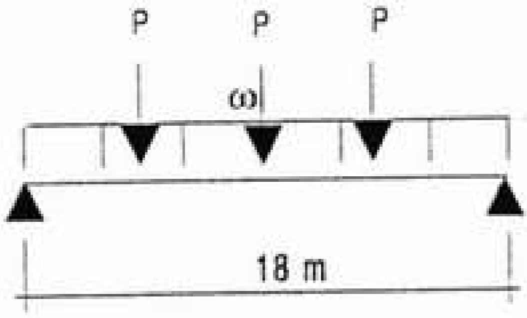
fc= 1.05 t/㎠

σc = 7.3 / 12.2 = 0.6 t/㎠

σc / fc = 0.6 / 1.05 = 0.57 < 1.0 O.K

BCG5 (18M SPAN , C LINE)





1) DEAD LOAD

w = 0.6 /2 = 0.3 t/m

P= 0.04 x4.5 x 8 = 1.44 t

Ra= Rb= 4.86 t

Md= 0.3 x 18^2 / 8 + 1.44 18 / 2 = 25.1 tm

2) WIND LOAD

㉠ TOP CHORD

Pw= 0.06 x4.5 x 2 x 0.8 = 0.43 t

Ra= Rb= 0.65 t

Mw= 0.43 18 / 2 = 2.4 tm

㉡ BOTTOM CHORD

Pw= 0.06 x4.5 x 4 x 0.8 = 0.86 t

Ra= Rb= 1.3 t

Mw= 0.86 18 / 2 = 5.18 tm

3) CRANE LOAD

Mh= 25.2 tm

Qh= 6.2 t

4) MEMBER DESIGN

㉠ TOP CHORD

N = 25.1 /1.0 + 25.2 /1.2 = 46.1 t

TRY : CT - 200 X 200 X 8 X 13

A= 42.1 cm² ix= 5.76 cm iy= 4.54 cm

Lk= 225 cm

λ= 225 / 4.54 = 49.6

fc= 1.38 t/cm²

σc= 46.1 / 42.1 = 1.1 t/cm²

σc /fc = 1.1 /1.38 = 0.79 < 1.0 O.K

㉡ BOTTOM CHORD

N = 25.1 /1.0 = 25.1 t

TRY : CT - 150 X 150 X 6.5 X 9

A= 23.4 cm² ix= 4.45 cm iy= 3.29 cm

Lk= 225 cm

λ= 225 / 3.29 = 68.4

fc= 1.22 t/cm²

σc= 25.1 / 23.4 = 1.07 t/cm²

σc /fc = 1.07 /1.22 = 0.88 < 1.0 O.K

㉢ TOP DIAGONAL MEMBER

N= 6.2 x 1.65 /1.2 = 8.5 t

TRY : L - 90 X 90 X 7

A= 12.2 cm² iv= 1.77 cm

Lk= $\sqrt{(1.125^2 + 1.2^2)}$ = 165 cm

λ= 165 / 1.77 = 93.2

fc= 0.96 t/cm²

σc= 8.5 / 12.2 = 0.7 t/cm²

σc /fc = 0.7 /0.96 = 0.73 < 1.0 O.K

㉣ BOTTOM DIAGONAL MEMBER

N= 1.3 x 1.65 /1.2 = 1.8 t (short term)

TRY : L - 60 X 60 X 5

A= 5.8 cm² iv= 1.18 cm

Lk= $\sqrt{(1.125^2 + 1.2^2)}$ = 165 cm

λ= 165 / 1.18 = 140

fc= 0.49 t/cm²

σc= 1.8 / 5.8 = 0.31 t/cm²

$\sigma c \ / fc \ = \ 0.31 / 0.49 \ = \ 0.63 < 1.0 \times 1.5$ O.K

⊖ SIDE DIAGONAL MEMBER

N= 4.86 x 1.51 /1.0 = 7.3 t

TRY : L - 90 X 90 X 7

A= 12.2 ㎠   iv= 1.77 cm

$Lk = \sqrt{(1.125^2 + 1.0^2)} = 151$ cm

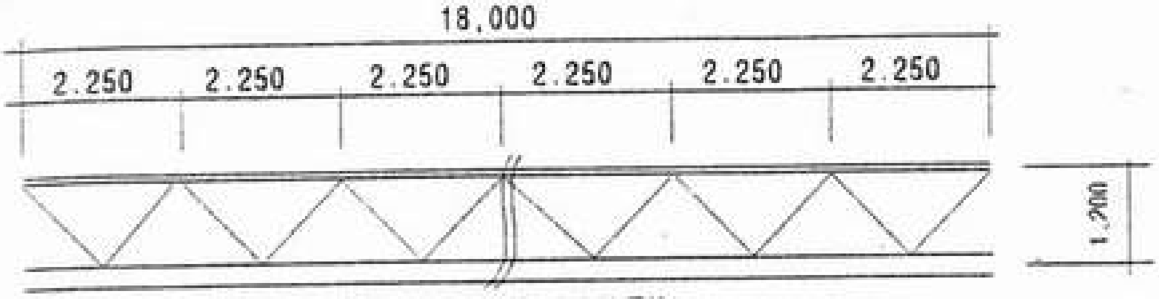
$\lambda = 151 / 1.77 = 85.3$

fc= 1.05 t/㎠

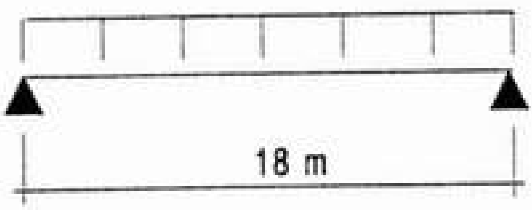
$\sigma c = 7.3 / 12.2 = 0.6$ t/㎠

$\sigma c \ / fc \ = \ 0.6 / 1.05 \ = \ 0.57 < 1.0$ O.K

BCG6 (18M SPAN , B LINE)



TOP &BOTTOM VIEW



1) DEAD LOAD

$w = 0.75 / 2 = 0.38$ t/m

$Ra = Rb = 3.42$ t

$Md = 0.38 \times 18^2 / 8 = 15.4$ tm

2) CRANE LOAD

$Mh = 34.7$ tm

$Qh = 8.6$ t

3) MEMBER DESIGN

㉠ TOP DIAGONAL MEMBER

$N = 8.6 \times 1.88 / 1.5 = 10.8$ t

TRY : L - 100 X 100 X 7

$A = 13.6$ cm² $iv = 1.97$ cm

$Lk = \sqrt{(1.125^2 + 1.5^2)} = 188$ cm

$\lambda = 188 / 1.97 = 95.4$

$fc = 0.93$ t/cm²

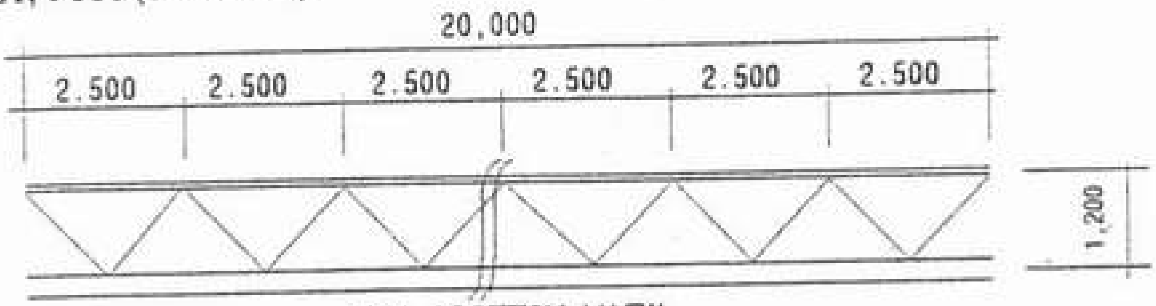
$\sigma c = 10.8 / 13.6 = 0.79$ t/cm²

$\sigma c / fc = 0.79 / 0.93 = 0.85 < 1.0$ O.K

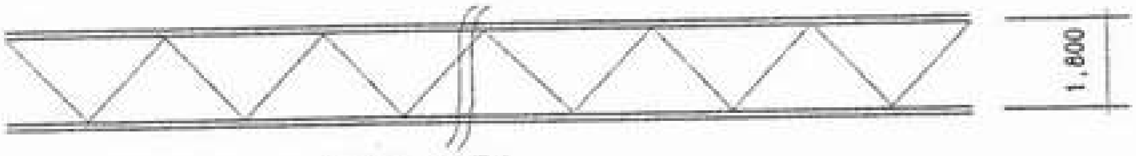
㉡ BOTTOM DIAGONAL MEMBER

TRY : L - 60 X 60 X 5

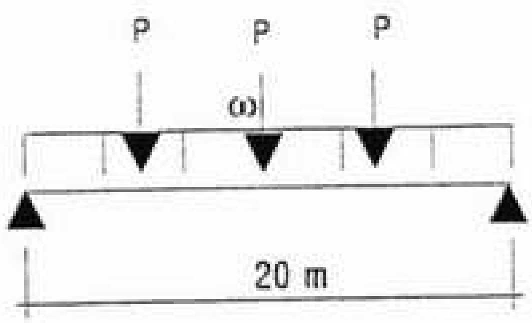
8CG1, 9CG1 (20M SPAN)



TOP &BOTTOM VIEW



SIDE VIEW



1) DEAD LOAD

w = 0.6 /2 = 0.3 t/m

P= 0.04 x5.0 x 8 = 1.6 t

Ra= Rb= 5.4 t

Md= 0.3 x 20^2 / 8 + 1.6 20 / 2 = 31.0 tm

2) WIND LOAD

㉠ TOP CHORD

Pw= 0.06 x5.0 x 2 x 0.8 = 0.48 t

Ra= Rb= 0.72 t

Mw= 0.48 20 / 2 = 2.4 tm

㉡ BOTTOM CHORD

Pw= 0.06 x5.0 x 4 x 0.8 = 0.96 t

Ra= Rb= 1.44 t

Mw= 0.96 20 / 2 = 6.4 tm

3) CRANE LOAD

Mh= 21.5 tm

Qh= 5.0 t

4) MEMBER DESIGN

㉠ TOP CHORD

N = 31.0 /1.8 + 21.5 /1.2 = 35.1 t

TRY : CT - 200 X 200 X 8 X 13

A= 42.1 ㎠ ix= 5.76 cm iy= 4.54 cm

Lk= 250 cm

λ= 250 / 4.54 = 55.1

fc= 1.34 t/㎠

σc= 35.1 / 42.1 = 0.83 t/㎠

σc /fc = 0.83 /1.34 = 0.62 < 1.0 O.K

㉡ BOTTOM CHORD

N = 31 /1.8 = 17.2 t

TRY : CT - 150 X 150 X 6.5 X 9

A= 23.4 ㎠ ix= 4.45 cm iy= 3.29 cm

Lk= 250 cm

λ= 250 / 3.29 = 76

fc= 1.14 t/㎠

σc= 17.2 / 23.4 = 0.74 t/㎠

σc /fc = 0.74 /1.14 = 0.65 < 1.0 O.K

㉢ TOP DIAGONAL MEMBER

N= 5 x 1.73 /1.2 = 7.2 t

TRY : L - 90 X 90 X 7

A= 12.2 ㎠ iv= 1.77 cm

Lk= $\sqrt{(1.25^2 + 1.2^2)}$ = 173 cm

λ= 173 / 1.77 = 97.7

fc= 0.91 t/㎠

σc= 7.2 / 12.2 = 0.59 t/㎠

σc /fc = 0.59 /0.91 = 0.65 < 1.0 O.K

㉣ BOTTOM DIAGONAL MEMBER

N= 1.44 x 1.73 /1.2 = 2.1 t (short term)

TRY : L - 60 X 60 X 5

A= 5.8 ㎠ iv= 1.18 cm

Lk= $\sqrt{(1.25^2 + 1.2^2)}$ = 173 cm

λ= 173 / 1.18 = 147

fc= 0.44 t/㎠

σc= 2.1 / 5.8 = 0.36 t/㎠

$\sigma c \ / fc \ = \ 0.36 / 0.44 \ = \ 0.82 \ < \ 1.0 \times 1.5$ O.K

㊀ SIDE DIAGONAL MEMBER

N= 5.4 x 2.19 /1.8 = 6.6 t

TRY : L - 90 X 90 X 7

A= 12.2 ㎠ iv= 1.77 cm

$Lk = \sqrt{(1.25^2 + 1.8^2)} = 219$ cm

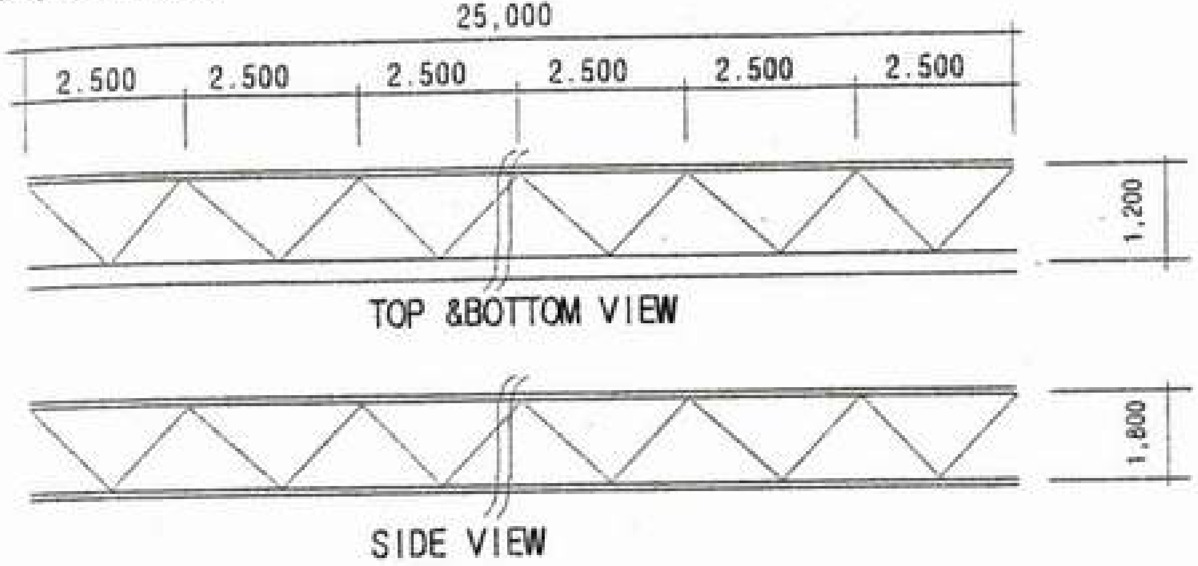
$\lambda = 219 \ / \ 1.77 = 124$

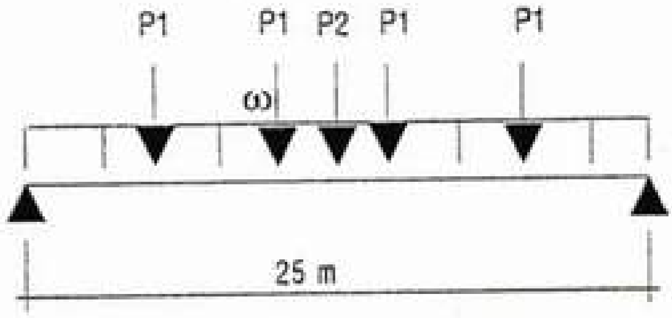
fc= 0.62 t/㎠

$\sigma c = 6.6 \ / \ 12.2 = 0.54$ t/㎠

$\sigma c \ / fc \ = \ 0.54 / 0.62 \ = \ 0.87 \ < \ 1.0$ O.K

8CG2(25M SPAN)





1) DEAD LOAD

w = 0.6 /2 = 0.3 t/m

P1= 0.04 x5.0 x 8 = 1.6 t P2= 28.5 t(computer analysis)

Ra= Rb= 21.2 t

Md= 0.3 x 25^2 / 8 + 17.5 x12.5 -1.6 x 10 = 226.2 tm

2) WIND LOAD

㉠ TOP CHORD

Pw= 0.06 x5.0 x 2 x 0.8 = 0.48 t

Ra= Rb= 0.96 t

Mw= 0.48 x 25 x 3 / 5 = 7.2 tm

㉡ BOTTOM CHORD

Pw= 0.06 x5.0 x 4 x 0.8 = 0.96 t

Ra= Rb= 1.92 t

Mw= 0.96 x 25 x 3 / 5 = 14.4 tm

3) CRANE LOAD

Mh= 28.6 tm

Qh= 5.2 t

4) MEMBER DESIGN

㉠ TOP CHORD

N = 226.2 /1.8 + 28.6 /1.2 = 149.5 t

TRY : H - 300 X 300 X 10 X 15

A= 119 ㎠ ix= 13.1 cm iy= 7.51 cm

Lk= 250 cm

λ = 250 / 7.51 = 33.3

fc= 1.5 t/㎠

σc= 149 / 119 = 1.26 t/㎠

σc /fc = 1.26 /1.50 = 0.837 < 1.0 O.K

㉡ BOTTOM CHORD

N = 226.2 /1.8 = 126 t

TRY : H - 300 X 300 X 10 X 15

A= 119 ㎠ ix= 13.1 cm iy= 7.51 cm

Lk= 250 cm

λ = 250 / 7.51 = 33.3

fc= 1.5 t/㎠

σc= 126 / 119 = 1.06 t/㎠

σc /fc = 1.06 /1.50 = 0.704 < 1.0 O.K

㉢ TOP DIAGONAL MEMBER

N= 5.2 x 1.73 /1.2 = 7.5 t

TRY : L - 90 X 90 X 7

A= 12.2 ㎠ iv= 1.77 cm

Lk= $\sqrt{(1.25^2 + 1.2^2)}$ = 173 cm

λ = 173 / 1.77 = 97.7

fc= 0.91 t/㎠

σc= 7.5 / 12.2 = 0.61 t/㎠

σc /fc = 0.61 /0.91 = 0.676 < 1.0 O.K

ⓔ BOTTOM DIAGONAL MEMBER

N= 1.92 x 1.73 /1.2 = 2.8 t (short term)

TRY : L - 60 X 60 X 5

A= 5.8 ㎠ iv= 1.18 cm

Lk= $\sqrt{(1.25^2 + 1.2^2)}$ = 173 cm

λ= 173 / 1.18 = 147

fc= 0.44 t/㎠

σc= 2.8 / 5.8 = 0.48 t/㎠

σc /fc = 0.48 /0.44 = 1.097 < 1.0 x1.5 O.K

ⓔ SIDE DIAGONAL MEMBER

N= 21.2 x 2.19 /1.8 = 25.8 t

TRY : CT - 150 X 150 X 6.5 X 9

A= 23.4 ㎠ ix= 4.45 cm iy= 3.29 cm

Lk= $\sqrt{(1.25^2 + 1.8^2)}$ = 219 cm

λ= 219 / 3.29 = 66.6

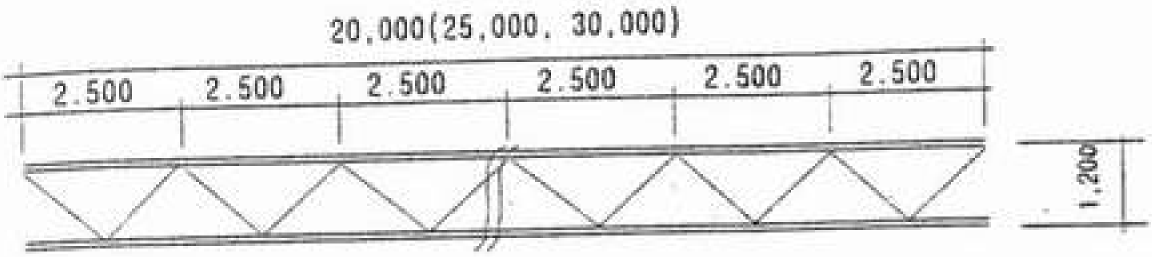
fc= 1.23 t/㎠

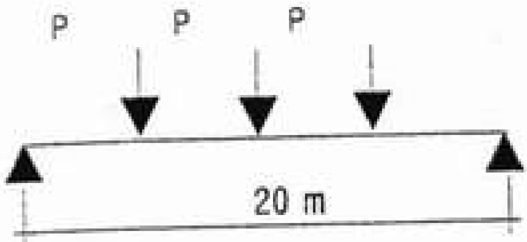
σc= 25.8 / 23.4 = 1.1 t/㎠

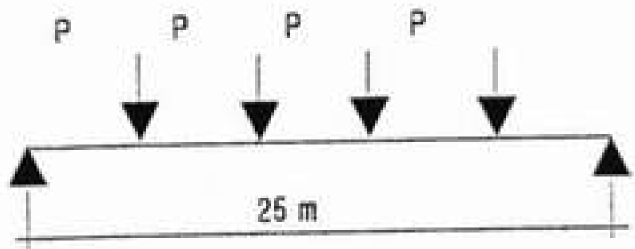
σc /fc = 1.1 /1.23 = 0.896 < 1.0 O.K

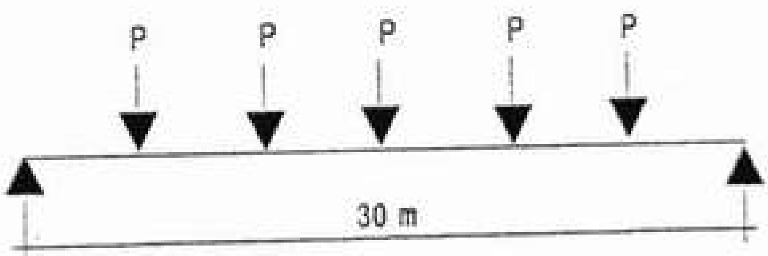
9. DESIGN OF SUB COLUMN & WIND GIRDER

WIND GIRDER DESIGN(AWG1,DWG1,1WG1,1WG2)









1) 1WG1

Pw = 0.8 x 0.06 x 5 x 7.3 = 1.75 t
Mw = 3 x 1.75 x 25 /5.0 = 26.3 tm
Ra = Rb = 2 x 1.75 = 3.5 t

ωd= 0.25 t(D.L + L.L)
Md = 0.25 x 5^2 / 8 = 0.78 tm
Ra = Rb = 0.63t

㉠ TOP & BOTTOM CHORD
N = 26.3 /1.2 = 21.9 t
TRY : CT - 147 X 200 X 8 X 12

A= 36.2 t/㎠ ix= 3.97 cm iy= 4.7 cm
Zx= 48.2 t/㎤ Zy= 80.2 t/㎤
Lkx= 250 cm Lky= 500 cm
λx= 250 / 3.97 = 63
λy= 500 / 4.7 = 106
fc= 0.82 t/㎠
σc= 21.9 / 36.2 = 0.61 t/㎠
σc /fc = 0.61 /0.82 = 0.74 < 1.0 O.K

fb= (1-0.4x (λ^2 /λp^2)) x ft = 1.1 t/㎠
σb= 78.1 / 80.2 = 0.97
σb /fb = 0.97 /1.10 = 0.89 < 1.0 O.K

㉡ DIAGONAL MEMBER

N= 3.5 x 1.73 /1.2 = 5.0 t

TRY : L - 90 X 90 X 7

A= 12.2 ㎠ iv= 1.77 cm

Lk= $\sqrt{(1.25^2 + 1.2^2)}$ = 173 cm

λ = 173 / 1.77 = 97.7

fc= 0.91 t/㎠

σc= 5 / 12.2 = 0.41 t/㎠

σc /fc = 0.41 /0.91 = 0.45 < 1.0 O.K

2) 1WG2

Pw = 0.8 x 0.06 x 5 x 7.3 = 1.75 t

Mw = 1.75 x 20 /2.0 = 17.5 tm

Ra = Rb = 3 x 1.75 /2 = 2.63 t

ωd= 0.25 t(D.L + L.L)

Md = 0.25 x 5^2 / 8 = 0.78 tm

Ra = Rb = 0.63t

㉠ TOP & BOTTOM CHORD

N = 17.5 /1.2 = 14.6 t

TRY : CT - 147 X 200 X 8 X 12

A= 36.2 t/㎠ ix= 3.97 cm iy= 4.7 cm

Zx= 48.2 t/㎠ Zy= 80.2 t/㎠

Lkx= 250 cm Lky= 500 cm

λx= 250 / 3.97 = 63

λy= 500 / 4.7 = 106

fc= 0.82 t/㎠

σc= 14.6 / 36.2 = 0.4 t/㎠

σc /fc = 0.4 /0.82 = 0.49 < 1.0 O.K

fb= (1- 0.4x (λ^2 / λp^2)) x ft = 1.1 t/㎠

σb= 78.1 / 80.2 = 0.97

σb /fb = 0.97 /1.10 = 0.89 < 1.0 O.K

㉡ DIAGONAL MEMBER

N= 2.63 x 1.73 /1.2 = 3.8 t

TRY : L - 90 X 90 X 7

A= 12.2 ㎠ iv= 1.77 cm

Lk= $\sqrt{(1.25^2 + 1.2^2)}$ = 173 cm

λ = 173 / 1.77 = 97.7

fc= 0.91 t/㎠

σc= 3.8 / 12.2 = 0.31 t/㎠

σc /fc = 0.31 /0.91 = 0.34 < 1.0 O.K

3) AWG1, DWG1

$P_w = 0.8 \times 0.06 \times 5 \times 7.3 = 1.75$ t

$M_w = 3 \times 1.75 \times 30 / 4.0 = 39.4$ tm

$R_a = R_b = 5 \times 1.75 / 2 = 4.38$ t

$\omega d = 0.25$ t(D.L + L.L)

$M_d = 0.25 \times 5^2 / 8 = 0.78$ tm

$R_a = R_b = 0.63$t

㉠ TOP & BOTTOM CHORD

$N = 39.4 / 1.2 = 32.8$ t

TRY : CT - 170 X 250 X 9 X 14

A= 50.7 t/㎠ ix= 4.48 cm iy= 6.0 cm

Zx= 73.1 t/㎠ Zy= 146 t/㎠

Lkx= 250 cm Lky= 500 cm

$\lambda x = 250 / 4.48 = 55.8$

$\lambda y = 500 / 6.0 = 83.3$

fc= 1.33 t/㎠

$\sigma c = 32.8 / 50.7 = 0.65$ t/㎠

$\sigma c / fc = 0.65 / 1.33 = 0.49 < 1.0$ O.K

$fb = (1 - 0.4x (\lambda^2 / \lambda p^2)) \times ft = 1.29$ t/㎠

$\sigma b = 78.1 / 146 = 0.54$

$\sigma b / fb = 0.54 / 1.29 = 0.41 < 1.0$ O.K

㉡ DIAGONAL MEMBER

$N = 4.38 \times 1.73 / 1.2 = 6.3$ t

TRY : L - 90 X 90 X 7

A= 12.2 ㎠ iv= 1.77 cm

$Lk = \sqrt{(1.25^2 + 1.2^2)} = 173$ cm

$\lambda = 173 / 1.77 = 97.7$

fc= 0.91 t/㎠

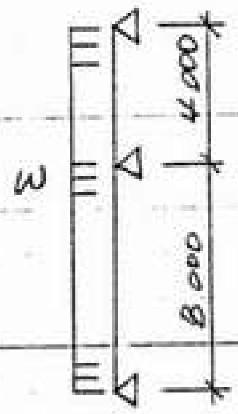
$\sigma c = 6.3 / 12.2 = 0.52$ t/㎠

$\sigma c / fc = 0.52 / 0.91 = 0.57 < 1.0$ O.K

Project :	Date :	Sheet : /
Title :	By :	Check :

SUB COLUMN DESIGN

1) A∼C LINE, 8∼9 ROW.



$w = 0.8 \times 0.06 \times 5 = 0.24\ t/m$

$M = 0.24 \times 8^2 / 8 = 1.92\ tm$

TRY H-194×150×6×9

$A = 39\ cm^2 \qquad i_y = 4.03\ cm$

$I_x = 2690\ cm^4 \qquad Z_x = 277\ cm^3$

$l_k = 800\ cm$

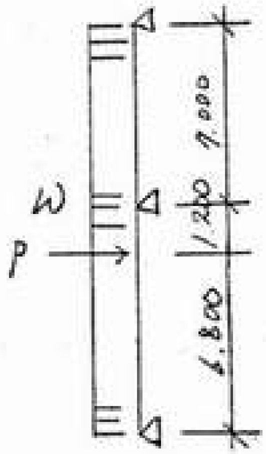
$\lambda = 800 / 4.03 = 199 > \lambda_p$

$f_b = 900 / (l_k \cdot h / A_f) = 0.72\ t/cm^2$

$\sigma_b = 192 / 277 = 0.69\ t/cm^2 < 1.5\ f_b \quad O.K.$

Project :	Date : . .	Sheet : /
Title :	By :	Check :

2). GABLE (1 ROW. A.D LINE)



$w = 0.8 \times 0.06 \times 5 = 0.24 t/m$

$P = 3.4 \times \cancel{0.8}\ 45 = 2.4t$ (for WIND GIR.)

$M = 0.24 \times 8^2/8 + 2.4 \times 1.2 \times 6.8/8$

$= 4.37\ tm.$

TRY H - 200 x 200 x 8 x 12

$A = 63.5 cm^2 \qquad i_y = 5.5 cm$

$Z_x = 472 cm^3 \qquad I_x = 4720 cm^4$

$l_k = 800 cm$

$\lambda = 800/5.5 = 145 > \lambda_p$.

$f_b = 900/(l_k \cdot h/A_f) = 1.35 t/cm^2$.

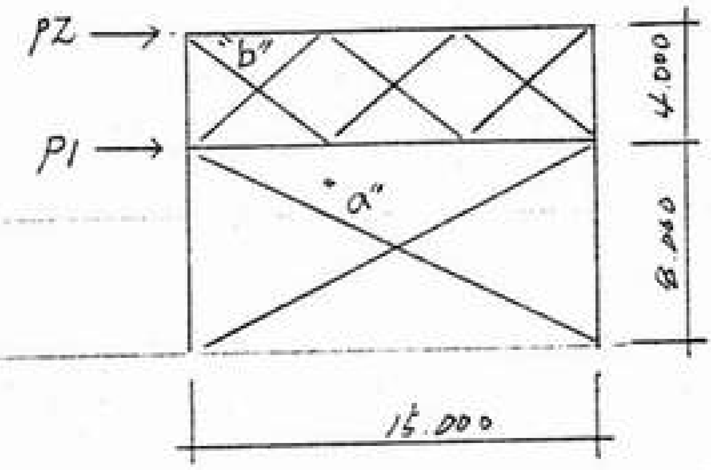
$\sigma_b = 437/412 = 0.93 t/cm^2 < 1.5 f_b$ O.K.

10. DESIGN OF WALL BRACING

Project :	Date : . .	Sheet : /
Title :	By :	Check :

WALL BRACING DESIGN

1) A-LINE



P1

$C.L = 2 \times 13.8 \times 0.15 = 4.2t$

$W.L = 1.4 \times 0.06 \times 10 \times 6 = 5.0t$

P2

$W.L = 1.4 \times 0.06 \times 10 \times 2 = 1.7t$

① MEMBER "a" (LATTICE TYPE)

$N_L = 4.2 \times 17 / 15 = 4.8t$

$N_S = 4.8 + 0.5 \times 5.0 \times 17/15 = 7.6t$

TRY CT-147 × 200 × 8 × 12.

$A = 36.2\,cm^2$ $\quad i_x = 3.97\,cm$ $\quad i_y = 4.71\,cm$

$l_k = 850\,cm$

$\lambda = 850/4.71 = 181 < 300$ O.K.

$f_t = 1.6\,t/cm^2$

$\sigma_t = 7.6/36.2 = 0.21\,t/cm^2 < f_t$ O.K

Project :	Date : . .	Sheet : /
Title :	By :	Check :

② MEMBER "b" (SINGLE)

$N_s = 1.7 \times 6.4 / 5 = 2.^2 t$

TRY L - 90×90×7

$l_k = 320 cm$

$\lambda = 320 / 1.77 = 181 < 300$ O.K

2) B - C LINE

P1

$C.L = 2 \times 15.8 \times 0.15 + 2 \times 26.8 \times 0.15 = 12.8 t$

$W.L = 1.4 \times 0.06 \times 6 \times 22.5 = 11.3 t$

P2

$W.L = 1.4 \times 0.06 \times 4^5 \times 22.5 = 8.^5 t$

① MEMBER "a" (LATTICE TYPE)

$N_L = 12.^8 \times 17 / 15 = 14.^5 t$

$N_s = 14.^5 + 0.5 \times 11.^3 \times 17/15 = 20.9 t$

TRY CT - 147 × 200 × 8 × 12

$A = 36.^2 cm^2$ $\quad i_x = 3.97 cm$ $\quad i_y = 4.71 cm$

$l_k = 850 cm$

$\lambda = 850 / 4.71 = 181 < 300$ O.K

$f_t = 1.6 t/cm^2$

$\sigma_t = 14.^5 / 36.^2 = 0.4 t/cm^2 < f_t$ O.K

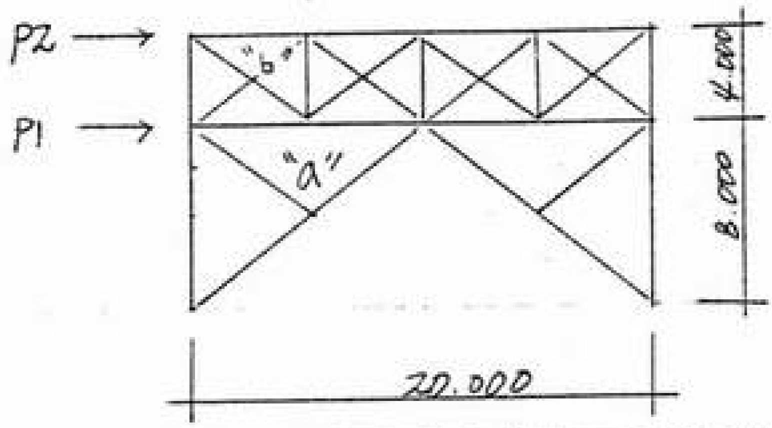
② MEMBER "b" (SINGLE)

$N_s = 3.5 \times 6.4 / 5 = 10.^9 t$

USE L - 90×90×7.

Project :	Date : . .	Sheet : /
Title :	By :	Check :

3) 8. 9 ROW



P1

$C.L = 2 \times 28.9 \times 0.15 = 8.7t$

$W.L = 1.4 \times 0.06 \times 6 \times 15 = 7.6t$

P2

$W.L = 1.4 \times 0.06 \times 2 \times 15 = 2.5t$

① MEMBER "a" (LATTICE TYPE)

$N_L = 8.7 \times 12.8/10 = 11.1t$

$N_S = 11.1 + 0.5 \times 7.6 \times 12.8/10 = 16.0t$

TRY CT - 147 × 200 × 8 × 12

$A = 36.2 cm^2$ $\quad i_x = 3.97 cm.$ $\quad i_y = 4.71 cm$

$l_K = 640 cm$

$\lambda = 640/4.71 = 136 < 200$ O.K.

$f_c = 0.52 t/cm^2$

$\sigma_c = 11.1/36.2 = 0.31 t/cm^2 < f_c$ O.K

Project :	Date : . .	Sheet : /
Title :	By :	Check :

② MEMBER "b" (SINGLE)

$N_S = 2.5 \times 6.4 / 5 = 3.2t$

USE L-90×90×7

11. ETC

Project :	Date : . .	Sheet : /
Title :	By :	Check :

PURLIN (15M)

$W = 0.09 \times 4.6 = 0.41 t/m$.

$M = 3.85 tm$ (COMPUTER ANALYSIS)

TRY H-300 × 150 × 6.5 × 9.

$A = 46.7 cm^2$

$I_x = 7210 cm^4$ $\quad$ $I_y = 508 cm^4$

$Z_x = 481 cm^3$ $\quad$ $Z_y = 67.7 cm^3$.

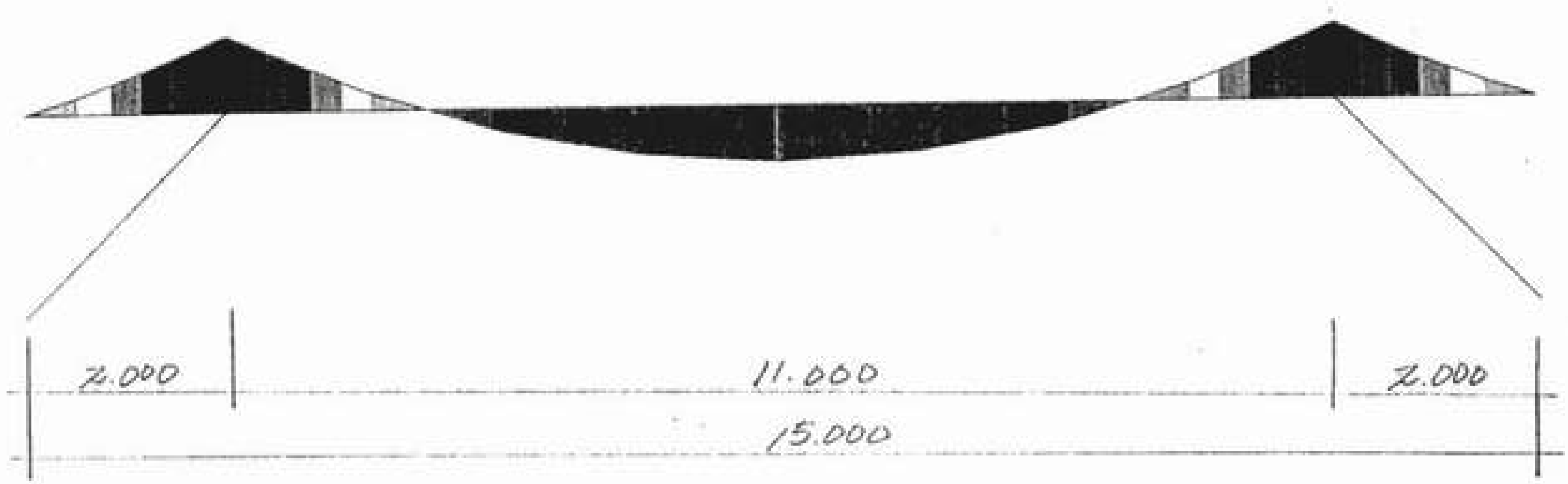
$i_y = 3.87 cm$

$l_{kx} = 1100 cm$ $\quad$ $l_{ky} = 500 cm$

$\lambda_y = 500 / 3.87 = 129 > \lambda_p$.

$f_b = 900 / (l_k \cdot h / A_f) = 0.81 t/cm^2$

$\sigma_b = 385 / 481 = 0.8 t/cm^2 < f_b$ O.K



MIDAS/GEN-GPS
POST-PROCESSOR

BEAM-B.M.D.

LOCAL-y

-3.850E+00
-3.249E+00
-2.647E+00
-2.046E+00
-1.444E+00
-8.431E-01
-2.417E-01
3.596E-01
9.610E-01
1.562E+00
2.164E+00
2.765E+00

LOADCOMB ID.= 1

FILE : PURLIN
UNIT: TON-M
DATE: 02-22-97

VIEW-DIRECTION

X: .000
Y: -1.000
Z: .000

PROJECT:
TITLE :
:
USER :

Project :	Date :	Sheet : /
Title :	By :	Check :

PURLIN (15M. SUPPORTING MONITOR)

$w = 0.09 \times 4.6 + 500/2 = 0.66t/m$

MONITOR ($w = 4m$) : 500kg/m

$M = 6.16tm$ (COMPUTER ANALYSIS)

TRY H-294 × 200 × 8 × 12

$A = 72.4cm^2$

$I_x = 11300\ cm^4$ $\quad I_y = 1600\ cm^4$

$Z_x = 771\ cm^3$ $\quad Z_y = 160\ cm^3$

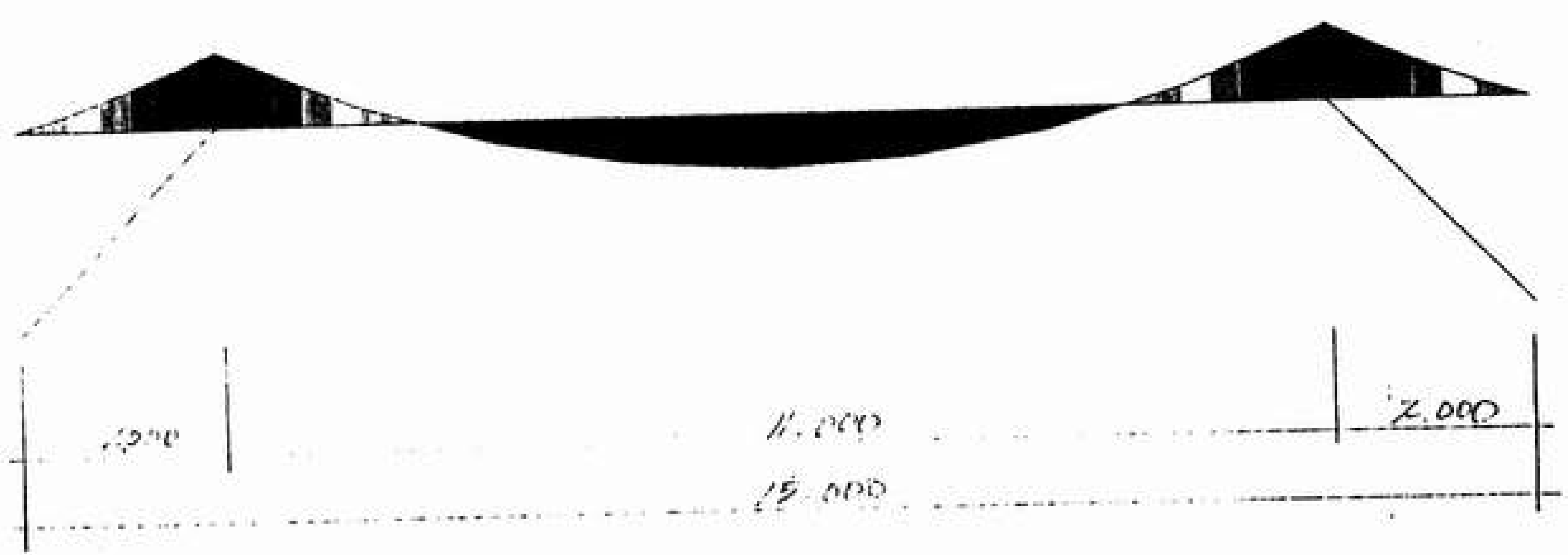
$i_y = 5.32cm$

$l_{kx} = 1100\ cm$ $\quad l_{ky} = 500\ cm$

$\lambda_y = 500/5.32 = 94 < \lambda_p$

$f_b = (1 - 0.4 \times \frac{\lambda^2}{\lambda_p^2}) \times f_t = 1.21t/cm^2$

$\sigma_b = 616/771 = 0.8t/cm^2 < f_b$



MIDAS/GEN-GPS
POST-PROCESSOR

BEAM-B.M.D.

LOCAL-y

-6.163E+00
-5.200E+00
-4.238E+00
-3.275E+00
-2.313E+00
-1.350E+00
-3.875E-01
5.750E-01
1.537E+00
2.500E+00
3.462E+00
4.125E+00

LOADCOMB ID.= 2

FILE : PURLIN
UNIT: TON-M
DATE: 02-22-97

VIEW-DIRECTION

X: .000
Y: -1.000
Z: .000

PROJECT:
TITLE :
:
USER :

Project :	Date : . .	Sheet : /
Title :	By :	Check :

PURLIN (18M)

$w = 0.09 \times 4.6 = 0.41\ t/m$

$M = 6.52tm$ (COMPUTER ANALYSIS)

TRY H - 294 x 200 x 8 x 12

$A = 72.4\ cm^2$

$I_x = 11300\ cm^4$ $\quad I_y = 1600\ cm^4$

$Z_x = 771\ cm^3$ $\quad Z_y = 160\ cm^3$

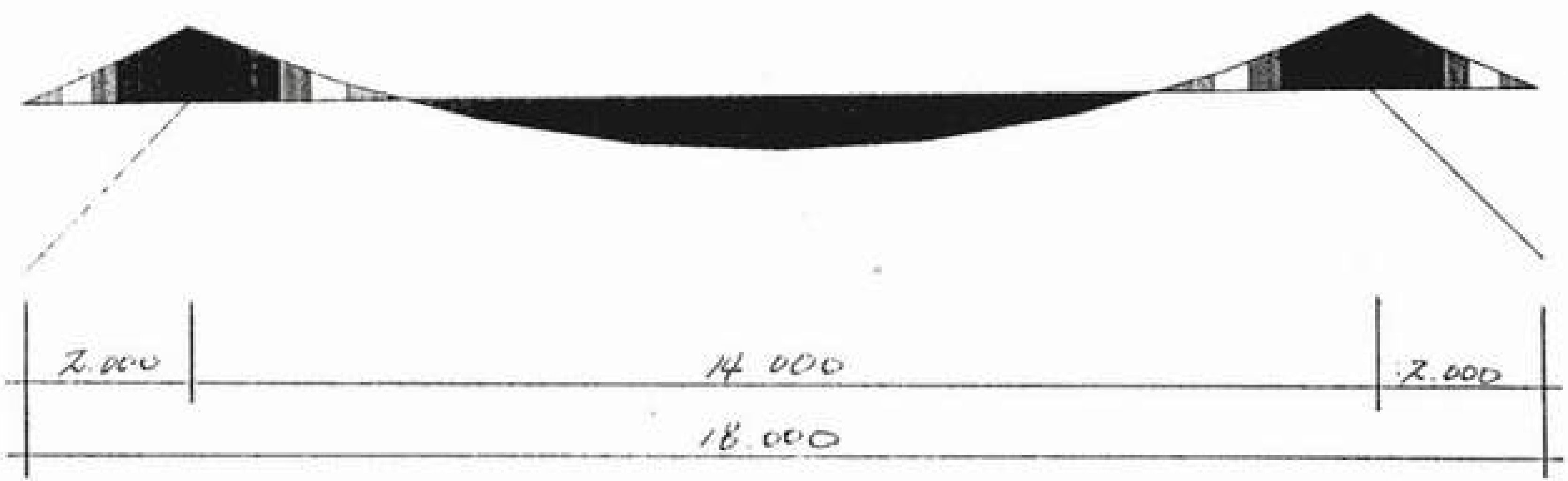
$i_y = 5.32\ cm$

$l_{kx} = 1400\ cm$ $\quad l_{ky} = 450\ cm$

$\lambda_y = 450 / 5.32 = 85 < \lambda_p$

$f_b = 1.21\ t/cm^2$

$\sigma_b = 652 / 771 = 0.85\ t/cm^2 < f_b$



MIDAS/GEN-GPS
POST-PROCESSOR

BEAM-B.M.D.

LOCAL-y
-6.524E+00
-5.504E+00
-4.485E+00
-3.466E+00
-2.446E+00
-1.427E+00
-4.076E-01
6.118E-01
1.631E+00
2.650E+00
3.670E+00
4.689E+00

LOADCOMB ID.= 1

FILE : PURLIN1
UNIT: TON-M
DATE: 02-22-97

VIEW-DIRECTION
X: .000
Y: -1.000
Z: .000

PROJECT:
TITLE :
:
USER :

Project :	Date : . .	Sheet : /
Title :	By :	Check :

PURLIN (18M, SUPPORTING MONITORS)

$w = 0.09 \times 4.6 + 500/2 = 0.66\ t/m$

$M = 9.98\ tm$ (COMPUTER ANALYSIS)

TRY $H - 400 \times 200 \times 8 \times 13$

$A = 84.1\ cm^2$

$I_x = 23700\ cm^4$ $\qquad I_y = 1740\ cm^4$

$Z_x = 1190\ cm^3$ $\qquad Z_y = 174\ cm^3$

$i_y = 5.26 cm$

$l_{kx} = 1400\ cm$ $\qquad l_{ky} = 450\ cm$

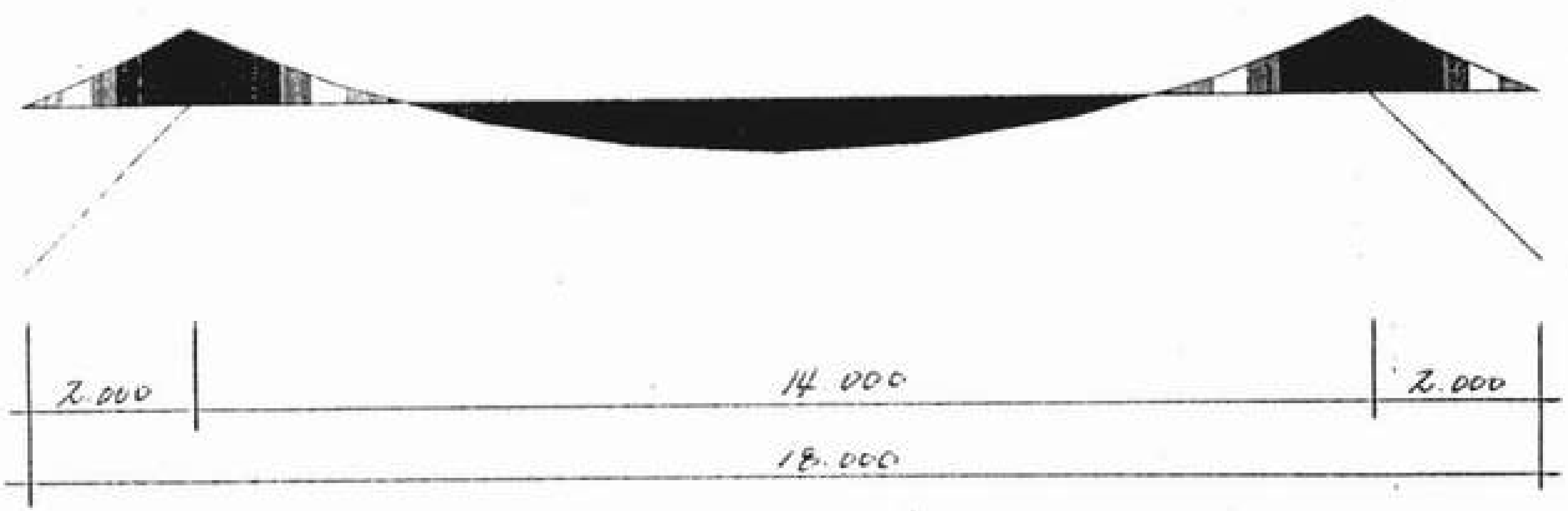
$\lambda_y = 450/5.26 = 86 < \lambda_p$

$f_b = (1 - 0.4 \times \dfrac{\lambda^2}{\lambda_p^2}) \times 1.6 = 1.27 t/cm^2$

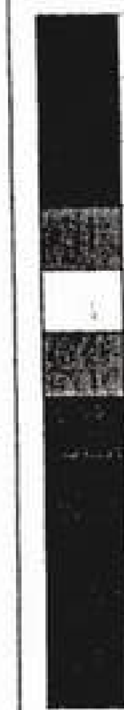
$\sigma_b = 998 / 1190 = 0.84 t/cm^2 < f_b$.

MIDAS/GEN-GPS
POST-PROCESSOR

BEAM-B.M.D.



LOCAL-y



-9.979E+00
-8.420E+00
-6.861E+00
-5.302E+00
-3.743E+00
-2.181E+00
-6.247E-01
9.314E-01
2.493E+00
4.053E+00
5.612E+00
7.171E+00

LOADCOMB ID.= 2

FILE : PURLIN1
UNIT: TON-M
DATE: 02-22-97

VIEW-DIRECTION

X: .000
Y: 1.000
Z: .000

PROJECT:
TITLE :
:
USER :

Project :	Date : . .	Sheet : /
Title :	By :	Check :

PURLIN (20M)

$w = 0.09 \times 5.0 = 0.45\ t/m$

$M = 8.81\ t/m$ (COMPUTER ANALYSIS)

TRY H-294 x 200 x 8 x 12

$A = 72.4\ cm^2$

$I_x = 11300\ cm^4$ $\quad I_y = 1600\ cm^4$

$Z_x = 771\ cm^3$ $\quad Z_y = 160\ cm^3$

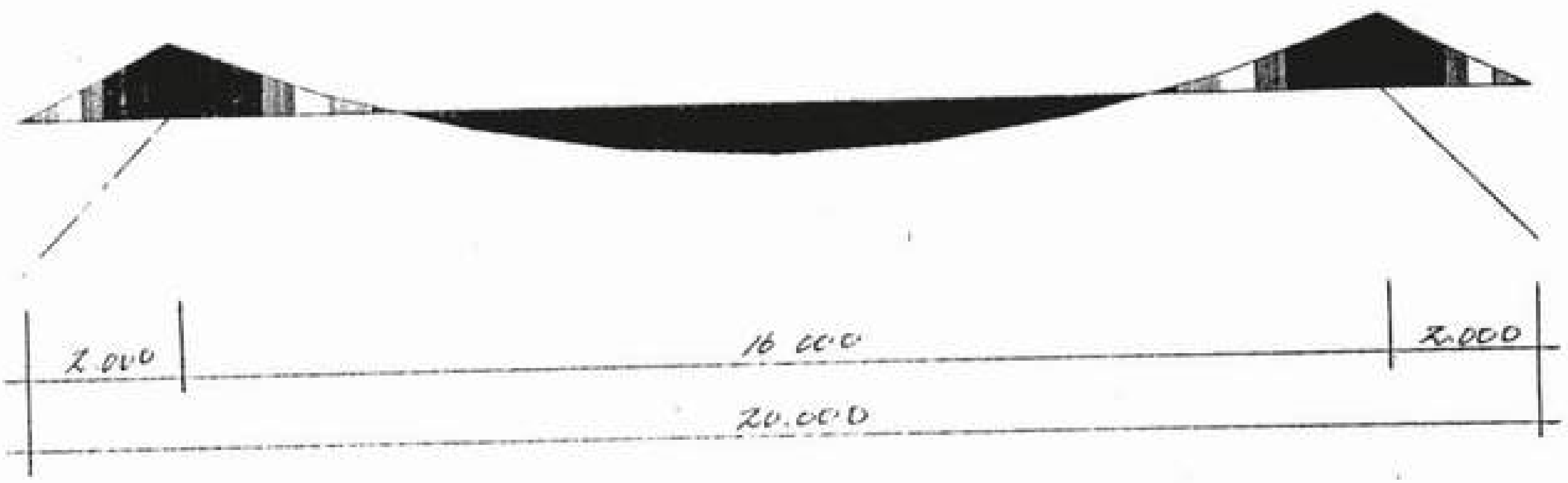
$i_y = 5.32\ cm$

$l_{kx} = 1660\ cm$ $\quad l_{ky} = 500\ cm$

$\lambda = 500/5.32 = 94 < \lambda_p$

$f_b = 1.21\ t/cm^2$

$\sigma_b = 881/771 = 1.14\ t/cm^2 < f_b$



PROJECT:
TITLE :
:
USER :

MIDAS/GEN-GPS
POST-PROCESSOR

BEAM-B.M.D.

LOCAL-y
-8.813E+00
-7.482E+00
-6.152E+00
-4.821E+00
-3.491E+00
-2.160E+00
-8.297E-01
5.008E-01
1.831E+00
3.162E+00
4.492E+00
5.823E+00

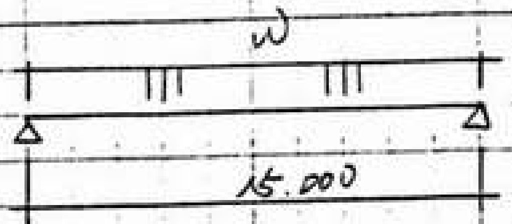
LOADCOMB ID.= 1

FILE : PURLIN2
UNIT: TON-M
DATE: 02-22-97

VIEW-DIRECTION
X: .000
Y: -1.000
Z: .000

Project :	Date : . .	Sheet : /
Title :	By :	Check :

EAVE GIRDER (15M)



TRY - H-294 × 200 × 8 × 12

$\omega = 0.09 \times 2.3 = 0.21\ t/m$

$M = 0.21 \times 15^2 / 8 = 5.91\ tm$

$A = 72.4\ cm^2$

$I_x = 11300\ cm^4$ $\qquad I_y = 1600\ cm^4$

$Z_x = 771\ cm^3$ $\qquad Z_y = 160\ cm^3$

$i_y = 5.32\ cm$

$l_k = 500\ cm$

$\lambda = 500 / 5.32 = 94 < \lambda_p$

$f_b = 1.21\ t/cm^2$

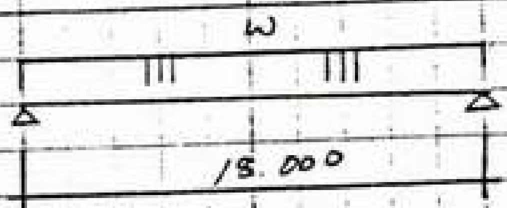
$\sigma_b = 591 / 771 = 0.77\ t/cm^2 < f_b$

$\delta_{max} = \dfrac{5 \times 2.1 \times 1500^4}{384 \times 2100000 \times 11300} = 5.8\ cm > L/300$ N.G

USE H-396 × 199 × 7 × 11

Project :	Date : . .	Sheet : /
	By :	Check :
Title :		

EAVE GIRDER (18 M)



$w = 0.69 \times 2.3 = 0.21\ t/m$

$M = 0.21 \times 18^2/8 = 8.51\ tm$

TRY H-400×200×8×13

$A = 84.1\ cm^2$

$I_x = 23700\ cm^4$ $I_y = 1740\ cm^4$

$Z_x = 1190\ cm^3$ $Z_y = 174\ cm^3$

$i_y = 5.26\ cm$

$l = 450\ cm$

$\lambda = 450 / 5.26 = 86$

$f_b = \left(1 - 0.4 \times \dfrac{\lambda^2}{\lambda_p^2}\right) \times f_t = 1.27\ t/cm^2$

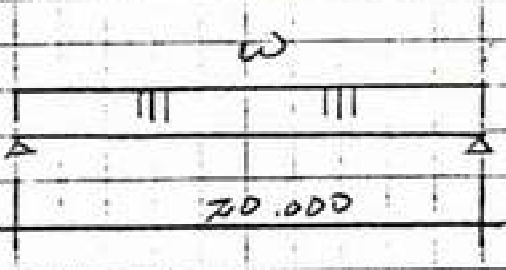
$\sigma_b = 851 / 1190 = 0.72\ t/cm^2 < f_b$ O.K

$\delta_{max} = \dfrac{5 \times 2.1 \times 1800^4}{384 \times 2100000 \times 23700} = 5.8\ cm < L/300$

포스코개발주식회사

Project :	Date : . .	Sheet : /
Title :	By :	Check :

EAVE GIRDER (20M)



$\omega = 0.09 \times 2.5 = 0.225 t/m$

$M = 0.225 \times 20^2 / 8 = 11.25 tm$

TRY H-450 x 200 x 9 x 14

$A = 96.1 cm^2$

$I_x = 33500 cm^4$ $\quad I_y = 1870 cm^4$

$Z_x = 1490 cm^3$ $\quad Z_y = 187 cm^3$

$i_y = 5.18 cm$

$l_k = 500 cm$

$\lambda = 500 / 5.18 = 97 < \lambda_p$

$f_b = (1 - 0.4 \times \frac{\lambda^2}{\lambda_p^2}) \times f_t = 1.18 t/cm^2$

$\sigma_b = 1125 / 1490 = 0.76 t/cm^2 < f_b$ O.K

USE H-400 x 200 x 8 x 13

2.0 OFFICE BUILDING

1. DESIGN LOAD

1) ROOF

CONCRETE(T=120)		290kg/m²
LIGHT CONCRETE(T=100)		200kg/m²
WATER PROOF & MORTAR		60kg/m²
CEILING		30kg/m²
D.L		580 kg/m²
L.L	180kg/m²	130 kg/m²
	760kg/m²	710kg/m²

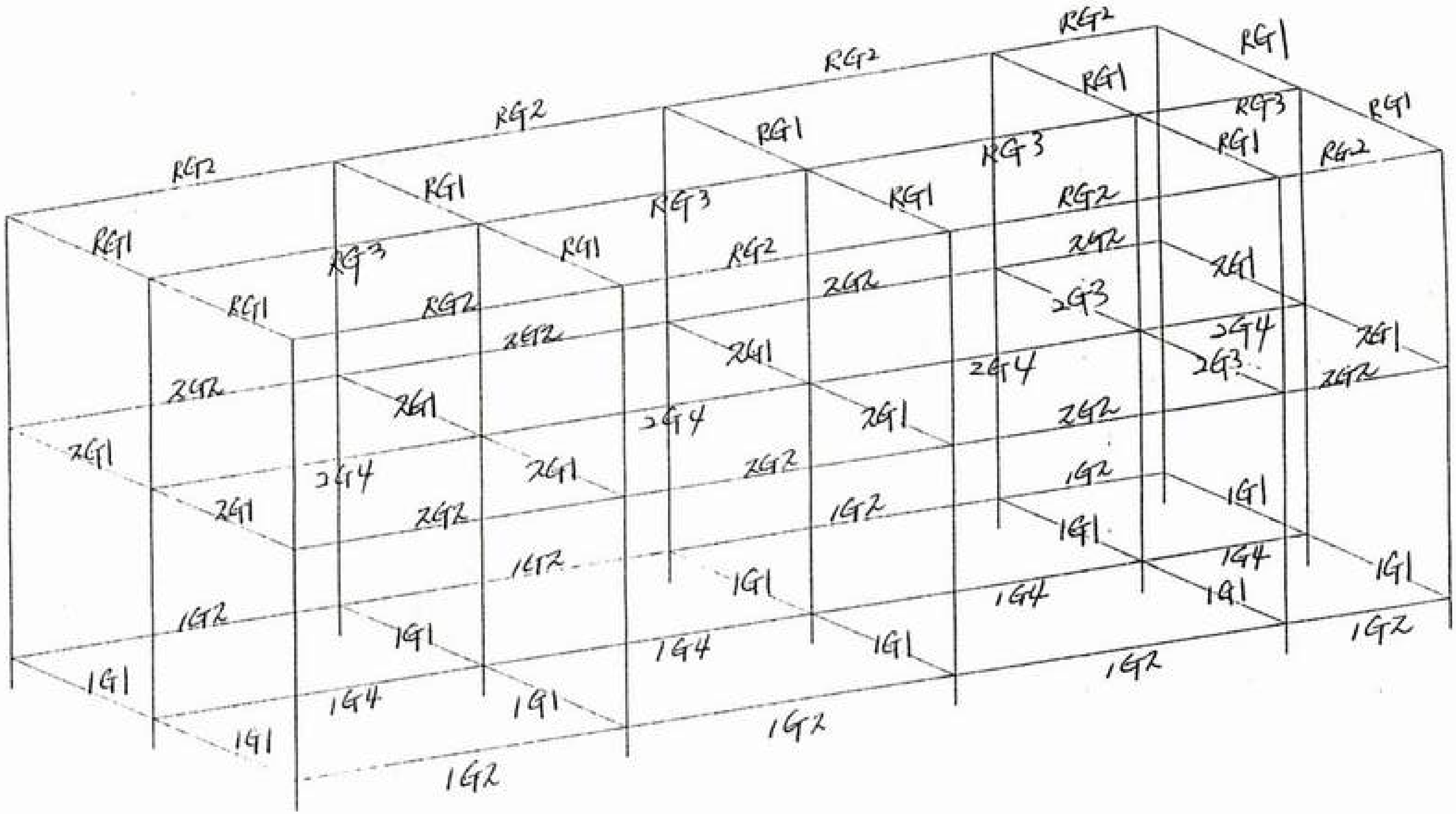
2) 2ND FLOOR

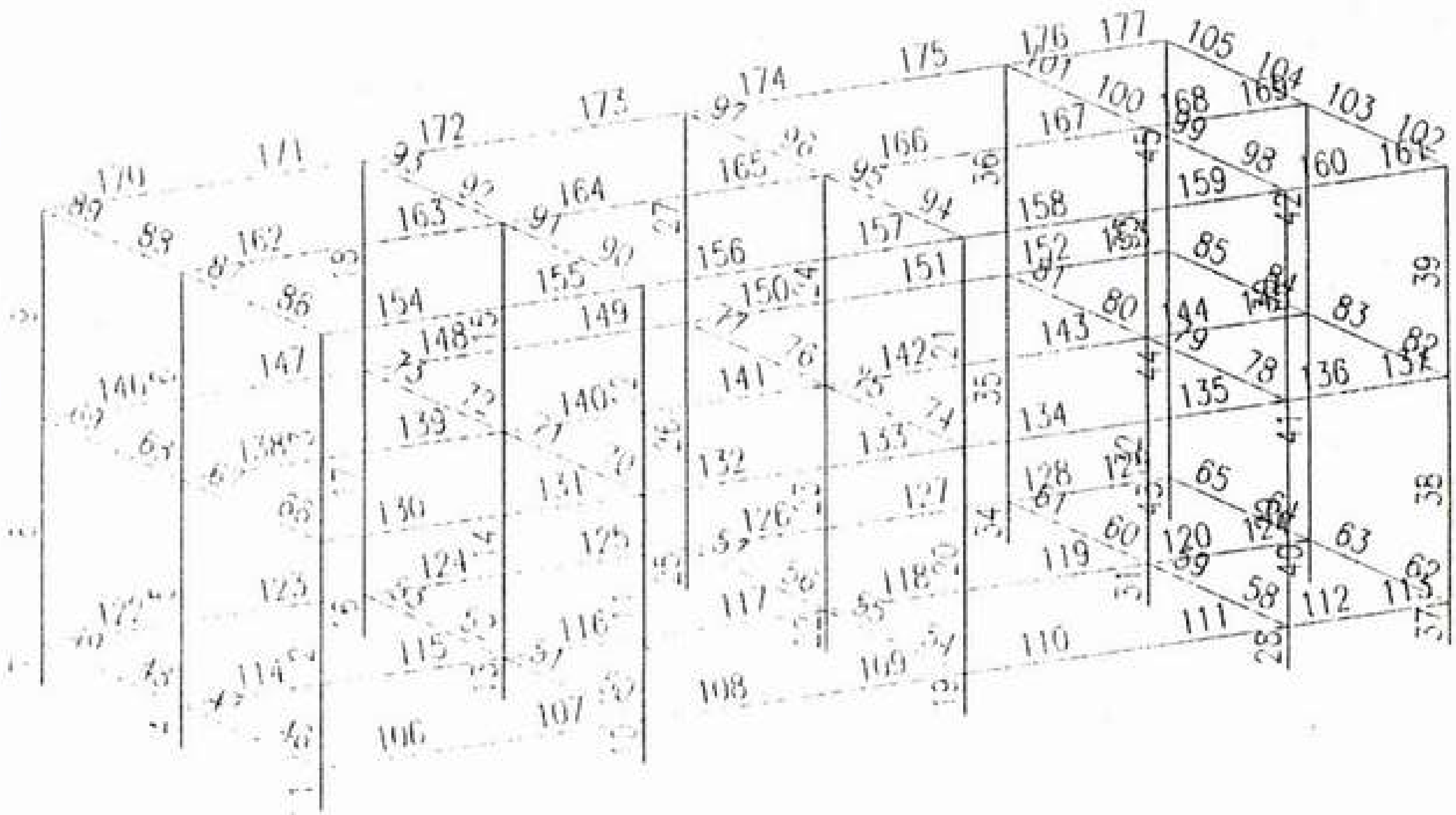
CONCRETE(T=120)		290kg/m²
FINISHING		100kg/m²
CEILING		30kg/m²
D.L		420kg/m²
L.L	300kg/m²	240kg/m²
	720kg/m²	660kg/m²

3) 1ST FLOOR

CONCRETE(T=200)		480kg/m²
FINISHING		100kg/m²
D.L		580kg/m²
L.L	300kg/m²	240kg/m²
	880kg/m²	820kg/m²

2. FRAME MODELING





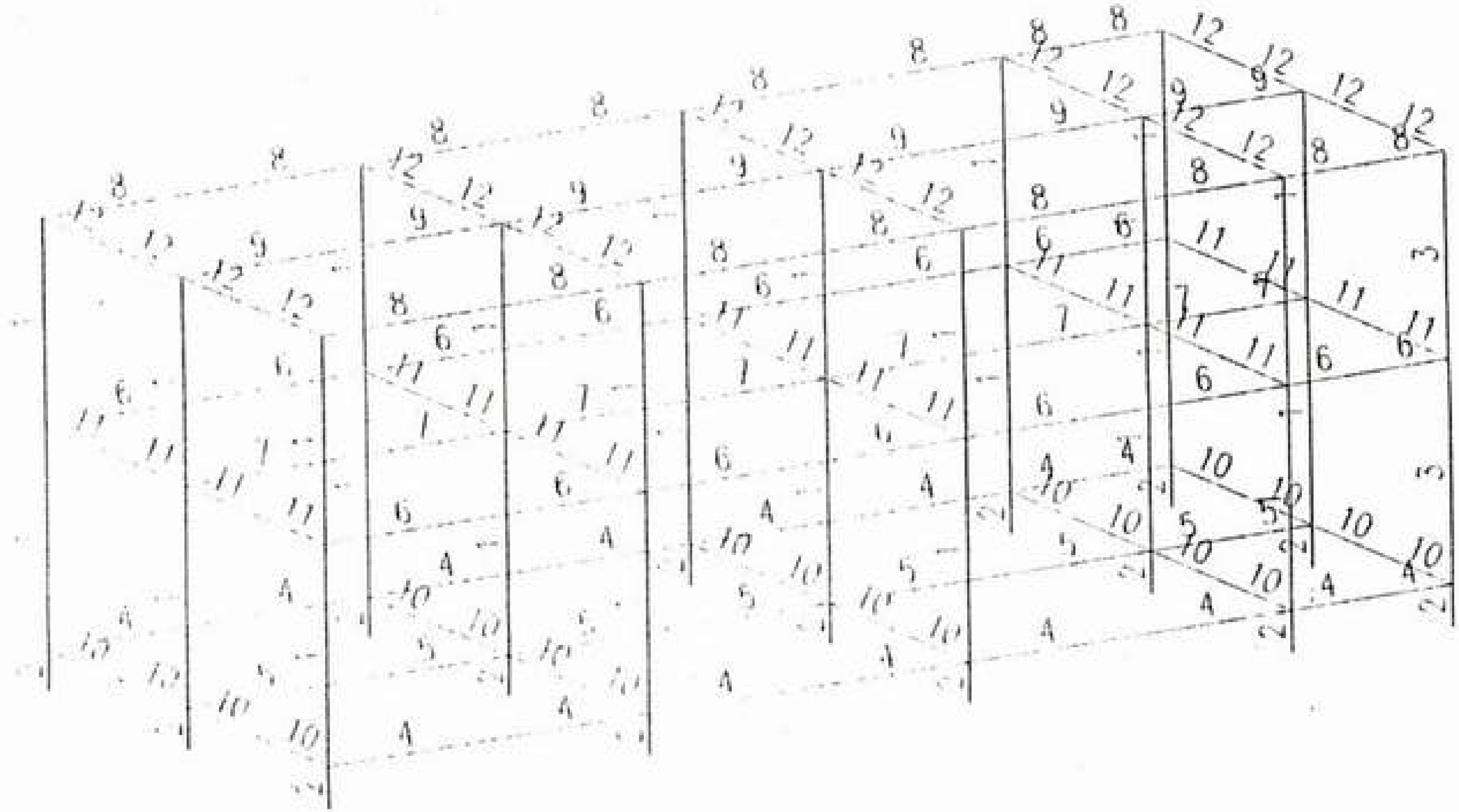
MIDAS/GEN-GPS POST-PROCESSOR	
PLOT LIMIT	
XMAX	21.000
XMIN	.000
YMAX	9.000
YMIN	.000
ZMAX	8.000
ZMIN	.000

FILE : OFFICE
UNIT: M,TON
DATE: 02-24-97

PROJECT:
TITLE : *ELEMENT NUMBER*
:
USER :

VIEW-DIRECTION

X: -.483
Y: -.837
Z: .259



MIDAS/GEN-GPS
POST-PROCESSOR

PLOT LIMIT

XMAX	21.000
XMIN	.000
YMAX	9.000
YMIN	.000
ZMAX	8.000
ZMIN	.000

FILE : OFFICE
UNIT: M,TON
DATE: 02-24-97

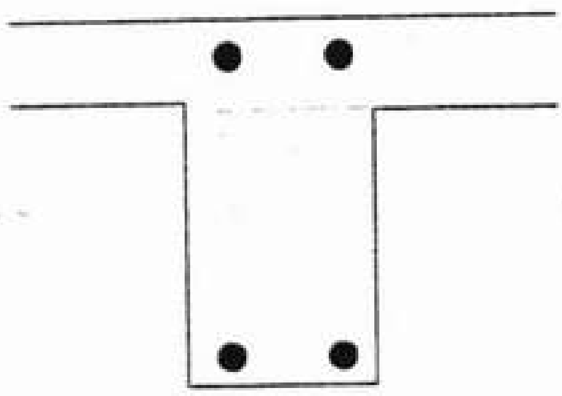
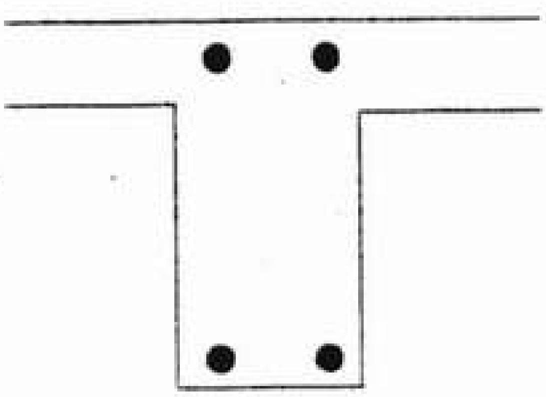
VIEW-DIRECTION

X:	-.483
Y:	-.837
Z:	.259

PROJECT:
TITLE : PROPERTY NUMBER
:
USER :

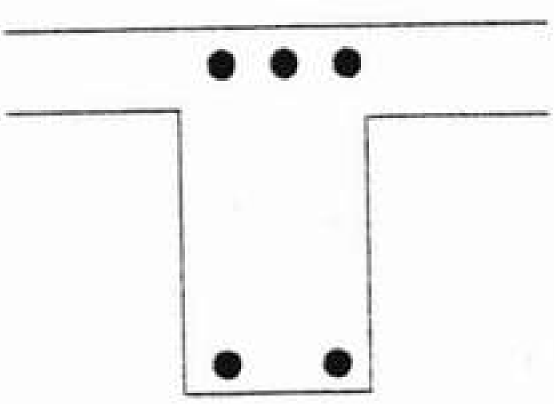
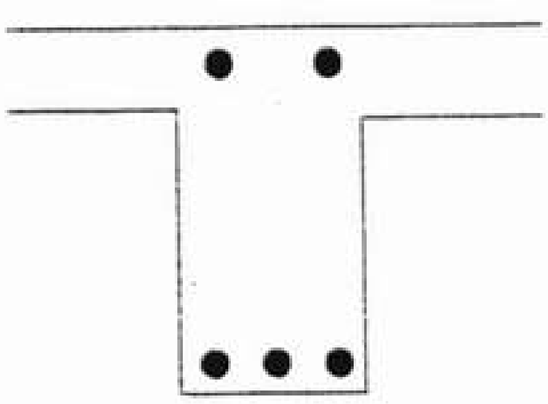
3. MEMBER DESIGN

NAME : RG1 (500 X 300)

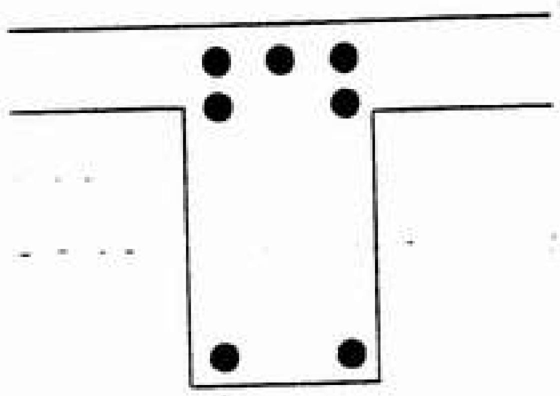
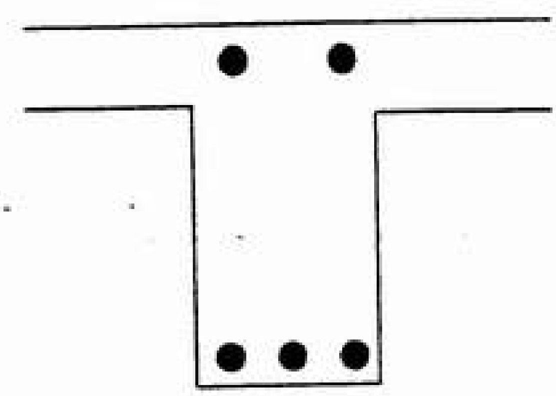
END	CENTER
	

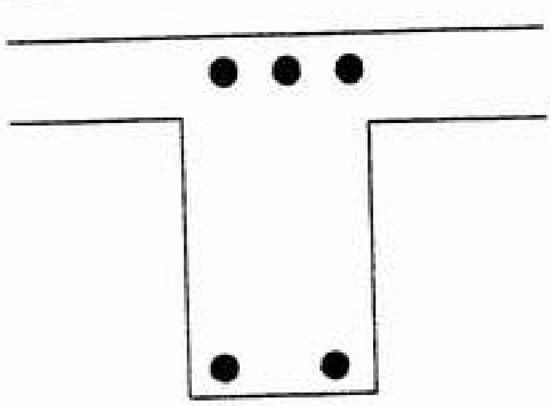
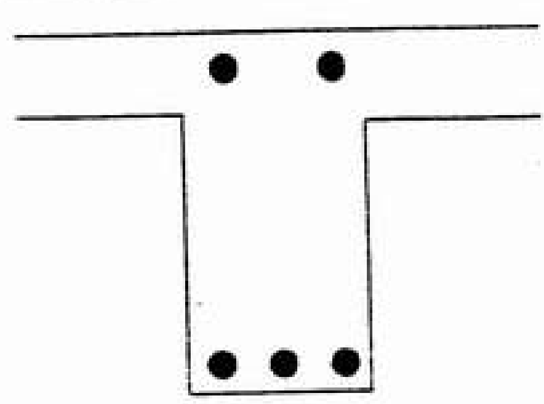
TOP	2 - D22	TOP	2 - D22
BOTTOM	2 - D22	BOTTOM	2 - D22
STIRRUP	D10 @200	STIRRUP	D10 @200

NAME : RG2 (600 X 300)

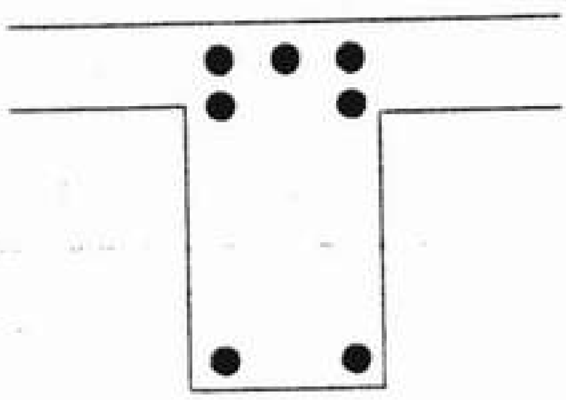
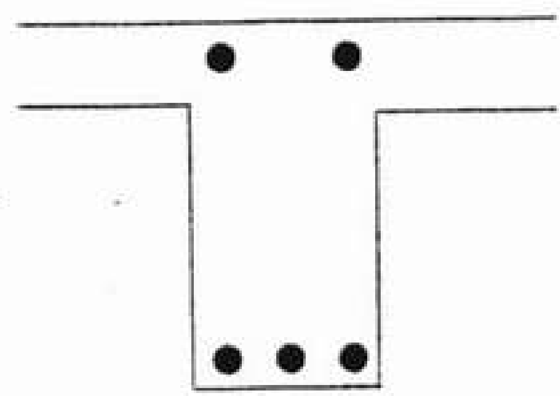
END	CENTER
	

TOP	3 - D22	TOP	2 - D22
BOTTOM	2 - D22	BOTTOM	3 - D22
STIRRUP	D10 @200	STIRRUP	D10 @200

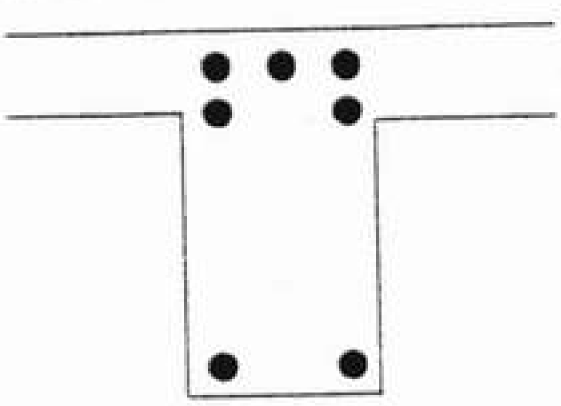
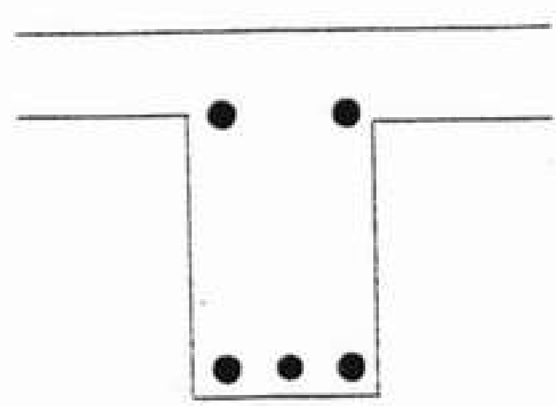
NAME : RG3 (600 X 300)			
END		CENTER	
			
TOP	5 - D22	TOP	2 - D22
BOTTOM	2 - D22	BOTTOM	3 - D22
STIRRUP	D10 @200	STIRRUP	D10 @200

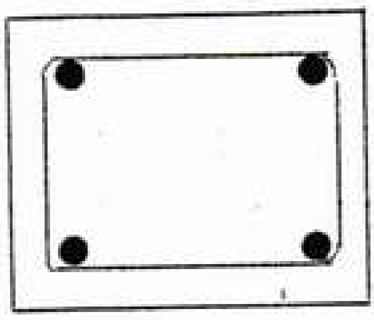
NAME : 1G1 , 2G1 (500 X 300)			
END		CENTER	
			
TOP	3 - D22	TOP	2 - D22
BOTTOM	2 - D22	BOTTOM	3 - D22
STIRRUP	D10 @200	STIRRUP	D10 @200

NAME : 1G2 ,2G2 , 1G4 , 2G4 (600 X 300)

END		CENTER	
			
TOP	5 - D22	TOP	2 - D22
BOTTOM	2 - D22	BOTTOM	3 - D22
STIRRUP	D10 @200	STIRRUP	D10 @200

NAME : 2G3 (500 X 300)

END		CENTER	
			
TOP	5 - D22	TOP	2 - D22
BOTTOM	2 - D22	BOTTOM	3 - D22
STIRRUP	D10 @200	STIRRUP	D10 @200

NAME : COLUMN (350 X 350)			
			
MAIN	4 - D25		
HOOP	D10 @300		

NAME :			

•.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

•.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
•.Main Rebar : fy = 3000. kg/cm^2
•.Stirrup : fys = 3000. kg/cm^2
•.Concrete : fc = 210. kg/cm^2

•.NOEL = 46. iSEC = 10. Span = 225 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	8.6(1)	7.73	2-D22	.0(0)	3.00	2-D22	10.8(1)	2.481*	3.52	D10 @220
1/4	3.1(1)	3.00	2-D22	.0(0)	3.00	2-D22	8.6(1)	1.965*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	1.0(1)	3.00	2-D22	6.0(1)	1.380*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	3.6(1)	6.55	2-D22	3.2(1)	.724	.00	D10 @220
1.0	.0(0)	3.00	2-D22	4.5(1)	6.55	2-D22	.0(1)	.002	.00	D10 @220

•.NOEL = 47. iSEC = 10. Span = 225 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	4.5(1)	6.55	2-D22	.0(1)	.002	.00	D10 @220
1/4	.0(0)	3.00	2-D22	3.6(1)	6.55	2-D22	3.2(1)	.728	.00	D10 @220
2/4	.0(0)	3.00	2-D22	1.0(1)	3.00	2-D22	6.0(1)	1.383*	3.52	D10 @220
3/4	3.1(1)	3.00	2-D22	.0(0)	3.00	2-D22	8.6(1)	1.969*	3.52	D10 @220
1.0	8.6(1)	7.73	2-D22	.0(0)	3.00	2-D22	10.8(1)	2.484*	3.52	D10 @220

•.NOEL = 48. iSEC = 10. Span = 225 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	10.2(1)	9.00	3-D22	.0(0)	3.00	2-D22	12.5(1)	2.874*	3.52	D10 @220
1/4	3.8(1)	6.55	2-D22	.0(0)	3.00	2-D22	10.2(1)	2.334*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	1.2(1)	3.00	2-D22	7.3(1)	1.675*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	4.4(1)	6.55	2-D22	3.9(1)	.898	.00	D10 @220
1.0	.0(0)	3.00	2-D22	5.5(1)	6.55	2-D22	.0(1)	.001	.00	D10 @220

•.NOEL = 49. iSEC = 10. Span = 225 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	5.5(1)	6.55	2-D22	.0(1)	.001	.00	D10 @220
1/4	.0(0)	3.00	2-D22	4.4(1)	6.55	2-D22	3.9(1)	.895	.00	D10 @220
2/4	.0(0)	3.00	2-D22	1.2(1)	3.00	2-D22	7.3(1)	1.673*	3.52	D10 @220
3/4	3.7(1)	6.55	2-D22	.0(0)	3.00	2-D22	10.2(1)	2.331*	3.52	D10 @220
1.0	10.1(1)	9.00	3-D22	.0(0)	3.00	2-D22	12.5(1)	2.871*	3.52	D10 @220

•.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

•.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
•.Main Rebar : fy = 3000. kg/cm^2
•.Stirrup : fys = 3000. kg/cm^2
•.Concrete : fc = 210. kg/cm^2

•.NOEL = 50. iSEC = 10. Span = 225 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	9.1(1)	8.05	3-D22	.0(0)	3.00	2-D22	10.9(1)	2.494*	3.52	D10 @220
1/4	3.4(1)	3.00	2-D22	.0(0)	3.00	2-D22	9.1(1)	2.081*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	1.0(1)	3.00	2-D22	6.7(1)	1.528*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	4.0(1)	6.55	2-D22	3.6(1)	.834	.00	D10 @220
1.0	.0(0)	3.00	2-D22	5.0(1)	6.55	2-D22	.0(1)	.001	.00	D10 @220

•.NOEL = 51. iSEC = 10. Span = 225 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	5.0(1)	6.55	2-D22	.0(1)	.001	.00	D10 @220
1/4	.0(0)	3.00	2-D22	4.0(1)	6.55	2-D22	3.6(1)	.835	.00	D10 @220
2/4	.0(0)	3.00	2-D22	1.0(1)	3.00	2-D22	6.7(1)	1.529*	3.52	D10 @220
3/4	3.4(1)	3.00	2-D22	.0(0)	3.00	2-D22	9.1(1)	2.083*	3.52	D10 @220
1.0	9.1(1)	8.05	3-D22	.0(0)	3.00	2-D22	10.9(1)	2.496*	3.52	D10 @220

•.NOEL = 52. iSEC = 10. Span = 225 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	7.1(1)	6.20	2-D22	.0(0)	3.00	2-D22	7.8(1)	1.789*	3.52	D10 @220
1/4	2.9(1)	3.00	2-D22	.0(0)	3.00	2-D22	7.1(1)	1.626*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	.7(1)	3.00	2-D22	5.6(1)	1.274*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	3.2(1)	3.00	2-D22	3.2(1)	.732	.00	D10 @220
1.0	.0(0)	3.00	2-D22	4.2(1)	6.55	2-D22	.0(1)	.001	.00	D10 @220

•.NOEL = 53. iSEC = 10. Span = 225 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	4.2(1)	6.55	2-D22	.0(1)	.001	.00	D10 @220
1/4	.0(0)	3.00	2-D22	3.2(1)	3.00	2-D22	3.2(1)	.729	.00	D10 @220
2/4	.0(0)	3.00	2-D22	.7(1)	3.00	2-D22	5.5(1)	1.271*	3.52	D10 @220
3/4	2.8(1)	3.00	2-D22	.0(0)	3.00	2-D22	7.1(1)	1.623*	3.52	D10 @220
1.0	7.1(1)	6.20	2-D22	.0(0)	3.00	2-D22	7.8(1)	1.786*	3.52	D10 @220

• MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

• PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
• Main Rebar : fy = 3000. kg/cm^2
• Stirrup : fys = 3000. kg/cm^2
• Concrete : fc = 210. kg/cm^2

• NOEL = 54, iSEC = 10, Span = 225 cm. << RC-BEAM Design Result >>
• Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	11.3(1)	10.26	3-D22	.0(0)	3.00	2-D22	13.3(1)	3.039*	3.99	D10 @220
1/4	4.3(1)	6.55	2-D22	.0(0)	3.00	2-D22	11.3(1)	2.592*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	1.3(1)	3.00	2-D22	8.4(1)	1.936*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	5.0(1)	6.55	2-D22	4.7(1)	1.072*	3.52	D10 @220
1.0	.0(0)	3.00	2-D22	6.3(1)	5.49	2-D22	.0(1)	.001	.00	D10 @220

• NOEL = 55, iSEC = 10, Span = 225 cm. << RC-BEAM Design Result >>
• Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	6.3(1)	5.49	2-D22	.0(1)	.001	.00	D10 @220
1/4	.0(0)	3.00	2-D22	5.0(1)	6.55	2-D22	4.7(1)	1.073*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	1.3(1)	3.00	2-D22	8.4(1)	1.938*	3.52	D10 @220
3/4	4.3(1)	6.55	2-D22	.0(0)	3.00	2-D22	11.3(1)	2.593*	3.52	D10 @220
1.0	11.3(1)	10.26	3-D22	.0(0)	3.00	2-D22	13.3(1)	3.040*	4.00	D10 @220

• NOEL = 56, iSEC = 10, Span = 225 cm. << RC-BEAM Design Result >>
• Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	6.7(1)	5.84	2-D22	.0(0)	3.00	2-D22	7.4(1)	1.699*	3.52	D10 @220
1/4	2.7(1)	3.00	2-D22	.0(0)	3.00	2-D22	6.7(1)	1.542*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	.7(1)	3.00	2-D22	5.3(1)	1.207*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	3.1(1)	3.00	2-D22	3.0(1)	.693	.00	D10 @220
1.0	.0(0)	3.00	2-D22	3.9(1)	6.55	2-D22	.0(1)	.002	.00	D10 @220

• NOEL = 57, iSEC = 10, Span = 225 cm. << RC-BEAM Design Result >>
• Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	3.9(1)	6.55	2-D22	.0(1)	.002	.00	D10 @220
1/4	.0(0)	3.00	2-D22	3.1(1)	3.00	2-D22	3.0(1)	.690	.00	D10 @220
2/4	.0(0)	3.00	2-D22	.7(1)	3.00	2-D22	5.2(1)	1.204*	3.52	D10 @220
3/4	2.7(1)	3.00	2-D22	.0(0)	3.00	2-D22	6.7(1)	1.539*	3.52	D10 @220
1.0	6.7(1)	5.84	2-D22	.0(0)	3.00	2-D22	7.4(1)	1.696*	3.52	D10 @220

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 58. iSEC = 10. Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	12.2(1)	11.21	3-D22	.0(0)	3.00	2-D22	14.9(1)	3.421*	5.46	D10 @220
1/4	4.5(1)	6.55	2-D22	.0(0)	3.00	2-D22	12.4(1)	2.837*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	1.5(1)	3.00	2-D22	8.9(1)	2.044*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	5.4(1)	6.55	2-D22	4.6(1)	1.046*	3.52	D10 @220
1.0	.0(0)	3.00	2-D22	6.5(1)	5.84	2-D22	.5(1)	.105	.00	D10 @220

*.NOEL = 59. iSEC = 10. Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	6.5(1)	5.84	2-D22	.5(1)	.105	.00	D10 @220
1/4	.0(0)	3.00	2-D22	5.0(1)	6.55	2-D22	4.9(1)	1.120*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	1.2(1)	3.00	2-D22	8.6(1)	1.980*	3.52	D10 @220
3/4	4.5(1)	6.55	2-D22	.0(0)	3.00	2-D22	11.5(1)	2.635*	3.52	D10 @220
1.0	11.6(1)	10.58	3-D22	.0(0)	3.00	2-D22	13.4(1)	3.083*	4.16	D10 @220

*.NOEL = 60. iSEC = 10. Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	10.0(1)	9.00	3-D22	.0(0)	3.00	2-D22	11.9(1)	2.735*	3.52	D10 @220
1/4	3.8(1)	6.55	2-D22	.0(0)	3.00	2-D22	10.0(1)	2.303*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	1.1(1)	3.00	2-D22	7.4(1)	1.693*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	4.4(1)	6.55	2-D22	4.0(1)	.909	.00	D10 @220
1.0	.0(0)	3.00	2-D22	5.5(1)	6.55	2-D22	.0(1)	.001	.00	D10 @220

*.NOEL = 61. iSEC = 10. Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	5.5(1)	6.55	2-D22	.0(1)	.001	.00	D10 @220
1/4	.0(0)	3.00	2-D22	4.4(1)	6.55	2-D22	4.0(1)	.906	.00	D10 @220
2/4	.0(0)	3.00	2-D22	1.2(1)	3.00	2-D22	7.4(1)	1.690*	3.52	D10 @220
3/4	3.8(1)	6.55	2-D22	.0(0)	3.00	2-D22	10.0(1)	2.300*	3.52	D10 @220
1.0	10.0(1)	9.00	3-D22	.0(0)	3.00	2-D22	11.9(1)	2.732*	3.52	D10 @220

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 62, iSEC = 10, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	4.6(1)	6.55	2-D22	.0(0)	3.00	2-D22	4.7(1)	1.085*	3.52	D10 @220
1/4	2.1(1)	3.00	2-D22	.0(0)	3.00	2-D22	4.3(1)	.981	.00	D10 @220
2/4	.0(0)	3.00	2-D22	.2(1)	3.00	2-D22	3.5(1)	.807	.00	D10 @220
3/4	.0(0)	3.00	2-D22	1.9(1)	3.00	2-D22	2.5(1)	.568	.00	D10 @220
1.0	.0(0)	3.00	2-D22	2.9(1)	3.00	2-D22	1.4(1)	.312	.00	D10 @220

*.NOEL = 63, iSEC = 10, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	2.9(1)	3.00	2-D22	1.4(1)	.312	.00	D10 @220
1/4	.0(0)	3.00	2-D22	2.9(1)	3.00	2-D22	1.5(1)	.355	.00	D10 @220
2/4	.0(0)	3.00	2-D22	1.2(1)	3.00	2-D22	4.4(1)	1.007*	3.52	D10 @220
3/4	2.0(1)	3.00	2-D22	.0(0)	3.00	2-D22	6.9(1)	1.593*	3.52	D10 @220
1.0	6.6(1)	5.84	2-D22	.0(0)	3.00	2-D22	9.2(1)	2.108*	3.52	D10 @220

*.NOEL = 64, iSEC = 10, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	8.3(1)	7.41	2-D22	.0(0)	3.00	2-D22	10.6(1)	2.421*	3.52	D10 @220
1/4	3.0(1)	3.00	2-D22	.0(0)	3.00	2-D22	8.3(1)	1.905*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	1.0(1)	3.00	2-D22	5.8(1)	1.320*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	3.5(1)	3.00	2-D22	2.9(1)	.668	.00	D10 @220
1.0	.0(0)	3.00	2-D22	4.3(1)	6.55	2-D22	.0(1)	.001	.00	D10 @220

*.NOEL = 65, iSEC = 10, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	4.3(1)	6.55	2-D22	.0(1)	.001	.00	D10 @220
1/4	.0(0)	3.00	2-D22	3.5(1)	3.00	2-D22	2.9(1)	.666	.00	D10 @220
2/4	.0(0)	3.00	2-D22	1.0(1)	3.00	2-D22	5.7(1)	1.318*	3.52	D10 @220
3/4	2.9(1)	3.00	2-D22	.0(0)	3.00	2-D22	8.3(1)	1.904*	3.52	D10 @220
1.0	8.3(1)	7.41	2-D22	.0(0)	3.00	2-D22	10.5(1)	2.419*	3.52	D10 @220

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

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*.NOEL = 66. iSEC = 11. Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	4.7(1)	6.55	2-D22	.0(0)	3.00	2-D22	9.2(1)	2.106*	3.52	D10 @220
1/4	.1(1)	3.00	2-D22	.0(0)	3.00	2-D22	7.1(1)	1.623*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	3.2(1)	3.00	2-D22	4.7(1)	1.070*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	5.1(1)	6.55	2-D22	2.0(1)	.447	.00	D10 @220
1.0	.0(0)	3.00	2-D22	5.3(1)	6.55	2-D22	1.1(1)	.246	.00	D10 @220

*.NOEL = 67. iSEC = 11. Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	5.3(1)	6.55	2-D22	1.1(1)	.246	.00	D10 @220
1/4	.0(0)	3.00	2-D22	3.8(1)	6.55	2-D22	4.1(1)	.940	.00	D10 @220
2/4	.0(0)	3.00	2-D22	.8(1)	3.00	2-D22	6.8(1)	1.563*	3.52	D10 @220
3/4	3.8(1)	6.55	2-D22	.0(0)	3.00	2-D22	9.2(1)	2.116*	3.52	D10 @220
1.0	9.6(1)	8.68	3-D22	.0(0)	3.00	2-D22	11.3(1)	2.598*	3.52	D10 @220

*.NOEL = 68. iSEC = 11. Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	9.5(1)	8.68	3-D22	.0(0)	3.00	2-D22	11.3(1)	2.597*	3.52	D10 @220
1/4	3.8(1)	6.55	2-D22	.0(0)	3.00	2-D22	9.2(1)	2.114*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	.8(1)	3.00	2-D22	6.8(1)	1.561*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	3.8(1)	6.55	2-D22	4.1(1)	.938	.00	D10 @220
1.0	.0(0)	3.00	2-D22	5.3(1)	6.55	2-D22	1.1(1)	.245	.00	D10 @220

*.NOEL = 69. iSEC = 11. Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	5.3(1)	6.55	2-D22	1.1(1)	.245	.00	D10 @220
1/4	.0(0)	3.00	2-D22	5.1(1)	6.55	2-D22	2.0(1)	.449	.00	D10 @220
2/4	.0(0)	3.00	2-D22	3.2(1)	3.00	2-D22	4.7(1)	1.072*	3.52	D10 @220
3/4	.1(1)	3.00	2-D22	.0(0)	3.00	2-D22	7.1(1)	1.625*	3.52	D10 @220
1.0	4.7(1)	6.55	2-D22	.0(0)	3.00	2-D22	9.2(1)	2.107*	3.52	D10 @220

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 70, iSEC = 11, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	3.3(1)	3.00	2-D22	.0(0)	3.00	2-D22	5.4(1)	1.243*	3.52	D10 @220
1/4	.4(1)	3.00	2-D22	.0(0)	3.00	2-D22	4.8(1)	1.105*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	2.0(1)	3.00	2-D22	3.6(1)	.826	.00	D10 @220
3/4	.0(0)	3.00	2-D22	3.5(1)	3.00	2-D22	1.8(1)	.406	.00	D10 @220
1.0	.0(0)	3.00	2-D22	3.9(1)	6.55	2-D22	.7(1)	.154	.00	D10 @220

*.NOEL = 71, iSEC = 11, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	3.9(1)	6.55	2-D22	.7(1)	.154	.00	D10 @220
1/4	.0(0)	3.00	2-D22	2.8(1)	3.00	2-D22	3.1(1)	.713	.00	D10 @220
2/4	.0(0)	3.00	2-D22	.5(1)	3.00	2-D22	4.9(1)	1.133*	3.52	D10 @220
3/4	2.7(1)	3.00	2-D22	.0(0)	3.00	2-D22	6.2(1)	1.412*	3.52	D10 @220
1.0	6.3(1)	5.49	2-D22	.0(0)	3.00	2-D22	6.8(1)	1.551*	3.52	D10 @220

*.NOEL = 72, iSEC = 11, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	6.3(1)	5.49	2-D22	.0(0)	3.00	2-D22	6.8(1)	1.551*	3.52	D10 @220
1/4	2.7(1)	3.00	2-D22	.0(0)	3.00	2-D22	6.2(1)	1.412*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	.5(1)	3.00	2-D22	4.9(1)	1.133*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	2.8(1)	3.00	2-D22	3.1(1)	.714	.00	D10 @220
1.0	.0(0)	3.00	2-D22	3.9(1)	6.55	2-D22	.7(1)	.154	.00	D10 @220

*.NOEL = 73, iSEC = 11, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	3.9(1)	6.55	2-D22	.7(1)	.154	.00	D10 @220
1/4	.0(0)	3.00	2-D22	3.5(1)	3.00	2-D22	1.8(1)	.406	.00	D10 @220
2/4	.0(0)	3.00	2-D22	2.0(1)	3.00	2-D22	3.6(1)	.826	.00	D10 @220
3/4	.4(1)	3.00	2-D22	.0(0)	3.00	2-D22	4.8(1)	1.105*	3.52	D10 @220
1.0	3.3(1)	3.00	2-D22	.0(0)	3.00	2-D22	5.4(1)	1.243*	3.52	D10 @220

• MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

• PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
• Main Rebar : fy = 3000. kg/cm^2
• Stirrup : fys = 3000. kg/cm^2
• Concrete : fc = 210. kg/cm^2

• NOEL = 74. iSEC = 11. Span = 225 cm. << RC-BEAM Design Result >>
• Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	4.4(1)	6.55	2-D22	.0(0)	3.00	2-D22	7.1(1)	1.622*	3.52	D10 @220
1/4	.6(1)	3.00	2-D22	-.0(0)	3.00	2-D22	6.4(1)	1.457*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	2.6(1)	3.00	2-D22	4.8(1)	1.099*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	4.6(1)	6.55	2-D22	2.4(1)	.548	.00	D10 @220
1.0	.0(0)	3.00	2-D22	5.1(1)	6.55	2-D22	.9(1)	.197	.00	D10 @220

• NOEL = 75. iSEC = 11. Span = 225 cm. << RC-BEAM Design Result >>
• Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	5.1(1)	6.55	2-D22	.9(1)	.197	.00	D10 @220
1/4	.0(0)	3.00	2-D22	3.6(1)	6.55	2-D22	4.1(1)	.942	.00	D10 @220
2/4	.0(0)	3.00	2-D22	.6(1)	3.00	2-D22	6.5(1)	1.494*	3.52	D10 @220
3/4	3.5(1)	3.00	2-D22	.0(0)	3.00	2-D22	8.1(1)	1.852*	3.52	D10 @220
1.0	8.3(1)	7.41	2-D22	.0(0)	3.00	2-D22	8.8(1)	2.017*	3.52	D10 @220

• NOEL = 76. iSEC = 11. Span = 225 cm. << RC-BEAM Design Result >>
• Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	8.2(1)	7.41	2-D22	.0(0)	3.00	2-D22	8.8(1)	2.011*	3.52	D10 @220
1/4	3.4(1)	3.00	2-D22	.0(0)	3.00	2-D22	8.0(1)	1.846*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	.7(1)	3.00	2-D22	6.5(1)	1.488*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	3.7(1)	6.55	2-D22	4.1(1)	.936	.00	D10 @220
1.0	.0(0)	3.00	2-D22	5.2(1)	6.55	2-D22	.8(1)	.192	.00	D10 @220

• NOEL = 77. iSEC = 11. Span = 225 cm. << RC-BEAM Design Result >>
• Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	5.2(1)	6.55	2-D22	.8(1)	.192	.00	D10 @220
1/4	.0(0)	3.00	2-D22	4.7(1)	6.55	2-D22	2.4(1)	.553	.00	D10 @220
2/4	.0(0)	3.00	2-D22	2.6(1)	3.00	2-D22	4.8(1)	1.105*	3.52	D10 @220
3/4	.6(1)	3.00	2-D22	.0(0)	3.00	2-D22	6.4(1)	1.463*	3.52	D10 @220
1.0	4.4(1)	6.55	2-D22	.0(0)	3.00	2-D22	7.1(1)	1.628*	3.52	D10 @220

•MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

•PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
•Main Rebar : fy = 3000. kg/cm^2
•Stirrup : fys = 3000. kg/cm^2
•Concrete : fc = 210. kg/cm^2

•NOEL = 78. iSEC = 11. Span = 225 cm. << RC-BEAM Design Result >>
•Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	7.9(1)	6.91	2-D22	.0(0)	3.00	2-D22	14.0(1)	3.200*	4.61	D10 @220
1/4	.7(1)	3.00	2-D22	.0(0)	3.00	2-D22	11.5(1)	2.632*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	4.8(1)	6.55	2-D22	7.9(1)	1.823*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	8.1(1)	7.10	2-D22	3.4(1)	.779	.00	D10 @220
1.0	.0(0)	3.00	2-D22	8.6(1)	7.73	2-D22	1.8(1)	.414	.00	D10 @220

•NOEL = 79. iSEC = 11. Span = 225 cm. << RC-BEAM Design Result >>
•Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	8.6(1)	7.73	2-D22	1.8(1)	.414	.00	D10 @220
1/4	.0(0)	3.00	2-D22	6.2(1)	5.49	2-D22	6.5(1)	1.480*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	1.4(1)	3.00	2-D22	10.5(1)	2.398*	3.52	D10 @220
3/4	5.4(1)	6.55	2-D22	.0(0)	3.00	2-D22	13.4(1)	3.080*	4.15	D10 @220
1.0	13.5(1)	12.48	4-D22	.0(0)	3.00	2-D22	15.4(1)	3.522*	5.85	D10 @220

•NOEL = 80. iSEC = 11. Span = 225 cm. << RC-BEAM Design Result >>
•Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	12.5(1)	11.21	3-D22	.0(0)	3.00	2-D22	13.5(1)	3.104*	4.24	D10 @220
1/4	5.3(1)	6.55	2-D22	.0(0)	3.00	2-D22	11.7(1)	2.687*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	.6(1)	3.00	2-D22	9.1(1)	2.076*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	4.7(1)	6.55	2-D22	5.6(1)	1.275*	3.52	D10 @220
1.0	.0(0)	3.00	2-D22	6.7(1)	5.84	2-D22	1.5(1)	.336	.00	D10 @220

•NOEL = 81. iSEC = 11. Span = 225 cm. << RC-BEAM Design Result >>
•Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	6.7(1)	5.84	2-D22	1.5(1)	.336	.00	D10 @220
1/4	.0(0)	3.00	2-D22	6.4(1)	5.49	2-D22	2.6(1)	.603	.00	D10 @220
2/4	.0(0)	3.00	2-D22	3.9(1)	6.55	2-D22	6.1(1)	1.404*	3.52	D10 @220
3/4	.4(1)	3.00	2-D22	.0(0)	3.00	2-D22	8.8(1)	2.015*	3.52	D10 @220
1.0	5.9(1)	5.13	2-D22	.0(0)	3.00	2-D22	10.6(1)	2.433*	3.52	D10 @220

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 82, iSEC = 11, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	2.6(1)	3.00	2-D22	.0(0)	3.00	2-D22	5.1(1)	1.168*	3.52	D10 @220
1/4	.0(0)	3.00	2-D22	.2(1)	3.00	2-D22	4.5(1)	1.041*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	2.4(1)	3.00	2-D22	3.5(1)	.796	.00	D10 @220
3/4	.0(0)	3.00	2-D22	4.0(1)	6.55	2-D22	1.9(1)	.439	.00	D10 @220
1.0	.0(0)	3.00	2-D22	4.6(1)	6.55	2-D22	.2(1)	.056	.00	D10 @220

*.NOEL = 83, iSEC = 11, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	4.6(1)	6.55	2-D22	.2(1)	.056	.00	D10 @220
1/4	.0(0)	3.00	2-D22	3.8(1)	6.55	2-D22	3.1(1)	.706	.00	D10 @220
2/4	.0(0)	3.00	2-D22	1.1(1)	3.00	2-D22	6.3(1)	1.442*	3.52	D10 @220
3/4	3.2(1)	3.00	2-D22	.0(0)	3.00	2-D22	9.0(1)	2.067*	3.52	D10 @220
1.0	8.9(1)	8.05	3-D22	.0(0)	3.00	2-D22	11.2(1)	2.573*	3.52	D10 @220

*.NOEL = 84, iSEC = 11, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	9.3(1)	8.36	3-D22	.0(0)	3.00	2-D22	11.1(1)	2.550*	3.52	D10 @220
1/4	3.7(1)	6.55	2-D22	.0(0)	3.00	2-D22	9.0(1)	2.067*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	.7(1)	3.00	2-D22	6.6(1)	1.514*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	3.7(1)	6.55	2-D22	3.9(1)	.895	.00	D10 @220
1.0	.0(0)	3.00	2-D22	5.1(1)	6.55	2-D22	1.1(1)	.260	.00	D10 @220

*.NOEL = 85, iSEC = 11, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	5.1(1)	6.55	2-D22	1.1(1)	.260	.00	D10 @220
1/4	.0(0)	3.00	2-D22	5.0(1)	6.55	2-D22	1.6(1)	.375	.00	D10 @220
2/4	.0(0)	3.00	2-D22	3.3(1)	3.00	2-D22	4.3(1)	.994	.00	D10 @220
3/4	.0(0)	3.00	2-D22	.2(1)	3.00	2-D22	6.7(1)	1.547*	3.52	D10 @220
1.0	4.2(1)	6.55	2-D22	.0(0)	3.00	2-D22	8.9(1)	2.030*	3.52	D10 @220

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 86, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	2.3(1)	3.00	2-D22	.0(0)	3.00	2-D22	4.5(1)	1.023*	3.52	D10 @220
1/4	.0(0)	3.00	2-D22	.1(1)	3.00	2-D22	3.7(1)	.851	.00	D10 @220
2/4	.0(0)	3.00	2-D22	1.8(1)	3.00	2-D22	2.6(1)	.601	.00	D10 @220
3/4	.0(0)	3.00	2-D22	2.9(1)	3.00	2-D22	1.2(1)	.272	.00	D10 @220
1.0	.0(0)	3.00	2-D22	3.1(1)	3.00	2-D22	.6(1)	.134	.00	D10 @220

*.NOEL = 87, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	3.1(1)	3.00	2-D22	.6(1)	.134	.00	D10 @220
1/4	.0(0)	3.00	2-D22	2.3(1)	3.00	2-D22	2.4(1)	.540	.00	D10 @220
2/4	.0(0)	3.00	2-D22	.5(1)	3.00	2-D22	3.8(1)	.869	.00	D10 @220
3/4	1.9(1)	3.00	2-D22	.0(0)	3.00	2-D22	4.9(1)	1.119*	3.52	D10 @220
1.0	4.9(1)	6.55	2-D22	.0(0)	3.00	2-D22	5.6(1)	1.291*	3.52	D10 @220

*.NOEL = 88, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	4.9(1)	6.55	2-D22	.0(0)	3.00	2-D22	5.6(1)	1.290*	3.52	D10 @220
1/4	1.9(1)	3.00	2-D22	.0(0)	3.00	2-D22	4.9(1)	1.118*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	.5(1)	3.00	2-D22	3.8(1)	.868	.00	D10 @220
3/4	.0(0)	3.00	2-D22	2.3(1)	3.00	2-D22	2.4(1)	.540	.00	D10 @220
1.0	.0(0)	3.00	2-D22	3.1(1)	3.00	2-D22	.6(1)	.133	.00	D10 @220

*.NOEL = 89, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	3.1(1)	3.00	2-D22	.6(1)	.133	.00	D10 @220
1/4	.0(0)	3.00	2-D22	2.9(1)	3.00	2-D22	1.2(1)	.273	.00	D10 @220
2/4	.0(0)	3.00	2-D22	1.8(1)	3.00	2-D22	2.6(1)	.601	.00	D10 @220
3/4	.0(0)	3.00	2-D22	.0(1)	3.00	2-D22	3.7(1)	.852	.00	D10 @220
1.0	2.3(1)	3.00	2-D22	.0(0)	3.00	2-D22	4.5(1)	1.024*	3.52	D10 @220

* MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

* PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
* Main Rebar : fy = 3000. kg/cm^2
* Stirrup : fys = 3000. kg/cm^2
* Concrete : fc = 210. kg/cm^2

* NOEL = 90, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
* Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup
0.0	2.7(1)	3.00	2-D22	.0(0)	3.00	2-D22	5.7(1)	1.297*	3.52	D10 @220
1/4	.0(0)	3.00	2-D22	.3(1)	3.00	2-D22	5.0(1)	1.150*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	2.8(1)	3.00	2-D22	3.7(1)	.848	.00	D10 @220
3/4	.0(0)	3.00	2-D22	4.3(1)	6.55	2-D22	1.7(1)	.390	.00	D10 @220
1.0	.0(0)	3.00	2-D22	4.6(1)	6.55	2-D22	1.0(1)	.225	.00	D10 @220

* NOEL = 91, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
* Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup
0.0	.0(0)	3.00	2-D22	4.6(1)	6.55	2-D22	1.0(1)	.225	.00	D10 @220
1/4	.0(0)	3.00	2-D22	3.2(1)	3.00	2-D22	3.7(1)	.839	.00	D10 @220
2/4	.0(0)	3.00	2-D22	.6(1)	3.00	2-D22	5.7(1)	1.297*	3.52	D10 @220
3/4	3.0(1)	3.00	2-D22	.0(0)	3.00	2-D22	7.0(1)	1.600*	3.52	D10 @220
1.0	7.1(1)	6.20	2-D22	.0(0)	3.00	2-D22	7.6(1)	1.746*	3.52	D10 @220

* NOEL = 92, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
* Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup
0.0	7.2(1)	6.55	2-D22	.0(0)	3.00	2-D22	7.6(1)	1.745*	3.52	D10 @220
1/4	3.1(1)	3.00	2-D22	.0(0)	3.00	2-D22	7.0(1)	1.598*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	.5(1)	3.00	2-D22	5.7(1)	1.296*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	3.2(1)	3.00	2-D22	3.7(1)	.838	.00	D10 @220
1.0	.0(0)	3.00	2-D22	4.5(1)	6.55	2-D22	1.0(1)	.223	.00	D10 @220

* NOEL = 93, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
* Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup
0.0	.0(0)	3.00	2-D22	4.5(1)	6.55	2-D22	1.0(1)	.223	.00	D10 @220
1/4	.0(0)	3.00	2-D22	4.3(1)	6.55	2-D22	1.7(1)	.391	.00	D10 @220
2/4	.0(0)	3.00	2-D22	2.7(1)	3.00	2-D22	3.7(1)	.849	.00	D10 @220
3/4	.0(0)	3.00	2-D22	.2(1)	3.00	2-D22	5.0(1)	1.152*	3.52	D10 @220
1.0	2.8(1)	3.00	2-D22	.0(0)	3.00	2-D22	5.7(1)	1.298*	3.52	D10 @220

•.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

•.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
•.Main Rebar : fy = 3000. kg/cm^2
•.Stirrup : fys = 3000. kg/cm^2
•.Concrete : fc = 210. kg/cm^2

•.NOEL = 94. iSEC = 12. Span = 225 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	3.7(1)	6.55	2-D22	.0(0)	3.00	2-D22	7.3(1)	1.684*	3.52	D10 @220
1/4	.0(0)	3.00	2-D22	.3(1)	3.00	2-D22	6.6(1)	1.513*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	3.5(1)	6.55	2-D22	5.0(1)	1.137*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	5.7(1)	4.88	2-D22	2.4(1)	.555	.00	D10 @220
1.0	.0(0)	3.00	2-D22	6.1(1)	5.49	2-D22	1.0(1)	.232	.00	D10 @220

•.NOEL = 95. iSEC = 12. Span = 225 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	6.1(1)	5.49	2-D22	1.0(1)	.232	.00	D10 @220
1/4	.0(0)	3.00	2-D22	4.5(1)	6.55	2-D22	4.4(1)	1.019*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	1.3(1)	3.00	2-D22	7.0(1)	1.601*	3.52	D10 @220
3/4	3.2(1)	3.00	2-D22	.0(0)	3.00	2-D22	8.6(1)	1.977*	3.52	D10 @220
1.0	8.3(1)	7.41	2-D22	.0(0)	3.00	2-D22	9.4(1)	2.148*	3.52	D10 @220

•.NOEL = 96. iSEC = 12. Span = 225 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	7.6(1)	6.91	2-D22	.0(0)	3.00	2-D22	7.7(1)	1.762*	3.52	D10 @220
1/4	3.4(1)	3.00	2-D22	.0(0)	3.00	2-D22	7.0(1)	1.616*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	.2(1)	3.00	2-D22	5.7(1)	1.313*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	2.9(1)	3.00	2-D22	3.7(1)	.855	.00	D10 @220
1.0	.0(0)	3.00	2-D22	4.2(1)	6.55	2-D22	1.0(1)	.241	.00	D10 @220

•.NOEL = 97. iSEC = 12. Span = 225 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 50 cm. bf = 0 cm. hf = 0 cm. $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	4.2(1)	6.55	2-D22	1.0(1)	.241	.00	D10 @220
1/4	.0(0)	3.00	2-D22	4.0(1)	6.55	2-D22	1.6(1)	.374	.00	D10 @220
2/4	.0(0)	3.00	2-D22	2.5(1)	3.00	2-D22	3.6(1)	.832	.00	D10 @220
3/4	.0(0)	3.00	2-D22	.1(1)	3.00	2-D22	4.9(1)	1.134*	3.52	D10 @220
1.0	2.9(1)	3.00	2-D22	.0(0)	3.00	2-D22	5.6(1)	1.281*	3.52	D10 @220

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 98, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	4.1(1)	6.55	2-D22	.0(0)	3.00	2-D22	7.3(1)	1.668*	3.52	D10 @220
1/4	.2(1)	3.00	2-D22	-.0(0)	3.00	2-D22	-6.5(1)	1.497*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	3.1(1)	3.00	2-D22	4.9(1)	1.121*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	5.2(1)	6.55	2-D22	2.4(1)	.544	.00	D10 @220
1.0	.0(0)	3.00	2-D22	5.6(1)	6.55	2-D22	.8(1)	.178	.00	D10 @220

*.NOEL = 99, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	5.6(1)	6.55	2-D22	.8(1)	.178	.00	D10 @220
1/4	.0(0)	3.00	2-D22	4.3(1)	6.55	2-D22	3.9(1)	.900	.00	D10 @220
2/4	.0(0)	3.00	2-D22	1.3(1)	3.00	2-D22	6.4(1)	1.478*	3.52	D10 @220
3/4	2.8(1)	3.00	2-D22	.0(0)	3.00	2-D22	8.1(1)	1.854*	3.52	D10 @220
1.0	7.6(1)	6.91	2-D22	.0(0)	3.00	2-D22	8.8(1)	2.025*	3.52	D10 @220

*.NOEL = 100, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	6.9(1)	6.20	2-D22	.0(0)	3.00	2-D22	7.2(1)	1.646*	3.52	D10 @220
1/4	3.0(1)	3.00	2-D22	.0(0)	3.00	2-D22	6.5(1)	1.500*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	.3(1)	3.00	2-D22	5.2(1)	1.197*	3.52	D10 @220
3/4	.0(0)	3.00	2-D22	2.7(1)	3.00	2-D22	3.2(1)	.743	.00	D10 @220
1.0	.0(0)	3.00	2-D22	3.9(1)	6.55	2-D22	.8(1)	.194	.00	D10 @220

*.NOEL = 101, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	3.9(1)	6.55	2-D22	.8(1)	.194	.00	D10 @220
1/4	.0(0)	3.00	2-D22	3.7(1)	6.55	2-D22	1.5(1)	.355	.00	D10 @220
2/4	.0(0)	3.00	2-D22	2.2(1)	3.00	2-D22	3.5(1)	.809	.00	D10 @220
3/4	.1(1)	3.00	2-D22	.0(0)	3.00	2-D22	4.8(1)	1.111*	3.52	D10 @220
1.0	3.1(1)	3.00	2-D22	.0(0)	3.00	2-D22	5.5(1)	1.258*	3.52	D10 @220

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 102, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	1.5(1)	3.00	2-D22	.0(0)	3.00	2-D22	4.1(1)	.929	.00	D10 @220
1/4	.0(0)	3.00	2-D22	.6(1)	3.00	2-D22	3.3(1)	.757	.00	D10 @220
2/4	.0(0)	3.00	2-D22	2.2(1)	3.00	2-D22	2.2(1)	.507	.00	D10 @220
3/4	.0(0)	3.00	2-D22	3.0(1)	3.00	2-D22	.8(1)	.183	.00	D10 @220
1.0	.0(0)	3.00	2-D22	3.1(1)	3.00	2-D22	.7(1)	.158	.00	D10 @220

*.NOEL = 103, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	3.1(1)	3.00	2-D22	.7(1)	.158	.00	D10 @220
1/4	.0(0)	3.00	2-D22	2.3(1)	3.00	2-D22	2.2(1)	.500	.00	D10 @220
2/4	.0(0)	3.00	2-D22	.6(1)	3.00	2-D22	3.6(1)	.824	.00	D10 @220
3/4	1.7(1)	3.00	2-D22	.0(0)	3.00	2-D22	4.7(1)	1.074*	3.52	D10 @220
1.0	4.6(1)	6.55	2-D22	.0(0)	3.00	2-D22	5.4(1)	1.246*	3.52	D10 @220

*.NOEL = 104, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	4.8(1)	6.55	2-D22	.0(0)	3.00	2-D22	5.4(1)	1.235*	3.52	D10 @220
1/4	2.0(1)	3.00	2-D22	.0(0)	3.00	2-D22	4.6(1)	1.063*	3.52	D10 @220
2/4	.0(0)	3.00	2-D22	.3(1)	3.00	2-D22	3.5(1)	.813	.00	D10 @220
3/4	.0(0)	3.00	2-D22	1.9(1)	3.00	2-D22	2.1(1)	.489	.00	D10 @220
1.0	.0(0)	3.00	2-D22	2.7(1)	3.00	2-D22	.6(1)	.147	.00	D10 @220

*.NOEL = 105, iSEC = 12, Span = 225 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 50 cm, bf = 0 cm, hf = 0 cm, $Vc = 8.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.00	2-D22	2.7(1)	3.00	2-D22	.6(1)	.147	.00	D10 @220
1/4	.0(0)	3.00	2-D22	2.7(1)	3.00	2-D22	.8(1)	.194	.00	D10 @220
2/4	.0(0)	3.00	2-D22	1.8(1)	3.00	2-D22	2.3(1)	.518	.00	D10 @220
3/4	.0(0)	3.00	2-D22	.2(1)	3.00	2-D22	3.3(1)	.768	.00	D10 @220
1.0	1.9(1)	3.00	2-D22	.0(0)	3.00	2-D22	4.1(1)	.940	.00	D10 @220

•.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

•.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
•.Main Rebar : fy = 3000. kg/cm^2
•.Stirrup : fys = 3000. kg/cm^2
•.Concrete : fc = 210. kg/cm^2

•.NOEL = 106. iSEC = 4. Span = 300 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	16.5(1)	12.18	4-D22	.0(0)	3.60	2-D22	15.6(1)	2.914*	3.52	D10 @270
1/4	6.0(1)	7.87	3-D22	.0(0)	3.60	2-D22	12.4(1)	2.326*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	2.0(1)	3.60	2-D22	8.7(1)	1.635*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	7.0(1)	7.87	3-D22	4.5(1)	.843	.00	D10 @270
1.0	.0(0)	3.60	2-D22	8.7(1)	6.16	2-D22	.0(1)	.001	.00	D10 @270

•.NOEL = 107. iSEC = 4. Span = 300 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	8.7(1)	6.16	2-D22	.0(1)	.001	.00	D10 @270
1/4	.0(0)	3.60	2-D22	7.0(1)	7.87	3-D22	4.5(1)	.844	.00	D10 @270
2/4	.0(0)	3.60	2-D22	2.0(1)	3.60	2-D22	8.7(1)	1.637*	3.52	D10 @270
3/4	6.0(1)	7.87	3-D22	.0(0)	3.60	2-D22	12.4(1)	2.327*	3.52	D10 @270
1.0	16.5(1)	12.18	4-D22	.0(0)	3.60	2-D22	15.6(1)	2.915*	3.52	D10 @270

•.NOEL = 108. iSEC = 4. Span = 300 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	7.0(1)	7.87	3-D22	.0(0)	3.60	2-D22	6.0(1)	1.121*	3.52	D10 @270
1/4	2.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	5.2(1)	.981	.00	D10 @270
2/4	.0(0)	3.60	2-D22	.8(1)	3.60	2-D22	3.9(1)	.738	.00	D10 @270
3/4	.0(0)	3.60	2-D22	3.1(1)	3.60	2-D22	2.1(1)	.394	.00	D10 @270
1.0	.0(0)	3.60	2-D22	3.8(1)	3.60	2-D22	.0(1)	.001	.00	D10 @270

•.NOEL = 109. iSEC = 4. Span = 300 cm. << RC-BEAM Design Result >>
•.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	3.8(1)	3.60	2-D22	.0(1)	.001	.00	D10 @270
1/4	.0(0)	3.60	2-D22	3.1(1)	3.60	2-D22	2.1(1)	.396	.00	D10 @270
2/4	.0(0)	3.60	2-D22	.7(1)	3.60	2-D22	4.0(1)	.740	.00	D10 @270
3/4	2.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	5.2(1)	.982	.00	D10 @270
1.0	7.0(1)	7.87	3-D22	.0(0)	3.60	2-D22	6.0(1)	1.122*	3.52	D10 @270

•.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

•.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
•.Main Rebar : fy = 3000. kg/cm^2
•.Stirrup : fys = 3000. kg/cm^2
•.Concrete : fc = 210. kg/cm^2

•.NOEL = 110, iSEC = 4, Span = 300 cm. << RC-BEAM Design Result >>
•.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	21.4(1)	16.05	5-D22	.0(0)	3.60	2-D22	19.5(1)	3.657*	6.37	D10 @220
1/4	7.9(1)	7.87	3-D22	.0(0)	3.60	2-D22	16.1(1)	3.019*	3.91	D10 @270
2/4	.0(0)	3.60	2-D22	2.5(1)	3.60	2-D22	11.6(1)	2.180*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	9.2(1)	6.59	2-D22	6.1(1)	1.141*	3.52	D10 @270
1.0	.0(0)	3.60	2-D22	11.5(1)	8.29	3-D22	.0(1)	.001	.00	D10 @270

•.NOEL = 111, iSEC = 4, Span = 300 cm. << RC-BEAM Design Result >>
•.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	11.5(1)	8.29	3-D22	.0(1)	.001	.00	D10 @270
1/4	.0(0)	3.60	2-D22	9.3(1)	6.59	2-D22	6.1(1)	1.139*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	2.5(1)	3.60	2-D22	11.6(1)	2.178*	3.52	D10 @270
3/4	7.9(1)	7.87	3-D22	.0(0)	3.60	2-D22	16.1(1)	3.017*	3.91	D10 @270
1.0	21.4(1)	16.05	5-D22	.0(0)	3.60	2-D22	19.5(1)	3.655*	6.36	D10 @220

•.NOEL = 112, iSEC = 4, Span = 150 cm. << RC-BEAM Design Result >>
•.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	1.2(1)	3.60	2-D22	.0(0)	3.60	2-D22	2.1(1)	.388	.00	D10 @270
1/4	.5(1)	3.60	2-D22	.0(0)	3.60	2-D22	1.8(1)	.331	.00	D10 @270
2/4	.0(0)	3.60	2-D22	.1(1)	3.60	2-D22	1.3(1)	.248	.00	D10 @270
3/4	.0(0)	3.60	2-D22	.5(1)	3.60	2-D22	.7(1)	.140	.00	D10 @270
1.0	.0(0)	3.60	2-D22	.6(1)	3.60	2-D22	.0(1)	.006	.00	D10 @270

•.NOEL = 113, iSEC = 4, Span = 150 cm. << RC-BEAM Design Result >>
•.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	.6(1)	3.60	2-D22	.0(1)	.006	.00	D10 @270
1/4	.0(0)	3.60	2-D22	.5(1)	3.60	2-D22	.7(1)	.128	.00	D10 @270
2/4	.0(0)	3.60	2-D22	.1(1)	3.60	2-D22	1.3(1)	.236	.00	D10 @270
3/4	.4(1)	3.60	2-D22	.0(0)	3.60	2-D22	1.7(1)	.319	.00	D10 @270
1.0	1.1(1)	3.60	2-D22	.0(0)	3.60	2-D22	2.0(1)	.376	.00	D10 @270

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 114, iSEC = 5, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	17.5(1)	12.96	4-D22	.0(0)	3.60	2-D22	14.1(1)	2.642*	3.52	D10 @270
1/4	7.2(1)	7.87	3-D22	.0(0)	3.60	2-D22	12.9(1)	2.415*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	1.5(1)	3.60	2-D22	10.2(1)	1.914*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	7.7(1)	7.87	3-D22	6.1(1)	1.138*	3.52	D10 @270
1.0	.0(0)	3.60	2-D22	10.4(1)	7.44	2-D22	1.2(1)	.225	.00	D10 @270

*.NOEL = 115, iSEC = 5, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	10.4(1)	7.44	2-D22	1.2(1)	.225	.00	D10 @270
1/4	.0(0)	3.60	2-D22	8.9(1)	6.59	2-D22	5.3(1)	.987	.00	D10 @270
2/4	.0(0)	3.60	2-D22	2.7(1)	3.60	2-D22	11.0(1)	2.062*	3.52	D10 @270
3/4	7.2(1)	7.87	3-D22	.0(0)	3.60	2-D22	15.3(1)	2.862*	3.52	D10 @270
1.0	19.8(1)	14.89	4-D22	.0(0)	3.60	2-D22	18.1(1)	3.388*	5.33	D10 @260

*.NOEL = 116, iSEC = 5, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	12.0(1)	8.69	3-D22	.0(0)	3.60	2-D22	10.1(1)	1.885*	3.52	D10 @270
1/4	4.8(1)	3.60	2-D22	.0(0)	3.60	2-D22	9.0(1)	1.694*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	1.3(1)	3.60	2-D22	6.9(1)	1.299*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	5.4(1)	7.87	3-D22	3.7(1)	.700	.00	D10 @270
1.0	.0(0)	3.60	2-D22	6.8(1)	7.87	3-D22	.0(1)	.001	.00	D10 @270

*.NOEL = 117, iSEC = 5, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	6.8(1)	7.87	3-D22	.0(1)	.001	.00	D10 @270
1/4	.0(0)	3.60	2-D22	5.4(1)	7.87	3-D22	3.7(1)	.702	.00	D10 @270
2/4	.0(0)	3.60	2-D22	1.3(1)	3.60	2-D22	6.9(1)	1.301*	3.52	D10 @270
3/4	4.8(1)	3.60	2-D22	.0(0)	3.60	2-D22	9.1(1)	1.696*	3.52	D10 @270
1.0	12.0(1)	8.69	3-D22	.0(0)	3.60	2-D22	10.1(1)	1.887*	3.52	D10 @270

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 118, iSEC = 5, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	25.9(1)	19.93	6-D22	.0(0)	3.60	2-D22	22.6(1)	4.234*	8.58	D10 @160
1/4	10.0(1)	7.05	2-D22	.0(0)	3.60	2-D22	19.6(1)	3.667*	6.41	D10 @220
2/4	.0(0)	3.60	2-D22	3.0(1)	3.60	2-D22	14.6(1)	2.743*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	11.5(1)	8.29	3-D22	7.8(1)	1.462*	3.52	D10 @270
1.0	.0(0)	3.60	2-D22	14.4(1)	10.63	3-D22	.0(1)	.002	.00	D10 @270

*.NOEL = 119, iSEC = 5, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	14.4(1)	10.63	3-D22	.0(1)	.002	.00	D10 @270
1/4	.0(0)	3.60	2-D22	11.5(1)	8.29	3-D22	7.8(1)	1.458*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	3.0(1)	3.60	2-D22	14.6(1)	2.739*	3.52	D10 @270
3/4	10.0(1)	7.05	2-D22	.0(0)	3.60	2-D22	19.6(1)	3.663*	6.39	D10 @220
1.0	25.9(1)	19.93	6-D22	.0(0)	3.60	2-D22	22.6(1)	4.230*	8.57	D10 @160

*.NOEL = 120, iSEC = 5, Span = 150 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	2.0(1)	3.60	2-D22	.0(0)	3.60	2-D22	3.2(1)	.596	.00	D10 @270
1/4	.8(1)	3.60	2-D22	.0(0)	3.60	2-D22	2.8(1)	.526	.00	D10 @270
2/4	.0(0)	3.60	2-D22	.1(1)	3.60	2-D22	2.2(1)	.405	.00	D10 @270
3/4	.0(0)	3.60	2-D22	.8(1)	3.60	2-D22	1.2(1)	.233	.00	D10 @270
1.0	.0(0)	3.60	2-D22	1.0(1)	3.60	2-D22	.1(1)	.010	.00	D10 @270

*.NOEL = 121, iSEC = 5, Span = 150 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	1.0(1)	3.60	2-D22	.1(1)	.010	.00	D10 @270
1/4	.0(0)	3.60	2-D22	.8(1)	3.60	2-D22	1.1(1)	.214	.00	D10 @270
2/4	.0(0)	3.60	2-D22	.2(1)	3.60	2-D22	2.1(1)	.386	.00	D10 @270
3/4	.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	2.7(1)	.507	.00	D10 @270
1.0	1.8(1)	3.60	2-D22	.0(0)	3.60	2-D22	3.1(1)	.577	.00	D10 @270

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 122, iSEC = 4, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	20.0(1)	14.89	4-D22	.0(0)	3.60	2-D22	18.4(1)	3.445*	5.55	D10 @250
1/4	7.4(1)	7.87	3-D22	.0(0)	3.60	2-D22	15.1(1)	2.821*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	2.4(1)	3.60	2-D22	10.8(1)	2.024*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	8.6(1)	6.16	2-D22	5.6(1)	1.055*	3.52	D10 @270
1.0	.0(0)	3.60	2-D22	10.7(1)	7.87	3-D22	.0(1)	.001	.00	D10 @270

*.NOEL = 123, iSEC = 4, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	10.7(1)	7.87	3-D22	.0(1)	.001	.00	D10 @270
1/4	.0(0)	3.60	2-D22	8.6(1)	6.16	2-D22	5.6(1)	1.057*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	2.4(1)	3.60	2-D22	10.8(1)	2.026*	3.52	D10 @270
3/4	7.4(1)	7.87	3-D22	.0(0)	3.60	2-D22	15.1(1)	2.823*	3.52	D10 @270
1.0	20.0(1)	14.89	4-D22	.0(0)	3.60	2-D22	18.4(1)	3.446*	5.56	D10 @250

*.NOEL = 124, iSEC = 4, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	7.0(1)	7.87	3-D22	.0(0)	3.60	2-D22	6.0(1)	1.122*	3.52	D10 @270
1/4	2.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	5.2(1)	.981	.00	D10 @270
2/4	.0(0)	3.60	2-D22	.7(1)	3.60	2-D22	3.9(1)	.739	.00	D10 @270
3/4	.0(0)	3.60	2-D22	3.1(1)	3.60	2-D22	2.1(1)	.395	.00	D10 @270
1.0	.0(0)	3.60	2-D22	3.8(1)	3.60	2-D22	.0(1)	.000	.00	D10 @270

*.NOEL = 125, iSEC = 4, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	3.8(1)	3.60	2-D22	.0(1)	.000	.00	D10 @270
1/4	.0(0)	3.60	2-D22	3.1(1)	3.60	2-D22	2.1(1)	.395	.00	D10 @270
2/4	.0(0)	3.60	2-D22	.8(1)	3.60	2-D22	3.9(1)	.739	.00	D10 @270
3/4	2.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	5.2(1)	.981	.00	D10 @270
1.0	7.0(1)	7.87	3-D22	.0(0)	3.60	2-D22	6.0(1)	1.121*	3.52	D10 @270

• MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

• PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
• Main Rebar : fy = 3000. kg/cm^2
• Stirrup : fys = 3000. kg/cm^2
• Concrete : fc = 210. kg/cm^2

• NOEL = 126, iSEC = 4, Span = 300 cm. << RC-BEAM Design Result >>
• Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	19.2(1)	14.12	4-D22	.0(0)	3.60	2-D22	17.8(1)	3.324*	5.09	D10 @270
1/4	7.1(1)	7.87	3-D22	.0(0)	3.60	2-D22	14.5(1)	2.709*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	2.3(1)	3.60	2-D22	10.3(1)	1.936*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	8.2(1)	7.87	3-D22	5.4(1)	1.007*	3.52	D10 @270
1.0	.0(0)	3.60	2-D22	10.3(1)	7.44	2-D22	.0(1)	.000	.00	D10 @270

• NOEL = 127, iSEC = 4, Span = 300 cm. << RC-BEAM Design Result >>
• Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	10.3(1)	7.44	2-D22	.0(1)	.000	.00	D10 @270
1/4	.0(0)	3.60	2-D22	8.2(1)	7.87	3-D22	5.4(1)	1.007*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	2.3(1)	3.60	2-D22	10.3(1)	1.936*	3.52	D10 @270
3/4	7.1(1)	7.87	3-D22	.0(0)	3.60	2-D22	14.5(1)	2.708*	3.52	D10 @270
1.0	19.2(1)	14.12	4-D22	.0(0)	3.60	2-D22	17.7(1)	3.324*	5.09	D10 @270

• NOEL = 128, iSEC = 4, Span = 150 cm. << RC-BEAM Design Result >>
• Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	3.6(1)	3.60	2-D22	.0(0)	3.60	2-D22	6.9(1)	1.286*	3.52	D10 @270
1/4	1.3(1)	3.60	2-D22	.0(0)	3.60	2-D22	5.4(1)	1.004*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	.4(1)	3.60	2-D22	3.7(1)	.697	.00	D10 @270
3/4	.0(0)	3.60	2-D22	1.4(1)	3.60	2-D22	1.9(1)	.365	.00	D10 @270
1.0	.0(0)	3.60	2-D22	1.8(1)	3.60	2-D22	.0(1)	.007	.00	D10 @270

• NOEL = 129, iSEC = 4, Span = 150 cm. << RC-BEAM Design Result >>
• Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	1.8(1)	3.60	2-D22	.0(1)	.007	.00	D10 @270
1/4	.0(0)	3.60	2-D22	1.5(1)	3.60	2-D22	1.9(1)	.351	.00	D10 @270
2/4	.0(0)	3.60	2-D22	.4(1)	3.60	2-D22	3.6(1)	.683	.00	D10 @270
3/4	1.2(1)	3.60	2-D22	.0(0)	3.60	2-D22	5.3(1)	.990	.00	D10 @270
1.0	3.5(1)	3.60	2-D22	.0(0)	3.60	2-D22	6.8(1)	1.272*	3.52	D10 @270

* MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

* PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
* Main Rebar : fy = 3000. kg/cm^2
* Stirrup : fys = 3000. kg/cm^2
* Concrete : fc = 210. kg/cm^2

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* NOEL = 130, iSEC = 6, Span = 300 cm. << RC-BEAM Design Result >>
* Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	7.9(1)	7.87	3-D22	.0(0)	3.60	2-D22	13.1(1)	2.454*	3.52	D10 @270
1/4	.0(0)	3.60	2-D22	.9(1)	3.60	2-D22	10.1(1)	1.900*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	7.2(1)	7.87	3-D22	6.7(1)	1.245*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	10.7(1)	7.87	3-D22	2.6(1)	.488	.00	D10 @270
1.0	.0(0)	3.60	2-D22	11.0(1)	7.87	3-D22	1.7(1)	.320	.00	D10 @270

* NOEL = 131, iSEC = 6, Span = 300 cm. << RC-BEAM Design Result >>
* Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	11.0(1)	7.87	3-D22	1.7(1)	.320	.00	D10 @270
1/4	.0(0)	3.60	2-D22	8.1(1)	7.87	3-D22	6.0(1)	1.128*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	2.1(1)	3.60	2-D22	10.1(1)	1.885*	3.52	D10 @270
3/4	6.8(1)	7.87	3-D22	.0(0)	3.60	2-D22	13.6(1)	2.540*	3.52	D10 @270
1.0	18.1(1)	13.34	4-D22	.0(0)	3.60	2-D22	16.5(1)	3.093*	4.20	D10 @270

* NOEL = 132, iSEC = 6, Span = 300 cm. << RC-BEAM Design Result >>
* Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	16.1(1)	11.79	4-D22	.0(0)	3.60	2-D22	14.6(1)	2.727*	3.52	D10 @270
1/4	6.3(1)	7.87	3-D22	.0(0)	3.60	2-D22	11.6(1)	2.174*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	1.2(1)	3.60	2-D22	8.1(1)	1.519*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	5.8(1)	7.87	3-D22	4.1(1)	.762	.00	D10 @270
1.0	.0(0)	3.60	2-D22	7.2(1)	7.87	3-D22	.2(1)	.046	.00	D10 @270

* NOEL = 133, iSEC = 6, Span = 300 cm. << RC-BEAM Design Result >>
* Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	7.2(1)	7.87	3-D22	.2(1)	.046	.00	D10 @270
1/4	.0(0)	3.60	2-D22	5.4(1)	7.87	3-D22	4.6(1)	.854	.00	D10 @270
2/4	.0(0)	3.60	2-D22	.4(1)	3.60	2-D22	8.6(1)	1.611*	3.52	D10 @270
3/4	7.4(1)	7.87	3-D22	.0(0)	3.60	2-D22	12.1(1)	2.266*	3.52	D10 @270
1.0	17.6(1)	12.96	4-D22	.0(0)	3.60	2-D22	15.1(1)	2.819*	3.52	D10 @270

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 134. iSEC = 6. Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	19.5(1)	14.89	4-D22	.0(0)	3.60	2-D22	18.6(1)	3.490*	5.73	D10 @240
1/4	6.7(1)	7.87	3-D22	.0(0)	3.60	2-D22	15.5(1)	2.899*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	3.4(1)	3.60	2-D22	11.4(1)	2.129*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	10.1(1)	7.44	2-D22	6.3(1)	1.180*	3.52	D10 @270
1.0	.0(0)	3.60	2-D22	12.8(1)	9.47	3-D22	.8(1)	.142	.00	D10 @270

*.NOEL = 135. iSEC = 6. Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	12.8(1)	9.47	3-D22	.8(1)	.142	.00	D10 @270
1/4	.0(0)	3.60	2-D22	11.3(1)	8.29	3-D22	4.8(1)	.896	.00	D10 @270
2/4	.0(0)	3.60	2-D22	5.7(1)	7.87	3-D22	9.9(1)	1.845*	3.52	D10 @270
3/4	3.3(1)	3.60	2-D22	.0(0)	3.60	2-D22	14.0(1)	2.615*	3.52	D10 @270
1.0	15.0(1)	11.02	3-D22	.0(0)	3.60	2-D22	17.1(1)	3.206*	4.64	D10 @270

*.NOEL = 136. iSEC = 6. Span = 150 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	8.8(1)	6.16	2-D22	.0(0)	3.60	2-D22	5.5(1)	1.031*	3.52	D10 @270
1/4	6.7(1)	7.87	3-D22	.0(0)	3.60	2-D22	5.2(1)	.965	.00	D10 @270
2/4	4.9(1)	3.60	2-D22	.0(0)	3.60	2-D22	4.6(1)	.856	.00	D10 @270
3/4	3.3(1)	3.60	2-D22	.0(0)	3.60	2-D22	3.8(1)	.705	.00	D10 @270
1.0	2.1(1)	3.60	2-D22	.0(0)	3.60	2-D22	2.7(1)	.510	.00	D10 @270

*.NOEL = 137. iSEC = 6. Span = 150 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	2.1(1)	3.60	2-D22	.0(0)	3.60	2-D22	2.7(1)	.510	.00	D10 @270
1/4	1.3(1)	3.60	2-D22	.0(0)	3.60	2-D22	1.7(1)	.316	.00	D10 @270
2/4	.8(1)	3.60	2-D22	.0(0)	3.60	2-D22	.9(1)	.164	.00	D10 @270
3/4	.6(1)	3.60	2-D22	.0(0)	3.60	2-D22	.3(1)	.055	.00	D10 @270
1.0	.6(1)	3.60	2-D22	.0(0)	3.60	2-D22	.1(1)	.011	.00	D10 @270

• MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

• PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
• Main Rebar : fy = 3000. kg/cm^2
• Stirrup : fys = 3000. kg/cm^2
• Concrete : fc = 210. kg/cm^2

• NOEL = 138. iSEC = 7. Span = 300 cm. << RC-BEAM Design Result >>
• Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	6.2(1)	7.87	3-D22	.0(0)	3.60	2-D22	8.8(1)	1.656*	3.52	D10 @270
1/4	.0(0)	3.60	2-D22	.1(1)	3.60	2-D22	7.8(1)	1.465*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	5.3(1)	7.87	3-D22	5.7(1)	1.070*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	8.4(1)	6.16	2-D22	2.5(1)	.471	.00	D10 @270
1.0	.0(0)	3.60	2-D22	8.9(1)	6.59	2-D22	1.2(1)	.230	.00	D10 @270

• NOEL = 139. iSEC = 7. Span = 300 cm. << RC-BEAM Design Result >>
• Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	8.9(1)	6.59	2-D22	1.2(1)	.230	.00	D10 @270
1/4	.0(0)	3.60	2-D22	6.6(1)	7.87	3-D22	5.0(1)	.931	.00	D10 @270
2/4	.0(0)	3.60	2-D22	1.6(1)	3.60	2-D22	8.2(1)	1.530*	3.52	D10 @270
3/4	5.4(1)	7.87	3-D22	.0(0)	3.60	2-D22	10.3(1)	1.925*	3.52	D10 @270
1.0	13.6(1)	9.86	3-D22	.0(0)	3.60	2-D22	11.3(1)	2.116*	3.52	D10 @270

• NOEL = 140. iSEC = 7. Span = 300 cm. << RC-BEAM Design Result >>
• Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	11.6(1)	8.29	3-D22	.0(0)	3.60	2-D22	9.5(1)	1.779*	3.52	D10 @270
1/4	4.8(1)	3.60	2-D22	.0(0)	3.60	2-D22	8.5(1)	1.588*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	.8(1)	3.60	2-D22	6.4(1)	1.193*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	4.4(1)	3.60	2-D22	3.2(1)	.594	.00	D10 @270
1.0	.0(0)	3.60	2-D22	5.4(1)	7.87	3-D22	.6(1)	.107	.00	D10 @270

• NOEL = 141. iSEC = 7. Span = 300 cm. << RC-BEAM Design Result >>
• Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	5.4(1)	7.87	3-D22	.6(1)	.107	.00	D10 @270
1/4	.0(0)	3.60	2-D22	3.6(1)	3.60	2-D22	4.3(1)	.808	.00	D10 @270
2/4	.9(1)	3.60	2-D22	.0(0)	3.60	2-D22	7.5(1)	1.407*	3.52	D10 @270
3/4	7.4(1)	7.87	3-D22	.0(0)	3.60	2-D22	9.6(1)	1.802*	3.52	D10 @270
1.0	15.1(1)	11.02	3-D22	.0(0)	3.60	2-D22	10.6(1)	1.993*	3.52	D10 @270

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 142. iSEC = 7. Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	18.4(1)	13.73	4-D22	.0(0)	3.60	2-D22	16.7(1)	3.125*	4.32	D10 @270
1/4	6.3(1)	7.87	3-D22	-.0(0)	3.60	2-D22	15.3(1)	2.857*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	4.0(1)	3.60	2-D22	11.9(1)	2.232*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	11.1(1)	8.29	3-D22	6.7(1)	1.249*	3.52	D10 @270
1.0	.0(0)	3.60	2-D22	13.8(1)	10.24	3-D22	.5(1)	.088	.00	D10 @270

*.NOEL = 143. iSEC = 7. Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	13.8(1)	10.24	3-D22	.5(1)	.088	.00	D10 @270
1/4	.0(0)	3.60	2-D22	11.8(1)	8.69	3-D22	5.7(1)	1.073*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	5.4(1)	7.87	3-D22	11.0(1)	2.055*	3.52	D10 @270
3/4	4.2(1)	3.60	2-D22	.0(0)	3.60	2-D22	14.3(1)	2.680*	3.52	D10 @270
1.0	15.6(1)	11.41	3-D22	.0(0)	3.60	2-D22	15.7(1)	2.948*	3.64	D10 @270

*.NOEL = 144. iSEC = 7. Span = 150 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	9.1(1)	6.59	2-D22	.0(0)	3.60	2-D22	6.5(1)	1.214*	3.52	D10 @270
1/4	6.7(1)	7.87	3-D22	.0(0)	3.60	2-D22	6.1(1)	1.135*	3.52	D10 @270
2/4	4.6(1)	3.60	2-D22	.0(0)	3.60	2-D22	5.3(1)	.988	.00	D10 @270
3/4	2.8(1)	3.60	2-D22	.0(0)	3.60	2-D22	4.1(1)	.773	.00	D10 @270
1.0	1.5(1)	3.60	2-D22	.0(0)	3.60	2-D22	2.6(1)	.489	.00	D10 @270

*.NOEL = 145. iSEC = 7. Span = 150 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	1.5(1)	3.60	2-D22	.0(0)	3.60	2-D22	2.6(1)	.489	.00	D10 @270
1/4	.8(1)	3.60	2-D22	.0(0)	3.60	2-D22	1.1(1)	.205	.00	D10 @270
2/4	.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	.1(1)	.010	.00	D10 @270
3/4	.8(1)	3.60	2-D22	.0(0)	3.60	2-D22	.8(1)	.157	.00	D10 @270
1.0	1.2(1)	3.60	2-D22	.0(0)	3.60	2-D22	1.3(1)	.236	.00	D10 @270

• MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

• PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
• Main Rebar : fy = 3000. kg/cm^2
• Stirrup : fys = 3000. kg/cm^2
• Concrete : fc = 210. kg/cm^2

• NOEL = 146. iSEC = 6. Span = 300 cm. << RC-BEAM Design Result >>
• Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	7.9(1)	7.87	3-D22	.0(0)	3.60	2-D22	13.1(1)	2.454*	3.52	D10 @270
1/4	.0(0)	3.60	2-D22	.9(1)	3.60	2-D22	10.2(1)	1.901*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	7.2(1)	7.87	3-D22	6.7(1)	1.246*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	10.7(1)	7.87	3-D22	2.6(1)	.489	.00	D10 @270
1.0	.0(0)	3.60	2-D22	11.1(1)	7.87	3-D22	1.7(1)	.319	.00	D10 @270

• NOEL = 147. iSEC = 6. Span = 300 cm. << RC-BEAM Design Result >>
• Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	11.1(1)	7.87	3-D22	1.7(1)	.319	.00	D10 @270
1/4	.0(0)	3.60	2-D22	8.2(1)	7.87	3-D22	6.0(1)	1.127*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	2.1(1)	3.60	2-D22	10.1(1)	1.884*	3.52	D10 @270
3/4	6.8(1)	7.87	3-D22	.0(0)	3.60	2-D22	13.6(1)	2.539*	3.52	D10 @270
1.0	18.1(1)	13.34	4-D22	.0(0)	3.60	2-D22	16.5(1)	3.092*	4.20	D10 @270

• NOEL = 148. iSEC = 6. Span = 300 cm. << RC-BEAM Design Result >>
• Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	16.0(1)	11.79	4-D22	.0(0)	3.60	2-D22	14.5(1)	2.721*	3.52	D10 @270
1/4	6.2(1)	7.87	3-D22	.0(0)	3.60	2-D22	11.6(1)	2.168*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	1.2(1)	3.60	2-D22	8.1(1)	1.513*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	5.8(1)	7.87	3-D22	4.0(1)	.756	.00	D10 @270
1.0	.0(0)	3.60	2-D22	7.2(1)	7.87	3-D22	.3(1)	.052	.00	D10 @270

• NOEL = 149. iSEC = 6. Span = 300 cm. << RC-BEAM Design Result >>
• Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	7.2(1)	7.87	3-D22	.3(1)	.052	.00	D10 @270
1/4	.0(0)	3.60	2-D22	5.4(1)	7.87	3-D22	4.6(1)	.860	.00	D10 @270
2/4	.0(0)	3.60	2-D22	.4(1)	3.60	2-D22	8.6(1)	1.617*	3.52	D10 @270
3/4	7.5(1)	7.87	3-D22	.0(0)	3.60	2-D22	12.1(1)	2.272*	3.52	D10 @270
1.0	17.7(1)	12.96	4-D22	.0(0)	3.60	2-D22	15.1(1)	2.825*	3.52	D10 @270

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 150, iSEC = 6, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	19.2(1)	14.12	4-D22	.0(0)	3.60	2-D22	18.5(1)	3.457*	5.60	D10 @250
1/4	6.5(1)	7.87	3-D22	.0(0)	3.60	2-D22	15.3(1)	2.865*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	3.5(1)	3.60	2-D22	11.2(1)	2.095*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	10.1(1)	7.44	2-D22	6.1(1)	1.147*	3.52	D10 @270
1.0	.0(0)	3.60	2-D22	12.6(1)	9.08	3-D22	.6(1)	.109	.00	D10 @270

*.NOEL = 151, iSEC = 6, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	12.6(1)	9.08	3-D22	.6(1)	.109	.00	D10 @270
1/4	.0(0)	3.60	2-D22	10.9(1)	7.87	3-D22	5.0(1)	.929	.00	D10 @270
2/4	.0(0)	3.60	2-D22	5.2(1)	7.87	3-D22	10.0(1)	1.878*	3.52	D10 @270
3/4	3.9(1)	3.60	2-D22	.0(0)	3.60	2-D22	14.1(1)	2.648*	3.52	D10 @270
1.0	15.7(1)	11.41	3-D22	.0(0)	3.60	2-D22	17.3(1)	3.240*	4.76	D10 @270

*.NOEL = 152, iSEC = 6, Span = 150 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	10.4(1)	7.44	2-D22	.0(0)	3.60	2-D22	9.5(1)	1.776*	3.52	D10 @270
1/4	7.1(1)	7.87	3-D22	.0(0)	3.60	2-D22	8.1(1)	1.512*	3.52	D10 @270
2/4	4.4(1)	3.60	2-D22	.0(0)	3.60	2-D22	6.5(1)	1.223*	3.52	D10 @270
3/4	2.2(1)	3.60	2-D22	.0(0)	3.60	2-D22	4.8(1)	.908	.00	D10 @270
1.0	.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	3.0(1)	.567	.00	D10 @270

*.NOEL = 153, iSEC = 6, Span = 150 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	3.0(1)	.567	.00	D10 @270
1/4	.0(0)	3.60	2-D22	.1(1)	3.60	2-D22	1.2(1)	.227	.00	D10 @270
2/4	.0(0)	3.60	2-D22	.2(1)	3.60	2-D22	.5(1)	.088	.00	D10 @270
3/4	.3(1)	3.60	2-D22	.0(0)	3.60	2-D22	2.0(1)	.377	.00	D10 @270
1.0	1.3(1)	3.60	2-D22	.0(0)	3.60	2-D22	3.4(1)	.641	.00	D10 @270

* MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

* PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
* Main Rebar : fy = 3000. kg/cm^2
* Stirrup : fys = 3000. kg/cm^2
* Concrete : fc = 210. kg/cm^2

* NOEL = 154. iSEC = 8. Span = 300 cm. << RC-BEAM Design Result >>
* Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	3.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	6.9(1)	1.285*	3.52	D10 @270
1/4	.0(0)	3.60	2-D22	1.0(1)	3.60	2-D22	5.7(1)	1.069*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	4.7(1)	3.60	2-D22	3.9(1)	.739	.00	D10 @270
3/4	.0(0)	3.60	2-D22	6.8(1)	7.87	3-D22	1.6(1)	.296	.00	D10 @270
1.0	.0(0)	3.60	2-D22	7.0(1)	7.87	3-D22	1.1(1)	.204	.00	D10 @270

* NOEL = 155. iSEC = 8. Span = 300 cm. << RC-BEAM Design Result >>
* Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	7.0(1)	7.87	3-D22	1.1(1)	.204	.00	D10 @270
1/4	.0(0)	3.60	2-D22	5.1(1)	3.60	2-D22	3.8(1)	.704	.00	D10 @270
2/4	.0(0)	3.60	2-D22	1.4(1)	3.60	2-D22	6.1(1)	1.147*	3.52	D10 @270
3/4	3.9(1)	3.60	2-D22	.0(0)	3.60	2-D22	7.9(1)	1.476*	3.52	D10 @270
1.0	10.3(1)	7.44	2-D22	.0(0)	3.60	2-D22	9.0(1)	1.693*	3.52	D10 @270

* NOEL = 156. iSEC = 8. Span = 300 cm. << RC-BEAM Design Result >>
* Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	9.2(1)	6.59	2-D22	.0(0)	3.60	2-D22	7.7(1)	1.439*	3.52	D10 @270
1/4	3.8(1)	3.60	2-D22	.0(0)	3.60	2-D22	6.5(1)	1.222*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	.5(1)	3.60	2-D22	4.8(1)	.892	.00	D10 @270
3/4	.0(0)	3.60	2-D22	3.2(1)	3.60	2-D22	2.4(1)	.449	.00	D10 @270
1.0	.0(0)	3.60	2-D22	4.0(1)	3.60	2-D22	.3(1)	.051	.00	D10 @270

* NOEL = 157. iSEC = 8. Span = 300 cm. << RC-BEAM Design Result >>
* Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	4.0(1)	3.60	2-D22	.3(1)	.051	.00	D10 @270
1/4	.0(0)	3.60	2-D22	2.8(1)	3.60	2-D22	2.9(1)	.550	.00	D10 @270
2/4	.3(1)	3.60	2-D22	.0(0)	3.60	2-D22	5.3(1)	.993	.00	D10 @270
3/4	5.0(1)	3.60	2-D22	.0(0)	3.60	2-D22	7.1(1)	1.323*	3.52	D10 @270
1.0	10.8(1)	7.87	3-D22	.0(0)	3.60	2-D22	8.2(1)	1.540*	3.52	D10 @270

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 158, iSEC = 8, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	11.9(1)	8.69	3-D22	.0(0)	3.60	2-D22	11.3(1)	2.108*	3.52	D10 @270
1/4	3.9(1)	3.60	2-D22	.0(0)	3.60	2-D22	9.9(1)	1.855*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	2.7(1)	3.60	2-D22	7.6(1)	1.418*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	7.2(1)	7.87	3-D22	4.2(1)	.796	.00	D10 @270
1.0	.0(0)	3.60	2-D22	8.9(1)	6.59	2-D22	.4(1)	.081	.00	D10 @270

*.NOEL = 159, iSEC = 8, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	8.9(1)	6.59	2-D22	.4(1)	.081	.00	D10 @270
1/4	.0(0)	3.60	2-D22	7.8(1)	7.87	3-D22	3.4(1)	.633	.00	D10 @270
2/4	.0(0)	3.60	2-D22	4.0(1)	3.60	2-D22	6.7(1)	1.255*	3.52	D10 @270
3/4	2.0(1)	3.60	2-D22	.0(0)	3.60	2-D22	9.0(1)	1.693*	3.52	D10 @270
1.0	9.3(1)	6.59	2-D22	.0(0)	3.60	2-D22	10.4(1)	1.945*	3.52	D10 @270

*.NOEL = 160, iSEC = 8, Span = 150 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	6.0(1)	7.87	3-D22	.0(0)	3.60	2-D22	4.7(1)	.884	.00	D10 @270
1/4	4.3(1)	3.60	2-D22	.0(0)	3.60	2-D22	4.2(1)	.790	.00	D10 @270
2/4	2.8(1)	3.60	2-D22	.0(0)	3.60	2-D22	3.6(1)	.667	.00	D10 @270
3/4	1.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	2.8(1)	.517	.00	D10 @270
1.0	.8(1)	3.60	2-D22	.0(0)	3.60	2-D22	1.8(1)	.338	.00	D10 @270

*.NOEL = 161, iSEC = 8, Span = 150 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.8(1)	3.60	2-D22	.0(0)	3.60	2-D22	1.8(1)	.338	.00	D10 @270
1/4	.3(1)	3.60	2-D22	.0(0)	3.60	2-D22	.8(1)	.159	.00	D10 @270
2/4	.1(1)	3.60	2-D22	.0(0)	3.60	2-D22	.0(1)	.008	.00	D10 @270
3/4	.3(1)	3.60	2-D22	.0(0)	3.60	2-D22	.6(1)	.115	.00	D10 @270
1.0	.6(1)	3.60	2-D22	.0(0)	3.60	2-D22	1.1(1)	.209	.00	D10 @270

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 162, iSEC = 9, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	5.2(1)	3.60	2-D22	.0(0)	3.60	2-D22	9.3(1)	1.741*	3.52	D10 @270
1/4	.0(0)	3.60	2-D22	1.5(1)	3.60	2-D22	8.2(1)	1.538*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	6.9(1)	7.87	3-D22	5.9(1)	1.109*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	10.1(1)	7.44	2-D22	2.4(1)	.454	.00	D10 @270
1.0	.0(0)	3.60	2-D22	10.3(1)	7.44	2-D22	1.7(1)	.315	.00	D10 @270

*.NOEL = 163, iSEC = 9, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	10.3(1)	7.44	2-D22	1.7(1)	.315	.00	D10 @270
1/4	.0(0)	3.60	2-D22	7.5(1)	7.87	3-D22	5.8(1)	1.083*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	1.8(1)	3.60	2-D22	9.3(1)	1.739*	3.52	D10 @270
3/4	6.1(1)	7.87	3-D22	.0(0)	3.60	2-D22	11.6(1)	2.168*	3.52	D10 @270
1.0	15.2(1)	11.02	3-D22	.0(0)	3.60	2-D22	12.7(1)	2.370*	3.52	D10 @270

*.NOEL = 164, iSEC = 9, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	13.8(1)	10.24	3-D22	.0(0)	3.60	2-D22	10.8(1)	2.025*	3.52	D10 @270
1/4	6.0(1)	7.87	3-D22	.0(0)	3.60	2-D22	9.7(1)	1.823*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	.5(1)	3.60	2-D22	7.4(1)	1.394*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	4.9(1)	3.60	2-D22	3.9(1)	.738	.00	D10 @270
1.0	.0(0)	3.60	2-D22	6.3(1)	7.87	3-D22	.2(1)	.030	.00	D10 @270

*.NOEL = 165, iSEC = 9, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	6.3(1)	7.87	3-D22	.2(1)	.030	.00	D10 @270
1/4	.0(0)	3.60	2-D22	4.6(1)	3.60	2-D22	4.3(1)	.799	.00	D10 @270
2/4	.0(0)	3.60	2-D22	.0(1)	3.60	2-D22	7.8(1)	1.454*	3.52	D10 @270
3/4	6.7(1)	7.87	3-D22	.0(0)	3.60	2-D22	10.1(1)	1.883*	3.52	D10 @270
1.0	14.7(1)	11.02	3-D22	.0(0)	3.60	2-D22	11.1(1)	2.085*	3.52	D10 @270

* MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

* PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
* Main Rebar : fy = 3000. kg/cm^2
* Stirrup : fys = 3000. kg/cm^2
* Concrete : fc = 210. kg/cm^2

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* NOEL = 166. iSEC = 9. Span = 300 cm. << RC-BEAM Design Result >>
* Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	16.5(1)	12.18	4-D22	.0(0)	3.60	2-D22	14.6(1)	2.730*	3.52	D10 @270
1/4	5.9(1)	7.87	3-D22	.0(0)	3.60	2-D22	13.3(1)	2.491*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	3.1(1)	3.60	2-D22	10.4(1)	1.955*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	9.3(1)	6.59	2-D22	6.0(1)	1.121*	3.52	D10 @270
1.0	.0(0)	3.60	2-D22	11.8(1)	8.69	3-D22	.7(1)	.137	.00	D10 @270

* NOEL = 167. iSEC = 9. Span = 300 cm. << RC-BEAM Design Result >>
* Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	11.8(1)	8.69	3-D22	.7(1)	.137	.00	D10 @270
1/4	.0(0)	3.60	2-D22	10.4(1)	7.44	2-D22	4.5(1)	.846	.00	D10 @270
2/4	.0(0)	3.60	2-D22	5.3(1)	7.87	3-D22	9.0(1)	1.681*	3.52	D10 @270
3/4	2.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	11.8(1)	2.217*	3.52	D10 @270
1.0	12.1(1)	8.69	3-D22	.0(0)	3.60	2-D22	13.1(1)	2.455*	3.52	D10 @270

* NOEL = 168. iSEC = 9. Span = 150 cm. << RC-BEAM Design Result >>
* Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	7.8(1)	7.87	3-D22	.0(0)	3.60	2-D22	5.6(1)	1.055*	3.52	D10 @270
1/4	5.7(1)	7.87	3-D22	.0(0)	3.60	2-D22	5.2(1)	.982	.00	D10 @270
2/4	3.9(1)	3.60	2-D22	.0(0)	3.60	2-D22	4.6(1)	.853	.00	D10 @270
3/4	2.4(1)	3.60	2-D22	.0(0)	3.60	2-D22	3.6(1)	.667	.00	D10 @270
1.0	1.3(1)	3.60	2-D22	.0(0)	3.60	2-D22	2.3(1)	.424	.00	D10 @270

* NOEL = 169. iSEC = 9. Span = 150 cm. << RC-BEAM Design Result >>
* Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	1.3(1)	3.60	2-D22	.0(0)	3.60	2-D22	2.3(1)	.424	.00	D10 @270
1/4	.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	1.0(1)	.181	.00	D10 @270
2/4	.5(1)	3.60	2-D22	.0(0)	3.60	2-D22	.0(1)	.005	.00	D10 @270
3/4	.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	.7(1)	.134	.00	D10 @270
1.0	1.0(1)	3.60	2-D22	.0(0)	3.60	2-D22	1.1(1)	.207	.00	D10 @270

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 170. iSEC = 8. Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	3.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	6.8(1)	1.277*	3.52	D10 @270
1/4	.0(0)	3.60	2-D22	1.0(1)	3.60	2-D22	5.7(1)	1.060*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	4.6(1)	3.60	2-D22	3.9(1)	.730	.00	D10 @270
3/4	.0(0)	3.60	2-D22	6.7(1)	7.87	3-D22	1.5(1)	.287	.00	D10 @270
1.0	.0(0)	3.60	2-D22	6.9(1)	7.87	3-D22	1.1(1)	.212	.00	D10 @270

*.NOEL = 171. iSEC = 8. Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	6.9(1)	7.87	3-D22	1.1(1)	.212	.00	D10 @270
1/4	.0(0)	3.60	2-D22	5.0(1)	3.60	2-D22	3.8(1)	.712	.00	D10 @270
2/4	.0(0)	3.60	2-D22	1.2(1)	3.60	2-D22	6.2(1)	1.155*	3.52	D10 @270
3/4	4.1(1)	3.60	2-D22	.0(0)	3.60	2-D22	7.9(1)	1.485*	3.52	D10 @270
1.0	10.5(1)	7.44	2-D22	.0(0)	3.60	2-D22	9.1(1)	1.702*	3.52	D10 @270

*.NOEL = 172. iSEC = 8. Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	9.5(1)	7.01	2-D22	.0(0)	3.60	2-D22	8.0(1)	1.497*	3.52	D10 @270
1/4	3.9(1)	3.60	2-D22	.0(0)	3.60	2-D22	6.8(1)	1.281*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	.6(1)	3.60	2-D22	5.1(1)	.951	.00	D10 @270
3/4	.0(0)	3.60	2-D22	3.5(1)	3.60	2-D22	2.7(1)	.508	.00	D10 @270
1.0	.0(0)	3.60	2-D22	4.6(1)	3.60	2-D22	.0(1)	.008	.00	D10 @270

*.NOEL = 173. iSEC = 8. Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT. Bc = 30 cm. Hc = 60 cm. bf = 0 cm. hf = 0 cm. $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	4.6(1)	3.60	2-D22	.0(1)	.008	.00	D10 @270
1/4	.0(0)	3.60	2-D22	3.6(1)	3.60	2-D22	2.6(1)	.492	.00	D10 @270
2/4	.0(0)	3.60	2-D22	.7(1)	3.60	2-D22	5.0(1)	.935	.00	D10 @270
3/4	3.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	6.8(1)	1.265*	3.52	D10 @270
1.0	9.3(1)	6.59	2-D22	.0(0)	3.60	2-D22	7.9(1)	1.481*	3.52	D10 @270

*.MIDAS/GEN-R.C.S (RCBEAM) : RC-BEAM Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000. kg/cm^2
*.Stirrup : fys = 3000. kg/cm^2
*.Concrete : fc = 210. kg/cm^2

*.NOEL = 174, iSEC = 8, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	9.5(1)	7.01	2-D22	.0(0)	3.60	2-D22	8.4(1)	1.582*	3.52	D10 @270
1/4	3.6(1)	3.60	2-D22	.0(0)	3.60	2-D22	7.3(1)	1.366*	3.52	D10 @270
2/4	.0(0)	3.60	2-D22	1.3(1)	3.60	2-D22	5.5(1)	1.036*	3.52	D10 @270
3/4	.0(0)	3.60	2-D22	4.6(1)	3.60	2-D22	3.2(1)	.593	.00	D10 @270
1.0	.0(0)	3.60	2-D22	5.9(1)	7.87	3-D22	.5(1)	.093	.00	D10 @270

*.NOEL = 175, iSEC = 8, Span = 300 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(0)	3.60	2-D22	5.9(1)	7.87	3-D22	.5(1)	.093	.00	D10 @270
1/4	.0(0)	3.60	2-D22	5.3(1)	7.87	3-D22	2.2(1)	.407	.00	D10 @270
2/4	.0(0)	3.60	2-D22	2.8(1)	3.60	2-D22	4.5(1)	.850	.00	D10 @270
3/4	1.3(1)	3.60	2-D22	.0(0)	3.60	2-D22	6.3(1)	1.179*	3.52	D10 @270
1.0	6.5(1)	7.87	3-D22	.0(0)	3.60	2-D22	7.5(1)	1.396*	3.52	D10 @270

*.NOEL = 176, iSEC = 8, Span = 150 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	4.1(1)	3.60	2-D22	.0(0)	3.60	2-D22	4.0(1)	.743	.00	D10 @270
1/4	2.7(1)	3.60	2-D22	.0(0)	3.60	2-D22	3.5(1)	.649	.00	D10 @270
2/4	1.5(1)	3.60	2-D22	.0(0)	3.60	2-D22	2.8(1)	.526	.00	D10 @270
3/4	.6(1)	3.60	2-D22	.0(0)	3.60	2-D22	2.0(1)	.375	.00	D10 @270
1.0	.0(1)	3.60	2-D22	.0(0)	3.60	2-D22	1.0(1)	.196	.00	D10 @270

*.NOEL = 177, iSEC = 8, Span = 150 cm. << RC-BEAM Design Result >>
*.Type = RECT, Bc = 30 cm, Hc = 60 cm, bf = 0 cm, hf = 0 cm, $Vc = 10.7 ton

Pnt	N-Mu(t.m)	AsTop	Rebar	P-Mu(t.m)	AsBot	Rebar	Vu(ton)	Vu/$Vc/2	Ast_V	Stirrup.
0.0	.0(1)	3.60	2-D22	.0(0)	3.60	2-D22	1.0(1)	.196	.00	D10 @270
1/4	.0(0)	3.60	2-D22	.2(1)	3.60	2-D22	.1(1)	.017	.00	D10 @270
2/4	.0(0)	3.60	2-D22	.0(1)	3.60	2-D22	.7(1)	.134	.00	D10 @270
3/4	.4(1)	3.60	2-D22	.0(0)	3.60	2-D22	1.4(1)	.256	.00	D10 @270
1.0	1.0(1)	3.60	2-D22	.0(0)	3.60	2-D22	1.9(1)	.350	.00	D10 @270

*.MIDAS/GEN-R.C.S (RCCOLM) : RC-COLUMN Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000 kg/cm^2
*.Stirrup : fys = 3000 kg/cm^2

*.COLUMN LOCATION : X = 0 cm, Y = 0 cm << RC-COLM Design Result >>

NOEL	HTc	iSEC	Shp	Hc	Bc	f'c	LC	Pu(t)	Mu(t.m)	Mu/$Mn	As-V	V.-Rebar	Vu(t)	Vu/$Vc	As-H	H.-Rebar
3	350	1	RT	35	35	210	1	12.8	5.7	.86	12.3	4- 2-D25	2.4	.34	.0	D10 @350
2	380	1	RT	35	35	210	1	36.8	5.1	.62	12.3	4- 2-D25	1.3	.16	.0	D10 @350

*.COLUMN LOCATION : X = 0 cm, Y = 450 cm << RC-COLM Design Result >>

NOEL	HTc	iSEC	Shp	Hc	Bc	f'c	LC	Pu(t)	Mu(t.m)	Mu/$Mn	As-V	V.-Rebar	Vu(t)	Vu/$Vc	As-H	H.-Rebar
6	350	1	RT	35	35	210	1	22.1	5.3	.76	12.3	4- 2-D25	2.5	.34	.0	D10 @350
5	380	1	RT	35	35	210	1	55.2	4.1	.52	12.3	4- 2-D25	.9	.11	.0	D10 @350

*.COLUMN LOCATION : X = 0 cm, Y = 900 cm << RC-COLM Design Result >>

NOEL	HTc	iSEC	Shp	Hc	Bc	f'c	LC	Pu(t)	Mu(t.m)	Mu/$Mn	As-V	V.-Rebar	Vu(t)	Vu/$Vc	As-H	H.-Rebar
9	350	1	RT	35	35	210	1	12.8	5.7	.86	12.3	4- 2-D25	2.4	.34	.0	D10 @350
8	380	1	RT	35	35	210	1	36.7	5.0	.62	12.3	4- 2-D25	1.2	.15	.0	D10 @350

*.COLUMN LOCATION : X = 600 cm, Y = 0 cm << RC-COLM Design Result >>

NOEL	HTc	iSEC	Shp	Hc	Bc	f'c	LC	Pu(t)	Mu(t.m)	Mu/$Mn	As-V	V.-Rebar	Vu(t)	Vu/$Vc	As-H	H.-Rebar
12	350	1	RT	35	35	210	1	23.9	3.8	.46	12.3	4- 2-D25	1.4	.19	.0	D10 @350
11	380	1	RT	35	35	210	1	62.0	3.7	.53	12.3	4- 2-D25	.5	.05	.0	D10 @350

*.COLUMN LOCATION : X = 600 cm, Y = 450 cm << RC-COLM Design Result >>

NOEL	HTc	iSEC	Shp	Hc	Bc	f'c	LC	Pu(t)	Mu(t.m)	Mu/$Mn	As-V	V.-Rebar	Vu(t)	Vu/$Vc	As-H	H.-Rebar
15	350	1	RT	35	35	210	1	40.2	2.6	.36	12.3	4- 2-D25	.8	.09	.0	D10 @350
14	380	1	RT	35	35	210	1	76.2	3.3	.57	12.3	4- 2-D25	.3	.03	.0	D10 @350

*.COLUMN LOCATION : X = 600 cm, Y = 900 cm << RC-COLM Design Result >>

NOEL	HTc	iSEC	Shp	Hc	Bc	f'c	LC	Pu(t)	Mu(t.m)	Mu/$Mn	As-V	V.-Rebar	Vu(t)	Vu/$Vc	As-H	H.-Rebar
18	350	1	RT	35	35	210	1	24.3	3.7	.45	12.3	4- 2-D25	1.4	.19	.0	D10 @350
17	380	1	RT	35	35	210	1	62.4	3.7	.54	12.3	4- 2-D25	.5	.05	.0	D10 @350

*.MIDAS/GEN-R.C.S (RCCOLM) : RC-COLUMN Analysis/Design Program Based on ACI318-89.

*.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
*.Main Rebar : fy = 3000 kg/cm^2
*.Stirrup : fys = 3000 kg/cm^2

*.COLUMN LOCATION : X = 1200 cm, Y = 0 cm << RC-COLM Design Result >>

NOEL	HTc	iSEC	Shp	Hc	Bc	f'c	LC	Pu(t)	Mu(t.m)	Mu/$Mn	As-V	V.-Rebar	Vu(t)	Vu/$Vc	As-H	H.-Rebar
21	350	1	RT	35	35	210	1	28.3	4.7	.57	12.3	4- 2-D25	1.9	.24	.0	D10 @350
20	380	1	RT	35	35	210	1	70.7	4.4	.62	12.3	4- 2-D25	.7	.07	.0	D10 @350

*.COLUMN LOCATION : X = 1200 cm, Y = 450 cm << RC-COLM Design Result >>

NOEL	HTc	iSEC	Shp	Hc	Bc	f'c	LC	Pu(t)	Mu(t.m)	Mu/$Mn	As-V	V.-Rebar	Vu(t)	Vu/$Vc	As-H	H.-Rebar
24	350	1	RT	35	35	210	1	44.3	3.3	.42	12.3	4- 2-D25	1.0	.12	.0	D10 @350
23	380	1	RT	35	35	210	1	90.8	4.4	.71	12.3	4- 2-D25	.5	.05	.0	D10 @350

*.COLUMN LOCATION : X = 1200 cm, Y = 900 cm << RC-COLM Design Result >>

NOEL	HTc	iSEC	Shp	Hc	Bc	f'c	LC	Pu(t)	Mu(t.m)	Mu/$Mn	As-V	V.-Rebar	Vu(t)	Vu/$Vc	As-H	H.-Rebar
27	350	1	RT	35	35	210	1	23.5	3.7	.44	12.3	4- 2-D25	1.6	.21	.0	D10 @350
26	380	1	RT	35	35	210	1	65.7	4.2	.58	12.3	4- 2-D25	.7	.07	.0	D10 @350

*.COLUMN LOCATION : X = 1800 cm, Y = 0 cm << RC-COLM Design Result >>

NOEL	HTc	iSEC	Shp	Hc	Bc	f'c	LC	Pu(t)	Mu(t.m)	Mu/$Mn	As-V	V.-Rebar	Vu(t)	Vu/$Vc	As-H	H.-Rebar
30	350	1	RT	35	35	210	1	23.9	6.5	.97	12.3	4- 2-D25	2.3	.31	.0	D10 @350
29	380	1	RT	35	35	210	1	62.1	6.1	.75	12.3	4- 2-D25	1.2	.13	.0	D10 @350

*.COLUMN LOCATION : X = 1800 cm, Y = 450 cm << RC-COLM Design Result >>

NOEL	HTc	iSEC	Shp	Hc	Bc	f'c	LC	Pu(t)	Mu(t.m)	Mu/$Mn	As-V	V.-Rebar	Vu(t)	Vu/$Vc	As-H	H.-Rebar
33	350	1	RT	35	35	210	1	36.3	5.1	.58	12.3	4- 2-D25	2.3	.28	.0	D10 @350
32	380	1	RT	35	35	210	1	89.0	5.4	.76	12.3	4- 2-D25	1.0	.10	.0	D10 @350

*.COLUMN LOCATION : X = 1800 cm, Y = 900 cm << RC-COLM Design Result >>

NOEL	HTc	iSEC	Shp	Hc	Bc	f'c	LC	Pu(t)	Mu(t.m)	Mu/$Mn	As-V	V.-Rebar	Vu(t)	Vu/$Vc	As-H	H.-Rebar
36	350	1	RT	35	35	210	1	18.4	5.2	.77	12.3	4- 2-D25	1.8	.24	.0	D10 @350
35	380	1	RT	35	35	210	1	57.4	5.3	.66	12.3	4- 2-D25	.9	.11	.0	D10 @350

•.MIDAS/GEN-R.C.S (RCCOLM) : RC-COLUMN Analysis/Design Program Based on ACI318-89.

•.PROJECT : POS-THAI STEEL SERVICE CENTER OFFICE BUILDING
•.Main Rebar : fy = 3000 kg/cm^2
•.Stirrup : fys = 3000 kg/cm^2

•.COLUMN LOCATION : X = 2100 cm, Y = 450 cm << RC-COLM Design Result >>

MODEL	HTc	iSEC	Shp	Hc	Bc	f'c	LC	Pu(t)	Mu(t.m)	Mu/$Mn	As-V	V.-Rebar	Vu(t)	Vu/$Vc	As-H	H.-Rebar
42	350	1	RT	35	35	210	1	13.4	1.4	.16	12.3	4- 2-D25	.5	.07	.0	D10 @350
41	380	1	RT	35	35	210	1	38.7	1.8	.30	12.3	4- 2-D25	.2	.02	.0	D10 @350

•.COLUMN LOCATION : X = 2100 cm, Y = 900 cm << RC-COLM Design Result >>

MODEL	HTc	iSEC	Shp	Hc	Bc	f'c	LC	Pu(t)	Mu(t.m)	Mu/$Mn	As-V	V.-Rebar	Vu(t)	Vu/$Vc	As-H	H.-Rebar
45	350	1	RT	35	35	210	1	7.5	2.9	.45	12.3	4- 2-D25	1.3	.19	.0	D10 @350
44	380	1	RT	35	35	210	1	21.4	2.6	.30	12.3	4- 2-D25	.7	.10	.0	D10 @350

Project :	Date : . .	Sheet : /
Title :	By :	Check :

SLAB DESIGN

0.18

1) ROOF

$W_D = 0.58\ t/m^2$ $W_L = 0.13\ t/m^2$

$W_u = 1.4 \times 0.58 + 1.7 \times 0.18 = 1.12\ t/m^2$

$\lambda = 0.75$

MAIN DIRECTION

$C_a = 0.069$

$M = 0.069 \times 1.12 \times 4.5^2 = 1.57$ tm (NEGATIVE)

$C_{aDL} = 0.028$ $C_{aLL} = 0.045$

$M = 0.028 \times 0.81 \times 4.5^2 + 0.045 \times 0.22 \times 4.5^2$

$= 0.66$ tm (POSITIVE)

SUB DIRECTION

$C_b = 0.022$

$M = 0.022 \times 1.12 \times 6^2 = 0.87$ tm (NEGATIVE)

$C_{bDL} = 0.009$ $C_{bLL} = 0.014$

$M = 0.009 \times 0.81 \times 6^2 + 0.014 \times 0.22 \times 6^2$

$= 0.37$ tm (POSITIVE)

MAIN DIRECTION

D13 @ 100

SUB DIRECTION

D13 @ 200

Project :	Date : . .	Sheet : /
Title :	By :	Check :

2) 2ND FLOOR.

$w_D = 0.42\,t/m^2$ $w_L = 0.3\,t/m^2$

$w_u = 1.4 \times 0.42 + 1.7 \times 0.3 = 1.1\,t/m^2$

$\lambda = 0.75$

MAIN DIRECTION

$C_a = 0.069$

$M = 0.069 \times 1.1 \times 4.5^2 = 1.54\,tm$

$\therefore$ D13 @ 100

SUB DIRECTION

$C_b = 0.022$

$M = 0.022 \times 1.1 \times 6^2 = 0.87\,tm$

$\therefore$ D13 @ 200.

Project :	Date : . .	Sheet : /
Title :	By :	Check :

3) 1ST FLOOR

$w_D = 0.58 t/m^2$ $w_L = 0.3 t/m^2$

$W_u = 1.4 \times 0.58 + 1.7 \times 0.3 = 1.32 t/m^2$

$\lambda = 0.75$

MAIN DIRECTION

$C_a = 0.069$

$M = 0.069 \times 1.32 \times 4.5^2 = 1.84 tm$

$\therefore$ D13 @ 200

SUB DIRECTON

$C_a = 0.022$

$M = 0.022 \times 1.32 \times 6^2 = 1.05 tm$

$\therefore$ D13 @ 300

4) DEFLECTION CHECK

MINIMUM $h = \{2 \times (600 + 450)\} / 180 = 11.7cm < 12cm$

O.K.

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*************************************************
* RESISTING MOMENT TABLE FOR SLAB BY KS-88 CODE *
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Fc = 210kg/cm2 Fy = 3000kg/cm2
SLAB THICK = 120 mm CONCRETE COVER = 20mm

MAIN DIRECTION (unit: tm/m)		SUB DIRECTION (unit: tm/m)	
D10 @ 100mm	Mr= 1.71	D10 @ 100mm	Mr=1.52
D10 @ 150mm	Mr= 1.16	D10 @ 150mm	Mr=1.04
D10 @ 200mm	Mr= 0.88	D10 @ 200mm	Mr=0.79
D10 @ 250mm	Mr= 0.71	D10 @ 250mm	Mr=0.63
D10 @ 300mm	Mr= 0.59	D10 @ 300mm	Mr=0.53
D10 @ 350mm	Mr= 0.51	D10 @ 350mm	Mr=0.46
D10 @ 400mm	Mr= 0.45	D10 @ 400mm	Mr=0.40

D10+D13@ 100mm	Mr= 2.30	D10 @ 100mm	Mr=1.46
D10+D13@ 150mm	Mr= 1.58	D10 @ 150mm	Mr=1.00
D10+D13@ 200mm	Mr= 1.20	D10 @ 200mm	Mr=0.76
D10+D13@ 250mm	Mr= 0.97	D10 @ 250mm	Mr=0.61
D10+D13@ 300mm	Mr= 0.82	D10 @ 300mm	Mr=0.51
D10+D13@ 350mm	Mr= 0.70	D10 @ 350mm	Mr=0.44
D10+D13@ 400mm	Mr= 0.62	D10 @ 400mm	Mr=0.39

D10+D13@ 100mm	Mr= 2.30	D10+D13@ 100mm	Mr=1.95
D10+D13@ 150mm	Mr= 1.58	D10+D13@ 150mm	Mr=1.35
D10+D13@ 200mm	Mr= 1.20	D10+D13@ 200mm	Mr=1.03
D10+D13@ 250mm	Mr= 0.97	D10+D13@ 250mm	Mr=0.83
D10+D13@ 300mm	Mr= 0.82	D10+D13@ 300mm	Mr=0.70
D10+D13@ 350mm	Mr= 0.70	D10+D13@ 350mm	Mr=0.60
D10+D13@ 400mm	Mr= 0.62	D10+D13@ 400mm	Mr=0.53

D13 @ 100mm	Mr= 2.84	D10 @ 100mm	Mr=1.46
D13 @ 150mm	Mr= 1.97	D10 @ 150mm	Mr=1.00
D13 @ 200mm	Mr= 1.51	D10 @ 200mm	Mr=0.76
D13 @ 250mm	Mr= 1.22	D10 @ 250mm	Mr=0.61
D13 @ 300mm	Mr= 1.03	D10 @ 300mm	Mr=0.51
D13 @ 350mm	Mr= 0.89	D10 @ 350mm	Mr=0.44
D13 @ 400mm	Mr= 0.78	D10 @ 400mm	Mr=0.39

D13 @ 100mm	Mr= 2.84	D10+D13@ 100mm	Mr=1.95
D13 @ 150mm	Mr= 1.97	D10+D13@ 150mm	Mr=1.35
D13 @ 200mm	Mr= 1.51	D10+D13@ 200mm	Mr=1.03
D13 @ 250mm	Mr= 1.22	D10+D13@ 250mm	Mr=0.83
D13 @ 300mm	Mr= 1.03	D10+D13@ 300mm	Mr=0.70
D13 @ 350mm	Mr= 0.89	D10+D13@ 350mm	Mr=0.60
D13 @ 400mm	Mr= 0.78	D10+D13@ 400mm	Mr=0.53

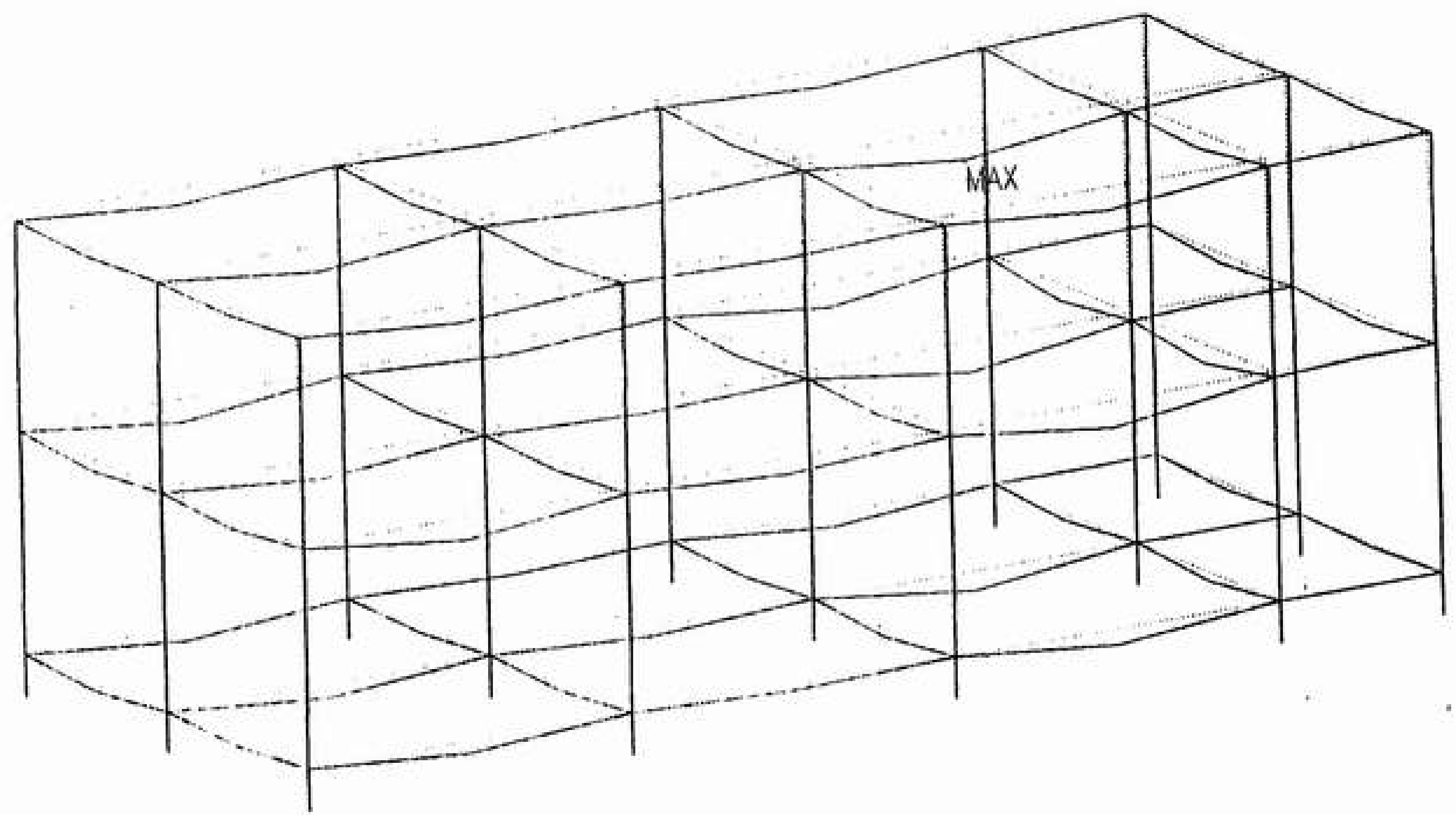
D13 @ 100mm	Mr= 2.84	D13 @ 100mm	Mr=2.39
D13 @ 150mm	Mr= 1.97	D13 @ 150mm	Mr=1.68
D13 @ 200mm	Mr= 1.51	D13 @ 200mm	Mr=1.29
D13 @ 250mm	Mr= 1.22	D13 @ 250mm	Mr=1.05
D13 @ 300mm	Mr= 1.03	D13 @ 300mm	Mr=0.88
D13 @ 350mm	Mr= 0.89	D13 @ 350mm	Mr=0.76
D13 @ 400mm	Mr= 0.78	D13 @ 400mm	Mr=0.67

```
*************************************************
* RESISTING MOMENT TABLE FOR SLAB BY KS-88 CODE *
*************************************************
```

Fc = 210kg/cm2　　SLAB THICK = 200 mm

Fy = 3000kg/cm2　　CONCRETE COVER = 30mm

MAIN DIRECTION (unit: tm/m)		SUB DIRECTION (unit: tm/m)	
D10 @ 100mm	Mr= 3.05	D10 @ 100mm	Mr=2.86
D10 @ 150mm	Mr= 2.06	D10 @ 150mm	Mr=1.93
D10 @ 200mm	Mr= 1.55	D10 @ 200mm	Mr=1.46
D10 @ 250mm	Mr= 1.25	D10 @ 250mm	Mr=1.17
D10 @ 300mm	Mr= 1.04	D10 @ 300mm	Mr=0.98
D10 @ 350mm	Mr= 0.89	D10 @ 350mm	Mr=0.84
D10 @ 400mm	Mr= 0.78	D10 @ 400mm	Mr=0.74
D10+D13@ 100mm	Mr= 4.17	D10 @ 100mm	Mr=2.80
D10+D13@ 150mm	Mr= 2.83	D10 @ 150mm	Mr=1.89
D10+D13@ 200mm	Mr= 2.14	D10 @ 200mm	Mr=1.43
D10+D13@ 250mm	Mr= 1.72	D10 @ 250mm	Mr=1.15
D10+D13@ 300mm	Mr= 1.44	D10 @ 300mm	Mr=0.96
D10+D13@ 350mm	Mr= 1.24	D10 @ 350mm	Mr=0.82
D10+D13@ 400mm	Mr= 1.08	D10 @ 400mm	Mr=0.72
D10+D13@ 100mm	Mr= 4.17	D10+D13@ 100mm	Mr=3.82
D10+D13@ 150mm	Mr= 2.83	D10+D13@ 150mm	Mr=2.60
D10+D13@ 200mm	Mr= 2.14	D10+D13@ 200mm	Mr=1.97
D10+D13@ 250mm	Mr= 1.72	D10+D13@ 250mm	Mr=1.58
D10+D13@ 300mm	Mr= 1.44	D10+D13@ 300mm	Mr=1.32
D10+D13@ 350mm	Mr= 1.24	D10+D13@ 350mm	Mr=1.14
D10+D13@ 400mm	Mr= 1.08	D10+D13@ 400mm	Mr=1.00
D13 @ 100mm	Mr= 5.24	D10 @ 100mm	Mr=2.80
D13 @ 150mm	Mr= 3.57	D10 @ 150mm	Mr=1.89
D13 @ 200mm	Mr= 2.71	D10 @ 200mm	Mr=1.43
D13 @ 250mm	Mr= 2.18	D10 @ 250mm	Mr=1.15
D13 @ 300mm	Mr= 1.83	D10 @ 300mm	Mr=0.96
D13 @ 350mm	Mr= 1.57	D10 @ 350mm	Mr=0.82
D13 @ 400mm	Mr= 1.38	D10 @ 400mm	Mr=0.72
D13 @ 100mm	Mr= 5.24	D10+D13@ 100mm	Mr=3.82
D13 @ 150mm	Mr= 3.57	D10+D13@ 150mm	Mr=2.60
D13 @ 200mm	Mr= 2.71	D10+D13@ 200mm	Mr=1.97
D13 @ 250mm	Mr= 2.18	D10+D13@ 250mm	Mr=1.58
D13 @ 300mm	Mr= 1.83	D10+D13@ 300mm	Mr=1.32
D13 @ 350mm	Mr= 1.57	D10+D13@ 350mm	Mr=1.14
D13 @ 400mm	Mr= 1.38	D10+D13@ 400mm	Mr=1.00
D13 @ 100mm	Mr= 5.24	D13 @ 100mm	Mr=4.79
D13 @ 150mm	Mr= 3.57	D13 @ 150mm	Mr=3.28
D13 @ 200mm	Mr= 2.71	D13 @ 200mm	Mr=2.49
D13 @ 250mm	Mr= 2.18	D13 @ 250mm	Mr=2.01
D13 @ 300mm	Mr= 1.83	D13 @ 300mm	Mr=1.68
D13 @ 350mm	Mr= 1.57	D13 @ 350mm	Mr=1.44
D13 @ 400mm	Mr= 1.38	D13 @ 400mm	Mr=1.27



MIDAS/GEN-GPS
POST-PROCESSOR

DISPLACEMENT

SCALE FACTOR
1.086E+02

X-DIR= .00062931
NODE= 48

Y-DIR=-.00028758
NODE= 60

Z-DIR=-.00480723
NODE= 121

COMB.= .00483394
NODE= 121

LOADCOMB ID.= 1

FILE : OFFICE
UNIT: M
DATE: 02-24-97

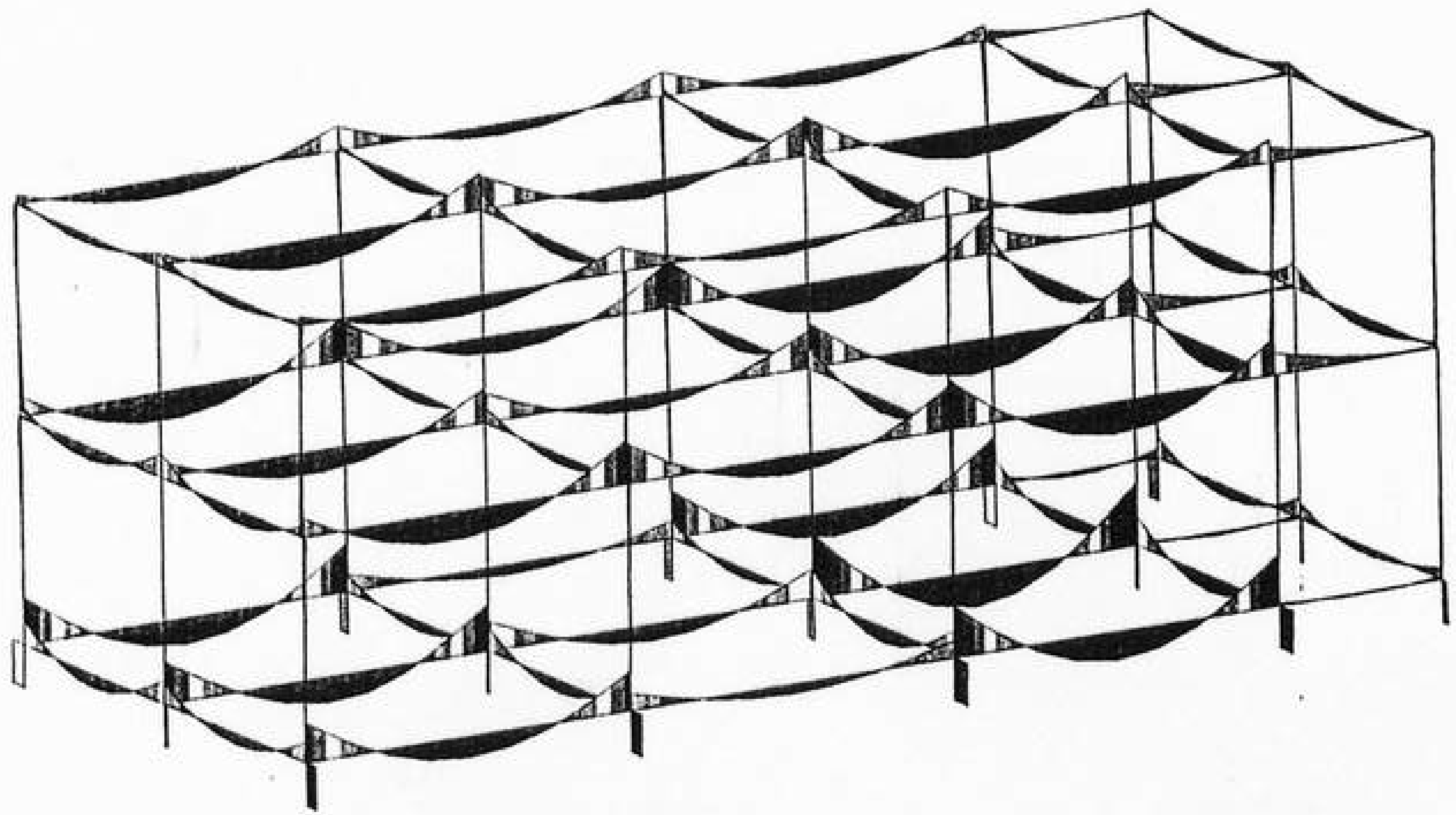
VIEW-DIRECTION

X: -.483
Y: -.837
Z: .259

PROJECT: COIL CENTER OFFICE BUILDING
TITLE :
:
USER :

MIDAS/GEN-GPS
POST-PROCESSOR

BEAM-B.M.D.



LOCAL-y

-2.594E+01
-2.227E+01
-1.860E+01
-1.493E+01
-1.126E+01
-7.593E+00
-3.923E+00
-2.536E-01
3.416E+00
7.086E+00
1.076E+01
1.443E+01

LOADCOMB ID.= 1

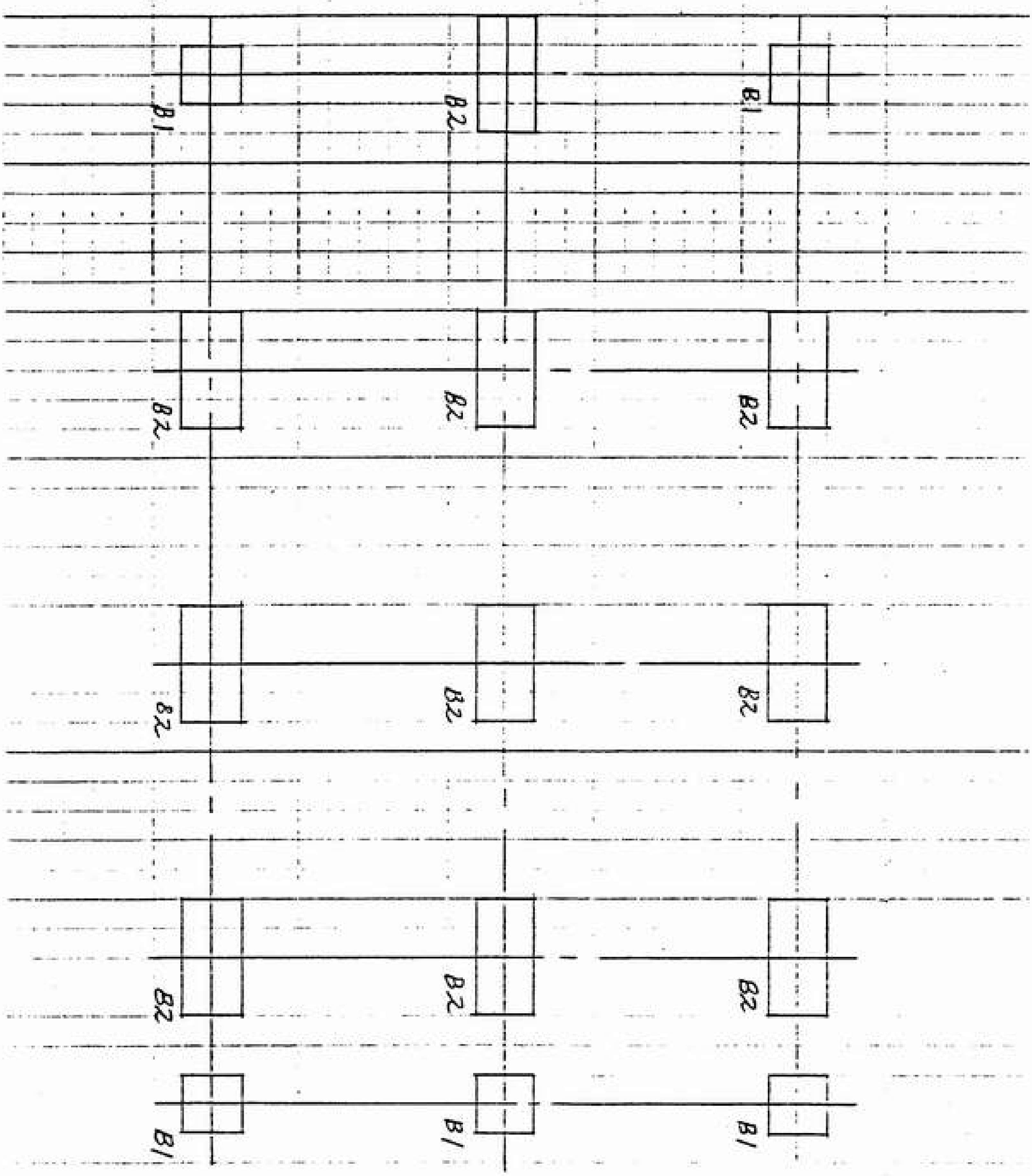
FILE : OFFICE
UNIT: TON-M
DATE: 02-24-97

PROJECT: COIL CENTER OFFICE BUILDING
TITLE :
:
USER :

VIEW-DIRECTION
X: -.483
Y: -.837
Z: .259

Project :	Date : . .	Sheet : /
Title :	By :	Check :

BASE DESIGN



$B1 : 1.6^{M} \times 1.6^{M} \times 0.9$ MAIN 8-D22

$B2 : 1.6^{M} \times 3.0^{M} \times 0.9$ SUB 15-D22

EACTION FORCES AND MOMENTS PRINTOUT

OAD COMBINATION NO. 1 UNIT SYSTEM ..: M .TON (FACTOR LOAD)

NODE	FX	FY	FZ	MX	MY	MZ
1	1.53692	.8282108	71.08959	7.620732	-15.17986	-.00021827
2	1.251109	.06245304	102.2127	1.546873	-18.04801	.00263689
3	1.611524	-.900658	75.59404	-9.145941	-18.64415	.00307782
4	-.862015	.6573424	103.9928	9.143152	8.451942	.00074088
5	-.8179273	-.07909111	135.7127	-1.93215	6.823631	.00188881
6	-.9993795	-.5758537	104.0734	-7.207557	11.77014	.00128633
7	.9349378	.879395	119.0565	10.99512	-13.43237	.00186
8	1.134416	-.1677309	156.8793	-4.480135	-12.57924	.00231277
9	.8459396	-.6921969	106.4221	-6.567614	-11.37633	.00377974
10	-1.791917	1.342453	107.3667	10.83815	18.58735	.00383956
11	-1.945378	-.146601	151.2811	-1.366669	23.39877	.00208258
12	-1.482306	-.9996818	102.716	-9.287989	14.34699	.00463231
13	.2894473	.5015557	26.67532	4.156863	1.357766	.00279987
14	.2863267	.1359836	69.42509	1.513397	2.015969	.00121047
15	.008302	-.8455798	45.87649	-7.289531	3.309906	.00305335

UMMATION OF REACTION FORCES PRINTOUT UNIT SYSTEM ..: M .TON

FX	FY	FZ
0	0	1478.374

OAD COMBINATION NO. 2 UNIT SYSTEM ..: M .TON (WORKING LOAD)

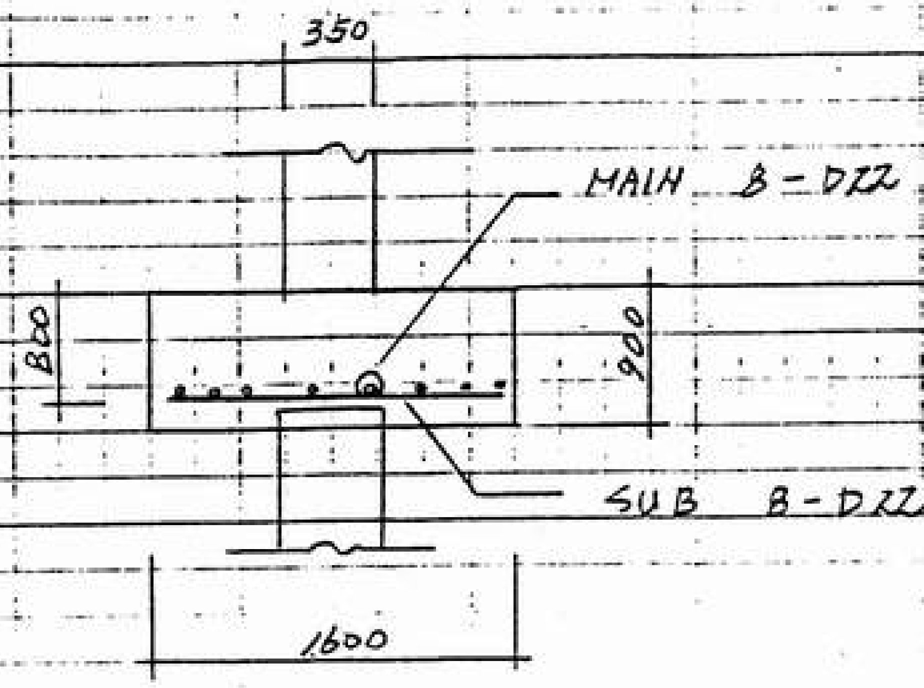
NODE	FX	FY	FZ	MX	MY	MZ
1	1.073501	.5780357	49.96236	5.346513	-10.61941	-.00019924
2	.8464525	.04468975	71.2828	1.104681	-12.44319	.00182606
3	1.126787	-.629543	53.18331	-6.436578	-13.0936	.00216022
4	-.6103324	.4435606	72.54594	6.335158	6.04598	.00043612
5	-.5739684	-.05701496	93.28128	-1.378898	4.889607	.00126592
6	-.7063899	-.3852668	72.56516	-4.952576	8.420694	.00081718
7	.666908	.6037701	82.69445	7.655524	-9.592	.00121413
8	.805709	-.1228117	107.7784	-3.1926	-8.986858	.00156388
9	.6024409	-.4672331	74.27938	-4.496952	-8.125123	.00259199
10	-1.260365	.9367917	74.7264	7.555323	13.07843	.00281256
11	-1.352083	-.1075895	104.6135	-.968857	16.31316	.00151045
12	-1.038726	-.6897254	72.05678	-6.450507	10.05169	.00335302
13	.2078882	.3488758	18.77082	2.880666	.9411972	.00205008
14	.2061151	.09613417	48.80727	1.083955	1.382164	.00088765
15	.00606272	-.5926733	32.41423	-5.121125	2.334987	.00226456

UMMATION OF REACTION FORCES PRINTOUT UNIT SYSTEM ..: M .TON

FX	FY	FZ
0	0	1028.962

Project :	Date : . .	Sheet : /
Title :	By :	Check :

1) B1 (1600 × 1600 × 750)



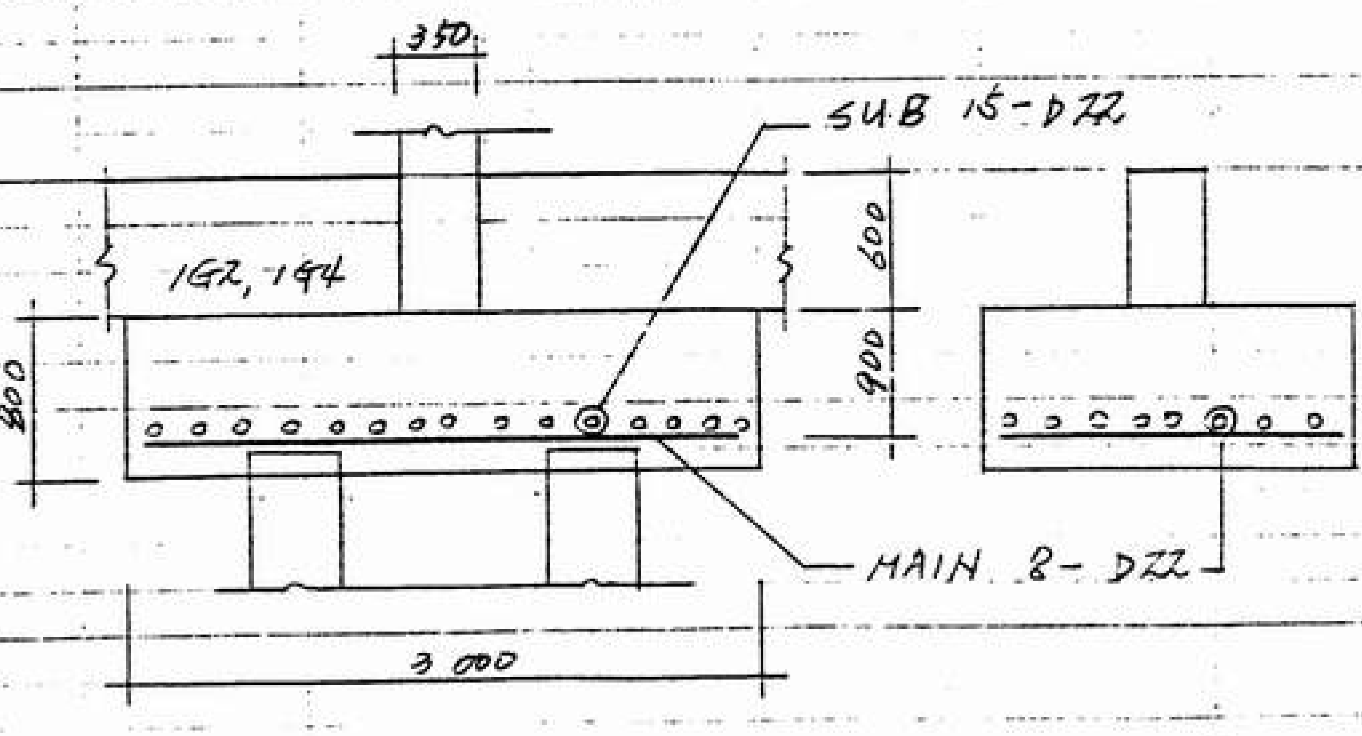
2) B2 (1600 × 3000 × 750)

COLUMN SIZE $35^{cm} \times 35^{cm}$

CONCRETE STRENGTH $f_c' = 210 kg/cm^2$

PC PILE SIZE $40^{cm} \times 40^{cm}$

$P_u = 156t$



Project :	Date : . .	Sheet : /
Title :	By :	Check :

SHEAR CHECK

i) ONE WAY SHEAR.

$V_u = 156/2 = 78\,t$

$\phi V_n = \phi(0.53\sqrt{f_c'}\ b_w\ d)$

$= 0.85(0.53\sqrt{210} \times 160 \times 75) = 78\,t$

$V_u < \phi V_n$ O.K

ii) TWO WAY SHEAR

$V_u \le \phi V_n$

$V_u = 156\,t$

$\phi V_n = \phi\, 0.27(2+4/\beta_c)\sqrt{f_c'}\ b_o d$

$= 0.85 \times 0.27 \times (2+4)\sqrt{210} \times 440 \times 75 \times 10^{-3}$

$= 658\,t < \phi(1.1\sqrt{f_c'}\ b_o d)$

$\phi V_n = \phi 1.1\sqrt{f_c'}\ b_o d$

$= 0.85 \times 1.1 \times \sqrt{210} \times 440 \times 75 = 447\,t$

$V_u \le \phi V_n$ O.K.

iii) PUNCHING SHEAR.

$V_u = 156/2 = 78\,t$

$b_o = 4 \times 115 = 460\,cm$

$V_u \le \phi 1.1\sqrt{f_c'}\ b_o d$

$= 0.85 \times 1.1 \times \sqrt{210} \times 460 \times 75 \times 10^{-3}$

$= 467\,t$ O.K.

Project :	Date : . .	Sheet : /
Title :	By :	Check :

iv) BENDING MOMENT

$$M_u = 78 \times 0.825 = 64.4\,tm$$

$$R_n = \frac{64.4 \times 10^5}{0.9 \times 160 \times 80^2} = 6.99\,kg/cm^2$$

$$\rho = \frac{0.85 \times 210}{3000} \times \left[1 - \sqrt{1 - \frac{2 \times 6.99}{0.85 \times 210}} \right]$$

$$= 0.0023$$

$$A_s = 0.0023 \times 160 \times 80 = 29.4\,cm^2$$

$$A_{s\,min} = 0.0018 \times 160 \times 90 = 25.9\,cm^2.$$

$\therefore$ 8 - D22 ($30.96\,cm^2$)

15 - D22 ($58.07\,cm^2$)

3.0 AUXILIARY BUILDING

1. DESIGN LOAD

1) WOOD SKID ROOM

① ROOF

COLOR SHEET	10kg/㎡
PURLIN & BEAM	15kg/㎡

② 1ST FLOOR

MAT CONCRETE(T=300)	720kg/㎡
LIVE LOAD	500 kg/㎡

2) TR ROOM

① ROOF

COLOR SHEET	10kg/㎡
PURLIN & BEAM	15kg/㎡

② 1ST FLOOR

MAT CONCRETE(T=300)	720kg/㎡
LIVE LOAD	1500 kg/㎡

3) ELECTRICAL ROOM

① ROOF

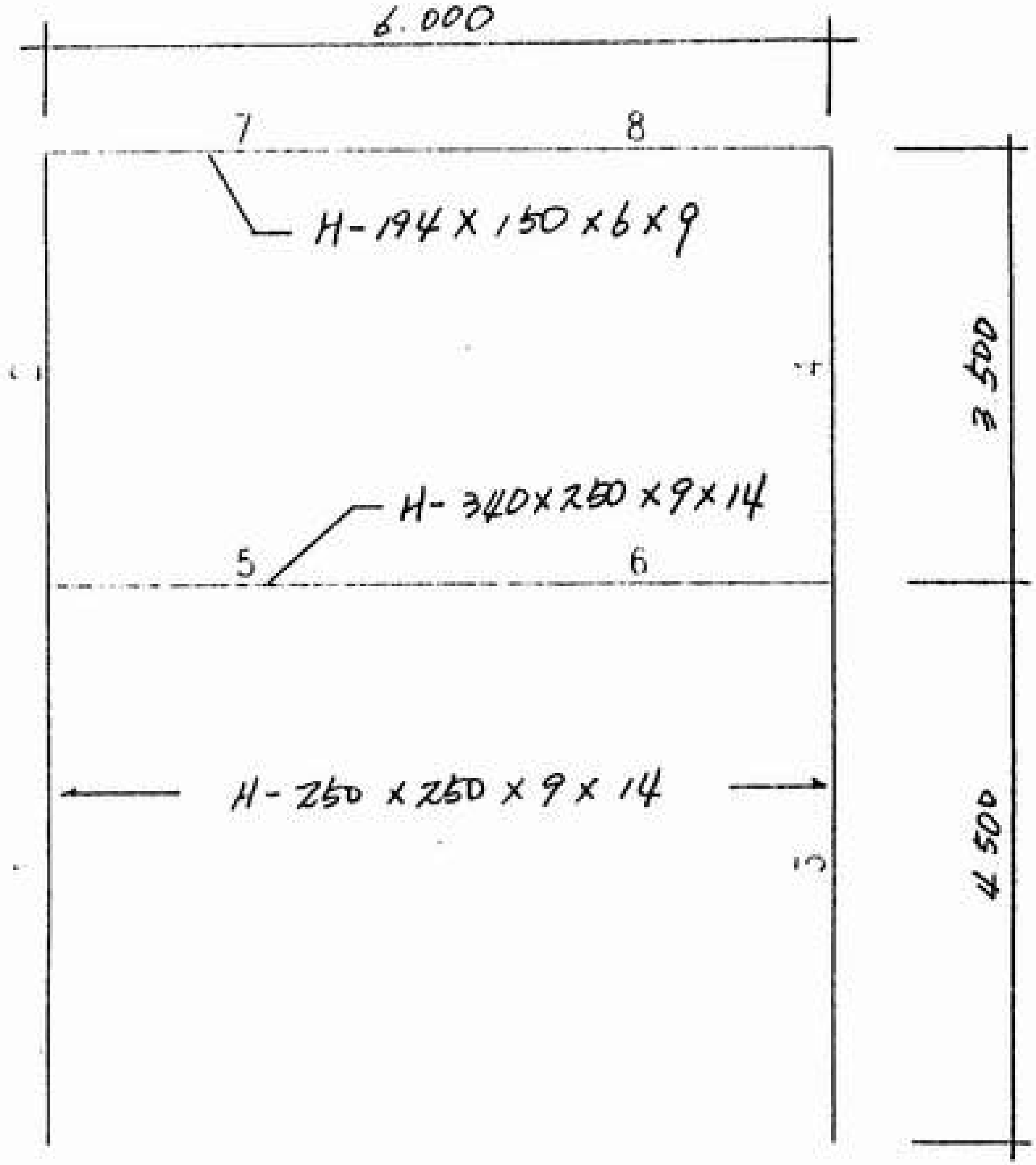
COLOR SHEET	10kg/㎡
PURLIN & BEAM	15kg/㎡

② 1ST FLOOR

MAT CONCRETE(T=300)	720kg/㎡
LIVE LOAD	900kg/㎡

③ 2ND FLOOR

CONCRETE (T=200)	480kg/㎡
FINISHING	100kg/㎡
LIVE LOAD	900kg/㎡



MIDAS/GEN-GPS
POST-PROCESSOR

PLOT LIMIT

XMAX	6.200
XMIN	.000
YMAX	.000
YMIN	.000
ZMAX	8.000
ZMIN	.000

FILE : ELEC
UNIT: M,TON
DATE: 02-27-97

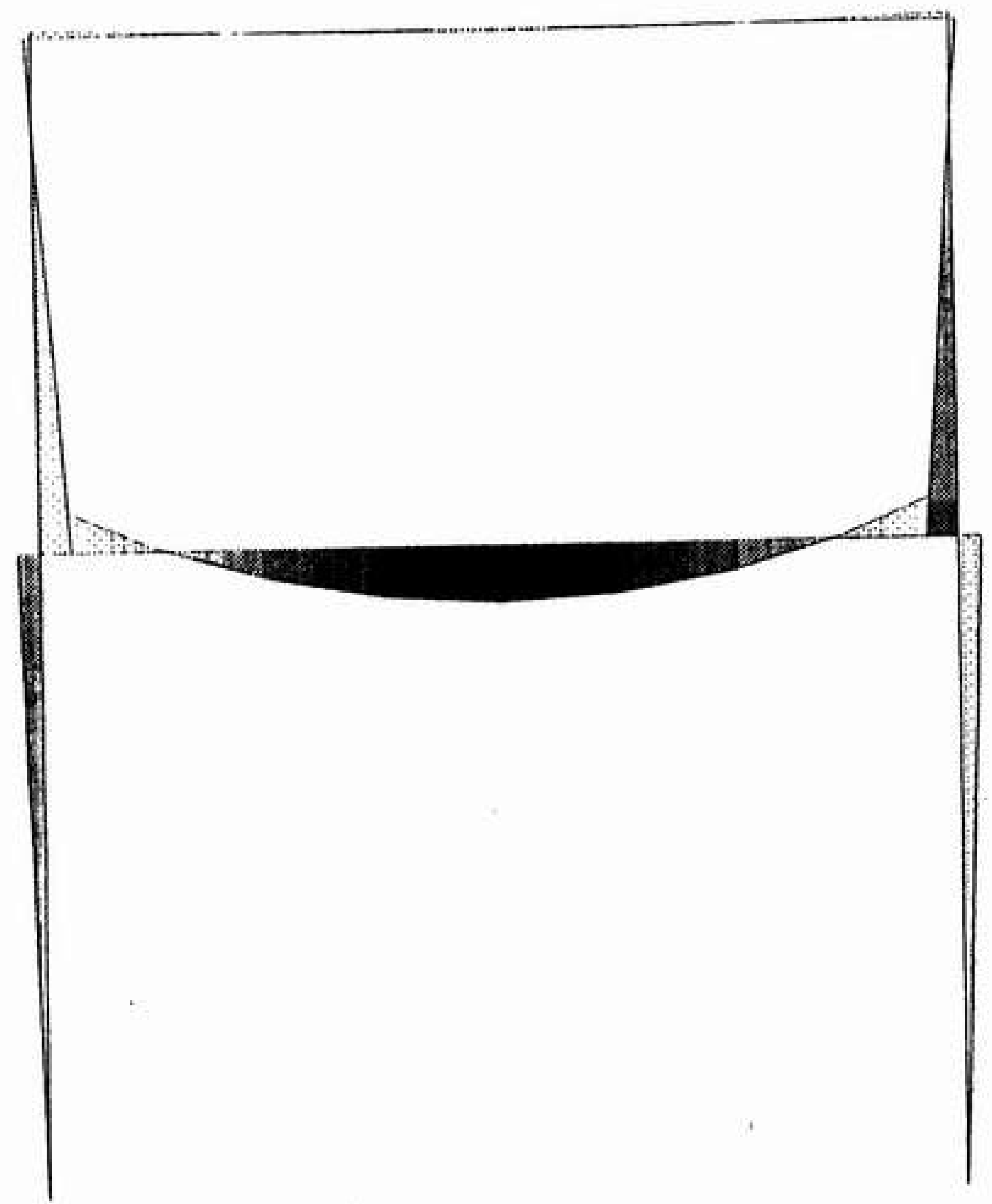
VIEW-DIRECTION

X:	.000	Z
Y:	-1.000	Y---X
Z:	.000	

PROJECT:
TITLE :
:
USER :

MIDAS/GEN-GPS
POST-PROCESSOR

BEAM-B.M.D.



LOCAL-y

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1.354E+01
1.071E+01
7.883E+00
5.052E+00
2.221E+00
-6.102E-01
-3.441E+00
-6.272E+00
-9.103E+00
-1.193E+01
-1.476E+01

LOADCOMB ID.= 1

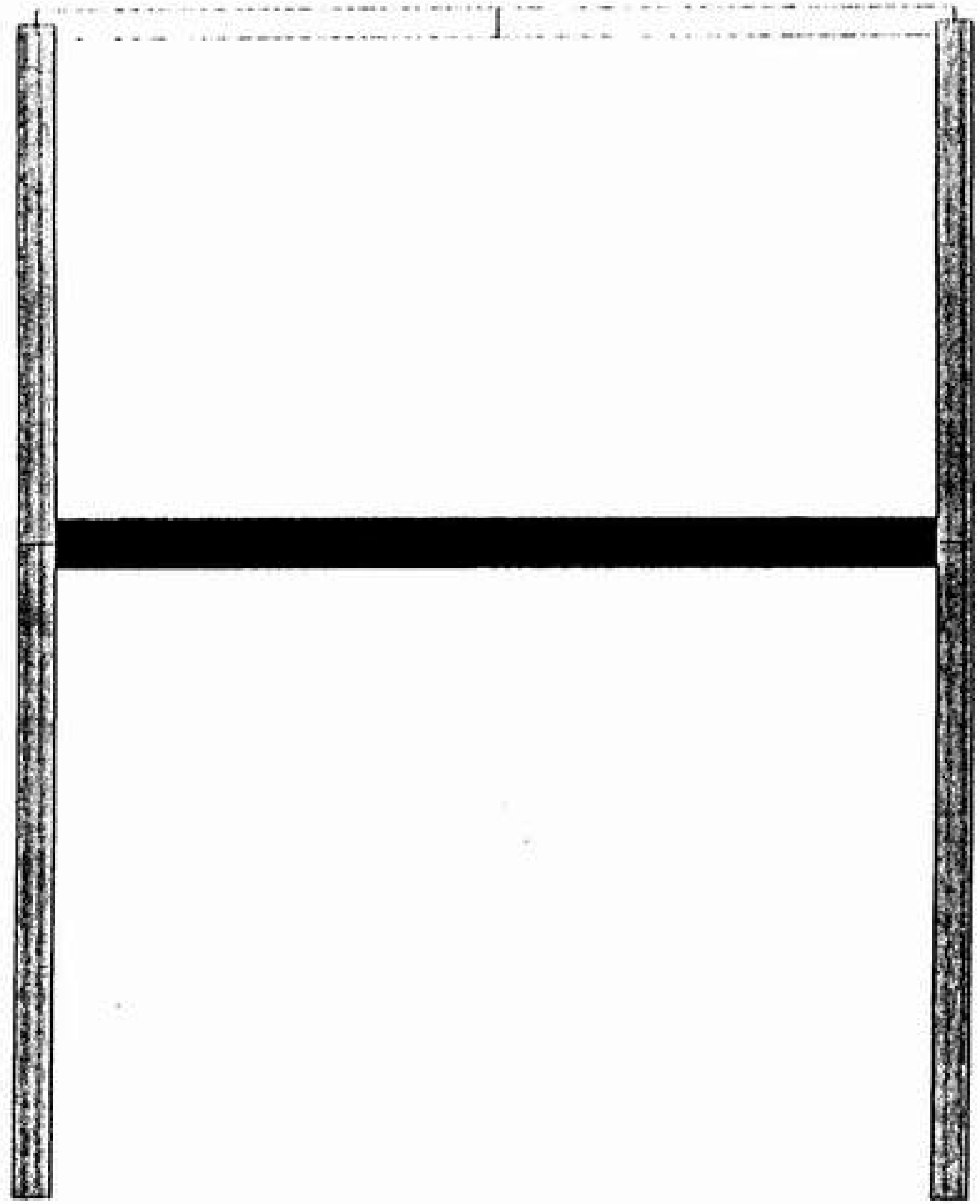
FILE : ELEC
UNIT: TON-M
DATE: 02-27-97

VIEW-DIRECTION

X: .000
Y: -1.000
Z: .000

Z
Y X

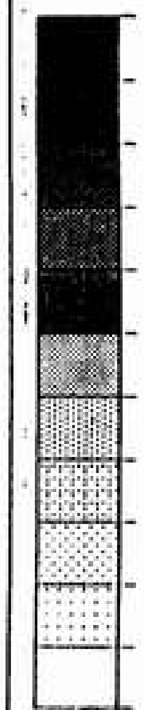
PROJECT:
TITLE :
:
USER :



MIDAS/GEN-GPS
POST-PROCESSOR

CODECHK-RATIO

COMBINED



8.528E-01
8.256E-01
7.985E-01
7.714E-01
7.443E-01
7.172E-01
6.900E-01
6.629E-01
6.358E-01
6.087E-01
5.816E-01
5.544E-01

CODECHK LDC # 1

FILE : ELEC
UNIT: M,TON
DATE: 02-27-97

VIEW-DIRECTION

X: .000
Y: -1.000
Z: .000

PROJECT:
TITLE :
:
USER :

```
*. MIDAS FILE   : ELEC.CAL
*. PROJECT      :  THILAND COIL CETER STRUCTURE ANALYSIS

*. LOADCOMB NO =  1,  ELEMENT NO =     1,  SECTION NO =   1,  MATERIAL NO =   1
*. UNIT SYSTEM : TONF, CM

*. SECTIONAL PROPERTIES  :  Designation = H 25x25x.9/1.4
   Depth      =      25.000,  Top F Width =      25.000,  Bot.F Width =     25.000
   Web Thick =         .900,  Top F Thick =       1.400,  Bot.F Thick =      1.400

   Area = .89980E+02,  Asy  = .58333E+02,  Asz  = .22500E+02
   Ybar = .12500E+02,  Zbar = .12500E+02,  Qyb  = .52049E+03, Qzb  = .78125E+02
   Iyy  = .10579E+05,  Izz  = .36472E+04,  Iyz  = .00000E+00
   Roy  = .10843E+02,  Roz  = .63666E+01,  Rop  = .00000E+00

*. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
   BLy  = .45000E+03,  BLz  = .45000E+03,  BLu  = .45000E+03
   Ky   =  1.000,      Kz   =  1.000

*. MATERIAL PROPERTIES :
   Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

*. GIVEN FORCES AND MOMENTS AT (1.0) POINT :
   Axial Force          Fxx   = -.2323E+02
   Shear Forces         Fyy   =  .0000E+00,  Fzz   =  .1371E+01
   Bending Moments      BMy   =  .6171E+03,  BMz   =  .0000E+00
   Moments of i-node    Myyi  =  .0000E+00,  Mzzi  =  .0000E+00
   Moments of j-node    Myyj  =  .6171E+03,  Mzzj  =  .0000E+00
```

```
[[[*]]]   CHECK THE AXIAL STRESS.
```

```
( ). Check the slenderness ratio of axial compression member (Kl/r).
     [ AISC-ASD89 Specification B7. ]

     -. Kl/r  =    70.7  <   200.0  ---> O.K.

( ). Check the width-thickness ratio of built-up flange (BTR).
     [ AISC-ASD89 Specification B5.1 ]

     -. h/t  =   24.67  <  70.   --->  kc = 1.000

     -. BTR  =  bf / 2tf  =    8.93  <  95/SQRT[Fy/kc]  --->  Qs = 1.000

( ). Check the depth-thickness ratio of web (DTR).
     [ AISC-ASD89 Specification B5.1 ]

     -. DTR  =  Dweb / tw  =   24.67  <  253/SQRT[Fy]  --->  Qa = 1.000
```

( ). Calculate the allowable compressive stress (Fa).
[AISC-ASD89 Specification E2. (E2-1)]

$$-.\ Cc = SQRT\left[\frac{2 \times Pi^{**}2 \times Es}{Qs \times Qa \times Fy}\right] = 131.42$$

-. Kl/r < Cc

$$-.\ Fa = \frac{Qs \times Qa \times \left[1. - \frac{(Kl/r)^{**}2}{(2 \times Cc^{**}2)}\right] \times Fy}{\frac{5}{3} + \frac{3 \times (Kl/r)}{8 \times Cc} - \frac{(Kl/r)^{**}3}{8 \times Cc^{**}3}} = 1.110$$

( ). Calculate the axial compressive stress of member (fa).

-. fa = Fxx / Area = -.258

( ). Check the interaction ratio of axial stress (fa/Fa).

$$-.\ \frac{fa}{Fa} = \frac{.258}{1.110} = .233 < 1.000 \text{ ---> O.K.}$$

[[[*]]] CHECK THE BENDING STRESSES ABOUT MAJOR AXIS.

( ). Check the laterally unbraced length of the compression flange (BLu).
[AISC-ASD89 Specification F1.1 (F1-2)]

-. Lcr1 = (76 x bf) / SQRT[Fy] = 128.03 in.

-. Lcr2 = 20000 / (Dweb/Af)Fy = 322.93 in.

-. Lcr = MIN[Lcr1, Lcr2] = 128.03 in.

-. BLu = 177.17 > Lcr ---> NON-COMPACT SECTION !

( ). Check the depth-thickness ratio of web (DTR).
[AISC-ASD89 Specification B5.1]

-. DTR = Dweb / tw = 27.78

-. axial stress : fa = -.258

-. fa/Fy = .108 < 0.16

$$\text{-. DTR} < \frac{640}{\text{SQRT[Fy]}} [1. - 3.74 \frac{fa}{Fy}] \text{ ---> COMPACT SECTION !}$$

( ). Calculate the bending coefficient (Cb).
[AISC-ASD89 Specification F1.3]

-. User defined or default value of Cb = 1.000

( ). Calculate the radius of gyration (rT)
[AISC-ASD89 Specification F1.3]

-. Azz = Bf*tf + tw*(Ccom-tf)/3 = 38.3

-. Izz = tf*Bf**3/12 + ((Ccom-tf)/3)*tw**3/12 = 1823.1

-. rT = SQRT[Izz/Azz] = 6.897

( ). Check the ratio of BLu-rT (BLu/rT).
[AISC-ASD89 Specification F1.3]

-. CRrog2 = SQRT[(510000 x Cb) / Fy] = 122.230

-. BLu/rT = 65.249 < CRrog2

( ). Calculate the allowable compressive bending stresses (FBC).
[AISC-ASD89 Specification F1.3 (F1-6,F1-8)]

$$\text{-. FBCi} = \frac{12000 \times Cb}{(BLu \times d) / Af} = 2.625$$

-. FBCi > 0.6 x Fy ---> FBCi = 0.6 x Fy = 1.440

$$\text{-. FBCj} = [\frac{2}{3} - \frac{Fy \times (BLu/rT)^{**}2}{1530000 \times Cb}] Fy = 1.372$$

-. FBC = MAX(FBCi, FBCj) = 1.440

( ). Check the width-thickness ratio of built-up flange (BTR).
[AISC-ASD89 Specification B5.1]

-. h/t = 27.78 < 70. ---> kc = 1.000

-. BTR = bf / 2tf = 8.93 < 95/SQRT[Fy/kc] ---> Qs = 1.000

( ). Calculate the allowable bending stresses (FBCy,FBTy).

-. FBTy = 0.6 x Fy = 1.440

-. FBCy = MIN[FBC, Qs x 0.6 x Fy] = 1.440

( ). Calculate actual bending stresses of member (fbcy,fbty).

-. fbcy = (BMy x Ccom) / Iyy = -.729

-. fbty = (BMy x Cten) / Iyy = .729

( ). Check the interaction ratio of stresses (fbcy/FBCy,fbty/FBTy).

$$-.\ \frac{fbcy}{FBCy} = \frac{.729}{1.440} = .506 < 1.000 \longrightarrow \text{O.K.}$$

$$-.\ \frac{fbty}{FBTy} = \frac{.729}{1.440} = .506 < 1.000 \longrightarrow \text{O.K.}$$

[[[*]]] CHECK THE COMBINED STRESSES.

( ). Check the ratio of combined stresses (Axial compression + bending).
[AISC-ASD89 Specification H1. (H1-1, H1-2)]

-. fa/Fa > 0.15

*. Check the combined stress at member end point.

$$-.\ Rmax = \frac{fa}{Fa} + \frac{fbcy}{FBCy} + \frac{fbcz}{FBCz}$$

$$= .739 < 1.000 \longrightarrow \text{O.K.}$$

[[[*]]] CHECK THE SHEAR STRESSES.

( ). Calculate the allowable shear stress of local-z direction (Fvz).
[AISC-ASD89 Specification F4]

-. DTR = h / tw = 24.67 < 380/SQRT[Fy]

-. Fvz = 0.40 x Fy = .960

( ). Calculate the shear stress of local-z direction (fvz).

-. fvz = (Fzz x Qyb) / Iyy = .067

( ). Check the interaction ratio of shear stress (fvz/Fvz).

$$-.\ \frac{fvz}{Fvz} = \frac{.067}{.960} = .070 < 1.000 \longrightarrow \text{O.K.}$$

```
*. MIDAS FILE   : ELEC.CAL
*. PROJECT      :  THILAND COIL CETER STRUCTURE ANALYSIS

*. LOADCOMB NO =  1,  ELEMENT NO =    5,  SECTION NO =   2,  MATERIAL NO =   1
*. UNIT SYSTEM : TONF, CM

*. SECTIONAL PROPERTIES  :  Designation = H 34x25x.9/1.4
   Depth     =       34.000,  Top F Width =      25.000,  Bot.F Width =      25.000
   Web Thick =         .900,  Top F Thick =       1.400,  Bot.F Thick =       1.400

   Area = .98080E+02,  Asy  = .58333E+02,  Asz  = .30600E+02
   Ybar = .12500E+02,  Zbar = .17000E+02,  Qyb  = .75557E+03, Qzb  = .78125E+02
   Iyy  = .20888E+05,  Izz  = .36477E+04,  Iyz  = .00000E+00
   Roy  = .14593E+02,  Roz  = .60985E+01,  Rop  = .00000E+00

*. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
   BLy  = .62000E+03,  BLz  = .31000E+03,  BLu  = .31000E+03
   Ky   =  1.000,      Kz   =  1.000

*. MATERIAL PROPERTIES :
   Fy   = .24000E+01,  Es   = .21000E+04,  MATERIAL NAME  = SS41

*. GIVEN FORCES AND MOMENTS AT (1.0) POINT :
   Axial Force          Fxx   =   .1606E+01
   Shear Forces         Fyy   =   .0000E+00,  Fzz  =  .2009E+02
   Bending Moments      BMy   =   .1638E+04,  BMz  =  .0000E+00
   Moments of i-node    Myyi  = -.1476E+04,  Mzzi =  .0000E+00
   Moments of j-node    Myyj  =  .1638E+04,  Mzzj =  .0000E+00
```

[[[*]]] CHECK THE AXIAL STRESS.

```
( ). Check the slenderness ratio of axial tension member (l/r).
     [ AISC-ASD89 Specification B7. ]

     -. l/r  =    50.8  <   300.0  ---> O.K.

( ). Calculate the allowable tensile stress (Ft).
     [ AISC-ASD89 Specification D1. ]

     -. Ft  =  0.6 x Fy  =      1.440

( ). Calculate the axial tensile stress of member (ft).

     -. ft  =  Fxx / Area  =       .016

( ). Check the interaction ratio of axial stress (ft/Ft).

         ft           .016
     -. ----  =  ---------  =   .011  <  1.000  ---> O.K.
         Ft          1.440
```

[[[*]]] CHECK THE BENDING STRESSES ABOUT MAJOR AXIS.

( ). Check the laterally unbraced length of the compression flange (BLu).
[AISC-ASD89 Specification F1.1 (F1-2)]

-. Lcr1 = (76 x bf) / SQRT[Fy] = 128.03 in.

-. Lcr2 = 20000 / (Dweb/Af)Fy = 237.45 in.

-. Lcr = MIN[Lcr1, Lcr2] = 128.03 in.

-. BLu = 122.05 < Lcr ---> COMPACT SECTION !

( ). Check the depth-thickness ratio of web (DTR).
[AISC-ASD89 Specification B5.1]

-. DTR = Dweb / tw = 37.78

-. axial stress : fa = .016

-. fa > 0.0 (Axial stress is tension or zero.)

-. DTR < 640/SQRT[Fy] ---> COMPACT SECTION !

( ). Check the width-thickness ratio of flange (BTR).
[AISC-ASD89 Specification B5.1]

-. BTR = bf / 2tf = 8.93

-. BTR < 65/SQRT[Fy] ---> COMPACT SECTION !

( ). Calculate the allowable bending stresses (FBCy,FBTy).
[AISC-ASD89 Specification F1.1 (F1-1)]

-. FBCy,FBTy = 0.66 x Fy = 1.584

( ). Calculate actual bending stresses of member (fbcy,fbty).

-. fbcy = (BMy x Ccom) / Iyy = -1.333

-. fbty = (BMy x Cten) / Iyy = 1.333

( ). Check the interaction ratio of stresses (fbcy/FBCy, fbty/FBTy).

$$-.\ \frac{fbcy}{FBCy} = \frac{1.333}{1.584} = .841 < 1.000 \dashrightarrow O.K.$$

$$-.\ \frac{fbty}{FBTy} = \frac{1.333}{1.584} = .841 < 1.000 \dashrightarrow O.K.$$

[[[*]]] CHECK THE COMBINED STRESSES.

( ). Check the ratio of combined stresses (Axial tension + bending).
[AISC-ASD89 Specification H2. (H2-1)]

$$-.\ Rmax1 = \frac{ft}{Ft} + \frac{fbty}{FBTy} + \frac{fbtz}{FBTz} \quad (H2\text{-}1)$$

$$= .853 < 1.000 \dashrightarrow O.K.$$

$$-.\ Rmax2 = \frac{fbcy}{FBCy} + \frac{fbcz}{FBCz}$$

$$= .841 < 1.000 \dashrightarrow O.K.$$

[[[*]]] CHECK THE SHEAR STRESSES.

( ). Calculate the allowable shear stress of local-z direction (Fvz).
[AISC-ASD89 Specification F4]

-. DTR = h / tw = 34.67 < 380/SQRT[Fy]

-. Fvz = 0.40 x Fy = .960

( ). Calculate the shear stress of local-z direction (fvz).

-. fvz = (Fzz x Qyb) / Iyy = .727

( ). Check the interaction ratio of shear stress (fvz/Fvz).

$$-.\ \frac{fvz}{Fvz} = \frac{.727}{.960} = .757 < 1.000 \dashrightarrow O.K.$$

*. MIDAS FILE : ELEC.CAL
*. PROJECT : THILAND COIL CETER STRUCTURE ANALYSIS

*. LOADCOMB NO = 1. ELEMENT NO = 7. SECTION NO = 3. MATERIAL NO = 1
*. UNIT SYSTEM : TONF, CM

*. SECTIONAL PROPERTIES : Designation = H 19.4x15x.6/.9
Depth = 19.400, Top F Width = 15.000, Bot.F Width = 15.000
Web Thick = .600, Top F Thick = .900, Bot.F Thick = .900

Area = .37560E+02, Asy = .22500E+02, Asz = .11640E+02
Ybar = .75000E+01, Zbar = .97000E+01, Qyb = .24684E+03, Qzb = .28125E+02
Iyy = .25846E+04, Izz = .50657E+03, Iyz = .00000E+00
Roy = .82953E+01, Roz = .36724E+01, Rop = .00000E+00

*. DESIGN PARAMETERS FOR STEEL STRESS EVALUATION :
BLy = .31000E+03, BLz = .31000E+03, BLu = .31000E+03
Ky = 1.000, Kz = 1.000

*. MATERIAL PROPERTIES :
Fy = .24000E+01, Es = .21000E+04, MATERIAL NAME = SS41

*. GIVEN FORCES AND MOMENTS AT (0.0) POINT :
Axial Force Fxx = -.2978E+01
Shear Forces Fyy = .0000E+00, Fzz = .1584E+01
Bending Moments BMy = -.1828E+03, BMz = .0000E+00
Moments of i-node Myyi = -.1828E+03, Mzzi = .0000E+00
Moments of j-node Myyj = .6271E+02, Mzzj = .0000E+00

[[[*]]] CHECK THE AXIAL STRESS.

( ). Check the slenderness ratio of axial compression member (Kl/r).
[AISC-ASD89 Specification B7.]

-. Kl/r = 84.4 < 200.0 ---> O.K.

( ). Check the width-thickness ratio of built-up flange (BTR).
[AISC-ASD89 Specification B5.1]

-. h/t = 29.33 < 70. ---> kc = 1.000

-. BTR = bf / 2tf = 8.33 < 95/SQRT[Fy/kc] ---> Qs = 1.000

( ). Check the depth-thickness ratio of web (DTR).
[AISC-ASD89 Specification B5.1]

-. DTR = Dweb / tw = 29.33 < 253/SQRT[Fy] ---> Qa = 1.000

( ). Calculate the allowable compressive stress (Fa).
[AISC-ASD89 Specification E2. (E2-1)]

$$-.\ Cc = SQRT\left[\frac{2 \times Pi^{**}2 \times Es}{Qs \times Qa \times Fy} \right] = 131.42$$

-. Kl/r < Cc

$$-.\ Fa = \frac{Qs \times Qa \times \left[1. - \frac{(Kl/r)^{**}2}{(2 \times Cc^{**}2)} \right] \times Fy}{\frac{5}{3} + \frac{3 \times (Kl/r)}{8 \times Cc} - \frac{(Kl/r)^{**}3}{8 \times Cc^{**}3}} = 1.016$$

( ). Calculate the axial compressive stress of member (fa).

-. fa = Fxx / Area = -.079

( ). Check the interaction ratio of axial stress (fa/Fa).

$$-.\ \frac{fa}{Fa} = \frac{.079}{1.016} = .078 < 1.000 \text{ ---> O.K.}$$

[[[*]]] CHECK THE BENDING STRESSES ABOUT MAJOR AXIS.

( ). Check the laterally unbraced length of the compression flange (BLu).
[AISC-ASD89 Specification F1.1 (F1-2)]

-. Lcr1 = (76 x bf) / SQRT[Fy] = 76.82 in.

-. Lcr2 = 20000 / (Dweb/Af)Fy = 160.51 in.

-. Lcr = MIN[Lcr1, Lcr2] = 76.82 in.

-. BLu = 122.05 > Lcr ---> NON-COMPACT SECTION !

( ). Check the depth-thickness ratio of web (DTR).
[AISC-ASD89 Specification B5.1]

-. DTR = Dweb / tw = 32.33

-. axial stress : fa = -.079

-. fa/Fy = .033 < 0.16

-. DTR < 640 / SQRT[Fy] [1. - 3.74 fa/Fy] ---> COMPACT SECTION !

( ). Calculate the bending coefficient (Cb).
[AISC-ASD89 Specification F1.3]

-. User defined or default value of Cb = 1.000

( ). Calculate the radius of gyration (rT)
[AISC-ASD89 Specification F1.3]

-. Azz = Bf*tf + tw*(Ccom-tf)/3 = 15.3

-. Izz = tf*Bf**3/12 + ((Ccom-tf)/3)*tw**3/12 = 253.2

-. rT = SQRT[Izz/Azz] = 4.073

( ). Check the ratio of BLu-rT (BLu/rT).
[AISC-ASD89 Specification F1.3]

-. CRrog2 = SQRT[(510000 x Cb) / Fy] = 122.230

-. BLu/rT = 76.107 < CRrog2

( ). Calculate the allowable compressive bending stresses (FBC).
[AISC-ASD89 Specification F1.3 (F1-6,F1-8)]

-. FBCi = (12000 x Cb) / ((BLu x d) / Af) = 1.894

-. FBCi > 0.6 x Fy ---> FBCi = 0.6 x Fy = 1.440

-. FBCj = [2/3 - (Fy x (BLu/rT)**2) / (1530000 x Cb)] Fy = 1.290

-. FBC = MAX(FBCi, FBCj) = 1.440

( ). Check the width-thickness ratio of built-up flange (BTR).
[AISC-ASD89 Specification B5.1]

-. h/t = 32.33 < 70. ---> kc = 1.000

-. BTR = bf / 2tf = 8.33 < 95/SQRT[Fy/kc] ---> Qs = 1.000

( ). Calculate the allowable bending stresses (FBCy,FBTy).

-. FBTy = 0.6 x Fy = 1.440

-. FBCy = MIN[FBC, Qs x 0.6 x Fy] = 1.440

( ). Calculate actual bending stresses of member (fbcy, fbty).

-. fbcy = (BMy x Ccom) / Iyy = -.686

-. fbty = (BMy x Cten) / Iyy = .686

( ). Check the interaction ratio of stresses (fbcy/FBCy, fbty/FBTy).

$$-.\ \frac{fbcy}{FBCy} = \frac{.686}{1.440} = .476 < 1.000 \text{ ---> O.K.}$$

$$-.\ \frac{fbty}{FBTy} = \frac{.686}{1.440} = .476 < 1.000 \text{ ---> O.K.}$$

[[[*]]] CHECK THE COMBINED STRESSES.

( ). Check the ratio of combined stresses (Axial compression + bending).
[AISC-ASD89 Specification H1. (H1-3)]

-. fa/Fa < 0.15

*. Check the combined stress at member end point.

$$-.\ Rmax = \frac{fa}{Fa} + \frac{fbcy}{FBCy} + \frac{fbcz}{FBCz}$$

$$= .554 < 1.000 \text{ ---> O.K.}$$

[[[*]]] CHECK THE SHEAR STRESSES.

( ). Calculate the allowable shear stress of local-z direction (Fvz).
[AISC-ASD89 Specification F4]

-. DTR = h / tw = 29.33 < 380/SQRT[Fy]

-. Fvz = 0.40 x Fy = .960

( ). Calculate the shear stress of local-z direction (fvz).

-. fvz = (Fzz x Qyb) / Iyy = .151

( ). Check the interaction ratio of shear stress (fvz/Fvz).

$$-.\ \frac{fvz}{Fvz} = \frac{.151}{.960} = .158 < 1.000 \text{ ---> O.K.}$$

Project :	Date : . .	Sheet : /
Title :	By :	Check :

MAT DESIGN

MAIN (LATITUDINAL DIRECTION)

$M_u = 11\,tm$ (POSITIVE)

$M_u = 7.9\,tm$ (NEGATIVE)

By COMPUTER ANALYSIS.

$$R_n = \frac{M_u}{\phi b d^2} = \frac{11 \times 10^5}{0.9 \times 100 \times 24^2} = 21.2\ kg/cm^2$$

$$\rho = \frac{0.85 \times 210}{3000}\left[1 - \sqrt{1 - \frac{2 \times 21.2}{0.85 \times 210}}\right]$$

$= 0.0075$

$A_s = 0.0075 \times 100 \times 24 = 18\ cm^2$

$A_{s\,min} = 0.0018 \times 100 \times 30 = 5.4\ cm^2$

$\therefore$ D19 @ 150

SUB (LONGITUDINAL DIRECTION)

$M_u = 6.2\,tm$ (POSITIVE)

$M_u = 3.1\,tm$ (NEGATIVE)

$$R_n = \frac{6.2 \times 10^5}{0.9 \times 100 \times 24^2} = 11.96\ kg/cm^2$$

$$\rho = \frac{0.85 \times 210}{3000}\left[1 - \sqrt{1 - \frac{2 \times 11.96}{0.85 \times 210}}\right]$$

$= 0.0041$

Project :	Date :	Sheet : /
Title :	By :	Check :

$$A_s = 0.0041 \times 100 \times 24 = 9.8\ cm^2$$

$\therefore$ D19 @ 250

PILE SUPPORTING

$M_u = 9.3\ tm$ (POSITIVE)

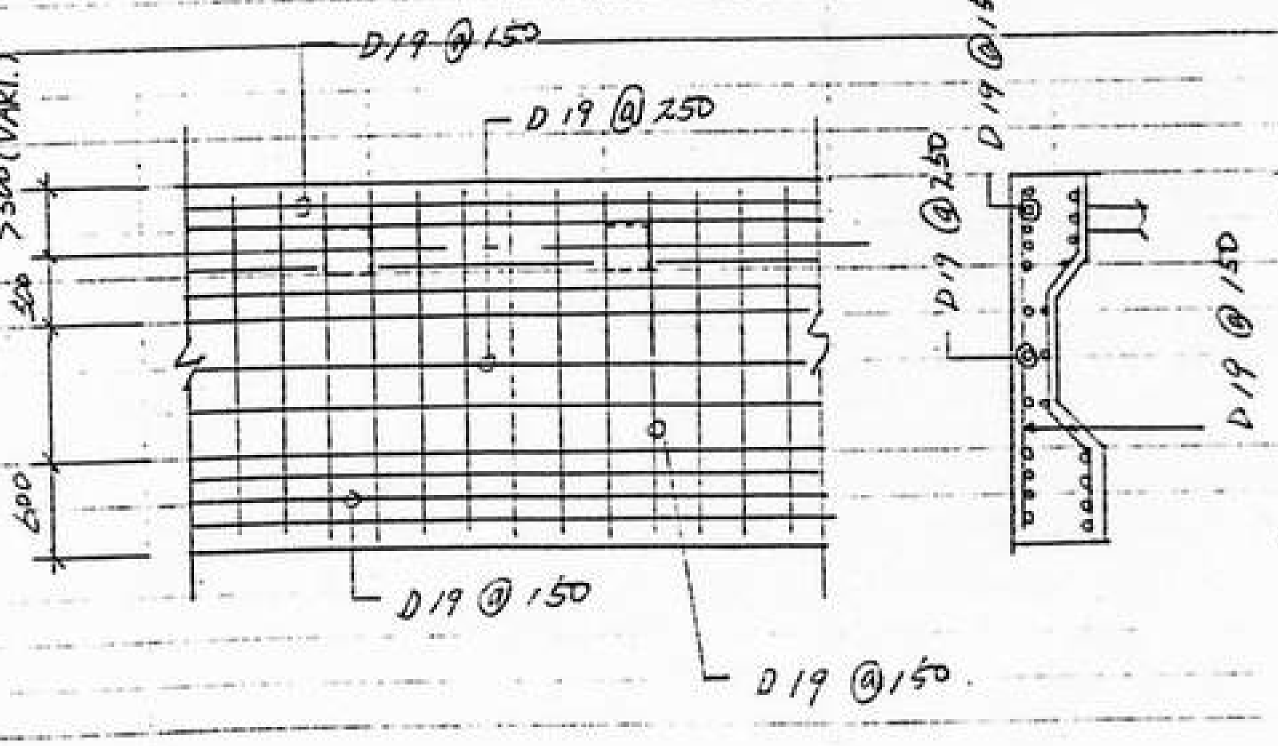
$M_u = 18.5\ tm$ (NEGATIVE)

$$R_n = \frac{18.5 \times 10^5}{0.9 \times 100 \times 40^2} = 12.85\ kg/cm^2$$

$$\rho = \frac{0.85 \times 210}{3000}\left[1 - \sqrt{1 - \frac{2 \times 12.85}{0.85 \times 210}}\right] = 0.0045$$

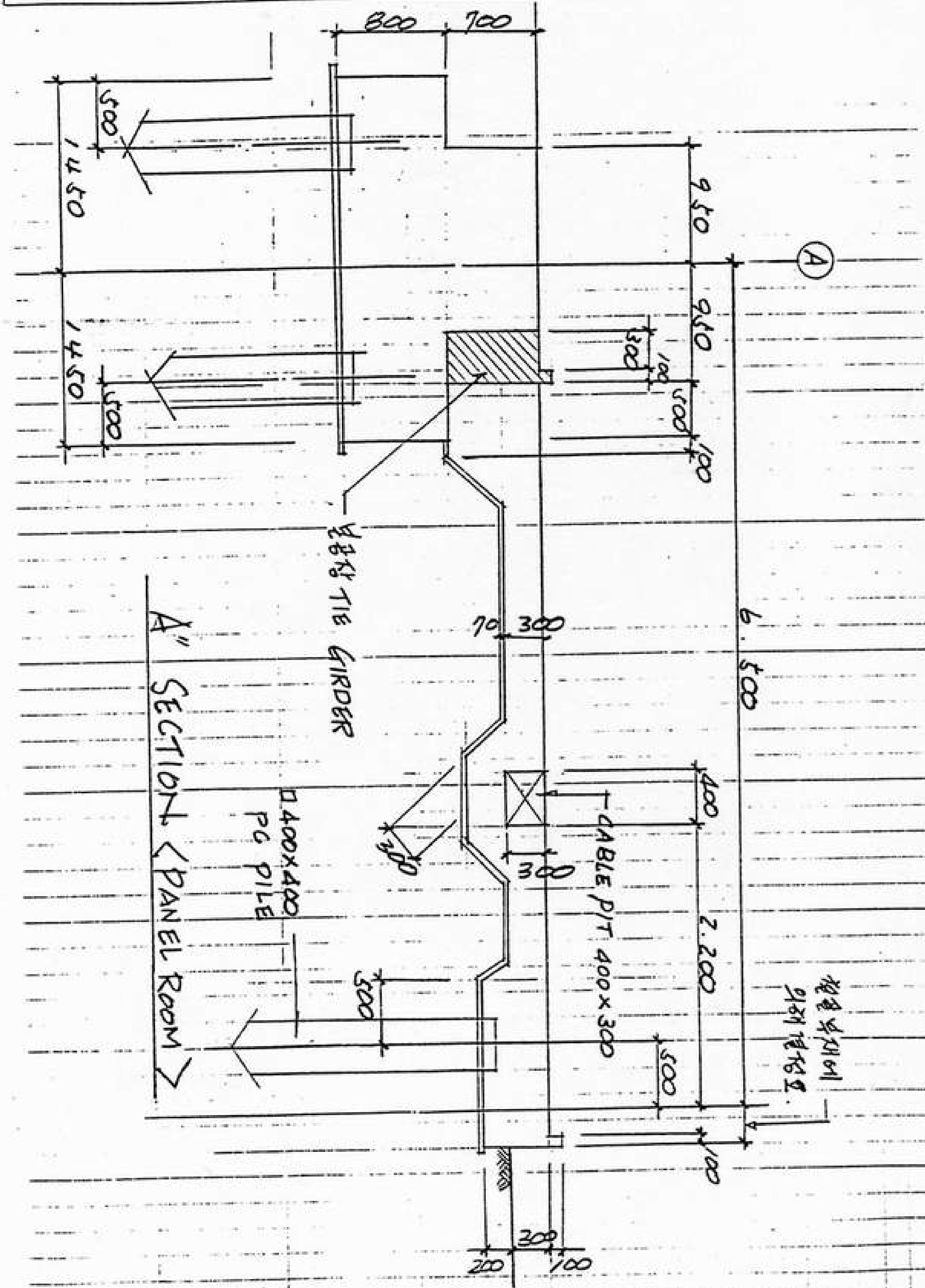
$$A_s = 0.0045 \times 100 \times 40 = 18\ cm^2$$

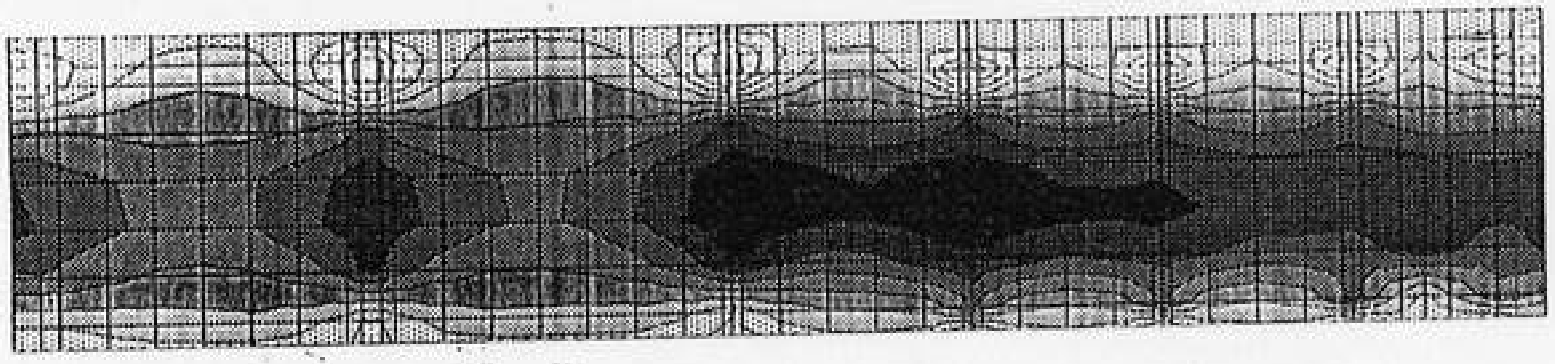
$\therefore$ D19 @ 150.



포스코개발주식회사

Project :	Date : . .	Sheet : /
Title :	By :	Check :





MIDAS/SDS-GPS
POST-PROCESSOR

SLAB FORCE

MOMENT-YY

1.101E+01
9.291E+00
7.571E+00
5.852E+00
4.133E+00
2.413E+00
6.941E-01
-1.025E+00
-2.745E+00
-4.464E+00
-6.183E+00
-7.902E+00

LOADCOMB ID.= 1

FILE : ELEC
UNIT: TON-M/M
DATE: 02-25-97

VIEW-DIRECTION

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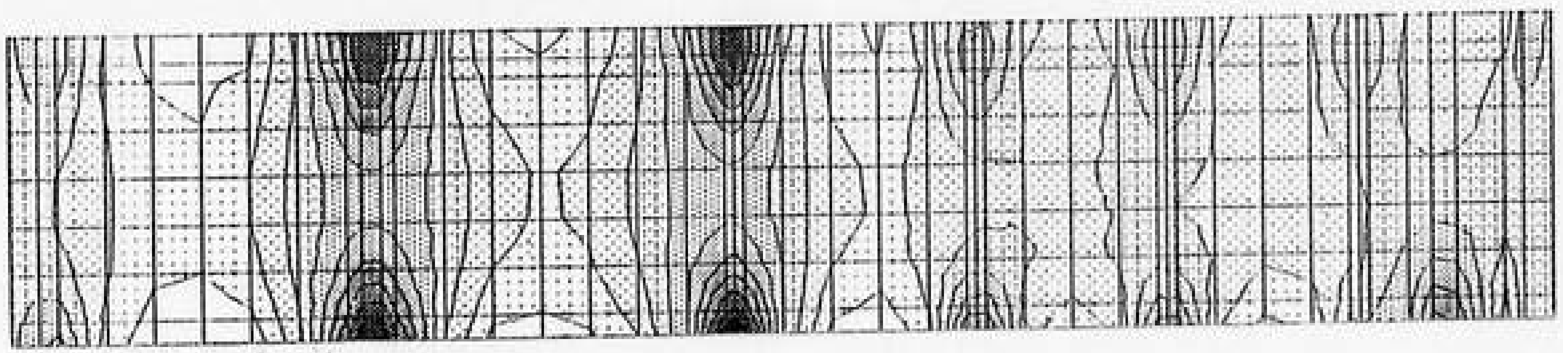
Y: .000
Z: -1.000

PROJECT:
TITLE : MAIN DIRECTION
:
USER :



MIDAS/SDS-GPS
POST-PROCESSOR

SLAB FORCE

MOMENT-XX

-1.852E+01
-1.599E+01
-1.316E+01
-1.093E+01
-8.396E+00
-5.864E+00
-3.333E+00
-8.012E-01
1.730E+00
4.262E+00
6.794E+00
9.325E+00

LOADCOMB ID.= 1

FILE : ELEC
UNIT: TON-M/M
DATE: 02-25-97

VIEW-DIRECTION

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Z: -1.000

PROJECT:
TITLE : SUB DIRECTION
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USER :

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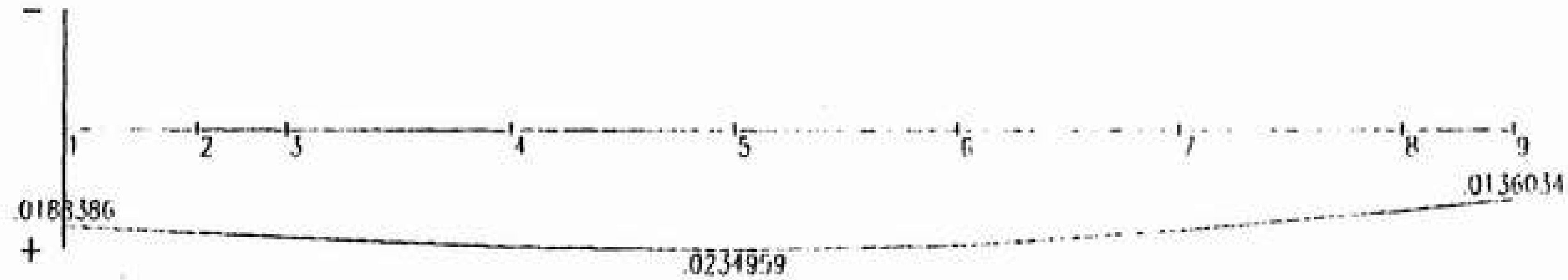
DEFORMED SHAPE

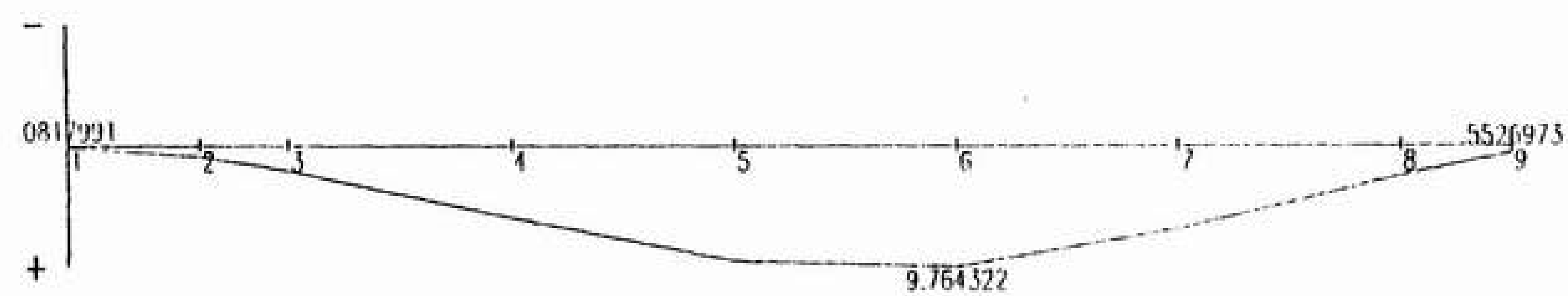


MIN: 1.360E-02 MAX: 2.350E-02

SHEAR FORCE DIAGRAM

MIN: -2.802125 MAX: 2.973423

BENDING MOMENT DIAGRAM



MIN: .0817991 MAX: 9.764322

PROJECT:

TITLE : CENTER STRIP (MAIN DIR.)

:

USER :

MIDAS/SDS-GPS
POST-PROCESSOR

GLINE OUTPUT

DISPLACEMENT

MIN 1.360E-02

MAX 2.350E-02

SHEAR FORCE

MIN -2.802125

MAX 2.973423

BENDING MOMENT

MIN .0817991

MAX 9.764322

LOADCOMB ID.= 1

FILE : ELEC
UNIT: M.TON
DATE: 02-25-97

VIEW-DIRECTION

X: .000

Y: .000

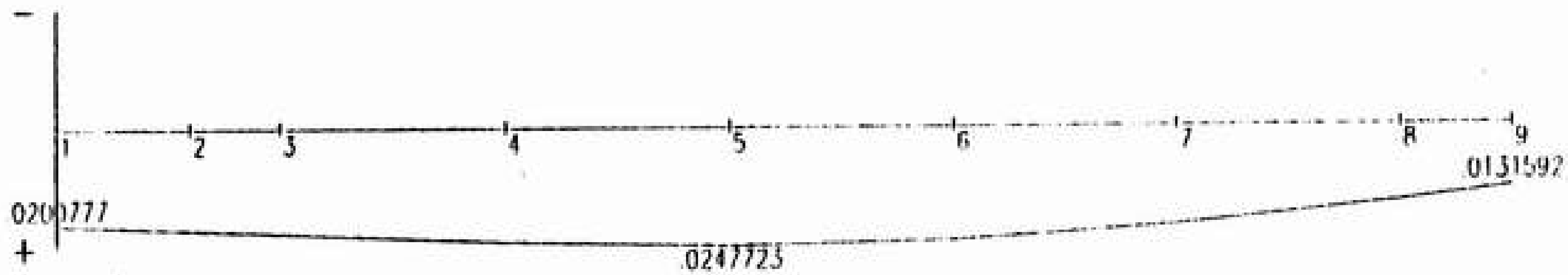
Z: -1.000

Z—X

Y

GRID LINE X=27

DEFORMED SHAPE



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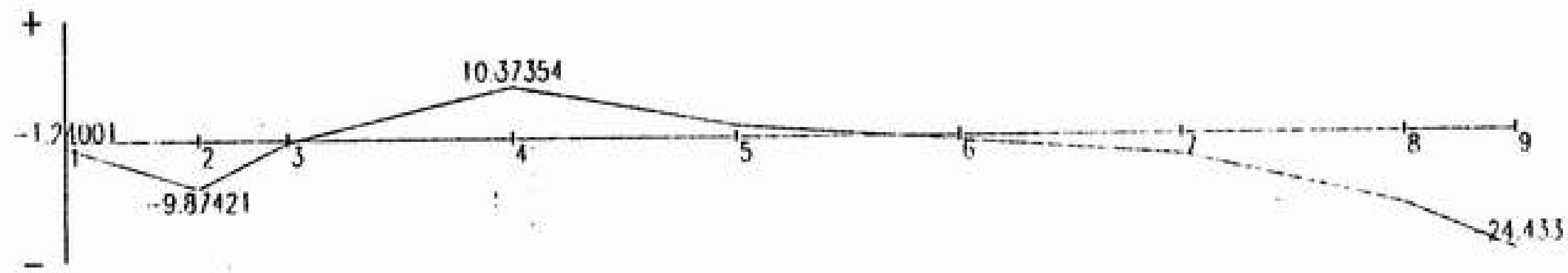
SHEAR FORCE DIAGRAM



MIN: -24.43298 MAX: 10.37354

BENDING MOMENT DIAGRAM

MIN: -7.902413 MAX: 11.00987

PROJECT:

TITLE : COLUMN STRIP (MAIN DIR.)

:

USER :

MIDAS/SDS-GPS
POST-PROCESSOR

GLINE OUTPUT

DISPLACEMENT

MIN 1.316E-02

MAX 2.477E-02

SHEAR FORCE

MIN -24.43298

MAX 10.37354

BENDING MOMENT

MIN -7.902413

MAX 11.00987

LOADCOMB ID.= 1

FILE : ELEC
UNIT: M,TON
DATE: 02-25-97

VIEW-DIRECTION

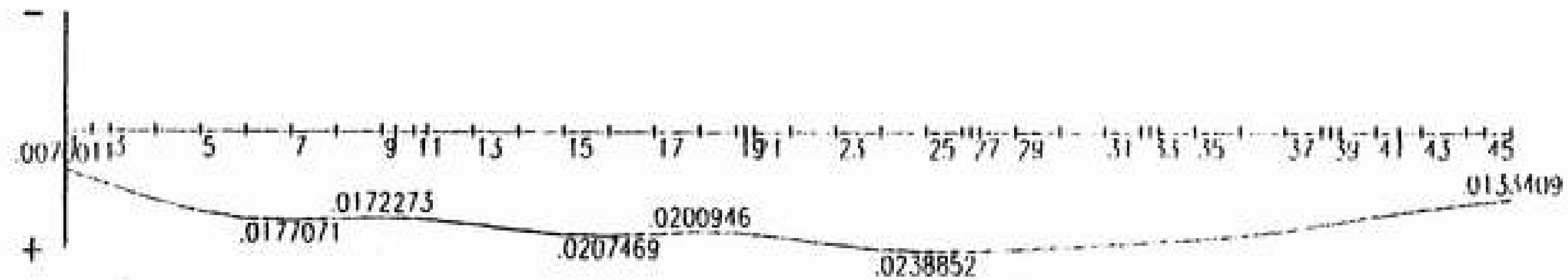
X: .000

Y: .000

Z: -1.000

GRID LINE Y=6

DEFORMED SHAPE



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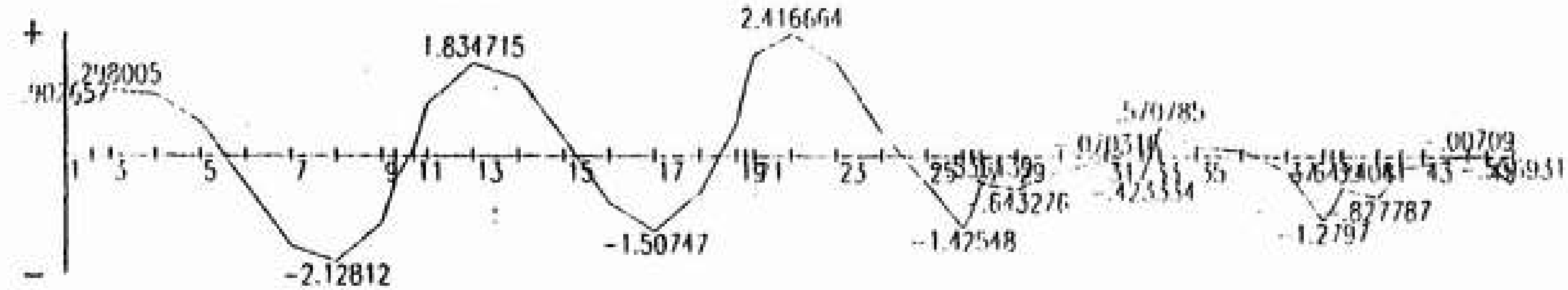
SHEAR FORCE DIAGRAM



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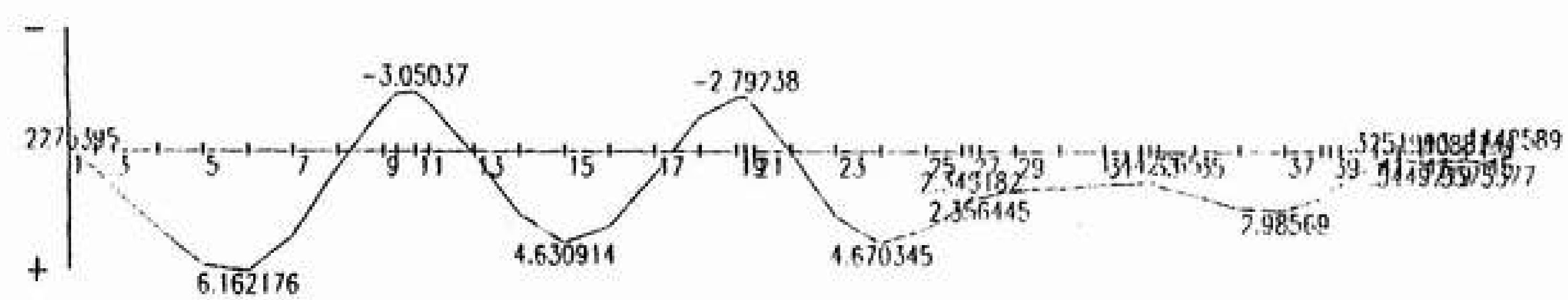
BENDING MOMENT DIAGRAM



MIN: -3.050372   MAX: 6.162176

PROJECT:

TITLE : CENTER STRIP (SUB DIR.)

:

USER :

MIDAS/SDS-GPS
POST-PROCESSOR

GLINE OUTPUT

DISPLACEMENT

MIN 7.601E-03

MAX 2.389E-02

SHEAR FORCE

MIN -2.12812

MAX 2.416664

BENDING MOMENT

MIN -3.050372

MAX 6.162176

LOADCOMB ID.= 1

FILE : ELEC
UNIT: M,TON
DATE: 02-25-97

VIEW-DIRECTION

X: .000

Y: .000

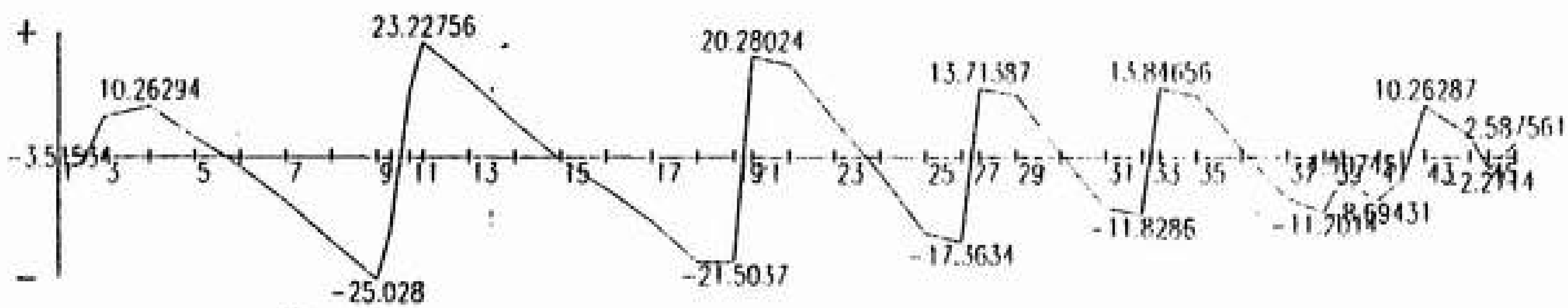
Z: -1.000

GRID LINE Y=9

DEFORMED SHAPE

MIN: 1.250E-03 MAX: 1.517E-02

SHEAR FORCE DIAGRAM



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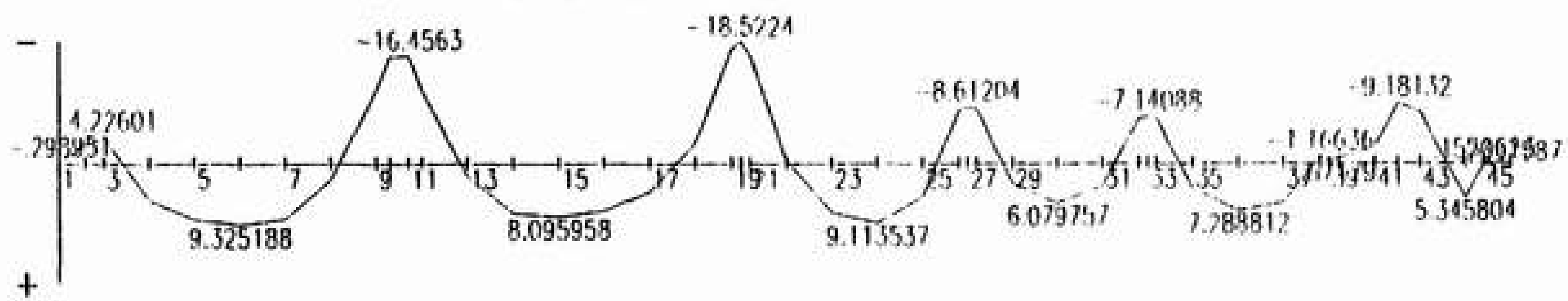
BENDING MOMENT DIAGRAM



MIN: -18.5224 MAX: 9.325188

PROJECT:

TITLE : COLUMN STRIP (SUB DIR.)

:

USER :

MIDAS/SDS-GPS
POST-PROCESSOR

GLINE OUTPUT

DISPLACEMENT

MIN 1.250E-03

MAX 1.517E-02

SHEAR FORCE

MIN -25.02803

MAX 23.22756

BENDING MOMENT

MIN -18.5224

MAX 9.325188

LOADCOMB ID.= 1

FILE : ELEC
UNIT: M,TON
DATE: 02-25-97

VIEW-DIRECTION

X: .000
Y: .000
Z: -1.000