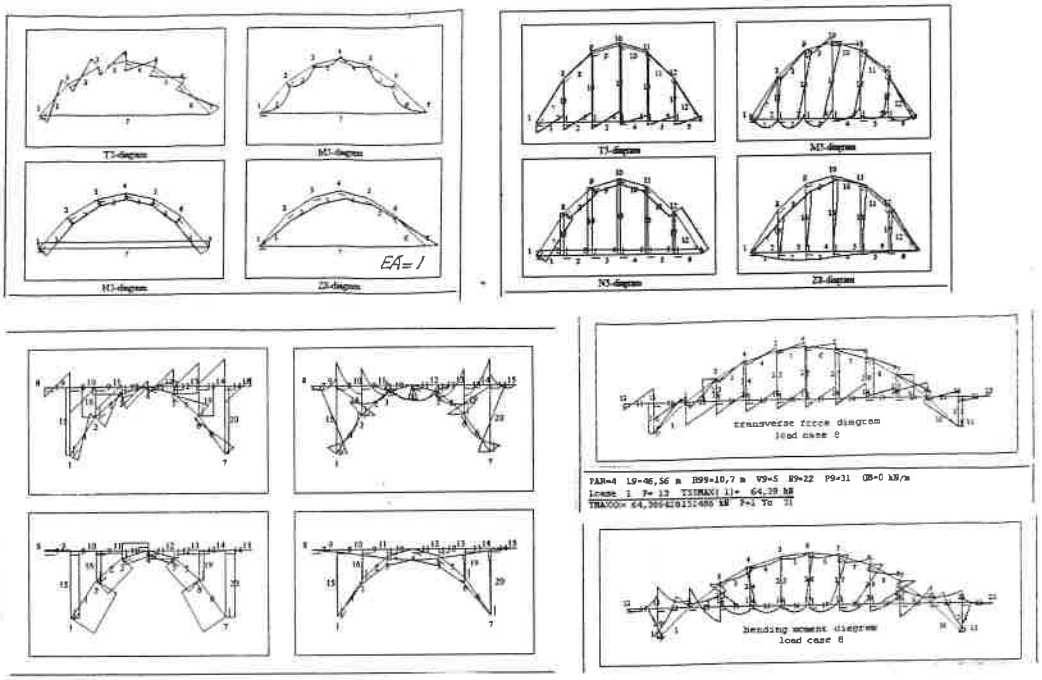
Part 17

Program **FRAMEPROGRAM666** 1 -35

Four different 'parabole frames' like shown here below with
OWH kN/m own weight of the horizontal members,
OWP kN/m own weight of the parabola members,
OWV kN/m own weight of the vertical members.

QB kN/m as distributed load for the horizontal members, span 1, span 1 and 2, 1, 2 and 3 etc.

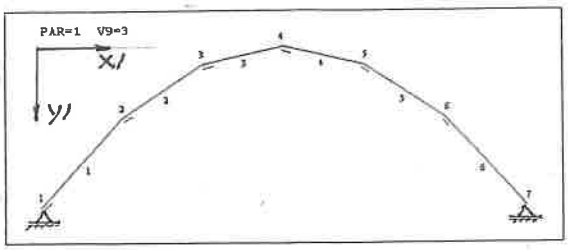


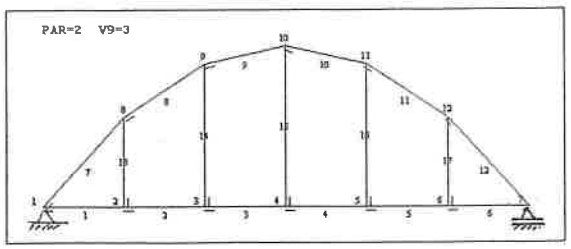
Different member/beam load forces can be added, joint load forces FX(I) and FY(I), Given bending stiffness 'EI' and strain stiffness 'EA' can be changed.

The T5, M5, N5-and ELCURVE diagrams and calculation results appear on the screen or printed with the printer.

The written code for the member and joint data 29-35 of the four constructions step by step explained.

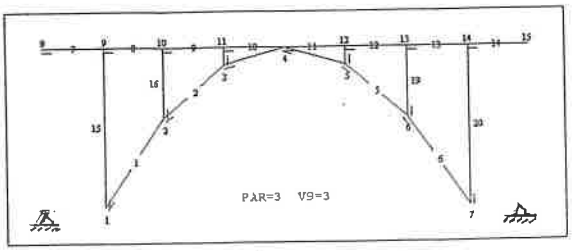
01

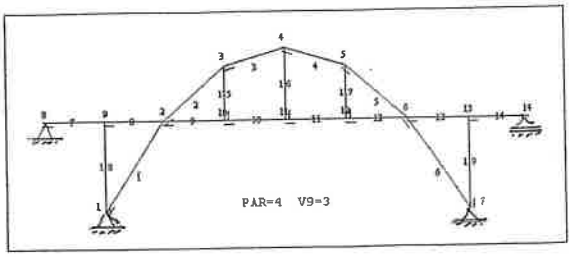




Printer print.
Some remarks, the examples will show more, experiment and find out more.
PrPr-4FRTMNZvert to print the four diagram 'portrait' and
PrPr-4FRTMNZhor to print the four diaframs 'landscape', A4 size.

PrPr the main click control for getting printer results, member end forces and moments DA(,), NA(,) and MF(I), support reactions RV(I) and RH(I), joint displacements UV(I) and UH(I), joint rotations UR(I).
PrD5D6 Yes adds D5(,), D6(,) and
Pr4FR Yes adds the four diagrams.
The examples will show more.





FRAMEPROGRAM666

Four 'parabola frames' PAR1 to PAR4.
Some comments about the controls to click on, the examples of the following pages will explain much more,

TSTRINGPAR the small text box for input of
L9 total horizontal length,
H99 total height and
V9 for the 'horizontal division' of the frame.
For the examples on the left all V9=3. Note the difference between first two and second two.

Suppose in TSTRINGPAR 24,8,3 Enter,
after input of these three data
ALWAYS click PAR1, or PAR2, or PAR3, or PAR4
first before going on!!!

Cls to clean the form if wished or necessary.

And for input of, kN/m,
OWH own weight of the horizontal members, it will be NQB(P),
OWP own weight of the parabola members, a vertical member load on sloping members, will be resolved into NQB(P) perpendicular to and NQA(P) along the parabola members,
OWV own weight of the vertical members it will be NQA(P), and

QB a 'movable' distributed load on the horizontal members to be loaded on member 1, 1 and 2, 1, 2 and 3 etc.

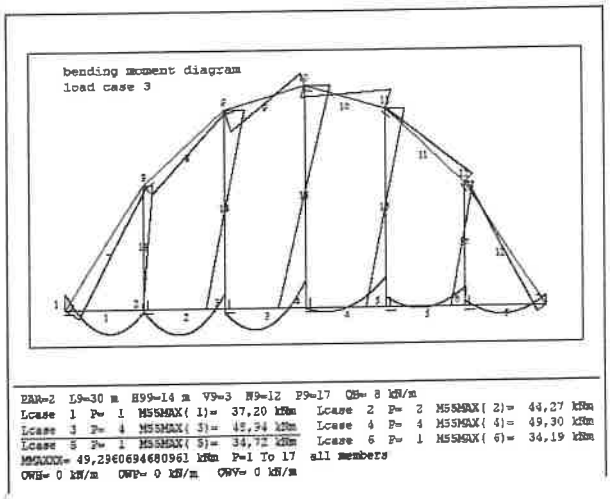
TSTRING the large text box for input of joint data like
FX(I) horizontal joint load force, assumed to the right,
FY(I) vertical joint load force, assumed downward, and MZ(I).
Further PV(I), PH(I), PR(I), NL(P), NH(P) and if wanted UV(I), UH(I) and UR(I).

Coord shows the coordinated of the joints,
Show1 shows the joint data,
Show2 shows the member data,
Show3 shows the member loads.

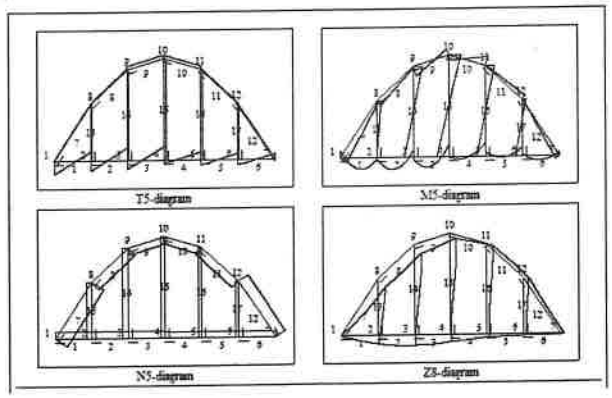
After input of the member loads the order of three control clicks, a must, is
Calculate, CalcT5M5N5MAX and DRAWT5M5N5ELCURVE,

the last one to click on successively to get the shear force, bending moment, normale force and deformation diagram with correspondind calculation results shown below the diagrams.

PrPr-4FRTMNZvert PrPr-4FRTMNZhor STORE NR= ? GET Coord Show1 Show2 Show3 Form2 MMAX
PrD5D6 No PrNFQ No PrPrLOADS CalcT5M5N5MAX T5?M5?N5?ELCURVE? Load case ? ZMAX
PrTMAX No PAR1 PAR2 OK Calculate Cls
PrMMAX No P9=? PAR3 L9=,H99=,V9= OK1 Again AOAGAIN
PrNMAX No PAR4
PrZMAX No
Pr4FR-No Ux and Uy EX1ab? EX2b EX3ab? EX4abc REDRAW T5 M5 N5 New loads
PrPr Draw4F PFRES33 DRAWT5M5N5ELCURVE JDS=NO Show4-QB End Reset PrF



PAR=2 L9=30 m H99=14 m V9=3 N9=12 P9=17 QB= 8 kN/m
Lcase 1 P= 1 M55MAX(1)= 37,20 kNm Lcase 2 P= 2 M55MAX(2)= 44,27 kNm
Lcase 3 P= 4 M55MAX(3)= 48,94 kNm Lcase 4 P= 4 M55MAX(4)= 49,30 kNm
Lcase 5 P= 1 M55MAX(5)= 34,72 kNm Lcase 6 P= 1 M55MAX(6)= 34,19 kNm
MMXXXX= 49,29606946B0961 kNm P=1 To 17 all members
QWB= 0 kN/m QWP= 0 kN/m QWV= 0 kN/m

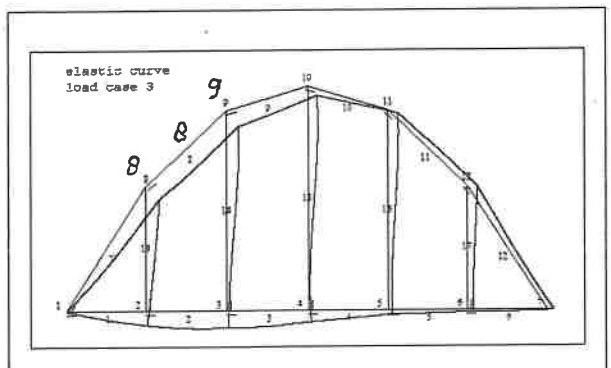


Beam end forces and moments

D5(1, 1)=-108,33 kN	D5(2, 1)= 108,33 kN	D5(8, 9)= 106,14 kN	D5(9, 9)=-106,14 kN
D6(1, 1)= -45,72 kN	D6(2, 1)= -34,28 kN	D6(8, 9)= -95,78 kN	D6(9, 9)= 95,78 kN
MF(1, 1)= -26,88 kNm	MF(2, 1)= -1,74 kNm	MF(8, 9)= 20,17 kNm	MF(9, 9)= -3,74 kNm
D5(2, 3)=-106,14 kN	D5(3, 2)= 106,14 kN	D5(9,10)= 101,06 kN	D5(10, 9)=-101,06 kN
D6(2, 3)= -34,22 kN	D6(3, 2)= -45,78 kN	D6(9,10)= -20,03 kN	D6(10, 9)= 20,03 kN
MF(2, 3)= 4,27 kNm	MF(3, 2)= 24,62 kNm	MF(9,10)= 36,38 kNm	MF(10, 9)= 20,69 kNm
D5(3, 4)=-101,06 kN	D5(4, 3)= 101,06 kN	D5(10,11)= 94,96 kN	D5(11,10)= -94,96 kN
D6(3, 4)= -29,97 kN	D6(4, 3)= -50,03 kN	D6(10,11)= 40,24 kN	D6(11,10)= -40,24 kN
MF(3, 4)= 5,99 kNm	MF(4, 3)= 16,14 kNm	MF(10,11)= 20,76 kNm	MF(11,10)= 32,75 kNm
D5(4, 5)= -94,96 kN	D5(5, 4)= 94,96 kN	D5(11,12)= 89,79 kN	D5(12,11)= -89,79 kN
D6(4, 5)= -10,24 kN	D6(5, 4)= -29,76 kN	D6(11,12)= 86,95 kN	D6(12,11)= -86,95 kN
MF(4, 5)= -0,17 kNm	MF(5, 4)= 48,94 kNm	MF(11,12)= -1,38 kNm	MF(12,11)= 17,11 kNm
D5(5, 6)= -89,79 kN	D5(6, 5)= 89,79 kN	D5(7,12)= -85,07 kN	D5(12, 7)= 85,07 kN

P=4 X= 5 m T5= -29,76 kN M5= -48,94 kNm
T7= -29,76 kN
P=4 X= 0 m T5= 10,24 kN M5= -0,17 kNm
T7= 10,24 kN

PrF P=,4,X=,0 OK Print data End Cls



PAR=2 L9=30 m H99=14 m V9=3 N9=12 P9=17 QB= 8 kN/m
Lcase 1 P= 8 Z55MAX(1)= 613,91 /EI Lcase 2 P= 8 Z55MAX(2)=1045,90 /EI
Lcase 3 P= 8 Z55MAX(3)=1204,60 /EI Lcase 4 P= 8 Z55MAX(4)=1080,57 /EI
Lcase 5 P= 8 Z55MAX(5)= 943,01 /EI Lcase 6 P= 8 Z55MAX(6)= 925,86 /EI
ZMAXXX= 1204,59974321735 /EI P=1 To 17 all members
QWB= 0 kN/m QWP= 0 kN/m QWV= 0 kN/m

In case of a movable load QB=8 kN/m.

Just a short impression.
After Calculate and CalcT5M5N5MAX to wait one are more seconds until T5?M5?N5ELCURVE? gets visible to click on.
With a click on it appears T5 or M5, N5 or ELCURVE. Suppose M5, when clicking Load case Load case 1, Load case 2 etc.. The calculations are carried out with each click, with each click the bending moment diagram for that load case appears.

Suppose L9,H99,V9 with L9= 30 m, H99= 14 m and V9=3 with PAR2, given bending stiffness EI and strain stiffnes 'EA' is 8EI. Then with M5 the print on the left appears for load case 3.
First three horizontal members loaded.
For load case 3 largest maximum moment for P=4 M55MAX=(3)= 48,94 kNm.

With several clicks on PFRES33, most controls disappear, below the diagrams appear D5(,), D6(,) and MF(,), after that DA(,), NA(,) MF(,), next RV(I), RH(I), UV(I) and UH(I), after 'last' click UR(I), all for load case 3.

See on the left for P=4, with L=4 and H=5, D6(4,5)= -10,24 kN and D6(5,4)= -29,76 kN, MF(4,5)= -0,17 kNm and MF(5,4)= 48,94 kNm.

(For Show4-QB with results for each of the three groups of members see page 16.)
Click Reset to get back all the controls.

With a click in Draw4F all four diagrams appaer (Draw4F not always a correct print, see page 26! for remarks, not always succesful...), printed with a click on PrF like done for the other diagrams/results.

Form2 to click on,
the second form for data input. L1=30/6= 5 m
Here above M55MAX(3)= 48,94 kNm, load case 3.

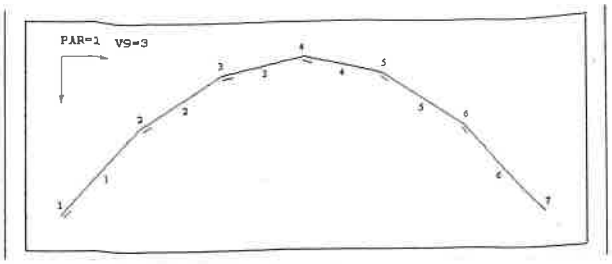
P=,P1,X=,L1 To type its TSTRING
P=,4,X=,5 Enter and click Print data
to see bending moment M5 and tranverse forces T5 and T7.
P=4 X=5 T5= -29,76 kN M5= -48,94 kNm
T7= -29,76 kN
See Form2 on the left how it looks like.
See page 6b how to interprete these bending moments and shear forces.

Click M5 to N5 , ELCURVE and click to Load case 3.
The deformation diagram appears with for load case 3 the largest displacement for member P=8, at member end 9 perpendicular to the member.

Lcase 3 P=8 Z55MAX(3)= 1205/EI

Controls STORE NR= GET to store the data put before Calcullate etc.

Following pages with examples and more explanation in detail.

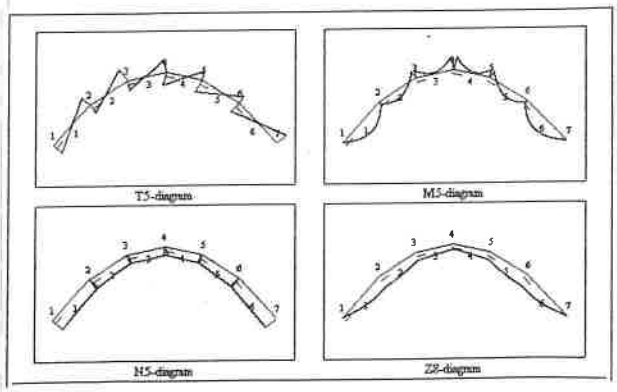


I	FY	FV	UV	SV	X1	FX	FH	UH	SH	Y1	H2	PR	UR	SR
1	0,00	1	0,0	0,0	0,00	0,00	1	0,0	0,0	8,00	0,00	0	0,0	0,0
2	0,00	0	0,0	0,0	4,00	0,00	0	0,0	0,0	3,56	0,00	0	0,0	0,0
3	0,00	0	0,0	0,0	8,00	0,00	0	0,0	0,0	0,89	0,00	0	0,0	0,0
4	0,00	0	0,0	0,0	12,00	0,00	0	0,0	0,0	0,00	0,00	0	0,0	0,0
5	0,00	0	0,0	0,0	16,00	0,00	0	0,0	0,0	0,89	0,00	0	0,0	0,0
6	0,00	0	0,0	0,0	20,00	0,00	0	0,0	0,0	3,56	0,00	0	0,0	0,0
7	0,00	1	0,0	0,0	24,00	0,00	1	0,0	0,0	8,00	0,00	0	0,0	0,0

P	LL	HH	ML	MH	BA	LE	RE	EI	EA	L1	P	LL	HH	ML	MH	BA	LE	RE	EI	EA	L1
1	1	2	0	0	1	0	0	1,0	8	5,98	4	4	5	0	0	4	0	0	1,0	8	4,10
2	2	3	0	0	2	0	0	1,0	8	4,81	5	5	6	0	0	5	0	0	1,0	8	4,81
3	3	4	0	0	3	0	0	1,0	8	4,10	6	6	7	0	0	6	0	0	1,0	8	5,98

NQB(1)=1	I	Q3	Q4	L3	L4	NQA(1)=1	I	Q6	Q7	L6	L7
	1	1,34	1,34	0,00	5,98		1	-1,49	-1,49	0,00	5,98
NQB(2)=1	I	Q3	Q4	L3	L4	NQA(2)=1	I	Q6	Q7	L6	L7
	1	1,66	1,66	0,00	4,81		1	-1,11	-1,11	0,00	4,81
NQB(3)=1	I	Q3	Q4	L3	L4	NQA(3)=1	I	Q6	Q7	L6	L7
	1	1,95	1,95	0,00	4,10		1	-0,43	-0,43	0,00	4,10
NQB(4)=1	I	Q3	Q4	L3	L4	NQA(4)=1	I	Q6	Q7	L6	L7
	1	1,95	1,95	0,00	4,10		1	0,43	0,43	0,00	4,10
NQB(5)=1	I	Q3	Q4	L3	L4	NQA(5)=1	I	Q6	Q7	L6	L7
	1	1,66	1,66	0,00	4,81		1	1,11	1,11	0,00	4,81
NQB(6)=1	I	Q3	Q4	L3	L4	NQA(6)=1	I	Q6	Q7	L6	L7
	1	1,34	1,34	0,00	5,98		1	1,49	1,49	0,00	5,98

NQV(1)=1	I	Q3V	Q4V	LH3	LH4	NQV(2)=1	I	Q3V	Q4V	LH3	LH4
	1	2,00	2,00	0,00	4,00		1	2,00	2,00	0,00	4,00
NQV(3)=1	I	Q3V	Q4V	LH3	LH4	NQV(4)=1	I	Q3V	Q4V	LH3	LH4
	1	2,00	2,00	0,00	4,00		1	2,00	2,00	0,00	4,00
NQV(5)=1	I	Q3V	Q4V	LH3	LH4	NQV(6)=1	I	Q3V	Q4V	LH3	LH4
	1	2,00	2,00	0,00	4,00		1	2,00	2,00	0,00	4,00



Beam end forces and moments.

D5(1, 2)=	21,21	kN	D5(2, 1)=	-21,21	kN	D5(4, 5)=	21,21	kN	D5(5, 4)=	-21,21	kN
D6(1, 2)=	-29,77	kN	D6(2, 1)=	17,81	kN	D6(4, 5)=	0,00	kN	D6(5, 4)=	-8,20	kN
MF(1, 2)=	0,00	kNm	MF(2, 1)=	-0,89	kNm	MF(4, 5)=	-6,12	kNm	MF(5, 4)=	3,66	kNm
D5(2, 3)=	21,21	kN	D5(3, 2)=	-21,21	kN	D5(5, 6)=	21,21	kN	D5(6, 5)=	-21,21	kN
D6(2, 3)=	-17,81	kN	D6(3, 2)=	8,20	kN	D6(5, 6)=	8,20	kN	D6(6, 5)=	-17,81	kN
MF(2, 3)=	0,89	kNm	MF(3, 2)=	3,66	kNm	MF(5, 6)=	-3,66	kNm	MF(6, 5)=	-0,89	kNm
D5(3, 4)=	21,21	kN	D5(4, 3)=	-21,21	kN	D5(6, 7)=	21,21	kN	D5(7, 6)=	-21,21	kN
D6(3, 4)=	-8,20	kN	D6(4, 3)=	0,00	kN	D6(6, 7)=	17,81	kN	D6(7, 6)=	-29,77	kN
MF(3, 4)=	-3,66	kNm	MF(4, 3)=	6,12	kNm	MF(6, 7)=	0,89	kNm	MF(7, 6)=	0,00	kNm

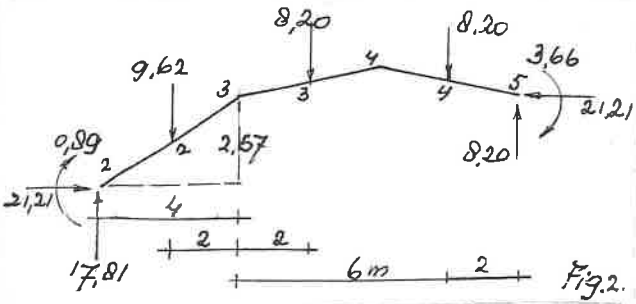


Fig.2.

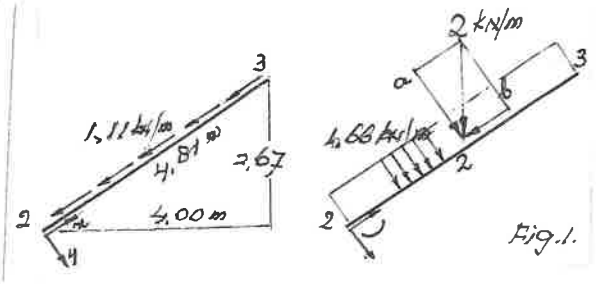
P= 1	MMAX=	6,43	kNm	X=	3,11	m	P= 2	MMAX=	0,89	kNm	X= 1,04 m
P= 3	MMAX=	-6,12	kNm	X=	4,10	m	P= 4	MMAX=	-6,12	kNm	X= 0,00 m
P= 5	MMAX=	3,69	kNm	X=	2,98	m	P= 6	MMAX=	6,43	kNm	X= 2,88 m
P= 1	ZMAX=	81,49	/EI	X=	5,92	m	P= 2	ZMAX=	84,84	/EI	X= 0,00 m
P= 3	ZMAX=	57,44	/EI	X=	0,00	m	P= 4	ZMAX=	57,44	/EI	X= 4,10 m
P= 5	ZMAX=	84,84	/EI	X=	4,81	m	P= 6	ZMAX=	81,49	/EI	X= 0,07 m

Example. EX1a

L9=24 m horizontal length, H99= 8 m height, V9=3, half length divided into V9=3 parts.
To type in the smallest text box TSTRINGPAR, on the right of L9=,H99=,V9=
24,8,3 Enter.
Next click on PAR1, the parabola is drawn, P9? below PAR1 becomes P9=6. Or click EX1a.
Click Cls, Show1 for the joint data and Show2 for the member data like shown on the left.
And click PAR1 to bring the parabola back.
NB (LE and RE are of no importance!!!

For PAR1 is given bending stiffness EII(P)=1 and strain stiffness EAA(P)=8*EI.
Suppose member own weight is OWP= 2 kN/m then to type in TSTRINGPAR OWP=2 Enter, is NQV(P) to be resolved into components
a is NQB(P) perpendicular to the member and
b is NQA(P) along the member. Next click Calculate, CalcT5M5N5MAX, DRAWT5M5N5ELCURVE.

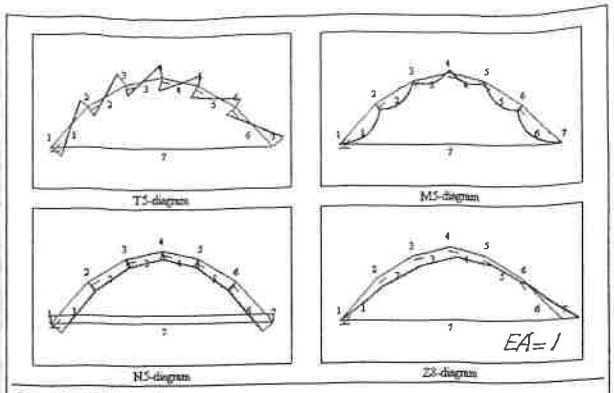
Fig.1.
member 2 L1= 4,81 m
Y1(2)-Y1(3)= 3,56-0,89= 2,67 m
X1(3)=X1(2)= 8,00-4,00= 4,00 m



a/4,00= 2/4,81 a= 1,66 kN/m
b/2,67= 2/4,81 b= 1,11 kN/m

NQB(2)= 1,66 kN/m, positive value, corresponding with the beam axis system ↻,
NQA(2)= -1,11 kN/m, negative value, corresponding with the member axis system ↓.
Click Show3 to get the components NQB(P) and NQA(P) of NQV(P).
With a click on Draw4F the four diagrams are drawn.
Clicking PFRES33 shows member end forces D5(,)and D6(,), NA(,) and DA(,), and the reactions and joint displacements, 'last click' with joint rotations.

Fig.2.
A part of the construction is drawn with forces and moments drawn with their real directions.
Member 2 with length 4,81 m times 2 kN/m is 9,62 kN. Etc. Distances follow from coordinates.
Σ hor.=0 ? yes
Σ vert.=0 ? 9,62+8,20+8,20-17,81-8,20=0,01 yes
Σ mom. w.r.t. joint 3=0 ?
17,81*4-21,21*2,67-9,62*2+8,20*2+8,20*6-8,20*8
+0,89 +3,66= 141,39-141,47= -0,08 ok
With Cls, MMAX and ZMAX maximum values are printed as shown on the left. Also symmetry.
P=1 MMAX=6,43 kNm X=3,11 m from joint 1, and
P=6 MMAX=6,43 kNm X=2,88 m from joint 6.
X=2,88 m is 5,98-3,11=2,87 m, is correct.



Beam end forces and moments.

D5(1, 2)= 20,64 kN	D5(2, 1)= -20,64 kN	D5(5, 6)= 20,64 kN	D5(6, 5)= -20,64 kN
D6(1, 2)= -29,77 kN	D6(2, 1)= 17,81 kN	D6(5, 6)= 8,20 kN	D6(6, 5)= -17,81 kN
MF(1, 2)= 0,00 kNm	MF(2, 1)= -3,41 kNm	MF(5, 6)= 0,36 kNm	MF(6, 5)= -3,41 kNm
D5(2, 3)= 20,64 kN	D5(3, 2)= -20,64 kN	D5(6, 7)= 20,64 kN	D5(7, 6)= -20,64 kN
D6(2, 3)= -17,81 kN	D6(3, 2)= 8,20 kN	D6(6, 7)= 17,81 kN	D6(7, 6)= -29,77 kN
MF(2, 3)= 3,41 kNm	MF(3, 2)= -0,36 kNm	MF(6, 7)= 3,41 kNm	MF(7, 6)= 0,00 kNm
D5(3, 4)= 20,64 kN	D5(4, 3)= -20,64 kN	D5(1, 7)= -20,64 kN	D5(7, 1)= 20,64 kN
D6(3, 4)= -8,20 kN	D6(4, 3)= 0,00 kN	D6(1, 7)= 0,00 kN	D6(7, 1)= 0,00 kN
MF(3, 4)= 0,36 kNm	MF(4, 3)= 1,60 kNm	MF(1, 7)= 0,00 kNm	MF(7, 1)= 0,00 kNm
D5(4, 5)= 20,64 kN	D5(5, 4)= -20,64 kN		
D6(4, 5)= 0,00 kN	D6(5, 4)= -8,20 kN		
MF(4, 5)= -1,60 kNm	MF(5, 4)= -0,36 kNm		

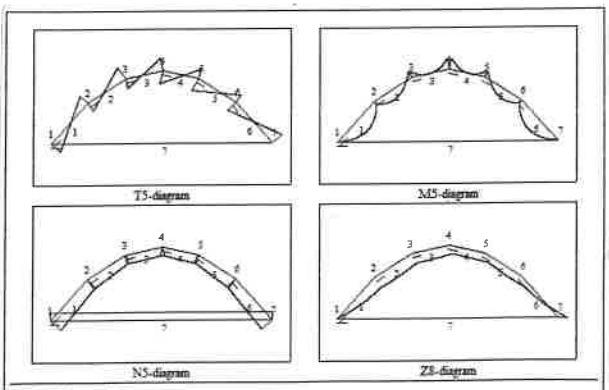
Support reactions.

RV(1)= 29,77 kN RH(1)= 0,00 kN RV(7)= 29,77 kN

Joint displacements.

UV(1)= 0,00 /EI	UH(1)= 0,00 /EI	UV(2)= 224,88 /EI	UH(2)= 214,68 /EI
UV(3)= 311,77 /EI	UH(3)= 254,99 /EI	UV(4)= 328,77 /EI	UH(4)= 247,73 /EI
UV(5)= 311,77 /EI	UH(5)= 240,47 /EI	UV(6)= 224,88 /EI	UH(6)= 280,78 /EI
UV(7)= 0,00 /EI	UH(7)= 495,46 /EI		

P	LL	HB	NL	NH	BA	LE	RE	EI	EA	Ll
1	1	2	0	0	1	0	0	1,0	8	5,98
2	2	3	0	0	2	0	0	1,0	8	4,81
3	3	4	0	0	3	0	0	1,0	8	4,10
4	4	5	0	0	4	0	0	1,0	8	4,10
5	5	6	0	0	5	0	0	1,0	8	4,81
6	6	7	0	0	6	0	0	1,0	8	5,98
7	1	7	1	1	1	1	1	1,0	5	24,00



Beam end forces and moments.

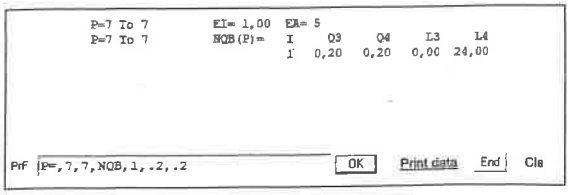
D5(1, 2)= 21,09 kN	D5(2, 1)= -21,09 kN	D5(5, 6)= 21,09 kN	D5(6, 5)= -21,09 kN
D6(1, 2)= -29,77 kN	D6(2, 1)= 17,81 kN	D6(5, 6)= 8,20 kN	D6(6, 5)= -17,81 kN
MF(1, 2)= 0,00 kNm	MF(2, 1)= -1,41 kNm	MF(5, 6)= -2,83 kNm	MF(6, 5)= -1,41 kNm
D5(2, 3)= 21,09 kN	D5(3, 2)= -21,09 kN	D5(6, 7)= 21,09 kN	D5(7, 6)= -21,09 kN
D6(2, 3)= -17,81 kN	D6(3, 2)= 8,20 kN	D6(6, 7)= 17,81 kN	D6(7, 6)= -29,77 kN
MF(2, 3)= 1,41 kNm	MF(3, 2)= 2,83 kNm	MF(6, 7)= 1,41 kNm	MF(7, 6)= 0,00 kNm
D5(3, 4)= 21,09 kN	D5(4, 3)= -21,09 kN	D5(1, 7)= -21,09 kN	D5(7, 1)= 21,09 kN
D6(3, 4)= -8,20 kN	D6(4, 3)= 0,00 kN	D6(1, 7)= 0,00 kN	D6(7, 1)= 0,00 kN
MF(3, 4)= -2,83 kNm	MF(4, 3)= 5,19 kNm	MF(1, 7)= 0,00 kNm	MF(7, 1)= 0,00 kNm
D5(4, 5)= 21,09 kN	D5(5, 4)= -21,09 kN		
D6(4, 5)= 0,00 kN	D6(5, 4)= -8,20 kN		
MF(4, 5)= -5,19 kNm	MF(5, 4)= 2,83 kNm		

Support reactions.

RV(1)= 29,77 kN RH(1)= 0,00 kN RV(7)= 29,77 kN

Joint displacements.

UV(1)= 0,00 /EI	UH(1)= 0,00 /EI	UV(2)= 103,41 /EI	UH(2)= 79,38 /EI
UV(3)= 107,80 /EI	UH(3)= 64,42 /EI	UV(4)= 96,45 /EI	UH(4)= 50,63 /EI
UV(5)= 107,80 /EI	UH(5)= 36,83 /EI	UV(6)= 103,41 /EI	UH(6)= 21,87 /EI
UV(7)= 0,00 /EI	UH(7)= 101,25 /EI		



Example. EX1b

Same example with L9=24 m, H99= 8 m, and V9=3.
In TSTRINGPAR 24,8,3 Enter, click PAR1, below PAR1 appears P9=6.
In TSTRINGPAR OWP=2 Enter.

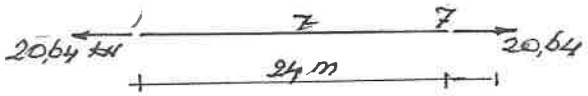
Next click on P9=6, becomes P9=7. Click PAR1, a horizontal member between the supports appears.
(If V9=4 then P9 becomes P9=2*4+1= 9, etc.)
Or, click EX1b.
Member 7 without own weight. Click Show3 to see it, no NQV(7).
Click Show2 to print the member data, now with member P=7.
(NL=1 NH=1 LE=1 RE=1 LE and RE no use)

All members EII(P)=1 and EAA(P)=8EI except member 7 with EII(7)=1 and EAA(7)=1EI.
Click Calculate and Draw4F for the 4 diagrams.
Click PFRES33, see the member end forces with

D5(1,7)= -20,64 kN and D5(7,1)= 20,64 kN.
Member ends are hinges, MF(1,7)=0, MF(7,1)=0.
No own weight, D6(1,7)= 0 and D6(7,1)=0.

And, not printed,
NA(1,7)= -20,64 kN and NA(7,1)= 20,64 kN.
Go on clicking and find,
Member 7, cable?, lengthens UH(7)= 495,46/EI.

Fig.3.



UH(7) is (20,64*24)/EA= 495,36/1EI= 495,36/EI

Next EAA(7)=1EI is changed into EAA(7)=5EI.
Click Form2 to go to the second form (...done when experimenting with programming...).

P=,P1,P2,'EI',EI,EA to type in TSTRING
P=,7,7,EI,1,5 Enter,
input 'EI' here?, yes, just like that....
Click Print data and see the input done.
Click somewhere an empty place to go back to the first form.
First click Again.
Click Calculate, Draw4F, Show3 and PFRES33 several times for the calculation results.

D5(1,7)= -21,09 kN and D5(7,1)= 21,09 kN,
NA(1,7)= -21,09 kN and NA(7,1)= 21,09 kN.
member 7 lengthens UH(7)= 101,25/EI.

UH(7) is (21,09*24)/EA= 495,36/5EI= 101,23/EI
The lengthening of member 7 is less than before and thus the deformation is different than before.
Suppose member 7 has own weight 0.2 kN/m
Go to Form2, double click TSTRING,
P=,P1,P2,NQB,I,Q3,Q4
I in Q33(P,I), here I=1 the first Q-load on member 7, to type in TSTRING of Form2

P=,7,7,NQB,1,.2,.2 Enter.
Print data shows the data put in.
See the four diagrams next page.

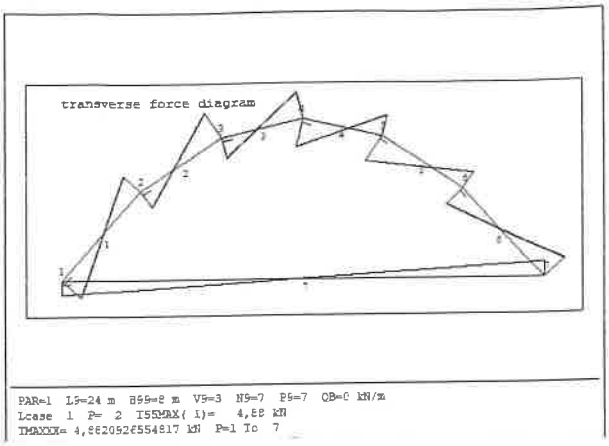
NQB(1)=1	I	Q3	Q4	L3	L4	NQA(1)=1	I	Q6	Q7	L6	L7
	1	1,34	1,34	0,00	5,98		1	-1,49	-1,49	0,00	5,98
NQB(2)=1	I	Q3	Q4	L3	L4	NQA(2)=1	I	Q6	Q7	L6	L7
	1	1,66	1,66	0,00	4,81		1	-1,11	-1,11	0,00	4,81
NQB(3)=1	I	Q3	Q4	L3	L4	NQA(3)=1	I	Q6	Q7	L6	L7
	1	1,95	1,95	0,00	4,10		1	-0,43	-0,43	0,00	4,10
NQB(4)=1	I	Q3	Q4	L3	L4	NQA(4)=1	I	Q6	Q7	L6	L7
	1	1,95	1,95	0,00	4,10		1	0,43	0,43	0,00	4,10
NQB(5)=1	I	Q3	Q4	L3	L4	NQA(5)=1	I	Q6	Q7	L6	L7
	1	1,66	1,66	0,00	4,81		1	1,11	1,11	0,00	4,81
NQB(6)=1	I	Q3	Q4	L3	L4	NQA(6)=1	I	Q6	Q7	L6	L7
	1	1,34	1,34	0,00	5,98		1	1,49	1,49	0,00	5,98
NQB(7)=1	I	Q3	Q4	L3	L4						
	1	0,20	0,20	0,00	24,00						

Click Show3 for the member load data like done before. Now the distributed load for member 7 is added shown on the left.

NQB(7)=1	I	Q3	Q4	L3	L4
	1	0,20	0,20	0,00	24,00

Click Again, Calculate and CalcT5M5N5MAX and successively DRAWT5M5N5ELCURVE to get the four diagrtams with maximum valuess.

The first is the 'transverse force diagram',
T55MAX(1)= 4,88 kN



PAR=1 L9=24 m B99=8 m V9=3 N9=7 P9=7 QB=0 kN/m
Lcase 1 P= 2 T55MAX(1)= 4,88 kN
TMAXXX= 4,882052655481? kN P=1 To 7

Fig.4.
member 2

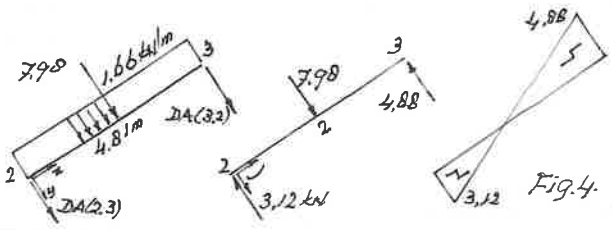


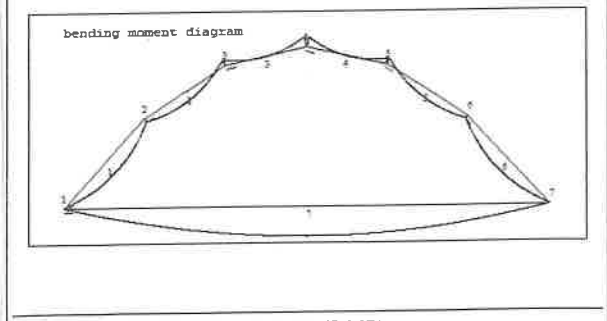
Fig.4.

2nd click on PFRES33 with DA(,), NA(,) MF(,).
DA(3,2)= -4,88 kN belonging to assumed direction of DA(3,2).
Because of symmetry, DA(5,6)= -4,88 kN.
NB DA(,) not the same direction assumption as for transverse force diagram.

Beam end forces and moments

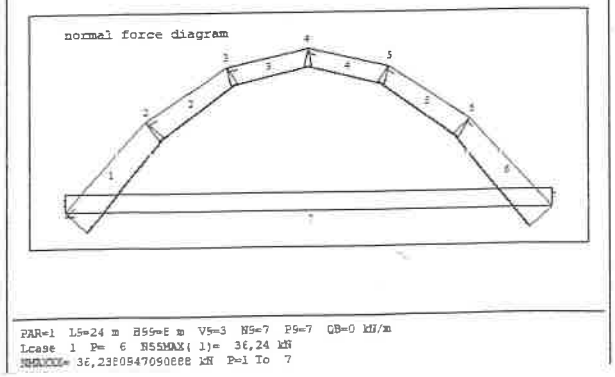
DA(1, 2)=	-4,24 kN	DA(2, 1)=	-3,76 kN	DA(5, 6)=	-4,88 kN	DA(6, 5)=	-3,12 kN
NA(1, 2)=	36,24 kN	NA(2, 1)=	-27,35 kN	NA(5, 6)=	25,10 kN	NA(6, 5)=	-27,43 kN
MF(1, 2)=	0,00 kNm	MF(2, 1)=	-1,41 kNm	MF(5, 6)=	-2,83 kNm	MF(6, 5)=	-1,41 kNm
DA(2, 3)=	-3,12 kN	DA(3, 2)=	-4,88 kN	DA(6, 7)=	-3,76 kN	DA(7, 6)=	-4,24 kN
NA(2, 3)=	27,43 kN	NA(3, 2)=	-22,10 kN	NA(6, 7)=	27,35 kN	NA(7, 6)=	-36,24 kN
MF(2, 3)=	1,41 kNm	MF(3, 2)=	2,83 kNm	MF(6, 7)=	1,41 kNm	MF(7, 6)=	0,00 kNm
DA(3, 4)=	-3,42 kN	DA(4, 3)=	-4,58 kN	DA(1, 7)=	-2,40 kN	DA(7, 1)=	-2,40 kN
NA(3, 4)=	22,37 kN	NA(4, 3)=	-20,59 kN	NA(1, 7)=	-21,09 kN	NA(7, 1)=	21,09 kN
MF(3, 4)=	-2,83 kNm	MF(4, 3)=	5,19 kNm	MF(1, 7)=	0,00 kNm	MF(7, 1)=	0,00 kNm
DA(4, 5)=	-4,58 kN	DA(5, 4)=	-3,42 kN				
NA(4, 5)=	20,59 kN	NA(5, 4)=	-22,37 kN				
MF(4, 5)=	-5,19 kNm	MF(5, 4)=	2,83 kNm				

Second click with bending moment diagram, M55MAX(1)= 14,4 kNm, member 7 with hinges at both ends, Q=.2 kN/m,
MMAX= (1/8)*(.2)*(24^2)= 14,4 kNm.
How the diagram 'looks like' depends on the maximum moment, compare with the preceding diagrams.



PAR=1 L9=24 m B99=8 m V9=3 N9=7 P9=7 QB=0 kN/m
Lcase 1 P= 7 M55MAX(1)= 14,40 kNm
MMAXXX= 14,39999 kNm P=1 To 7

Third click with normal force diagram, N55MAX(1)= 36,24 kN, member 6, with NA(7,6)= -36,24 kN, or NA(1,2), symmetry.



PAR=1 L9=24 m B99=8 m V9=3 N9=7 P9=7 QB=0 kN/m
Lcase 1 P= 6 N55MAX(1)= 36,24 kN
NMAXXX= 36,23809470908?? kN P=1 To 7

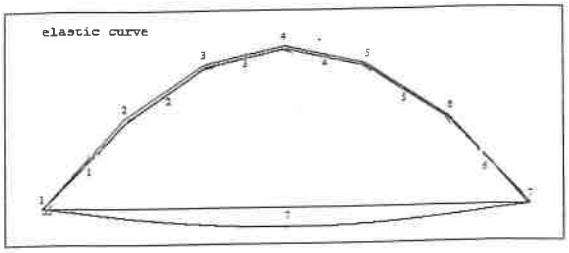
Fourth click with 'elastic curve'
Last click on PFRES33 gives joint rotations and member end slopes of member 7, 115,20/EI.
(.2)(24^3)/24EI= 115,2/EI.

Joint rotations

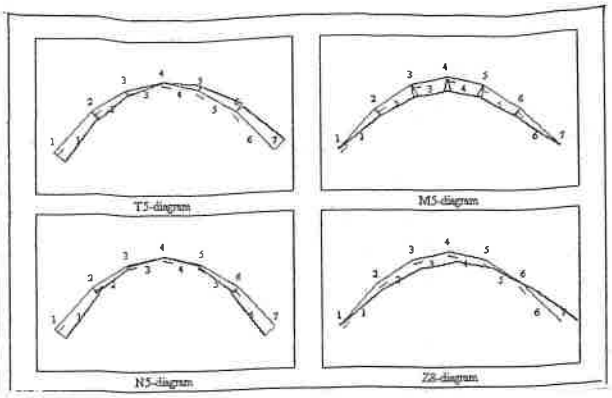
UR(1)=	34,76 /EI	UR(2)=	6,72 /EI	UR(3)=	-5,26 /EI	UR(4)=	0,00 /EI
UR(5)=	5,26 /EI	UR(6)=	-6,72 /EI	UR(7)=	-34,76 /EI		

Separately calculated slopes HE(,)

HE(1, 7)=	115,20 /EI	HE(7, 1)=	-115,20 /EI



PAR=1 L9=24 m B99=8 m V9=3 N9=7 P9=7 QB=0 kN/m
Lcase 1 P= 7 Z55MAX(1)= 864,00 /EI
ZMAXXX= 863,999220000085 /EI P=1 To 7



Beam end forces and moments.

DA(1, 2)=	-19,91 kN	DA(2, 1)=	11,91 kN	DA(4, 5)=	0,00 kN	DA(5, 4)=	-8,00 kN
NA(1, 2)=	22,13 kN	NA(2, 1)=	-13,24 kN	NA(4, 5)=	0,00 kN	NA(5, 4)=	-1,78 kN
MF(1, 2)=	0,00 kNm	MF(2, 1)=	-95,16 kNm	MF(4, 5)=	163,56 kNm	MF(5, 4)=	-147,17 kNm
DA(2, 3)=	-14,82 kN	DA(3, 2)=	6,82 kN	DA(5, 6)=	6,82 kN	DA(6, 5)=	-14,82 kN
NA(2, 3)=	9,88 kN	NA(3, 2)=	-4,55 kN	NA(5, 6)=	4,55 kN	NA(6, 5)=	-9,88 kN
MF(2, 3)=	95,16 kNm	MF(3, 2)=	-147,17 kNm	MF(5, 6)=	147,17 kNm	MF(6, 5)=	-95,16 kNm
DA(3, 4)=	-8,00 kN	DA(4, 3)=	0,00 kN	DA(6, 7)=	11,91 kN	DA(7, 6)=	-19,91 kN
NA(3, 4)=	1,78 kN	NA(4, 3)=	0,00 kN	NA(6, 7)=	13,24 kN	NA(7, 6)=	-22,13 kN
MF(3, 4)=	147,17 kNm	MF(4, 3)=	-163,56 kNm	MF(6, 7)=	95,16 kNm	MF(7, 6)=	0,00 kNm

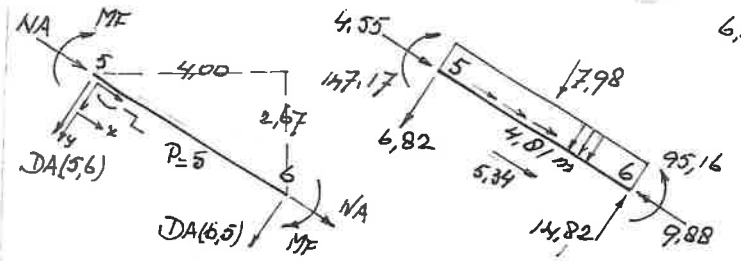


Fig.5.

Support reactions.

RV(1)= 29,77 kN	RH(1)= 0,00 kN	RV(7)= 29,77 kN	

Joint displacements.

UV(1)= 0,0 /EI	UH(1)= 0,0 /EI	UV(2)= 5798,9 /EI	UH(2)= 6423,5 /EI
UV(3)= 9671,6 /EI	UH(3)= 9000,1 /EI	UV(4)=10989,7 /EI	UH(4)= 9292,5 /EI
UV(5)= 9671,6 /EI	UH(5)= 9585,0 /EI	UV(6)= 5798,9 /EI	UH(6)=12161,6 /EI
UV(7)= 0,0 /EI	UH(7)=18585,0 /EI		

Joint rotations.

UR(1)= 1534,0 /EI	UR(2)= 1245,7 /EI	UR(3)= 647,8 /EI	UR(4)= 0,0 /EI
UR(5)= -647,8 /EI	UR(6)=-1245,7 /EI	UR(7)=-1554,0 /EI	

Ux(1, 2)=	0	Ux(2, 1)=	-13 /EI	Ux(2, 3)=	2126	Ux(3, 2)=	2124 /EI
Uy(1, 2)=	0	Uy(2, 1)=	8654 /EI	Uy(2, 3)=	8388	Uy(3, 2)=	13040 /EI
Ux(3, 4)=	6688	Ux(4, 3)=	6687 /EI	Ux(4, 5)=	11455	Ux(5, 4)=	11455 /EI
Uy(3, 4)=	11394	Uy(4, 3)=	12744 /EI	Uy(4, 5)=	6712	Uy(5, 4)=	7362 /EI
Ux(5, 6)=	13340	Ux(6, 5)=	13336 /EI	Ux(6, 7)=	12446	Ux(7, 6)=	12433 /EI
Uy(5, 6)=	2731	Uy(6, 5)=	-1921 /EI	Uy(6, 7)=	-5160	Uy(7, 6)=	-13814 /EI

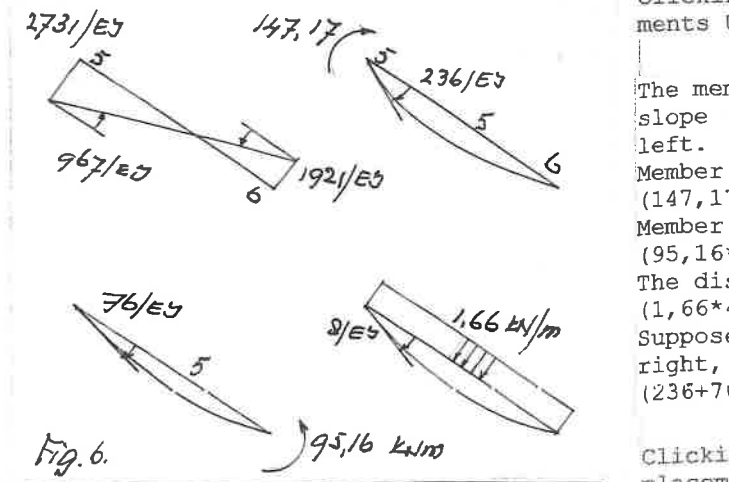


Fig. 6.

P= 1	ZMAX=	9219,9 /EI	X=	0,00 m	P= 2	ZMAX=	17030,6 /EI	X=	4,81 m
P= 3	ZMAX=	12743,8 /EI	X=	4,10 m	P= 4	ZMAX=	8712,2 /EI	X=	0,00 m
P= 5	ZMAX=	2730,5 /EI	X=	0,00 m	P= 6	ZMAX=	-13814,1 /EI	X=	5,98 m
P= 1	MMAX=	95,16 kNm	X=	5,98 m	P= 2	MMAX=	147,17 kNm	X=	4,81 m
P= 3	MMAX=	163,56 kNm	X=	4,10 m	P= 4	MMAX=	163,56 kNm	X=	0,00 m
P= 5	MMAX=	147,17 kNm	X=	0,00 m	P= 6	MMAX=	95,16 kNm	X=	0,00 m

Example. EX1a one more time.

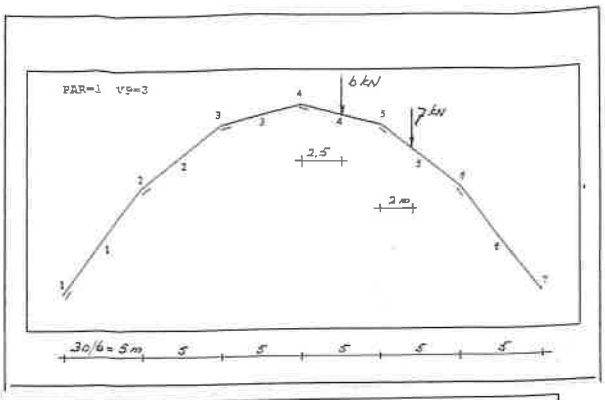
L9=24 m H99= 8 m V9=3
In TSTRINGPAR 24,8,3 Enter. And in TSTRINGPAR OWP=2 Enter, or click EX1a.
To make support 7 to move horizontally then type in the large text box TSTRING PH(7)=0 Enter. Click Calculate and Draw4F.
Clicking PFRES33 shows D5(,), D6(,), MF(,) or DA(,), NA(,), MF(,).
Fig.5.
member 5
With the assumptions made the member end forces and moments can be drawn with their real directions and values added.
Length L1)5)= 4,81 m, from Show2.
The components of the vertical distributed load of 2 kN/m are, click Show3,
NQB(5)= 1,66 kN/m and NQA(5)= 1,11 kN/m
1,66*4,81= 7,98 kN 1,11*4,81= 5,34 kN
Equilibrium?
7,98+6,82-14,82=-0,02 4,55+5,34-9,88=0,02 ok

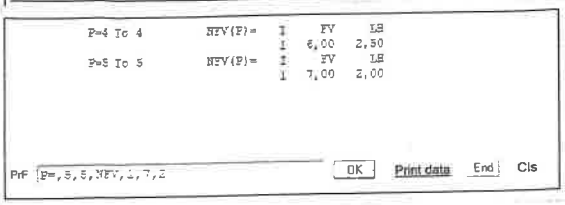
Both correct, and Σ mom. w.r.t. joint 6=0 ?
147,17-95,16-6,82*4,81-7,98*4,81/2=0,02 ok.
With PFRES33 reactions and displacements.
Joint 7 with UH(7)=18585/EI to the right, and joint 4 with UH(4)= 9293/EI to the right is half of UH(7).

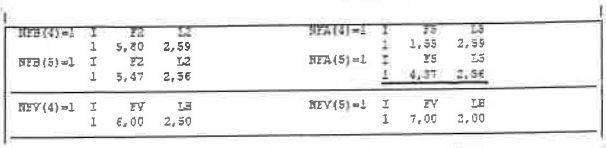
Fig.6.
Checking member end rotation, is joint rotation UR(5)= -648/EI, that's to the left.
Four separate cases drawn determine together UR(5), slope of member end 5 of member 5.
Clicking Ux and Uy prints member end displacements Ux(,) and Uy(,) shown on the left.

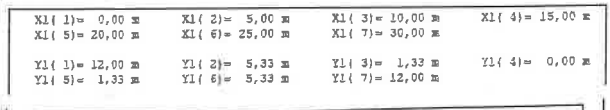
The member end displacements alone cause a slope (2731/EI+1921/EI)/4,81= 967/EI to the left.
Member end moment MF(5,6)=147,17 kNm causes (147,17*4,81)/3EI= 236/EI to the right.
Member end moment MF(6,5)=-95,16 kNm causes (95,16*4,81)/6EI= 76/EI to the right.
The disributed load of 1,66 kN/m causes (1,66*4,81^3)/24EI= 8/EI to the right.
Suppose the four slopes added is a slope to the right, then can be written,
(236+76+8-967)/EI=-647/EI is UR(5)=-648/EI, ok.

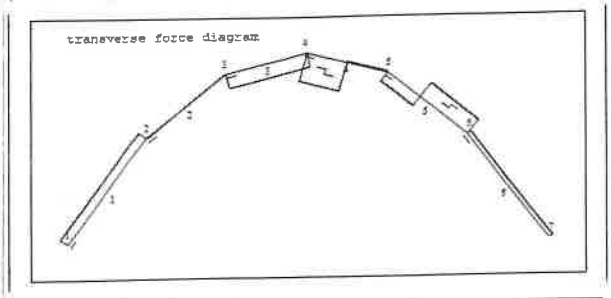
Clicking ZMAX and MMAX gives the maximun displacements and bending moments for each member.
Member 6 with ZMAX= -13814,1/EI...accuracy?...
at X= 5,98 m from member end 6, perpendicular to the member. L11(6)= 5,98 m.
This ZMAX is a component of UH(7)= 18585,0/EI.

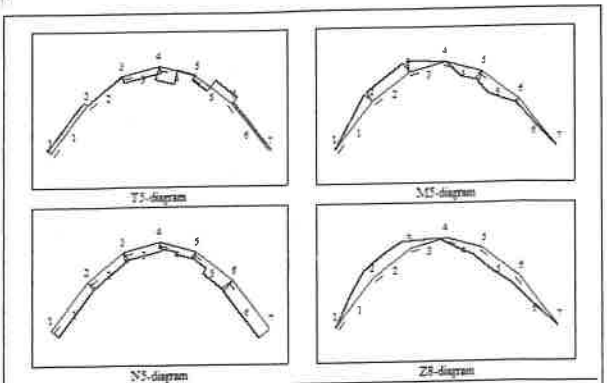












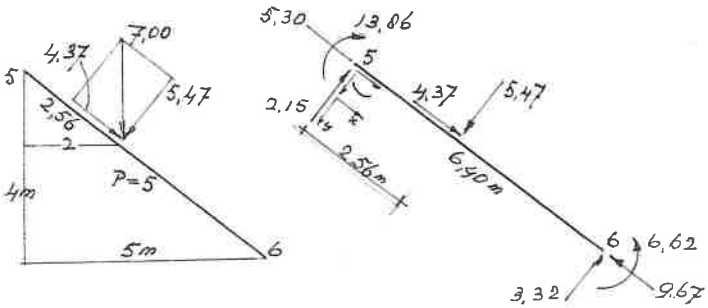
Example. Click AOAGAIN.

L9=30 m H99= 12 m V9=3 (V9=2 does not work)
In TSTRINGPAR 30,12,3 Enter, click PAR1!.
For all members given EI and 'ÉA'=8EI.
Click Coord for joint coordinates.

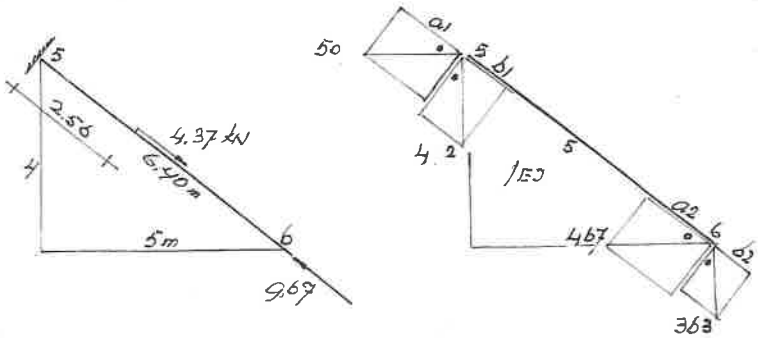
Suppose member 4 is loaded with a vertical member load of 6 kN and member 5 with 7 kN.
Click Form2 for input.

P=,P1,P2,NFV,I,FV,LH and type in its TSTRING
P=,4,4,NFV,1,6,2.5 Enter, click Print data,
double click in TSTRING and type
P=,5,5,NFV,1,7,2 Enter, click Print data.
Click Show3 to see the load data with the components perpendicular to and along the member.
Click
Calculate, CalcT5M5N5MAX and DRAWT5M5N5ELCURVE,
Click Draw4F for the four diagrams,
second click PFRES33 for DA(,), NA(,), MF(,),
third and fourth click for reactions and displacemnets.

member 5



Member end forces and moments are drawn with their real directions.

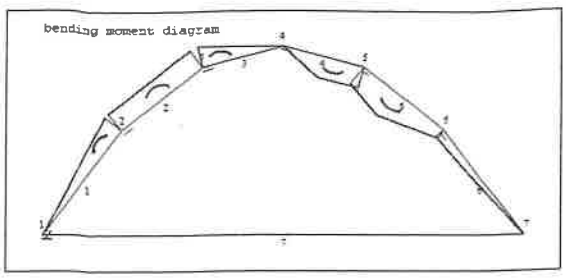


Lengthening? of member 5, with Hooke.

(4,37*2,56)/8EI-(9,67*6,40)/8EI=
(1,40-7,74)/EI= -6,34/EI, member 5 not longer as assumed but shorter.
Click Ux and Uy for the member end displacements, joint displacements, bottom left.

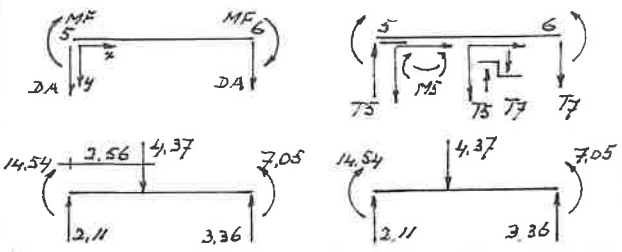
a1/506=(5/6,40)	a1=506*(5/6,40)=	395 /EI
b1/422=(4/6,40)	b1=422*(4/6,40)=	264 /EI
		131 /EI
a2/467=(5/6,40)	a2=467*(5/6,40)=	365 /EI
b2/363=(4/6,40)	b2=363*(4/6,40)=	227 /EI
		138 /EI

member 5 gets shorter,
b1+a2-a1-b2)= 264+365-395-227= 7,00 /EI
6,34 ≈ 7,00 ,5% ok



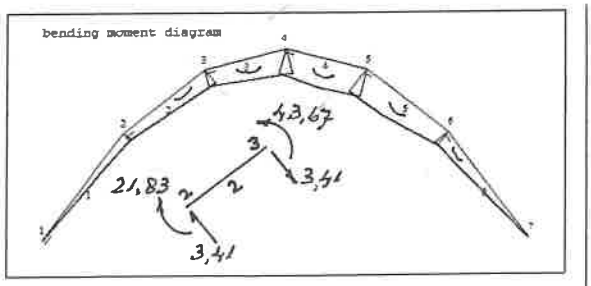
PAR=1 L9=30 m B99=12 m V9=3 N9=7 P9=7 QB= 0 kN/m
Lcase 1 P= 5 M55MAX(1)= 19,91 kNm
MMAXXX= 19,910569126638 kNm P=1 To 7 all members
QWB= 0 kN/m QWP= 0 kN/m QWV= 0 kN/m

P= 1	MMAX=	-14,29 kNm	X=	8,33 m	P= 2	MMAX=	-14,29 kNm	X=	0,00 m
P= 3	MMAX=	-14,13 kNm	X=	0,00 m	P= 4	MMAX=	15,01 kNm	X=	2,59 m
P= 5	MMAX=	19,91 kNm	X=	2,57 m	P= 6	MMAX=	7,04 kNm	X=	0,00 m
P= 7	MMAX=	0,00 kNm	X=	0,00 m					

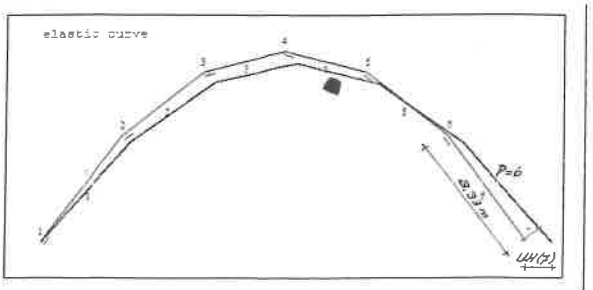


P=5 X= 0 m T5= 2,11 kN M5= 14,54 kNm
T7= 2,11 kN
P=5 X= 6,4 m T5= -3,36 kN M5= 7,05 kNm
T7= -3,36 kN
P=5 X= 2,56 m T5= 2,11 kN M5= 19,94 kNm
T7= 2,11 kN

PrF P=,5,X=,2,56 OK Print data End Cls



PAR=1 L9=30 m B99=12 m V9=3 N9=7 P9=6 QB= 0 kN/m
Lcase 1 P= 4 M55MAX(1)= 76,41 kNm
MMAXXX= 76,412504127175 kNm P=1 To 6 all members
QWB= 0 kN/m QWP= 0 kN/m QWV= 0 kN/m



UH(7)= 14032/EI Z55MAX= 11225/EI

PAR=1 L9=30 m B99=12 m V9=3 N9=7 P9=6 QB= 0 kN/m
Lcase 1 P= 6 Z55MAX(1)=11225,50 /EI
ZMAXXX= 11225,499595256132520795216641597 /EI P=1 To 6 all members
QWB= 0 kN/m QWP= 0 kN/m QWV= 0 kN/m

Going on with the same example.
A horizontal member between support 1 and 7 is added, just click P9=6 below PAR1 and P9=7 appears.
Click Again to make all displacements UV(I), UH(I) and UR(I) zero. Next click Calculate, CalcT5M5N5MAX, DRAWT5M5N5ELCURVE to get the diagrams, the bending moment diagram shown on the left. The largest bending moment, P= 5 M55MAX(1)= 19,91 kNm
(Lcase 1, there is here only one load case.)

Click MMAX to get the largest bending moment for each member; P=5 MMAX= 19,91 kNm, 2,54 m from beam end 5. This value belongs to the beam axis system ↷.

With clicking PFRES33 one can find for P=5 with L=5 and H=6 the member end moments
MF(5,6)= 14,54 kNm at member end 5, X=0, and
MF(6,5)= -7,04 kNm at member end 6.

Click Form2, and with P=,P,X=,L2 in TSTRING, see the Form2 print shown on the left.
P=5,0,X=,0 Enter T5= 2,11 kN M5= 14,54 kNm
P=,5,X=,6.4 Enter T5=-3,36 kN M5= 7,05 kNm
Now at 2,56 m from member end 5.
P=,5,X=,2.56 Enter T5= 2,11 kN M5= 19,94 kNm

If 2,56 m was exactly! at the place of the member load force of 4,37 kN then values like here below were found, left of 4,37 kN T5= 2,11 kN and rigth 4,37 kN T7= -3,36 kN.
See the member end forces
DA(5,6)= -2,11 kN and DA(6,5)= -3,36 kN.

The two figures show the assumptions made for member end forces and moments DA(,) and MF(,) and for bending moments M5 and shear forces T5 and T7. Positive answer, direction as assumed, negative answer, direction not as assumed but opposite directed.

Going on with the same example.
Now the horizontal member 7 will be removed, click P9=7, becomes P9=6.
Hinge support 7 will become a horizontal roller support, type in large TSTRING PH(7)=0 Enter.

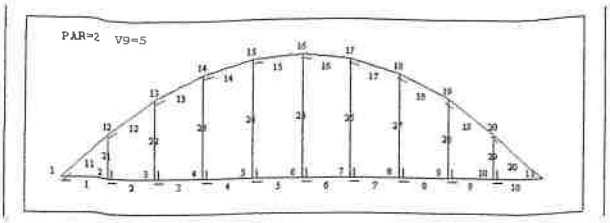
Click Again, Calculate, CalcT5M5N5MAX and DRAWT%M%N%ELCURVE, the second click gives the bending moment diagram shown on the left.

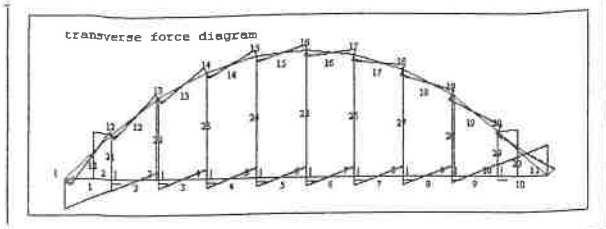
With PFRES33 to be found, for member P=2,
DA(2,3)= -3,41 kN DA(3,2)= 3,41 kN
MF(2,3)= 21,83 kNm MF(3,2)= -43,67 kNm

Fourth click on DRAWT5M5N5ELCURVE gives the deformation diagram. Z88MAX(1)= 11225/EI displacement at member end 7 perpendicular to the member, also to find with Cls, ZMAX, gives
P=6 ZMAX= -11225/EI X=8,33

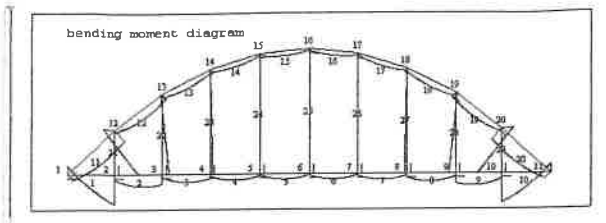
P= 1	ZMAX=	5393,5 /EI	X=	8,33 m	P= 2	ZMAX=	5383,0 /EI	X=	8,40 m
P= 3	ZMAX=	8402,5 /EI	X=	5,17 m	P= 4	ZMAX=	8041,5 /EI	X=	1,39 m
P= 5	ZMAX=	-2323,5 /EI	X=	6,40 m	P= 6	ZMAX=	-11225,5 /EI	X=	8,33 m

Click PFRES33.... gives UH(7)= 14032/EI.
Clicking JDS=No to JDS=Yes, then UV(I) and UH(I) are draw, try and see.

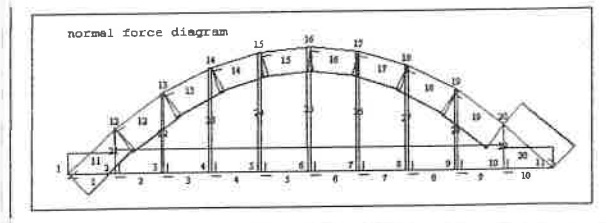




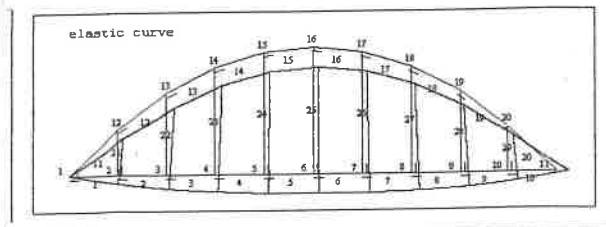
PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=0 kN/m
Lcase 1 P= 1 T5MAX(1)= 21,76 kN
TMAXXX= 21,7627629070202 kN P=1 To 29



PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=0 kN/m
Lcase 1 P= 1 M5MAX(1)= 31,94 kNm
MMAXXX= 31,9404590523745 kNm P=1 To 29



PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=0 kN/m
Lcase 1 P= 12 N5MAX(1)= 141,36 kN
NMAXXX= 141,355418218592 kN P=1 To 29



PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=0 kN/m
Lcase 1 P= 14 Z5MAX(1)= 670,32 /EI
ZMAXXX= 670,315287956249 /EI P=1 To 29

Example. EX2a Click AOAGAIN.

L9=27,56 m, H99= 7,24 m m, and V9=5.
In TSTRINGPAR
27.56,7.24,5 Enter, click PAR2 and the first picture on the left appears.

OWH=5 kN/m for the horizontal members,
OWP=3 kN/m for the parabola members and
OWV=.2 kN/m for the vertical members.
For all members bending stiffness 1EI and strain siffness 8EI....arbitrary values...
To type in small text box TSTRINGPAR

OWH=5 Enter, OWP=3 Enter, OWV=.2 Enter.

Click Calculate, CalcT5M5N5MAX and CalcT5M5N5ELCURVE. With four successive clicks the four diagrams appear on the screen with for each case a maximum value, each time largest of all 1 to 29 members.
(QB=0, thus now only one load case.)

T5 M5 N5
Clicking three times on T5 gives each time the transverse force diagram for one of the three groups of members with a maximum value for that group. Not shown here but results here below. All absolute values.

Transverse force T5.

P= 1	TMAXXX= 21,76 kN	P= 1 to 29	
P= 1	TMAXXX= 21,76 kN	P= 1 to 10	1st click
P=11	TMAXXX= 6,08 kN	P=11 to 20	2nd click
P=29	TMAXXX= 14,44 kN	P=21 to 29	3rd click

Bending moment M5.

P= 1	MMAXXX= 31,94 kNm	P= 1 to 29	
P= 1	MMAXXX= 31,94 kNm	P= 1 to 10	1st
P=11	MMAXXX= 17,53 kNm	P=11 to 20	2nd
P=29	MMAXXX= 25,70 kNm	P=21 to 29	3rd

Normal force N5.

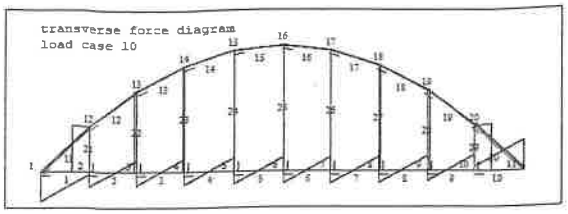
P=12	NMAXXX= 141,36 kN	P= 1 to 29	
P= 5	NMAXXX= 113,66 kN	P= 1 to 10	1st
P=12	NMAXXX= 141,36 kN	P=11 to 20	2nd
P=25	NMAXXX= 15,30 kN	P=21 to 29	3rd

Click Cls and MMAX to get the largest bending moment MMAX for all 29 members printed. The maxima arise two times because of symmetry. Member 1 and 10, member 11 and 20, member 21 and 29.

Click Cls and ZMAX to see the largest displacements perpendicular to the member.
Only same ZMAX for member 1 and 10 because of symmetry, but no symmetry of the whole deformation, support 7 moves horizontally.

P= 1	MMAX=	31,94 kNm	X=	2,76 m	P= 2	MMAX=	13,60 kNm	X=	1,72 m
P= 3	MMAX=	9,07 kNm	X=	1,45 m	P= 4	MMAX=	7,13 kNm	X=	1,38 m
P= 5	MMAX=	6,32 kNm	X=	1,38 m	P= 6	MMAX=	6,32 kNm	X=	1,39 m
P= 7	MMAX=	7,13 kNm	X=	1,39 m	P= 8	MMAX=	9,07 kNm	X=	1,32 m
P= 9	MMAX=	13,60 kNm	X=	1,04 m	P=10	MMAX=	31,94 kNm	X=	0,00 m
P=11	MMAX=	17,53 kNm	X=	2,79 m	P=12	MMAX=	8,65 kNm	X=	1,37 m
P=13	MMAX=	6,33 kNm	X=	1,44 m	P=14	MMAX=	5,06 kNm	X=	1,33 m
P=15	MMAX=	4,47 kNm	X=	1,35 m	P=16	MMAX=	4,47 kNm	X=	1,44 m
P=17	MMAX=	5,06 kNm	X=	1,57 m	P=18	MMAX=	6,33 kNm	X=	1,68 m
P=19	MMAX=	8,65 kNm	X=	1,56 m	P=20	MMAX=	17,53 kNm	X=	1,01 m
P=21	MMAX=	25,70 kNm	X=	0,00 m	P=22	MMAX=	7,02 kNm	X=	0,00 m
P=23	MMAX=	2,35 kNm	X=	0,00 m	P=24	MMAX=	0,74 kNm	X=	0,00 m
P=25	MMAX=	0,00 kNm	X=	0,00 m	P=26	MMAX=	-0,74 kNm	X=	0,00 m
P=27	MMAX=	-2,35 kNm	X=	0,00 m	P=28	MMAX=	-7,02 kNm	X=	0,00 m
P=29	MMAX=	-25,70 kNm	X=	0,00 m					

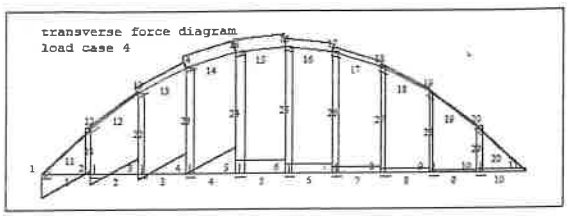
P= 1	ZMAX=	305,54 /EI	X=	2,76 m	P= 2	ZMAX=	438,05 /EI	X=	2,76 m
P= 3	ZMAX=	595,19 /EI	X=	2,76 m	P= 4	ZMAX=	652,25 /EI	X=	2,76 m
P= 5	ZMAX=	670,19 /EI	X=	2,76 m	P= 6	ZMAX=	670,19 /EI	X=	0,00 m
P= 7	ZMAX=	652,25 /EI	X=	0,00 m	P= 8	ZMAX=	595,19 /EI	X=	0,00 m
P= 9	ZMAX=	438,05 /EI	X=	0,00 m	P=10	ZMAX=	305,54 /EI	X=	0,00 m
P=11	ZMAX=	359,81 /EI	X=	3,79 m	P=12	ZMAX=	535,39 /EI	X=	3,42 m
P=13	ZMAX=	635,85 /EI	X=	3,11 m	P=14	ZMAX=	670,32 /EI	X=	2,89 m
P=15	ZMAX=	673,14 /EI	X=	2,77 m	P=16	ZMAX=	633,65 /EI	X=	0,00 m
P=17	ZMAX=	564,71 /EI	X=	0,00 m	P=18	ZMAX=	460,11 /EI	X=	0,00 m
P=19	ZMAX=	315,01 /EI	X=	0,00 m	P=20	ZMAX=	-259,62 /EI	X=	3,79 m
P=21	ZMAX=	200,57 /EI	X=	2,61 m	P=22	ZMAX=	256,11 /EI	X=	4,63 m
P=23	ZMAX=	254,57 /EI	X=	6,28 m	P=24	ZMAX=	226,90 /EI	X=	6,95 m
P=25	ZMAX=	188,92 /EI	X=	6,95 m	P=26	ZMAX=	228,08 /EI	X=	0,00 m
P=27	ZMAX=	267,21 /EI	X=	0,00 m	P=28	ZMAX=	306,20 /EI	X=	0,00 m
P=29	ZMAX=	344,51 /EI	X=	0,00 m					



PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=7 kN/m

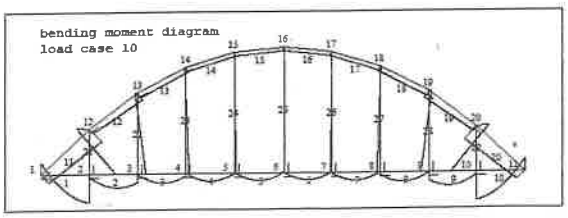
Lcase 1	P= 1	T55MAX(1)=	11,56 kN	Lcase 2	P= 1	T55MAX(2)=	14,03 kN
Lcase 3	P= 3	T55MAX(3)=	16,75 kN	Lcase 4	P= 4	T55MAX(4)=	18,56 kN
Lcase 5	P= 5	T55MAX(5)=	19,28 kN	Lcase 6	P= 1	T55MAX(6)=	19,99 kN
Lcase 7	P= 1	T55MAX(7)=	20,82 kN	Lcase 8	P= 1	T55MAX(8)=	21,42 kN
Lcase 9	P= 1	T55MAX(9)=	21,79 kN	Lcase 10	P= 1	T55MAX(10)=	21,90 kN

TMAXXX= 21,89794321345938 kN P=1 To 29



Beam end forces and moments.

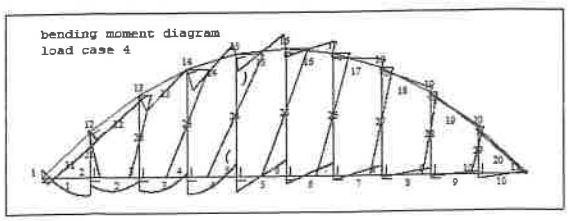
D5(1, 2)=	-45,57 kN	D5(2, 1)=	45,57 kN	D5(8, 9)=	-20,37 kN	D5(9, 8)=	20,37 kN
D6(1, 2)=	-17,59 kN	D6(2, 1)=	-1,70 kN	D6(8, 9)=	2,49 kN	D6(9, 8)=	-2,49 kN
MF(1, 2)=	-7,02 kNm	MF(2, 1)=	-14,87 kNm	MF(8, 9)=	2,03 kNm	MF(9, 8)=	4,84 kNm
D5(2, 3)=	-49,07 kN	D5(3, 2)=	49,07 kN	D5(9,10)=	-17,71 kN	D5(10, 9)=	17,71 kN
D6(2, 3)=	-8,24 kN	D6(3, 2)=	-11,06 kN	D6(9,10)=	1,34 kN	D6(10, 9)=	-1,34 kN
MF(2, 3)=	6,81 kNm	MF(3, 2)=	-2,92 kNm	MF(9,10)=	1,78 kNm	MF(10, 9)=	1,93 kNm



PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=7 kN/m

Lcase 1	P= 1	M55MAX(1)=	5,92 kNm	Lcase 2	P= 22	M55MAX(2)=	12,55 kNm
Lcase 3	P= 23	M55MAX(3)=	19,03 kNm	Lcase 4	P= 24	M55MAX(4)=	22,97 kNm
Lcase 5	P= 25	M55MAX(5)=	24,54 kNm	Lcase 6	P= 26	M55MAX(6)=	23,95 kNm
Lcase 7	P= 1	M55MAX(7)=	21,71 kNm	Lcase 8	P= 1	M55MAX(8)=	22,97 kNm
Lcase 9	P= 29	M55MAX(9)=	25,06 kNm	Lcase 10	P= 1	M55MAX(10)=	23,98 kNm

MMAXXX= 25,05772104244467 kNm P=1 To 29



Beam end forces and moments.

D5(1, 2)=	-45,57 kN	D5(2, 1)=	45,57 kN	D5(8, 9)=	-20,37 kN	D5(9, 8)=	20,37 kN
D6(1, 2)=	-17,59 kN	D6(2, 1)=	-1,70 kN	D6(8, 9)=	2,49 kN	D6(9, 8)=	-2,49 kN
MF(1, 2)=	-7,02 kNm	MF(2, 1)=	-14,87 kNm	MF(8, 9)=	2,03 kNm	MF(9, 8)=	4,84 kNm
D5(2, 3)=	-49,07 kN	D5(3, 2)=	49,07 kN	D5(9,10)=	-17,71 kN	D5(10, 9)=	17,71 kN
D6(2, 3)=	-8,24 kN	D6(3, 2)=	-11,06 kN	D6(9,10)=	1,34 kN	D6(10, 9)=	-1,34 kN
MF(2, 3)=	6,81 kNm	MF(3, 2)=	-2,92 kNm	MF(9,10)=	1,78 kNm	MF(10, 9)=	1,93 kNm

Example.

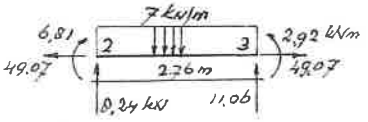
L9=27,56 m, H99= 7,24 m, V9=5.
In TSTRINGPAR 27.56,7.24,5 Enter, click PAR2 for the picture on the left.
Or click EX2a and New Loads, means no loads.
QB=7 kN/m, the verticakl distributed load for the horizontal members. Therefore to type in the little text box TSTRINGPAR QB=7 Enter.

Load cases.
1st case QB on member 1,
2nd case QB on member 1 and 2,
3rd case QB on member 1, 2 and 3. Etc.

Click Calculate and then CalcT5M5N5MAX, to carry out calculations for all load cases 1 to 10. On the right of it has become clearly visible T5?M5?N5?ELCURVE? to click on, will be done later.
Click DRAWT5M5N5ELCURVE to get the transverse force diagram for Load case 10.
Below appear the largest transverse forces T55MAX() for all load cases, and the largest of all, TMAXXX= 21,90 kN is T55MAX(10)= 21,90 kN.

Now click T5?M5?N5?ELCURVE?, appears **T5** to replace that long text, on the right of it Load case 0, click it to Load case 1 and at same time the diagram is changed.
Click to Load case **4**, the new transverse force diagram is drawn, at same time the necessary calculations are carried out.
The diagram shows clearly that the first four members are loaded.
Click PFRES33 for D5(,), D6(,) and MF(,) with values belonging to this case 4.

Fig.7.
member 2



D5(2,3)= -49,07 kN
D6(2,3)= -8,24 kN
MF(2,3)= 6,81 kNm

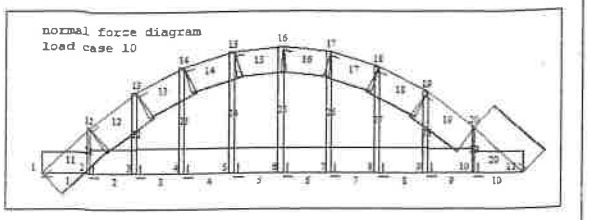
D5(3,2)= 49,07 kN
D6(3,2)= -11,06 kN
MF(3,2)= -2,92 kNm

$\sum$ hor.= 0 yes 2,76*7=19,32 kN
$\sum$ vert.= 0 19,32-8,24-11,06= 0,02 ok
$\sum$ mom. w.r.t. end 2= 0
19,32*(2,76/2)+6,81-2,92-11,06*(2,76)= 0,02 ok

Click Reset and DRAWT5M5N5ELCURVE to get back case 10 with diagram but still Load case 4 to go on with case 5, 6 etc. if wanted.

Click the underlined **T5** to **M5** and a 'clean' diagram appears (not shown here) with the calculation results for all 10 load cases. Load case 4 has become Load case 0.
Click DRAWT5M5N5ELCURVE for the bending moment diagram of case 10

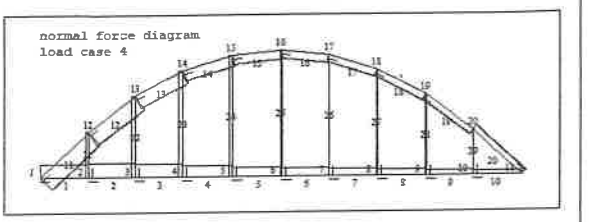
Next click Load case 0 to Load case 4. With each click the corresponding bending moment diagram appears, for Load case 4 shown on the left. Click PFRES33 for D5(,) D6(,) and MF(,).



PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=7 kN/m

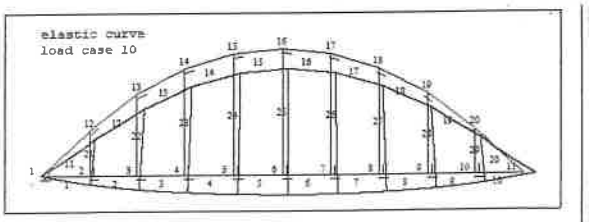
Lcase 1	P= 11	N55MAX(1)=	10,51 kN	Lcase 2	P= 11	N55MAX(2)=	29,81 kN
Lcase 3	P= 11	N55MAX(3)=	47,75 kN	Lcase 4	P= 11	N55MAX(4)=	63,44 kN
Lcase 5	P= 11	N55MAX(5)=	76,76 kN	Lcase 6	P= 12	N55MAX(6)=	87,98 kN
Lcase 7	P= 12	N55MAX(7)=	97,87 kN	Lcase 8	P= 12	N55MAX(8)=	104,94 kN
Lcase 9	P= 12	N55MAX(9)=	109,18 kN	Lcase 10	P= 12	N55MAX(10)=	110,60 kN

MMAXXX= 110,59728595613 kN P=1 To 29



Beam end forces and moments.

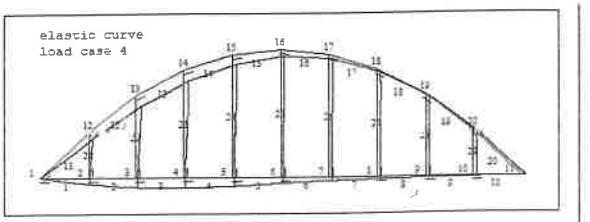
D5(1, 2)=	-45,57 kN	D5(2, 1)=	45,57 kN	D5(8, 9)=	-20,37 kN	D5(9, 8)=	20,37 kN
D6(1, 2)=	-17,59 kN	D6(2, 1)=	-1,70 kN	D6(8, 9)=	2,49 kN	D6(9, 8)=	-2,49 kN
MF(1, 2)=	-7,02 kNm	MF(2, 1)=	-14,87 kNm	MF(8, 9)=	2,03 kNm	MF(9, 8)=	4,84 kNm
D5(2, 3)=	-49,07 kN	D5(3, 2)=	49,07 kN	D5(9,10)=	-17,71 kN	D5(10, 9)=	17,71 kN
D6(2, 3)=	-8,24 kN	D6(3, 2)=	-11,06 kN	D6(9,10)=	1,34 kN	D6(10, 9)=	-1,34 kN
MF(2, 3)=	6,81 kNm	MF(3, 2)=	-2,92 kNm	MF(9,10)=	1,78 kNm	MF(10, 9)=	1,93 kNm



PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=7 kN/m

Lcase 1	P= 12	Z55MAX(1)=	34,99 /EI	Lcase 2	P= 13	Z55MAX(2)=	118,38 /EI
Lcase 3	P= 13	Z55MAX(3)=	221,44 /EI	Lcase 4	P= 13	Z55MAX(4)=	313,54 /EI
Lcase 5	P= 13	Z55MAX(5)=	390,94 /EI	Lcase 6	P= 14	Z55MAX(6)=	444,11 /EI
Lcase 7	P= 14	Z55MAX(7)=	486,42 /EI	Lcase 8	P= 14	Z55MAX(8)=	517,71 /EI
Lcase 9	P= 14	Z55MAX(9)=	536,89 /EI	Lcase 10	P= 6	Z55MAX(10)=	545,37 /EI

ZMAXXX= 1222,70095992424 /EI P=1 To 29



Beam end forces and moments.

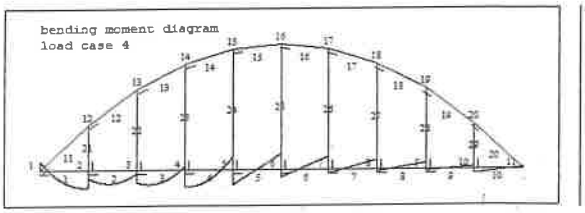
D5(1, 2)=	-45,57 kN	D5(2, 1)=	45,57 kN	D5(8, 9)=	-20,37 kN	D5(9, 8)=	20,37 kN
D6(1, 2)=	-17,59 kN	D6(2, 1)=	-1,70 kN	D6(8, 9)=	2,49 kN	D6(9, 8)=	-2,49 kN
MF(1, 2)=	-7,02 kNm	MF(2, 1)=	-14,87 kNm	MF(8, 9)=	2,03 kNm	MF(9, 8)=	4,84 kNm
D5(2, 3)=	-49,07 kN	D5(3, 2)=	49,07 kN	D5(9,10)=	-17,71 kN	D5(10, 9)=	17,71 kN
D6(2, 3)=	-8,24 kN	D6(3, 2)=	-11,06 kN	D6(9,10)=	1,34 kN	D6(10, 9)=	-1,34 kN
MF(2, 3)=	6,81 kNm	MF(3, 2)=	-2,92 kNm	MF(9,10)=	1,78 kNm	MF(10, 9)=	1,93 kNm

Going to normal force diagrams.
(Only QB=7 kN/m, 1EI an EA=8EI.)
Click Reset and DRAWT5M5N5ELCURVE to get back case 10 with bending moment diagram but still Load case 4 to go on with case 5, 6 etc. if wanted.
Click the underlined **M5** to **N5** and a 'clean' diagram appears with the calculation results for all 10 load cases, and Load case 4 has become Load case 0. Click DRAWT5M5N5ELCURVE for the normal force diagram of case 10.

Next click Load case 0 to Load case 4. With each click the corresponding normal force diagram appears, for Load case 4 shown on the left.
Click PFRES33 for D5(,) D6(,) and MF(,).
Since it is still Load case 4 like before still the same values, ofcourse, of member end forces and moments. See fig.7.
Click Reset and DRAWT5M5N5ELCURVE.

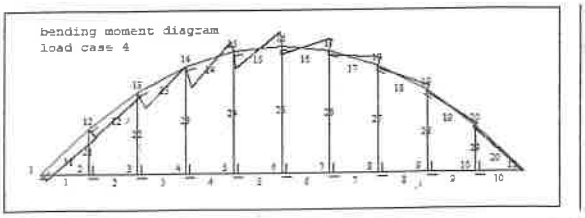
Next the deformation diagram.
Click the underlined **N5** to ELCURVE and DRAWT5M5N5ELCURVE for the deformation diagram of Load case 10. Click Load case 0 to Load case 4. PFRES33 gives again same results.

Going back to Load case 4 with **M5** .
See T5 M5 N5 and click M5 three times to get the bending moment diagrams belonging to the three groups of members, shown here below.



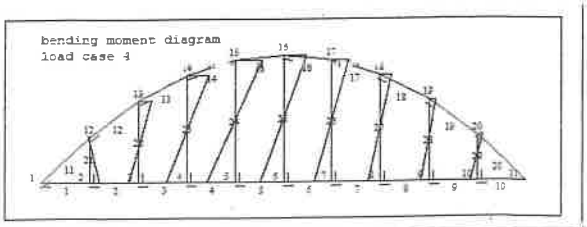
Lcase 1	P= 1	M55MAX(1)=	5,92 kNm	Lcase 2	P= 2	M55MAX(2)=	10,77 kNm
Lcase 3	P= 3	M55MAX(3)=	13,42 kNm	Lcase 4	P= 1	M55MAX(4)=	15,08 kNm
Lcase 5	P= 1	M55MAX(5)=	17,68 kNm	Lcase 6	P= 1	M55MAX(6)=	19,94 kNm
Lcase 7	P= 1	M55MAX(7)=	21,71 kNm	Lcase 8	P= 1	M55MAX(8)=	22,97 kNm
Lcase 9	P= 1	M55MAX(9)=	23,73 kNm	Lcase 10	P= 1	M55MAX(10)=	23,58 kNm

MMAXXX= 23,983532831968 3 kNm P=1 To 10



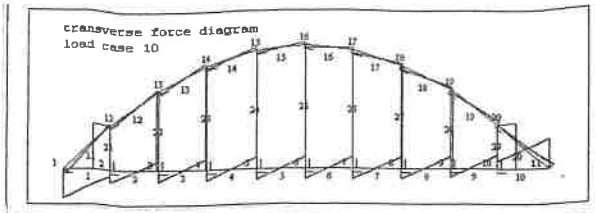
Lcase 1	P= 12	M55MAX(1)=	4,71 kNm	Lcase 2	P= 12	M55MAX(2)=	10,26 kNm
Lcase 3	P= 13	M55MAX(3)=	15,31 kNm	Lcase 4	P= 14	M55MAX(4)=	17,47 kNm
Lcase 5	P= 15	M55MAX(5)=	17,25 kNm	Lcase 6	P= 16	M55MAX(6)=	15,26 kNm
Lcase 7	P= 11	M55MAX(7)=	13,70 kNm	Lcase 8	P= 11	M55MAX(8)=	14,39 kNm
Lcase 9	P= 11	M55MAX(9)=	14,81 kNm	Lcase 10	P= 11	M55MAX(10)=	14,95 kNm

MMAXXX= 17,4682977793889 kNm P=11 To 20



Lcase 1	P= 22	M55MAX(1)=	4,12 kNm	Lcase 2	P= 22	M55MAX(2)=	12,55 kNm
Lcase 3	P= 23	M55MAX(3)=	19,03 kNm	Lcase 4	P= 24	M55MAX(4)=	22,97 kNm
Lcase 5	P= 25	M55MAX(5)=	24,54 kNm	Lcase 6	P= 26	M55MAX(6)=	23,95 kNm
Lcase 7	P= 27	M55MAX(7)=	21,60 kNm	Lcase 8	P= 29	M55MAX(8)=	22,61 kNm
Lcase 9	P= 29	M55MAX(9)=	25,06 kNm	Lcase 10	P= 21	M55MAX(10)=	21,43 kNm

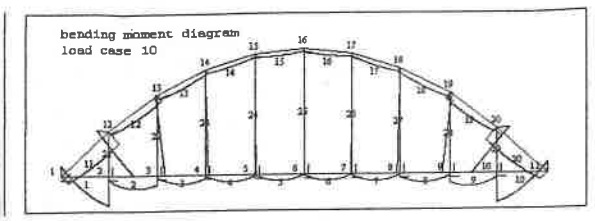
MMAXXX= 25,0577210424447 kNm P=21 To 29



PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=7 kN/m

Lcase	1	P=	1	T55MAX(1)=	33,33 kN	Lcase	2	P=	1	T55MAX(2)=	35,86 kN
Lcase	3	P=	1	T55MAX(3)=	37,75 kN	Lcase	4	P=	1	T55MAX(4)=	39,35 kN
Lcase	5	P=	1	T55MAX(5)=	40,67 kN	Lcase	6	P=	1	T55MAX(6)=	41,75 kN
Lcase	7	P=	1	T55MAX(7)=	42,59 kN	Lcase	8	P=	1	T55MAX(8)=	43,18 kN
Lcase	9	P=	1	T55MAX(9)=	43,54 kN	Lcase	10	P=	1	T55MAX(10)=	43,66 kN

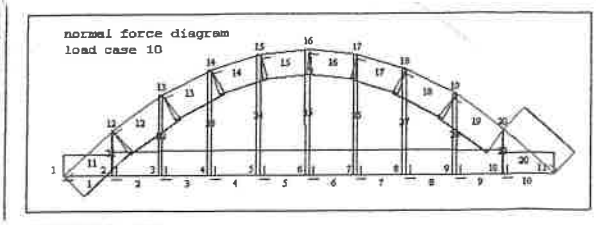
TMAXXX= 43,6607061204791 kN P=1 To 29



PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=7 kN/m

Lcase	1	P=	1	M55MAX(1)=	33,59 kNm	Lcase	2	P=	1	M55MAX(2)=	39,30 kNm
Lcase	3	P=	1	M55MAX(3)=	43,41 kNm	Lcase	4	P=	1	M55MAX(4)=	46,81 kNm
Lcase	5	P=	1	M55MAX(5)=	49,61 kNm	Lcase	6	P=	1	M55MAX(6)=	51,88 kNm
Lcase	7	P=	1	M55MAX(7)=	53,65 kNm	Lcase	8	P=	1	M55MAX(8)=	54,91 kNm
Lcase	9	P=	1	M55MAX(9)=	55,67 kNm	Lcase	10	P=	1	M55MAX(10)=	55,92 kNm

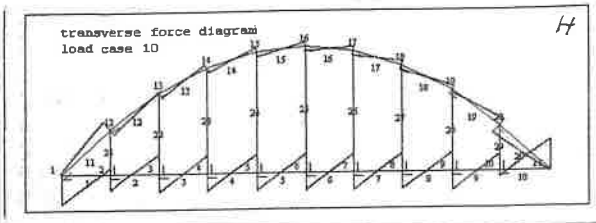
MMAXXX= 55,9239918843428 kNm P=1 To 29



PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=7 kN/m

Lcase	1	P=	11	N55MAX(1)=	149,44 kN	Lcase	2	P=	11	N55MAX(2)=	168,75 kN
Lcase	3	P=	11	N55MAX(3)=	186,68 kN	Lcase	4	P=	11	N55MAX(4)=	202,37 kN
Lcase	5	P=	12	N55MAX(5)=	216,63 kN	Lcase	6	P=	12	N55MAX(6)=	229,34 kN
Lcase	7	P=	12	N55MAX(7)=	239,23 kN	Lcase	8	P=	12	N55MAX(8)=	246,30 kN
Lcase	9	P=	12	N55MAX(9)=	250,54 kN	Lcase	10	P=	12	N55MAX(10)=	251,95 kN

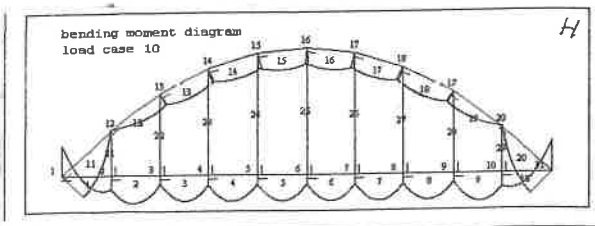
NMAXXX= 251,952671814205 kN P=1 To 29



PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=7 kN/m

Lcase	1	P=	1	T55MAX(1)=	27,39 kN	Lcase	2	P=	1	T55MAX(2)=	32,96 kN
Lcase	3	P=	1	T55MAX(3)=	36,23 kN	Lcase	4	P=	1	T55MAX(4)=	37,18 kN
Lcase	5	P=	1	T55MAX(5)=	36,35 kN	Lcase	6	P=	1	T55MAX(6)=	34,41 kN
Lcase	7	P=	1	T55MAX(7)=	32,02 kN	Lcase	8	P=	1	T55MAX(8)=	29,77 kN
Lcase	9	P=	1	T55MAX(9)=	28,18 kN	Lcase	10	P=	10	T55MAX(10)=	27,61 kN

TMAXXX= 37,1766299089312 kN P=1 To 29



PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=7 kN/m

Lcase	1	P=	2	M55MAX(1)=	19,11 kNm	Lcase	2	P=	2	M55MAX(2)=	41,57 kNm
Lcase	3	P=	2	M55MAX(3)=	54,15 kNm	Lcase	4	P=	3	M55MAX(4)=	59,53 kNm
Lcase	5	P=	3	M55MAX(5)=	58,64 kNm	Lcase	6	P=	3	M55MAX(6)=	50,99 kNm
Lcase	7	P=	3	M55MAX(7)=	39,98 kNm	Lcase	8	P=	3	M55MAX(8)=	29,03 kNm
Lcase	9	P=	2	M55MAX(9)=	21,79 kNm	Lcase	10	P=	11	M55MAX(10)=	20,72 kNm

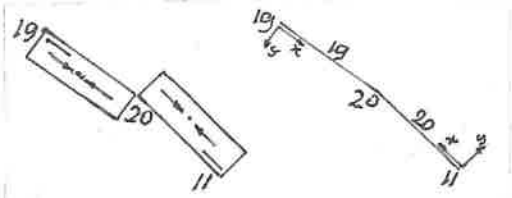
MMAXXX= 59,5318920788587 kNm P=1 To 29

Example. EX2b
L9=27,56 m, H99= 7,24 m m, and V9=5.
In TSTRINGPAR 27.56,7.24,5 Enter, click PAR2.
For all members bending stiffness 1EI and strain siffness 8EI....arbitrary valus...
To type in small text box TSTRINGPAR
OWH=5 Enter, OWP=3 Enter, OWV=.2 Enter.
QB=7 kN/m for the horizontal members is added, to type in TSTRINGPAR QB=7 Enter.
Or click EX2b

Click Calculate, CalcT5M5N5MAX, wait a moment until T5?M5?N5?ELCURVE? gets clearly visible, gets enabled to click on.
First click on DRAWT5M5N5ELCURVE gives the transverseforce diagram with maximum values for load case 10, all 10 horizontal members loaded with QB.
Second click on DRAWT5M5N5ELCURVE gives the bending moment diagram with maximum values for load case 10.
Third click gives the normal force diagram.
Fourth click gives deformation diagram not shown here.

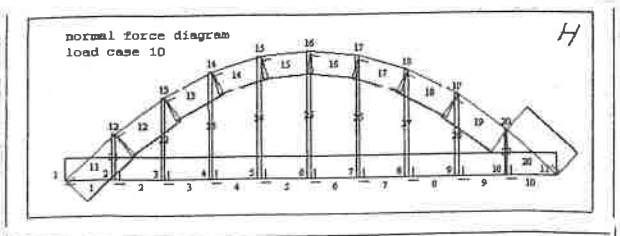
Example. EX2c. Click AOAGAIN.
Like EX2b, now member ends of the vertical members 21 to 29 are hinged connected with the joints, the joints themselves are no hinges!
When going on with EX2b
to type in large text box TSTRING
NL(21)=1,NH(21)=1,NL(22)=1,NH(22)=1 Enter,
NL(23)=1,NH(23)=1,NL(24)=1,NH(24)=1 Enter,
up to member 29.
A faster way, click on Form2 for the small form appearing above the controls and type in its TSTRING P=,21,29,NL,1 Enter,
and P=,21,29,NH,1 Enter. Or click EX2c.
And follow the same steps as here above.

Fig.8.
Normal force diagram for member 19 and 20, the difference sepends on member axis system at the lowest member end number.



With PFRES33 to find
NA(19,20)= 251,4 kN
NA(11,20)= 278,8 kN

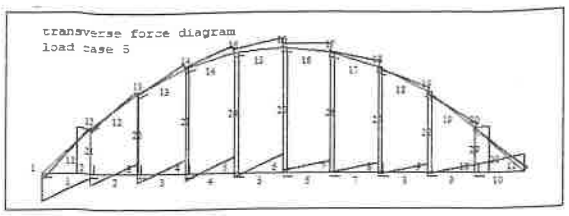
(NB Own weight 3 kN/m)
NA(20,19)= -257,5 kN
NA(20,11)= -270,9 kN



PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=7 kN/m

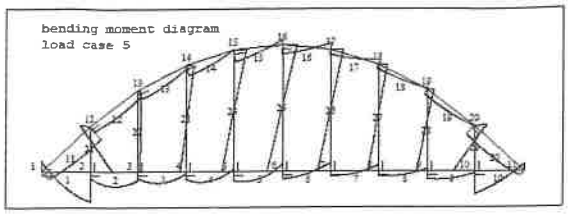
Lcase	1	P=	11	N55MAX(1)=	161,02 kN	Lcase	2	P=	11	N55MAX(2)=	173,20 kN
Lcase	3	P=	11	N55MAX(3)=	188,21 kN	Lcase	4	P=	11	N55MAX(4)=	205,31 kN
Lcase	5	P=	11	N55MAX(5)=	223,26 kN	Lcase	6	P=	11	N55MAX(6)=	240,64 kN
Lcase	7	P=	11	N55MAX(7)=	258,06 kN	Lcase	8	P=	11	N55MAX(8)=	268,23 kN
Lcase	9	P=	11	N55MAX(9)=	276,06 kN	Lcase	10	P=	11	N55MAX(10)=	278,76 kN

NMAXXX= 278,759003697202 kN P=1 To 29



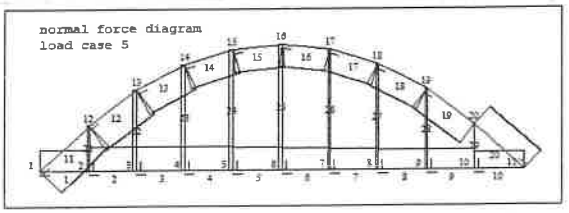
Beam end forces and moments.

D5(1, 2)=-151,89 kN	D5(2, 1)= 151,89 kN	D5(8, 9)=-144,98 kN	D5(9, 8)= 144,98 kN
D6(1, 2)= -40,67 kN	D6(2, 1)= 7,60 kN	D6(8, 9)= -2,65 kN	D6(9, 8)= -11,13 kN
MF(1, 2)= -16,92 kNm	MF(2, 1)= -49,61 kNm	MF(8, 9)= 8,11 kNm	MF(9, 8)= 3,57 kNm
D5(2, 3)=-172,39 kN	D5(3, 2)= 172,39 kN	D5(9,10)=-138,87 kN	D5(10, 9)= 138,87 kN
D6(2, 3)= -17,78 kN	D6(3, 2)= -15,29 kN	D6(9,10)= -3,09 kN	D6(10, 9)= -10,69 kN
MF(2, 3)= 11,79 kNm	MF(3, 2)= -15,22 kNm	MF(9,10)= 13,71 kNm	MF(10, 9)= -3,23 kNm



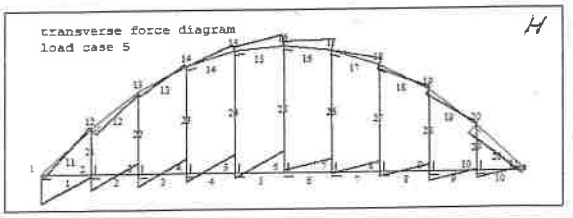
Beam end forces and moments.

D5(1, 2)=-151,89 kN	D5(2, 1)= 151,89 kN	D5(8, 9)=-144,98 kN	D5(9, 8)= 144,98 kN
D6(1, 2)= -40,67 kN	D6(2, 1)= 7,60 kN	D6(8, 9)= -2,65 kN	D6(9, 8)= -11,13 kN
MF(1, 2)= -16,92 kNm	MF(2, 1)= -49,61 kNm	MF(8, 9)= 8,11 kNm	MF(9, 8)= 3,57 kNm
D5(2, 3)=-172,39 kN	D5(3, 2)= 172,39 kN	D5(9,10)=-138,87 kN	D5(10, 9)= 138,87 kN
D6(2, 3)= -17,78 kN	D6(3, 2)= -15,29 kN	D6(9,10)= -3,09 kN	D6(10, 9)= -10,69 kN
MF(2, 3)= 11,79 kNm	MF(3, 2)= -15,22 kNm	MF(9,10)= 13,71 kNm	MF(10, 9)= -3,23 kNm



DA(4, 5)= -10,42 kN	DA(5, 4)= -22,66 kN	DA(1,12)= -7,03 kN	DA(12, 1)= -1,24 kN
NA(4, 5)=-168,31 kN	NA(5, 4)= 168,31 kN	NA(1,12)= 215,70 kN	NA(12, 1)=-207,88 kN
MF(4, 5)= 13,69 kNm	MF(5, 4)= 3,18 kNm	MF(1,12)= 16,92 kNm	MF(12, 1)= -27,90 kNm
DA(5, 6)= -6,87 kN	DA(6, 5)= -26,20 kN	DA(12,13)= -3,57 kN	DA(13,12)= -4,70 kN
NA(5, 6)=-162,69 kN	NA(6, 5)= 162,69 kN	NA(12,13)= 216,63 kN	NA(13,12)=-210,55 kN
MF(5, 6)= 15,72 kNm	MF(6, 5)= 10,92 kNm	MF(12,13)= 12,27 kNm	MF(13,12)= -10,34 kNm

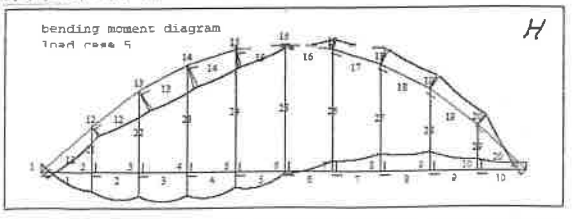
H



Beam end forces and moments.

D5(1, 2)=-158,20 kN	D5(2, 1)= 158,20 kN	D5(8, 9)=-158,20 kN	D5(9, 8)= 158,20 kN
D6(1, 2)= -36,35 kN	D6(2, 1)= 3,27 kN	D6(8, 9)= -6,05 kN	D6(9, 8)= -7,73 kN
MF(1, 2)= -16,65 kNm	MF(2, 1)= -37,96 kNm	MF(8, 9)= -34,25 kNm	MF(9, 8)= 36,56 kNm
D5(2, 3)=-158,20 kN	D5(3, 2)= 158,20 kN	D5(9,10)=-158,20 kN	D5(10, 9)= 158,20 kN
D6(2, 3)= -20,17 kN	D6(3, 2)= -12,91 kN	D6(9,10)= -12,50 kN	D6(10, 9)= -1,28 kN
MF(2, 3)= 37,96 kNm	MF(3, 2)= -47,97 kNm	MF(9,10)= -36,56 kNm	MF(10, 9)= 21,10 kNm

H



D5(2, 3)=-158,20 kN	D5(3, 2)= 158,20 kN	D5(9,10)=-158,20 kN	D5(10, 9)= 158,20 kN
D6(2, 3)= -20,17 kN	D6(3, 2)= -12,91 kN	D6(9,10)= -12,50 kN	D6(10, 9)= -1,28 kN
MF(2, 3)= 37,96 kNm	MF(3, 2)= -47,97 kNm	MF(9,10)= -36,56 kNm	MF(10, 9)= 21,10 kNm
D5(3, 4)=-158,20 kN	D5(4, 3)= 158,20 kN	D5(10,11)=-158,20 kN	D5(11,10)= 158,20 kN
D6(3, 4)= -16,00 kN	D6(4, 3)= -17,07 kN	D6(10,11)= -9,41 kN	D6(11,10)= -4,37 kN
MF(3, 4)= 47,97 kNm	MF(4, 3)= -46,50 kNm	MF(10,11)= -21,10 kNm	MF(11,10)= 14,16 kNm

Example. EX2b

Click EX2b.
Click Calculate, CalcT5M5N5MAX, wait a moment and click T5?M5?N5?ELCURVE? and click DRAWT5M5N5ELCURVE for the transverse force diagram with load case 10, all horizontal members are loaded. Below the maximum absolute values for all load cases, see prec. page.
For case 5 P=1 T55MAX(5)= 40,67 kN

Click T5?M5?N5?ELCURVE?, **T5** , still the max results for all load cases, and click Load case 0 to Load case 5, members 1 to 5 loaded, to see the diagram appear.
The calculations for case 5 have been carried out, click PFRES33 and find
P=1 D6(1,2)= -40,67 kN. Reset

Click Click **T5** to **M5** and click DRAWT5M5N5ELCURVE for the bending moment diagram with load case 10 with the maximum values for all load cases. For case 5,

P=1 M55MAX(5)= 49,61 kNm, see prec. page.
With PFRES33 to find P=1 MF(2,1)= -49,61 kNm.
Reset, **M5** to **N5** , etc.

Example. EX2c

The vertical members with member end hinges.
Same procedure like done above.
T5, for case 5, see prints with 'H'.
P=1 T5MAXX(5)= 36,35 kN,
With PFRES33 to find P=1 D6(1,2)= -36,35 kN.

Fig.9.
M5, for case 5, P=3 M55MAX(5)= 58,64 kNm, that's the maximum bending moment.

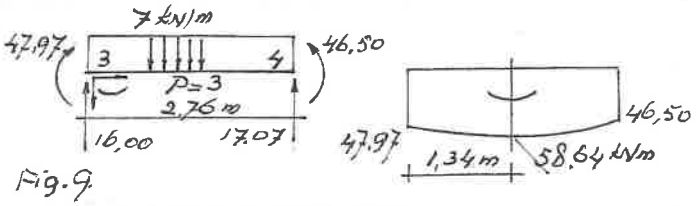
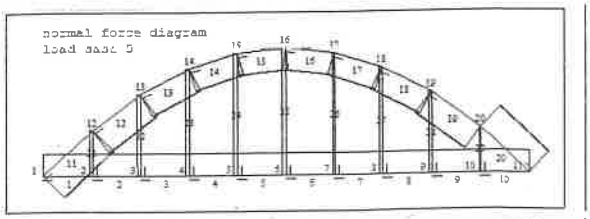


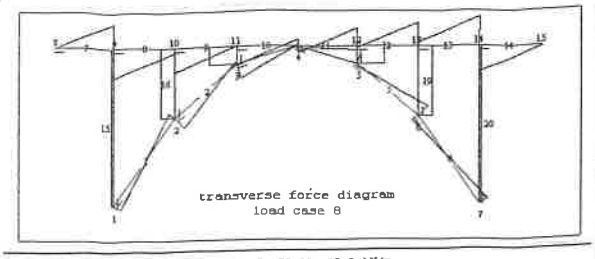
Fig.9

Load case 5 bottom left gives
MF(3,4)= 47,97 kNm and MF(4,3)= -46,50 kNm.
Click CIs, MMAX, see the results here below.

P= 1	MMAX=	37,96 kNm	X=	2,76 m
P= 3	MMAX=	58,64 kNm	X=	1,34 m
P= 5	MMAX=	33,72 kNm	X=	0,59 m



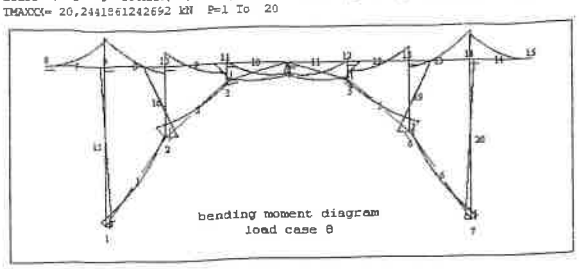
DA(4, 5)= -11,15 kN	DA(5, 4)= -21,92 kN	DA(1,12)= -5,93 kN	DA(12, 1)= -2,43 kN
NA(4, 5)=-158,20 kN	NA(5, 4)= 158,20 kN	NA(1,12)= 223,26 kN	NA(12, 1)=-215,44 kN
MF(4, 5)= 46,50 kNm	MF(5, 4)= -31,66 kNm	MF(1,12)= 16,93 kNm	MF(12, 1)= -23,08 kNm
DA(5, 6)= -7,04 kN	DA(6, 5)= -26,03 kN	DA(12,13)= -10,06 kN	DA(13,12)= 1,79 kN
NA(5, 6)=-158,20 kN	NA(6, 5)= 158,20 kN	NA(12,13)= 203,79 kN	NA(13,12)=-197,70 kN
MF(5, 6)= 31,66 kNm	MF(6, 5)= -5,49 kNm	MF(12,13)= 23,08 kNm	MF(13,12)= -43,34 kNm



PAR=3 L9=15 m H99=5 m V9=3 N9=15 P9=20 QB=8 kN/m

Lcase 1	P= 7	T55MAX(1)=	15,00 kN	Lcase 2	P= 3	T55MAX(2)=	15,95 kN
Lcase 3	P= 8	T55MAX(3)=	19,66 kN	Lcase 4	P= 3	T55MAX(4)=	20,24 kN
Lcase 5	P= 8	T55MAX(5)=	19,18 kN	Lcase 6	P= 8	T55MAX(6)=	17,95 kN
Lcase 7	P= 9	T55MAX(7)=	17,38 kN	Lcase 8	P= 8	T55MAX(8)=	17,73 kN

TMAXXX= 20,24418612426924 kN P=1 To 20



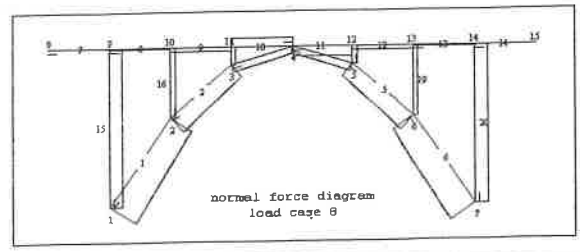
PAR=3 L9=15 m H99=5 m V9=3 N9=15 P9=20 QB=8 kN/m

Lcase 1	P= 7	M55MAX(1)=	14,06 kNm	Lcase 2	P= 7	M55MAX(2)=	14,06 kNm
Lcase 3	P= 8	M55MAX(3)=	15,56 kNm	Lcase 4	P= 8	M55MAX(4)=	16,49 kNm
Lcase 5	P= 8	M55MAX(5)=	16,48 kNm	Lcase 6	P= 8	M55MAX(6)=	16,19 kNm
Lcase 7	P= 8	M55MAX(7)=	16,02 kNm	Lcase 8	P= 8	M55MAX(8)=	16,09 kNm

MMAXXX= 16,49477413240672 kNm P=1 To 20

P= 1	MMAX=	-3,29 kNm	X=	0,00 m	P= 2	MMAX=	-7,38 kNm	X=	0,00 m
P= 3	MMAX=	6,38 kNm	X=	1,83 m	P= 4	MMAX=	6,38 kNm	X=	0,14 m
P= 5	MMAX=	-7,38 kNm	X=	2,51 m	P= 6	MMAX=	-3,29 kNm	X=	3,35 m
P= 7	MMAX=	-14,06 kNm	X=	1,88 m	P= 8	MMAX=	-16,09 kNm	X=	0,00 m
P= 9	MMAX=	-8,03 kNm	X=	0,00 m	P=10	MMAX=	5,53 kNm	X=	1,88 m
P=11	MMAX=	5,53 kNm	X=	0,00 m	P=12	MMAX=	-8,03 kNm	X=	1,88 m
P=13	MMAX=	-16,09 kNm	X=	1,88 m	P=14	MMAX=	-14,06 kNm	X=	0,00 m
P=15	MMAX=	3,29 kNm	X=	0,00 m	P=16	MMAX=	-11,12 kNm	X=	2,22 m
P=17	MMAX=	-5,90 kNm	X=	0,56 m	P=18	MMAX=	5,90 kNm	X=	0,56 m
P=19	MMAX=	11,12 kNm	X=	2,22 m	P=20	MMAX=	-3,29 kNm	X=	0,00 m

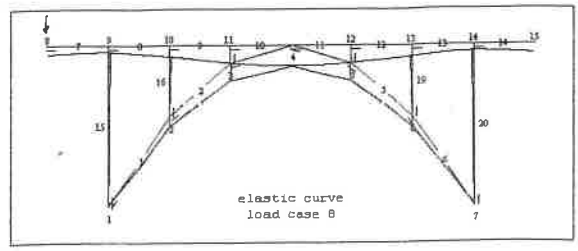
P= 1	ZMAX=	18,14 /EI	X=	3,35 m	P= 2	ZMAX=	44,15 /EI	X=	2,51 m
P= 3	ZMAX=	65,89 /EI	X=	1,96 m	P= 4	ZMAX=	65,89 /EI	X=	0,00 m
P= 5	ZMAX=	44,15 /EI	X=	0,00 m	P= 6	ZMAX=	18,14 /EI	X=	0,00 m
P= 7	ZMAX=	28,67 /EI	X=	0,00 m	P= 8	ZMAX=	37,53 /EI	X=	1,88 m
P= 9	ZMAX=	58,74 /EI	X=	1,88 m	P=10	ZMAX=	68,73 /EI	X=	1,88 m
P=11	ZMAX=	68,73 /EI	X=	0,00 m	P=12	ZMAX=	58,74 /EI	X=	0,00 m
P=13	ZMAX=	37,53 /EI	X=	0,00 m	P=14	ZMAX=	28,67 /EI	X=	1,88 m
P=15	ZMAX=	7,88 /EI	X=	5,00 m	P=16	ZMAX=	7,67 /EI	X=	2,22 m
P=17	ZMAX=	5,58 /EI	X=	0,56 m	P=18	ZMAX=	-5,58 /EI	X=	0,56 m
P=19	ZMAX=	-7,63 /EI	X=	2,22 m	P=20	ZMAX=	-7,88 /EI	X=	5,00 m



PAR=3 L9=15 m H99=5 m V9=3 N9=15 P9=20 QB=8 kN/m

Lcase 1	P= 1	N55MAX(1)=	37,94 kN	Lcase 2	P= 1	N55MAX(2)=	41,83 kN
Lcase 3	P= 1	N55MAX(3)=	49,97 kN	Lcase 4	P= 1	N55MAX(4)=	59,97 kN
Lcase 5	P= 1	N55MAX(5)=	69,49 kN	Lcase 6	P= 1	N55MAX(6)=	76,14 kN
Lcase 7	P= 1	N55MAX(7)=	78,61 kN	Lcase 8	P= 6	N55MAX(8)=	76,49 kN

NMAXXX= 78,6124329365568 kN P=1 To 20



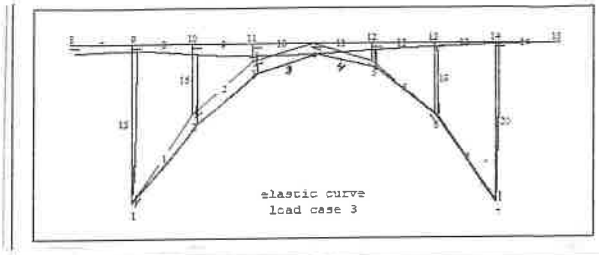
PAR=3 L9=15 m H99=5 m V9=3 N9=15 P9=20 QB=8 kN/m

Lcase 1	P= 7	Z55MAX(1)=	37,41 /EI	Lcase 2	P= 7	Z55MAX(2)=	37,60 /EI
Lcase 3	P= 3	Z55MAX(3)=	44,98 /EI	Lcase 4	P= 3	Z55MAX(4)=	60,19 /EI
Lcase 5	P= 3	Z55MAX(5)=	66,18 /EI	Lcase 6	P= 10	Z55MAX(6)=	69,14 /EI
Lcase 7	P= 11	Z55MAX(7)=	70,32 /EI	Lcase 8	P= 11	Z55MAX(8)=	68,73 /EI

ZMAXXX= 70,3246997475677 /EI P=1 To 20

Example. EX3a Click AOAGAIN.

L9=15 m, H99= 5 m, and V9=3
In TSTRINGPAR 15,5,3 Enter, click PAR3.
For all members bending stiffness 1EI and strain siffness 8EI. Movable load QB=8 kN/m, in TSTRINGPAR QB=8 Enter.
Parabola members own weight OWP= 5 kN/m, in TSTRINGPAR OWP=5 Enter.
Horizontal and vertical members no own weight, OWH=0 kN/m and OWV=0 kN/m.
Click Calculate, CalcT5M5N5MAX and four times DRAWT5M5N5ELCURVE to get the four prints on the left for load case 8, V9*2= 8.
Click Cls, MMAX and ZMAX for the largest bending moments and displacements for each member for load case 8.
Click T5?M5?N5?ELCURVE? **T5** appears, click it to M5, N5, **ELCURVE**. Next click Load case 0 to Load case 3, the first three horizontal members are loaded, see the picture here below.
Load case 3 with P= 3 Z55MAX(3)= 44,98/EI.



PAR=3 L9=15 m H99=5 m V9=3 N9=15 P9=20 QB=8 kN/m

Lcase 1	P= 7	Z55MAX(1)=	37,41 /EI	Lcase 2	P= 7	Z55MAX(2)=	37,60 /EI
Lcase 3	P= 3	Z55MAX(3)=	44,98 /EI	Lcase 4	P= 3	Z55MAX(4)=	60,19 /EI
Lcase 5	P= 3	Z55MAX(5)=	66,18 /EI	Lcase 6	P= 10	Z55MAX(6)=	69,14 /EI
Lcase 7	P= 11	Z55MAX(7)=	70,32 /EI	Lcase 8	P= 11	Z55MAX(8)=	68,73 /EI

ZMAXXX= 70,3246997475677 /EI P=1 To 20

Calculations for this case 3 have been carried out. Click Cls and ZMAX for the maximum displacement ZMAX for each member. The main pictures disappeared, to get it back click load case to 3, 4 etc. until Load case 3 is there again.

P= 1	ZMAX=	32,59 /EI	X=	3,35 m	P= 2	ZMAX=	42,46 /EI	X=	2,26 m
P= 3	ZMAX=	44,98 /EI	X=	0,00 m	P= 4	ZMAX=	30,57 /EI	X=	0,00 m
P= 5	ZMAX=	7,98 /EI	X=	5,00 m	P= 6	ZMAX=	-3,76 /EI	X=	0,03 m
P= 7	ZMAX=	30,33 /EI	X=	0,00 m	P= 8	ZMAX=	35,23 /EI	X=	1,88 m
P= 9	ZMAX=	42,24 /EI	X=	1,76 m	P=10	ZMAX=	42,20 /EI	X=	0,00 m
P=11	ZMAX=	35,58 /EI	X=	0,00 m	P=12	ZMAX=	22,35 /EI	X=	0,00 m
P=13	ZMAX=	10,84 /EI	X=	0,00 m	P=14	ZMAX=	-3,52 /EI	X=	1,38 m
P=15	ZMAX=	18,64 /EI	X=	5,00 m	P=16	ZMAX=	19,33 /EI	X=	2,22 m
P=17	ZMAX=	16,47 /EI	X=	0,00 m	P=18	ZMAX=	13,09 /EI	X=	0,00 m
P=19	ZMAX=	12,05 /EI	X=	0,00 m	P=20	ZMAX=	9,94 /EI	X=	4,13 m

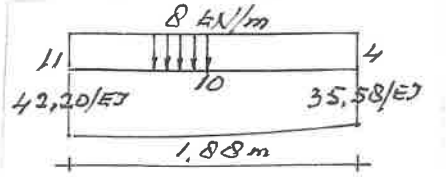
Click PFRES33 several times to get the joint displacements UH(I) and UV(I).

Support reactions.
RV(1)= 80,33 kN RH(1)= 22,98 kN RV(7)= 42,83 kN RH(7)= -22,98 kN

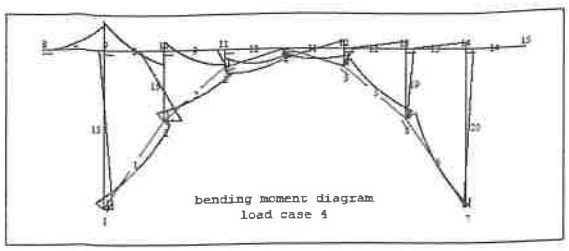
Joint displacements.

UV(1)= 0,00 /EI	UH(1)= 0,00 /EI	UV(2)= 33,17 /EI	UH(2)= 16,93 /EI
UV(3)= 42,03 /EI	UH(3)= 16,47 /EI	UV(4)= 35,58 /EI	UH(4)= 12,49 /EI
UV(5)= 22,31 /EI	UH(5)= 13,09 /EI	UV(6)= 11,13 /EI	UH(6)= 12,05 /EI
UV(7)= 0,00 /EI	UH(7)= 0,00 /EI	UV(8)= 30,33 /EI	UH(8)= 18,64 /EI
UV(9)= 21,66 /EI	UH(9)= 18,64 /EI	UV(10)= 35,23 /EI	UH(10)= 18,33 /EI
UV(11)= 42,20 /EI	UH(11)= 16,00 /EI	UV(12)= 22,35 /EI	UH(12)= 9,89 /EI
UV(13)= 10,84 /EI	UH(13)= 9,02 /EI	UV(14)= 1,97 /EI	UH(14)= 8,73 /EI
UV(15)= -3,52 /EI	UH(15)= 8,73 /EI		

Fig.9.
member 10



UV(11)= 42,20/EI and UV(4)=35,58/EI
And maximum displacement for member 10 is P=10 ZMAX= 42,20/EI X= 0,00 m. ok



Beam end forces and moments.

D5(1, 2)=	27,44 kN	D5(2, 1)=	-27,44 kN	D5(9,10)=	1,53 kN	D5(10, 9)=	-1,53 kN
D6(1, 2)=	-53,83 kN	D6(2, 1)=	37,08 kN	D6(9,10)=	-20,24 kN	D6(10, 9)=	5,24 kN
MF(1, 2)=	-5,23 kNm	MF(2, 1)=	-3,79 kNm	MF(9,10)=	-16,49 kNm	MF(10, 9)=	-7,40 kNm
D5(2, 3)=	17,31 kN	D5(3, 2)=	-17,31 kN	D5(10,11)=	11,66 kN	D5(11,10)=	-11,66 kN
D6(2, 3)=	-27,58 kN	D6(3, 2)=	15,03 kN	D6(10,11)=	-14,74 kN	D6(11,10)=	-0,26 kN
MF(2, 3)=	-5,80 kNm	MF(3, 2)=	-5,21 kNm	MF(10,11)=	-5,43 kNm	MF(11,10)=	-8,15 kNm
D5(3, 4)=	7,73 kN	D5(4, 3)=	-7,73 kN	D5(4,11)=	-21,24 kN	D5(11, 4)=	21,24 kN
D6(3, 4)=	-7,70 kN	D6(4, 3)=	-2,07 kN	D6(4,11)=	-7,93 kN	D6(11, 4)=	-7,07 kN
MF(3, 4)=	3,69 kNm	MF(4, 3)=	-4,67 kNm	MF(4,11)=	-3,55 kNm	MF(11, 4)=	4,35 kNm
D5(4, 5)=	15,28 kN	D5(5, 4)=	-15,28 kN	D5(4,12)=	13,69 kN	D5(12, 4)=	-13,69 kN
D6(4, 5)=	4,65 kN	D6(5, 4)=	-14,43 kN	D6(4,12)=	5,35 kN	D6(12, 4)=	-5,35 kN
MF(4, 5)=	2,93 kNm	MF(5, 4)=	6,47 kNm	MF(4,12)=	5,29 kNm	MF(12, 4)=	4,73 kNm

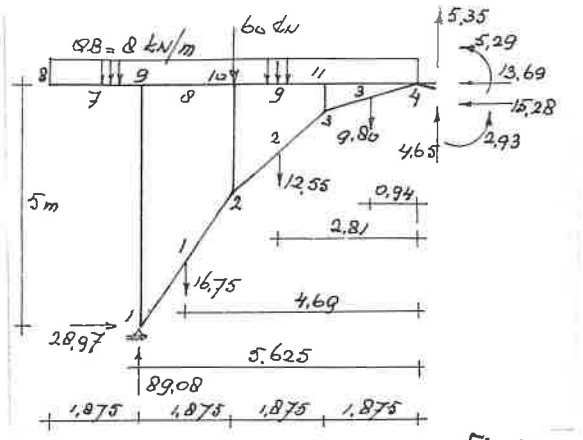


Fig.10.

Support reactions

RV(1)=	89,08 kN	RH(1)=	28,97 kN	RV(7)=	49,08 kN	RH(7)=	-28,97 kN

Joint displacements.

UV(1)=	0,00 /EI	UH(1)=	0,00 /EI	UV(2)=	39,45 /EI	UH(2)=	18,74 /EI
UV(3)=	55,98 /EI	UH(3)=	22,06 /EI	UV(4)=	49,10 /EI	UH(4)=	17,93 /EI
UV(5)=	27,25 /EI	UH(5)=	19,98 /EI	UV(6)=	10,62 /EI	UH(6)=	19,94 /EI
UV(7)=	0,00 /EI	UH(7)=	0,00 /EI	UV(8)=	25,20 /EI	UH(8)=	26,00 /EI
UV(9)=	22,03 /EI	UH(9)=	26,00 /EI	UV(10)=	42,09 /EI	UH(10)=	25,64 /EI
UV(11)=	56,49 /EI	UH(11)=	22,91 /EI	UV(12)=	27,46 /EI	UH(12)=	14,72 /EI
UV(13)=	10,71 /EI	UH(13)=	14,09 /EI	UV(14)=	1,30 /EI	UH(14)=	13,85 /EI
UV(15)=	-3,59 /EI	UH(15)=	13,85 /EI				

Joint rotations.

UR(1)=	11,88 /EI	UR(2)=	5,52 /EI	UR(3)=	1,45 /EI	UR(4)=	-9,71 /EI
UR(5)=	-9,24 /EI	UR(6)=	-0,43 /EI	UR(7)=	3,84 /EI	UR(8)=	-3,89 /EI
UR(9)=	4,90 /EI	UR(10)=	9,03 /EI	UR(11)=	2,09 /EI	UR(12)=	-10,24 /EI
UR(13)=	-6,21 /EI	UR(14)=	-2,61 /EI	UR(15)=	-2,61 /EI		

P	LL	HH	NL	NH	BA	LE	RE	EI	EA	LI	P	LL	HH	NL	NH	BA	LE	RE	EI	EA	LI
1	1	2	0	0	1	0	0	1,0	8	3,35	11	4	12	0	0	4	0	0	1,0	8	1,88
2	2	3	0	0	2	0	0	1,0	8	2,51	12	12	13	0	0	12	0	0	1,0	8	1,88
3	3	4	0	0	3	0	0	1,0	8	1,96	13	13	14	0	0	13	0	0	1,0	8	1,88
4	4	5	0	0	4	0	0	1,0	8	1,96	14	14	15	0	0	14	0	0	1,0	8	1,88
5	5	6	0	0	5	0	0	1,0	8	2,51	15	1	9	0	0	1	0	0	1,0	8	5,00
6	6	7	0	0	6	0	0	1,0	8	3,35	16	2	10	0	0	2	0	0	1,0	8	2,22
7	8	9	0	0	8	0	0	1,0	8	1,88	17	3	11	0	0	3	0	0	1,0	8	0,56
8	9	10	0	0	9	0	0	1,0	8	1,88	18	5	12	0	0	5	0	0	1,0	8	0,56
9	10	11	0	0	10	0	0	1,0	8	1,88	19	6	13	0	0	6	0	0	1,0	8	2,22
10	4	11	0	0	11	0	0	1,0	8	1,88	20	7	14	0	0	7	0	0	1,0	8	5,00

P= 1	MMAX=	-5,23 kNm	X=	0,00 m	P= 2	MMAX=	-5,89 kNm	X=	0,00 m
P= 3	MMAX=	6,50 kNm	X=	1,09 m	P= 4	MMAX=	-6,47 kNm	X=	1,96 m
P= 5	MMAX=	-5,74 kNm	X=	2,51 m	P= 6	MMAX=	-6,49 kNm	X=	0,00 m
P= 7	MMAX=	-14,06 kNm	X=	1,88 m	P= 8	MMAX=	-16,49 kNm	X=	0,00 m
P= 9	MMAX=	8,16 kNm	X=	1,85 m	P=10	MMAX=	7,48 kNm	X=	0,89 m
P=11	MMAX=	5,29 kNm	X=	0,00 m	P=12	MMAX=	-4,42 kNm	X=	1,88 m
P=13	MMAX=	-3,87 kNm	X=	1,88 m	P=14	MMAX=	0,00 kNm	X=	0,00 m
P=15	MMAX=	5,23 kNm	X=	0,00 m	P=16	MMAX=	-12,83 kNm	X=	2,22 m
P=17	MMAX=	-3,80 kNm	X=	0,56 m	P=18	MMAX=	4,85 kNm	X=	0,56 m
P=19	MMAX=	4,45 kNm	X=	2,22 m	P=20	MMAX=	3,87 kNm	X=	5,00 m

P= 1	ZMAX=	37,60 /EI	X=	3,35 m	P= 2	ZMAX=	56,50 /EI	X=	2,51 m
P= 3	ZMAX=	60,19 /EI	X=	0,33 m	P= 4	ZMAX=	41,98 /EI	X=	0,00 m
P= 5	ZMAX=	7,09 /EI	X=	0,00 m	P= 6	ZMAX=	-10,60 /EI	X=	0,07 m
P= 7	ZMAX=	0,00 /EI	X=	0,00 m	P= 8	ZMAX=	10,00 /EI	X=	1,88 m
P= 9	ZMAX=	56,49 /EI	X=	1,88 m	P=10	ZMAX=	56,91 /EI	X=	0,38 m
P=11	ZMAX=	49,10 /EI	X=	0,00 m	P=12	ZMAX=	27,46 /EI	X=	0,00 m
P=13	ZMAX=	10,71 /EI	X=	0,00 m	P=14	ZMAX=	-3,59 /EI	X=	1,88 m
P=15	ZMAX=	26,00 /EI	X=	5,00 m	P=16	ZMAX=	25,64 /EI	X=	2,22 m
P=17	ZMAX=	22,91 /EI	X=	0,56 m	P=18	ZMAX=	19,98 /EI	X=	0,00 m
P=19	ZMAX=	19,94 /EI	X=	0,00 m	P=20	ZMAX=	14,79 /EI	X=	4,26 m

Click ELCURVE to **M5** and click Load case 0 to Load case 4 which gives the picture shown on the left. The first four horizontal members are loaded with QB= 8 kN/m.
Still parabola members own weight OWP=5 kN/m, horizontal and vertical members no own weight.

All calculations for load case 4 have been carried out, click PFRES33 to get member end forces D5(,), D6(,) and member end moments MF(,). And clicking for support reactions an displacements.

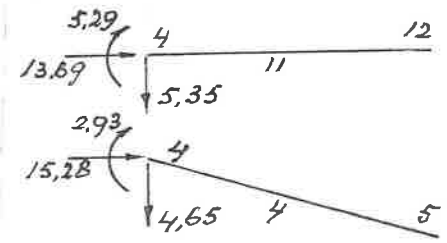
Fig.10 and 11.
Left half of the frame which is cut at the right of joint 4, cutting member 11 and 4. Member 4, and 3, is not printed to avoid a mixture of lines and numbers.
Own weight parabola members, lengths can be found with a click Show2.

member 1 P=1 3,35*5= 16,75 kN
member 2 P=2 2,51*5= 12,55 kN
member 3 P=3 1,96*5= 9,80 kN

Four members loaded with 8 kN/m.
4*(15/8)*8= 60,00 kN
99,10 kN

Support ractions
RV(1)= 89,08 kN and RH(1)= 28,97 kN.

Fig.11.



member 11
D5(4,12)= 13,69 kN, positive answer, so as assumed to the right on member end 4, on joint 4 as large as but opposite directed.
D6(4,12)= 5,35 kN, positive answer, so as assumed to the right on member end 4, on joint 4 as large as but opposite directed.
MF(4,12)= 5,29 kNm, positive answer, so asassumed to the right on member end 4, on joint 4 as large as but opposite durected.

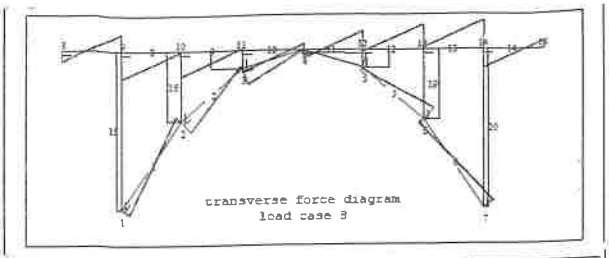
Member 4 same procedure.
D5(4,5)= 15,28 kN and D6(4,5)= 4,65 kN
MF(4,5)= 2,93 kNm

∑ hor.=0 ? 13,69+15,28-28,97= 0 ok
∑ vert.=0 ?
60,00+16,75+12,55+9,86-89,08-5,35-4,65=0,08 ok

∑ mom. w.r.t. joint 4=0 ?
60,00*3,75+16,75*4,69+12,55*2,81+9,80*0,94
+28,97*5+5,29+2,93-89,08*5,625=

225,00+78,56+35,27+9,21+144,85-501,08=0,03 ok

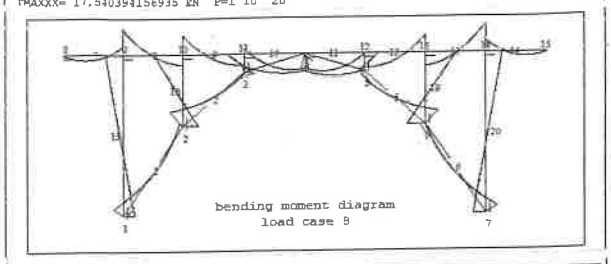
Load case 4, preceding page with
P=8 M55MAX(4)= 16,49 kNm, (absolute value).
With Cls and MMAX follows
P=8 MMAX= -16,49 kNm, a negative value which belongs to the beam axis system ⌒.



PAR=3 L9=15 m H99=5 m V9=3 N9=15 P9=20 QB=8 kN/m

Lcase 1	P= 7	T55MAX(1)=	3,16 kN	Lcase 2	P= 9	T55MAX(2)=	13,02 kN
Lcase 3	P= 9	T55MAX(3)=	16,42 kN	Lcase 4	P= 9	T55MAX(4)=	16,83 kN
Lcase 5	P= 17	T55MAX(5)=	17,54 kN	Lcase 6	P= 17	T55MAX(6)=	17,29 kN
Lcase 7	P= 13	T55MAX(7)=	17,25 kN	Lcase 9	P= 17	T55MAX(8)=	16,38 kN

TMAXXX= 17,540394156935 kN P=1 To 20



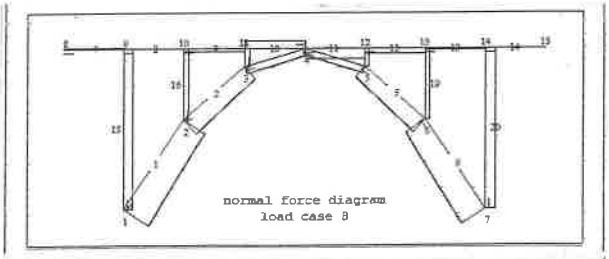
PAR=3 L9=15 m H99=5 m V9=3 N9=15 P9=20 QB=8 kN/m

Lcase 1	P= 19	M55MAX(1)=	6,16 kNm	Lcase 2	P= 16	M55MAX(2)=	6,45 kNm
Lcase 3	P= 16	M55MAX(3)=	11,29 kNm	Lcase 4	P= 16	M55MAX(4)=	13,29 kNm
Lcase 5	P= 16	M55MAX(5)=	12,94 kNm	Lcase 6	P= 16	M55MAX(6)=	12,11 kNm
Lcase 7	P= 13	M55MAX(7)=	12,43 kNm	Lcase 8	P= 15	M55MAX(8)=	12,00 kNm

MMAXXX= 13,287069286091 kNm P=1 To 20

P= 1	MMAX=	-4,69 kNm	X=	0,00 m	P= 2	MMAX=	-7,93 kNm	X=	0,00 m
P= 3	MMAX=	6,37 kNm	X=	1,93 m	P= 4	MMAX=	6,53 kNm	X=	0,37 m
P= 5	MMAX=	-7,22 kNm	X=	2,51 m	P= 6	MMAX=	-4,96 kNm	X=	3,35 m
P= 7	MMAX=	-3,45 kNm	X=	1,98 m	P= 8	MMAX=	-10,51 kNm	X=	0,00 m
P= 9	MMAX=	-7,81 kNm	X=	0,00 m	P=10	MMAX=	5,61 kNm	X=	1,88 m
P=11	MMAX=	5,61 kNm	X=	0,00 m	P=12	MMAX=	-8,92 kNm	X=	1,88 m
P=13	MMAX=	-11,37 kNm	X=	1,88 m	P=14	MMAX=	-4,88 kNm	X=	0,00 m
P=15	MMAX=	-7,07 kNm	X=	5,00 m	P=16	MMAX=	-11,57 kNm	X=	2,22 m
P=17	MMAX=	-6,13 kNm	X=	0,56 m	P=18	MMAX=	5,37 kNm	X=	0,56 m
P=19	MMAX=	12,00 kNm	X=	2,22 m	P=20	MMAX=	6,49 kNm	X=	5,00 m

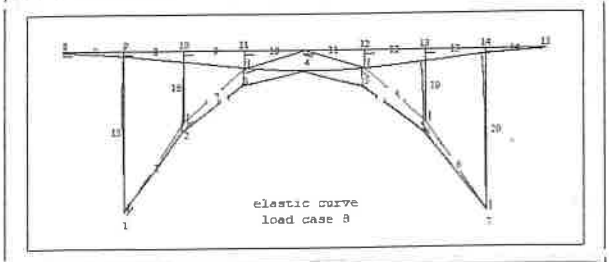
P= 1	ZMAX=	12,35 /EI	X=	3,35 m	P= 2	ZMAX=	39,24 /EI	X=	2,51 m
P= 3	ZMAX=	65,74 /EI	X=	1,96 m	P= 4	ZMAX=	69,32 /EI	X=	0,25 m
P= 5	ZMAX=	51,24 /EI	X=	0,00 m	P= 6	ZMAX=	23,73 /EI	X=	0,00 m
P= 7	ZMAX=	3,80 /EI	X=	0,99 m	P= 8	ZMAX=	24,12 /EI	X=	1,88 m
P= 9	ZMAX=	45,62 /EI	X=	1,38 m	P=10	ZMAX=	61,94 /EI	X=	0,89 m
P=11	ZMAX=	70,39 /EI	X=	0,09 m	P=12	ZMAX=	62,52 /EI	X=	0,00 m
P=13	ZMAX=	40,91 /EI	X=	0,00 m	P=14	ZMAX=	18,49 /EI	X=	0,00 m
P=15	ZMAX=	-4,72 /EI	X=	3,47 m	P=16	ZMAX=	-7,16 /EI	X=	0,00 m
P=17	ZMAX=	-5,16 /EI	X=	0,00 m	P=18	ZMAX=	-11,77 /EI	X=	0,56 m
P=19	ZMAX=	-14,32 /EI	X=	2,22 m	P=20	ZMAX=	-14,85 /EI	X=	5,00 m



PAR=3 L9=15 m H99=5 m V9=3 N9=15 P9=20 QB=8 kN/m

Lcase 1	P= 1	N55MAX(1)=	39,73 kN	Lcase 2	P= 1	N55MAX(2)=	45,62 kN
Lcase 3	P= 1	N55MAX(3)=	57,02 kN	Lcase 4	P= 1	N55MAX(4)=	68,84 kN
Lcase 5	P= 1	N55MAX(5)=	76,75 kN	Lcase 6	P= 1	N55MAX(6)=	80,35 kN
Lcase 7	P= 1	N55MAX(7)=	81,21 kN	Lcase 8	P= 1	N55MAX(8)=	81,16 kN

NMAXXX= 81,2056592131243 kN P=1 To 20



PAR=3 L9=15 m H99=5 m V9=3 N9=15 P9=20 QB=8 kN/m

Lcase 1	P= 11	Z55MAX(1)=	28,87 /EI	Lcase 2	P= 10	Z55MAX(2)=	29,96 /EI
Lcase 3	P= 10	Z55MAX(3)=	38,27 /EI	Lcase 4	P= 10	Z55MAX(4)=	51,97 /EI
Lcase 5	P= 10	Z55MAX(5)=	63,18 /EI	Lcase 6	P= 11	Z55MAX(6)=	69,02 /EI
Lcase 7	P= 11	Z55MAX(7)=	70,55 /EI	Lcase 8	P= 11	Z55MAX(8)=	70,54 /EI

ZMAXXX= 70,548378010827 4 /EI P=1 To 20

Example. EX3b AOAGAIN

L9=15 m, H99= 5 m, and V9=3 (Like EX3a.)
In TSTRINGPAR 15,5,3 Enter, and
click PAR3 now!, not later.

In TSTRINGPAR QB=8 Enter, and for parabola members own weight OWP=5 Enter.
Horizontal and vertical members no own weight, OWH=0 kN/m and OWV=0 kN/m.

Now joint 8 and 15 are supported.
Joint 8 a hinge support, PV(8)=1 and PH(8)=1,
joint 15 a roller support, PV(15)=1.
Click in large text box TSTRING and type

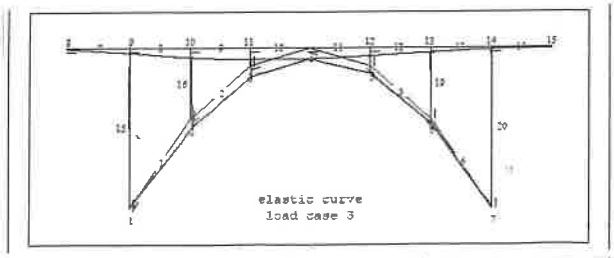
PV(8)=1,PH(8)=1,PV(15)=1 Enter.
Or click EX3b.

The construction is symmetrically loaded, but the construction itself is not because the two supports 8 and 15 are different.

Click Calculate, CalcT5M5N5MAX and four times DRAWT5M5N5ELCURVE to get the four prints on the left for load case 8, 8 hor. members loaded.
To compare with page 12.

For all members bending stiffness 1EI and strain siffness 8EI.

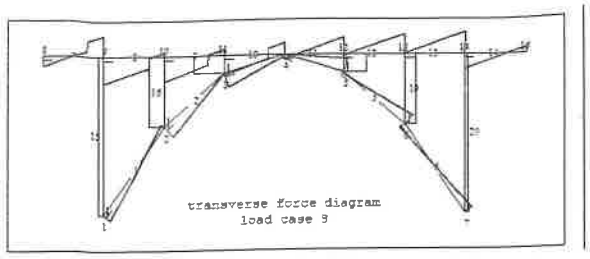
Click Cls, MMAX and ZMAX for the largest bending moments and displacements for each member for load case 8.
Click T5?M5?N5?ELCURVE? **T5** appears, click it to M5, N5, **ELCURVE**. Next click Load case 0 to Load case 3, the first three horizontal members are loaded, see the picture here below.
Load case 3 with P= 10 Z55MAX(3)= 38,27/EI.

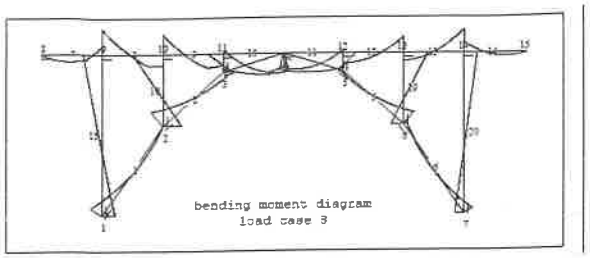


Calculations for this case 3 have been carried out. Click Cls and ZMAX for the maximum displacement ZMAX for each member. The main pictures disappeared, to get it back click load case to 3, 4 etc. until Load case 3 is there again.

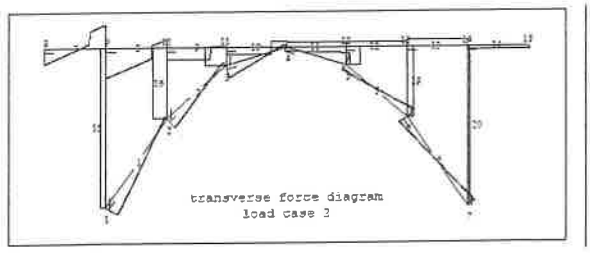
P= 1	ZMAX=	30,70 /EI	X=	2,35 m	P= 2	ZMAX=	10,70 /EI	X=	2,51 m
P= 3	ZMAX=	37,23 /EI	X=	0,31 m	P= 4	ZMAX=	34,34 /EI	X=	0,00 m
P= 5	ZMAX=	19,70 /EI	X=	0,00 m	P= 6	ZMAX=	7,14 /EI	X=	0,00 m
P= 7	ZMAX=	15,57 /EI	X=	1,98 m	P= 8	ZMAX=	31,55 /EI	X=	1,88 m
P= 9	ZMAX=	38,25 /EI	X=	1,88 m	P=10	ZMAX=	38,27 /EI	X=	0,22 m
P=11	ZMAX=	35,96 /EI	X=	0,00 m	P=12	ZMAX=	26,67 /EI	X=	0,00 m
P=13	ZMAX=	14,83 /EI	X=	0,00 m	P=14	ZMAX=	3,70 /EI	X=	0,00 m
P=15	ZMAX=	2,34 /EI	X=	1,01 m	P=16	ZMAX=	5,21 /EI	X=	0,18 m
P=17	ZMAX=	3,91 /EI	X=	0,07 m	P=18	ZMAX=	-2,32 /EI	X=	0,56 m
P=19	ZMAX=	-3,37 /EI	X=	2,22 m	P=20	ZMAX=	-3,62 /EI	X=	5,00 m

Click PFRES33 several times to get the joint displacements UH(I) and UV(I).
UV(8)= 0,00/EI UV(15)= 0,00/EI
UH(8)= 0,00/EI UH(15)= -3,62/EI





NFB(7)=1	I	F2	L2			NFB(8)=1	I	F2	L2		
	1	7,00	1,40				1	7,00	1,40		
NFB(9)=1	I	F2	L2			NFB(10)=1	I	F2	L2		
	1	7,00	1,40				1	7,00	1,40		
NQB(1)=1	I	Q3	Q4	L3	L4	NQA(1)=1	I	Q6	Q7	L6	L7
	1	2,80	2,80	0,00	3,35		1	-4,14	-4,14	0,00	3,35
NQB(2)=1	I	Q3	Q4	L3	L4	NQA(2)=1	I	Q6	Q7	L6	L7
	1	3,74	3,74	0,00	2,51		1	-3,32	-3,32	0,00	2,51
NQB(3)=1	I	Q3	Q4	L3	L4	NQA(3)=1	I	Q6	Q7	L6	L7
	1	4,79	4,79	0,00	1,96		1	-1,42	-1,42	0,00	1,96
NQB(4)=1	I	Q3	Q4	L3	L4	NQA(4)=1	I	Q6	Q7	L6	L7
	1	4,79	4,79	0,00	1,96		1	1,42	1,42	0,00	1,96
NQB(5)=1	I	Q3	Q4	L3	L4	NQA(5)=1	I	Q6	Q7	L6	L7
	1	3,74	3,74	0,00	2,51		1	3,32	3,32	0,00	2,51
NQB(6)=1	I	Q3	Q4	L3	L4	NQA(6)=1	I	Q6	Q7	L6	L7
	1	2,80	2,80	0,00	3,35		1	4,14	4,14	0,00	3,35
NQV(1)=1	I	Q3V	Q4V	LE3	LE4	NQV(2)=1	I	Q3V	Q4V	LE3	LE4
	1	5,00	5,00	0,00	1,88		1	5,00	5,00	0,00	1,88
NQV(3)=1	I	Q3V	Q4V	LE3	LE4	NQV(4)=1	I	Q3V	Q4V	LE3	LE4
	1	5,00	5,00	0,00	1,88		1	5,00	5,00	0,00	1,88
NQV(5)=1	I	Q3V	Q4V	LE3	LE4	NQV(6)=1	I	Q3V	Q4V	LE3	LE4
	1	5,00	5,00	0,00	1,88		1	5,00	5,00	0,00	1,88

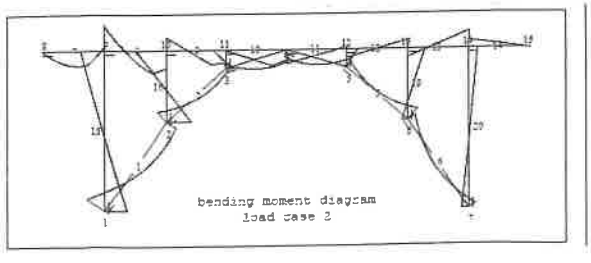


Beam end forces and moments.

D5(1, 2)=	27,70 kN	D5(2, 1)=	-27,70 kN	D5(9,10)=	-6,34 kN	D5(10, 9)=	6,34 kN
D6(1, 2)=	-54,82 kN	D6(2, 1)=	38,06 kN	D6(9,10)=	-16,83 kN	D6(10, 9)=	-5,17 kN
MF(1, 2)=	-6,63 kNm	MF(2, 1)=	-3,52 kNm	MF(9,10)=	-8,74 kNm	MF(10, 9)=	-5,43 kNm
D5(2, 3)=	19,71 kN	D5(3, 2)=	-19,71 kN	D5(10,11)=	1,65 kN	D5(11,10)=	-1,65 kN
D6(2, 3)=	-26,66 kN	D6(3, 2)=	14,12 kN	D6(10,11)=	-6,23 kN	D6(11,10)=	-0,77 kN
MF(2, 3)=	-4,46 kNm	MF(3, 2)=	-0,94 kNm	MF(10,11)=	-4,35 kNm	MF(11,10)=	-4,01 kNm
D5(3, 4)=	8,23 kN	D5(4, 3)=	-8,23 kN	D5(4,11)=	-13,12 kN	D5(11, 4)=	13,12 kN
D6(3, 4)=	-9,82 kN	D6(4, 3)=	0,05 kN	D6(4,11)=	-3,47 kN	D6(11, 4)=	-3,53 kN
MF(3, 4)=	-1,38 kNm	MF(4, 3)=	-3,29 kNm	MF(4,11)=	-3,25 kNm	MF(11, 4)=	-0,04 kNm

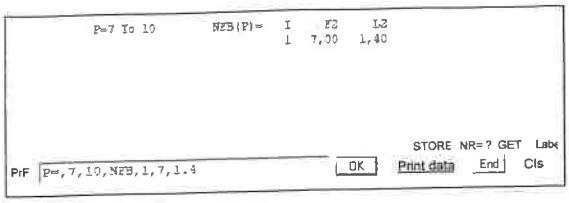
Beam end forces and moments.

D5(1, 9)=	2,82 kN	D5(9, 1)=	-2,82 kN	D5(5,12)=	-7,61 kN	D5(12, 5)=	7,61 kN
D6(1, 9)=	-30,24 kN	D6(9, 1)=	30,24 kN	D6(5,12)=	0,12 kN	D6(12, 5)=	-0,12 kN
MF(1, 9)=	6,63 kNm	MF(9, 1)=	7,46 kNm	MF(5,12)=	-0,68 kNm	MF(12, 5)=	-3,34 kNm
D5(2,10)=	7,99 kN	D5(10, 2)=	-7,99 kN	D5(6,13)=	-3,29 kN	D5(13, 6)=	3,29 kN
D6(2,10)=	-11,40 kN	D6(10, 2)=	11,40 kN	D6(6,13)=	1,50 kN	D6(13, 6)=	-1,50 kN
MF(2,10)=	7,98 kNm	MF(10, 2)=	9,78 kNm	MF(6,13)=	-1,73 kNm	MF(13, 6)=	-5,39 kNm
D5(3,11)=	11,47 kN	D5(11, 3)=	-11,47 kN	D5(7,14)=	-1,03 kN	D5(14, 7)=	1,03 kN
D6(3,11)=	-4,30 kN	D6(11, 3)=	4,30 kN	D6(7,14)=	-5,92 kN	D6(14, 7)=	5,92 kN
MF(3,11)=	2,32 kNm	MF(11, 3)=	4,06 kNm	MF(7,14)=	-2,24 kNm	MF(14, 7)=	-2,38 kNm



Example. EX3b one more time. AOAGAIN

L9=15 m, H99= 5 m, and V9=3 (Like EX3a.)
In TSTRINGPAR 15,5,3 Enter, click PAR3.
In TSTRINGPAR QB=8 Enter, and for parabola members own weight OWP=5 Enter. OWH=0 OWV=0
Click in large text box TSTRING and type
PV(8)=1,PH(8)=1,PV(15)=1 Enter. Or click EX3b.
Member load forces NFB(P) are added for the members 7 to 11, 4 horizontal members. There fore click Form2. One load force I=1.
P=,P1,P2,NFB,I,F2,L2
P=,7,10,NFB,1,7,1.4 Enter.
Click Print, see results here below.



Click Cls and Show3 for the member load forces, not showing NQB() with QB=8 kN/m.
Click Cls, Calculate, CalcT5M5N5MAX and DRAWT5M5N5ELCURVE two times for tranverse force and bending moment diagram.
Next click T5?M5?N5?ELCURVE?, **T5** and click Load case 0 to Load case 2 which gives the diagram shown on the left.
Click **T5** to **M5**, Load case 0 again, and click to Load case 2 which gives the corresponding bending moment diagram.

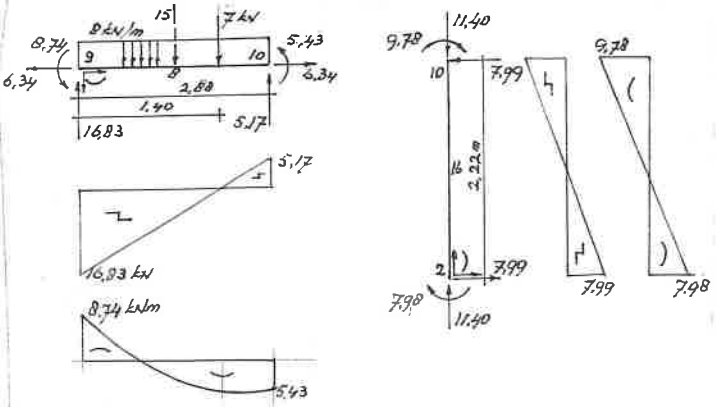


Fig.12.
Clicking PFRES33, some parts are printed on the left. See the underlined values belonging to the members 8 and 16 here above.

P= 1	MMAX=	-6,63 kNm	X=	0,00 m	P= 2	MMAX=	-4,46 kNm	X=	0,00 m		
P= 3	MMAX=	3,84 kNm	X=	1,48 m	P= 4	MMAX=	-2,85 kNm	X=	1,96 m		
P= 5	MMAX=	-4,79 kNm	X=	2,51 m	P= 6	MMAX=	-3,05 kNm	X=	0,00 m		
P= 7	MMAX=	4,61 kNm	X=	1,08 m	P= 8	MMAX=	-5,74 kNm	X=	0,00 m		
P= 9	MMAX=	4,39 kNm	X=	1,40 m	P=10	MMAX=	4,90 kNm	X=	1,40 m		
P=11	MMAX=	4,33 kNm	X=	0,00 m	P=12	MMAX=	-2,92 kNm	X=	1,88 m		
P=13	MMAX=	-5,65 kNm	X=	1,88 m	P=14	MMAX=	-2,77 kNm	X=	0,00 m		
P=15	MMAX=	-7,46 kNm	X=	5,00 m	P=16	MMAX=	-9,78 kNm	X=	2,22 m		
P=17	MMAX=	-4,06 kNm	X=	0,88 m	P=18	MMAX=	3,54 kNm	X=	0,54 m		
P=19	MMAX=	5,59 kNm	X=	2,22 m	P=20	MMAX=	3,86 kNm	X=	5,00 m		

Load 7359.7

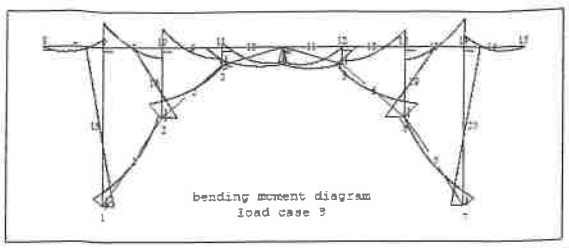
member 8

D5(9,10)=	-6,34 kN	D5(10,9)=	6,34 kN
D6(9,10)=	-16,83 kN	D6(10,9)=	-5,17 kN
MF(9,10)=	-8,74 kNm	MF(10,9)=	-5,43 kNm

member 16

D5(2,10)=	7,99 kN	D5(10,2)=	-7,99 kN
D6(2,10)=	-11,40 kN	D6(10,2)=	11,40 kN
MF(2,10)=	7,98 kNm	MF(10,2)=	9,78 kNm

Equilibrium...?

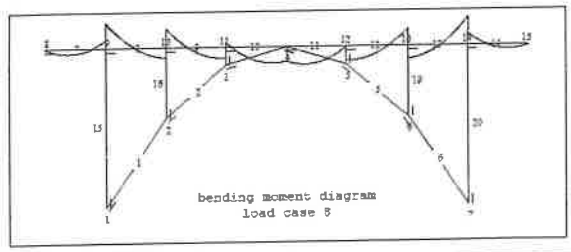


PAR=3 L9=15 m H99=5 m V9=3 H9=15 P9=20 QB=8 kN/m
Lcase 1 P= 19 M55MAX(1)= 6,16 kNm Lcase 2 P= 16 M55MAX(2)= 6,45 kNm
Lcase 3 P= 16 M55MAX(3)= 11,29 kNm Lcase 4 P= 16 M55MAX(4)= 13,29 kNm
Lcase 5 P= 16 M55MAX(5)= 12,94 kNm Lcase 6 P= 16 M55MAX(6)= 12,11 kNm
Lcase 7 P= 13 M55MAX(7)= 12,43 kNm Lcase 8 P= 19 M55MAX(8)= 12,00 kNm
MMAXXX= 13,2870699236091 kNm P=1 To 20 all members

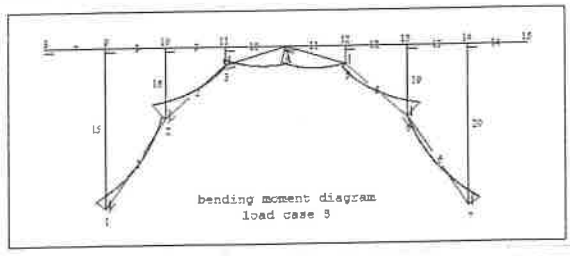
PAR=3 L9=15 m H99=5 m V9=3 H9=15 P9=20 QB=8 kN/m
Lcase 1 P= 13 M55MAX(1)= 5,70 kNm Lcase 2 P= 8 M55MAX(2)= 6,02 kNm
Lcase 3 P= 8 M55MAX(3)= 9,25 kNm Lcase 4 P= 8 M55MAX(4)= 10,75 kNm
Lcase 5 P= 8 M55MAX(5)= 10,99 kNm Lcase 6 P= 8 M55MAX(6)= 10,76 kNm
Lcase 7 P= 13 M55MAX(7)= 12,43 kNm Lcase 8 P= 13 M55MAX(8)= 11,37 kNm
MMAXXX= 12,4329979221351 kNm P=7 To 14 horizontal members 1

Lcase 1 P= 5 M55MAX(1)= 4,14 kNm Lcase 2 P= 1 M55MAX(2)= 5,11 kNm
Lcase 3 P= 1 M55MAX(3)= 6,52 kNm Lcase 4 P= 2 M55MAX(4)= 7,24 kNm
Lcase 5 P= 2 M55MAX(5)= 8,05 kNm Lcase 6 P= 5 M55MAX(6)= 8,91 kNm
Lcase 7 P= 2 M55MAX(7)= 7,38 kNm Lcase 8 P= 3 M55MAX(8)= 7,83 kNm
MMAXXX= 8,91254463401081 kNm P=1 To 6 parabola members 2

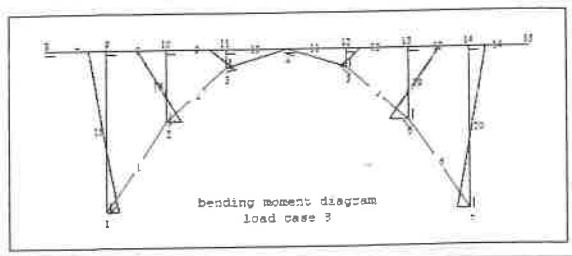
Lcase 1 P= 19 M55MAX(1)= 6,16 kNm Lcase 2 P= 16 M55MAX(2)= 6,45 kNm
Lcase 3 P= 16 M55MAX(3)= 11,29 kNm Lcase 4 P= 16 M55MAX(4)= 13,29 kNm
Lcase 5 P= 16 M55MAX(5)= 12,94 kNm Lcase 6 P= 16 M55MAX(6)= 12,11 kNm
Lcase 7 P= 19 M55MAX(7)= 12,38 kNm Lcase 8 P= 19 M55MAX(8)= 12,00 kNm
MMAXXX= 13,2870699236091 kNm P=15 To 20 vertical members 3



Lcase 1 P= 13 M55MAX(1)= 5,70 kNm Lcase 2 P= 8 M55MAX(2)= 6,02 kNm
Lcase 3 P= 8 M55MAX(3)= 9,25 kNm Lcase 4 P= 8 M55MAX(4)= 10,75 kNm
Lcase 5 P= 8 M55MAX(5)= 10,99 kNm Lcase 6 P= 8 M55MAX(6)= 10,76 kNm
Lcase 7 P= 13 M55MAX(7)= 12,43 kNm Lcase 8 P= 13 M55MAX(8)= 11,37 kNm
MMAXXX= 12,4329979221351 kNm P=7 To 14 horizontal members 1



Lcase 1 P= 5 M55MAX(1)= 4,14 kNm Lcase 2 P= 1 M55MAX(2)= 5,11 kNm
Lcase 3 P= 1 M55MAX(3)= 6,52 kNm Lcase 4 P= 2 M55MAX(4)= 7,24 kNm
Lcase 5 P= 2 M55MAX(5)= 8,05 kNm Lcase 6 P= 5 M55MAX(6)= 8,91 kNm
Lcase 7 P= 2 M55MAX(7)= 7,38 kNm Lcase 8 P= 3 M55MAX(8)= 7,83 kNm
MMAXXX= 8,91254463401081 kNm P=1 To 6 parabola members 2



Lcase 1 P= 19 M55MAX(1)= 6,16 kNm Lcase 2 P= 16 M55MAX(2)= 6,45 kNm
Lcase 3 P= 16 M55MAX(3)= 11,29 kNm Lcase 4 P= 16 M55MAX(4)= 13,29 kNm
Lcase 5 P= 16 M55MAX(5)= 12,94 kNm Lcase 6 P= 16 M55MAX(6)= 12,11 kNm
Lcase 7 P= 19 M55MAX(7)= 12,38 kNm Lcase 8 P= 19 M55MAX(8)= 12,00 kNm
MMAXXX= 13,2870699236091 kNm P=15 To 20 vertical members 3

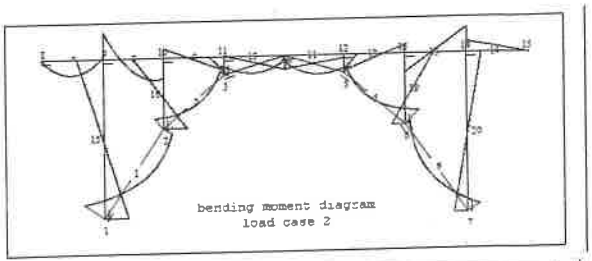
Example. EX3b

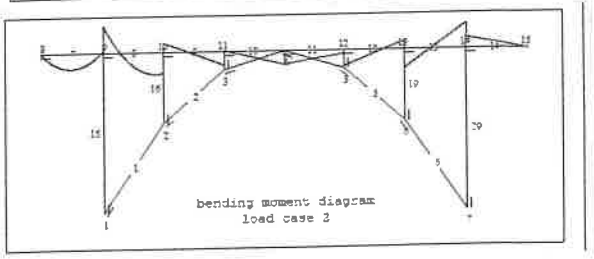
Like page 14. Plus PV(8)=1,PH(8)=1,PV(15)=1!
L9=15 m, H99= 5 m, and V9=3 (Like EX3a.)
In TSTRINGPAR 15,5,3 Enter, click PAR3.
In TSTRINGPAR QB=8 Enter, and for parabola members own weight OWP=5 Enter. OWH=0 OWV=0
Click Calculate, CalcT5M5N5MAX, second click DRAWT5M5N5ELCURVE gives bending moment diagram for load case 8.

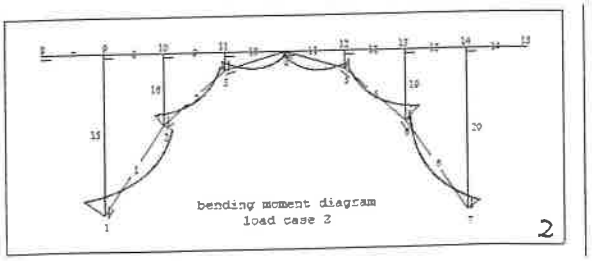
With a click on Show4-QB maximum results for four cases are printed with T55MAX(), second click with M55MAX() like shown on the left.
Click three times on M5 of T5 M5 N5 for three diagrams belonging to three member groups.
Click T5?M5?N5?ELCURVE?, T5 to M5 , and Load case 0 to Load case 2, next M5 (T5 M5 N5) three times for the bending moment diagrams shown here below.

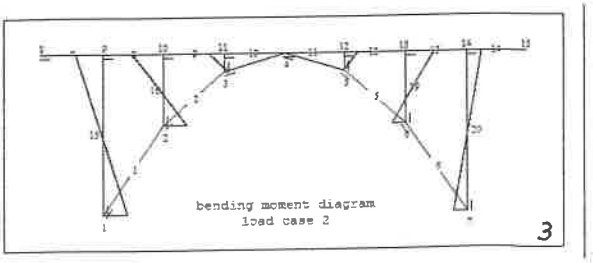
Lcase 1 P= 5 M55MAX(1)= 4,14 kNm Lcase 2 P= 1 M55MAX(2)= 5,11 kNm
Lcase 3 P= 1 M55MAX(3)= 6,52 kNm Lcase 4 P= 2 M55MAX(4)= 7,24 kNm
Lcase 5 P= 2 M55MAX(5)= 8,05 kNm Lcase 6 P= 5 M55MAX(6)= 8,91 kNm
Lcase 7 P= 2 M55MAX(7)= 7,38 kNm Lcase 8 P= 3 M55MAX(8)= 7,83 kNm
MMAXXX= 8,91254463401081 kNm P=1 To 6 parabola members 2

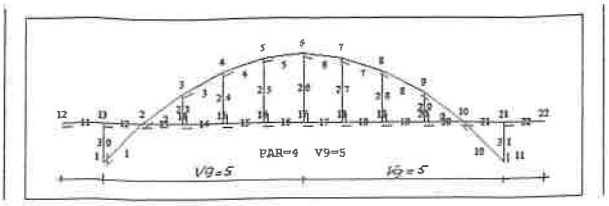
Lcase 1 P= 19 M55MAX(1)= 6,16 kNm Lcase 2 P= 16 M55MAX(2)= 6,45 kNm
Lcase 3 P= 16 M55MAX(3)= 11,29 kNm Lcase 4 P= 16 M55MAX(4)= 13,29 kNm
Lcase 5 P= 16 M55MAX(5)= 12,94 kNm Lcase 6 P= 16 M55MAX(6)= 12,11 kNm
Lcase 7 P= 19 M55MAX(7)= 12,38 kNm Lcase 8 P= 19 M55MAX(8)= 12,00 kNm
MMAXXX= 13,2870699236091 kNm P=15 To 20 vertical members 3











P=11 To 22 horizontal members										
NQB(11)=1	I	Q3	Q4	L3	L4	NQB(12)=1	I	Q3	Q4	L3	L4
	1	5,86	5,86	0,00	3,88		1	5,86	5,86	0,00	3,88
NQB(13)=1	I	Q3	Q4	L3	L4	NQB(14)=1	I	Q3	Q4	L3	L4
	1	5,86	5,86	0,00	3,88		1	5,86	5,86	0,00	3,88
NQB(15)=1	I	Q3	Q4	L3	L4	NQB(16)=1	I	Q3	Q4	L3	L4
	1	5,86	5,86	0,00	3,88		1	5,86	5,86	0,00	3,88
NQB(17)=1	I	Q3	Q4	L3	L4	NQB(18)=1	I	Q3	Q4	L3	L4
	1	5,86	5,86	0,00	3,88		1	5,86	5,86	0,00	3,88
NQB(19)=1	I	Q3	Q4	L3	L4	NQB(20)=1	I	Q3	Q4	L3	L4
	1	5,86	5,86	0,00	3,88		1	5,86	5,86	0,00	3,88
NQB(21)=1	I	Q3	Q4	L3	L4	NQB(22)=1	I	Q3	Q4	L3	L4
	1	5,86	5,86	0,00	3,88		1	5,86	5,86	0,00	3,88

P=1 To 10 parabola members										
NQB(1)=1	I	Q3	Q4	L3	L4	NQA(1)=1	I	Q6	Q7	L6	L7
	1	3,29	3,29	0,00	5,47		1	-3,26	-3,26	0,00	5,47
NQB(2)=1	I	Q3	Q4	L3	L4	NQA(2)=1	I	Q6	Q7	L6	L7
	1	3,66	3,66	0,00	4,90		1	-2,83	-2,83	0,00	4,90
NQB(3)=1	I	Q3	Q4	L3	L4	NQA(3)=1	I	Q6	Q7	L6	L7
	1	4,05	4,05	0,00	4,43		1	-2,24	-2,24	0,00	4,43
NQB(4)=1	I	Q3	Q4	L3	L4	NQA(4)=1	I	Q6	Q7	L6	L7
	1	4,40	4,40	0,00	4,09		1	-1,45	-1,45	0,00	4,09
NQB(5)=1	I	Q3	Q4	L3	L4	NQA(5)=1	I	Q6	Q7	L6	L7
	1	4,60	4,60	0,00	3,90		1	-0,51	-0,51	0,00	3,90
NQB(6)=1	I	Q3	Q4	L3	L4	NQA(6)=1	I	Q6	Q7	L6	L7
	1	4,60	4,60	0,00	3,90		1	0,51	0,51	0,00	3,90
NQB(7)=1	I	Q3	Q4	L3	L4	NQA(7)=1	I	Q6	Q7	L6	L7
	1	4,40	4,40	0,00	4,09		1	1,45	1,45	0,00	4,09
NQB(8)=1	I	Q3	Q4	L3	L4	NQA(8)=1	I	Q6	Q7	L6	L7
	1	4,05	4,05	0,00	4,43		1	2,24	2,24	0,00	4,43
NQB(9)=1	I	Q3	Q4	L3	L4	NQA(9)=1	I	Q6	Q7	L6	L7
	1	3,66	3,66	0,00	4,90		1	2,83	2,83	0,00	4,90
NQB(10)=1	I	Q3	Q4	L3	L4	NQA(10)=1	I	Q6	Q7	L6	L7
	1	3,29	3,29	0,00	5,47		1	3,26	3,26	0,00	5,47

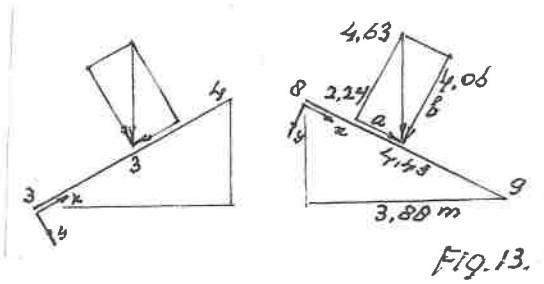


Fig.13.

P=1 To 10 parabola members										
NQV(1)=1	I	Q3V	Q4V	LH3	LH4	NQV(2)=1	I	Q3V	Q4V	LH3	LH4
	1	4,63	4,63	0,00	3,88		1	4,63	4,63	0,00	3,88
NQV(3)=1	I	Q3V	Q4V	LH3	LH4	NQV(4)=1	I	Q3V	Q4V	LH3	LH4
	1	4,63	4,63	0,00	3,88		1	4,63	4,63	0,00	3,88
NQV(5)=1	I	Q3V	Q4V	LH3	LH4	NQV(6)=1	I	Q3V	Q4V	LH3	LH4
	1	4,63	4,63	0,00	3,88		1	4,63	4,63	0,00	3,88
NQV(7)=1	I	Q3V	Q4V	LH3	LH4	NQV(8)=1	I	Q3V	Q4V	LH3	LH4
	1	4,63	4,63	0,00	3,88		1	4,63	4,63	0,00	3,88
NQV(9)=1	I	Q3V	Q4V	LH3	LH4	NQV(10)=1	I	Q3V	Q4V	LH3	LH4
	1	4,63	4,63	0,00	3,88		1	4,63	4,63	0,00	3,88

P=23 To 31 vertical members										
NQA(23)=1	I	Q6	Q7	L6	L7	NQA(24)=1	I	Q6	Q7	L6	L7
	1	2,15	2,15	0,00	3,00		1	2,15	2,15	0,00	5,14
NQA(25)=1	I	Q6	Q7	L6	L7	NQA(26)=1	I	Q6	Q7	L6	L7
	1	2,15	2,15	0,00	6,42		1	2,15	2,15	0,00	6,85
NQA(27)=1	I	Q6	Q7	L6	L7	NQA(28)=1	I	Q6	Q7	L6	L7
	1	2,15	2,15	0,00	6,42		1	2,15	2,15	0,00	5,14
NQA(29)=1	I	Q6	Q7	L6	L7	NQA(30)=1	I	Q6	Q7	L6	L7
	1	2,15	2,15	0,00	3,00		1	-2,15	-2,15	0,00	3,85
NQA(31)=1	I	Q6	Q7	L6	L7						
	1	-2,15	-2,15	0,00	3,85						

Support reactions.

RV(1)= 283,9 kN	RH(1)= 244,2 kN	RV(11)= 285,1 kN	RH(11)= -239,3 kN
RV(12)= 5,2 kN	RH(12)= -4,4 kN	RV(22)= 3,5 kN	

Joint displacements.

UV(1)= 0,0 /EI	UH(1)= 0,0 /EI	UV(2)= 315,7 /EI	UH(2)= 0,0 /EI
UV(3)= 801,7 /EI	UH(3)= 169,5 /EI	UV(4)= 1108,1 /EI	UH(4)= 171,0 /EI
UV(5)= 1284,7 /EI	UH(5)= 95,4 /EI	UV(6)= 1347,5 /EI	UH(6)= -15,2 /EI
UV(7)= 1300,2 /EI	UH(7)= -127,6 /EI	UV(8)= 1138,6 /EI	UH(8)= -208,4 /EI
UV(9)= 844,8 /EI	UH(9)= -214,5 /EI	UV(10)= 357,4 /EI	UH(10)= -45,6 /EI
UV(11)= 0,0 /EI	UH(11)= 0,0 /EI	UV(12)= 0,0 /EI	UH(12)= 0,0 /EI
UV(13)= 20,1 /EI	UH(13)= 2,1 /EI	UV(14)= 805,9 /EI	UH(14)= -16,3 /EI
UV(15)= 1124,6 /EI	UH(15)= -21,1 /EI	UV(16)= 1306,9 /EI	UH(16)= -23,0 /EI
UV(17)= 1371,8 /EI	UH(17)= -23,9 /EI	UV(18)= 1322,5 /EI	UH(18)= -24,8 /EI
UV(19)= 1153,3 /EI	UH(19)= -26,4 /EI	UV(20)= 849,2 /EI	UH(20)= -30,7 /EI
UV(21)= 22,0 /EI	UH(21)= -49,7 /EI	UV(22)= 0,0 /EI	UH(22)= -49,7 /EI

Joint rotations.

UR(1)= 1,63 /EI	UR(2)= 108,70 /EI	UR(3)= 66,04 /EI	UR(4)= 42,90 /EI
UR(5)= 21,87 /EI	UR(6)= 1,85 /EI	UR(7)= -18,24 /EI	UR(8)= -39,67 /EI
UR(9)= -64,27 /EI	UR(10)= -114,50 /EI	UR(11)= -15,70 /EI	UR(12)= 3,97 /EI
UR(13)= 21,86 /EI	UR(14)= 93,26 /EI	UR(15)= 57,58 /EI	UR(16)= 29,17 /EI
UR(17)= 1,86 /EI	UR(18)= -25,53 /EI	UR(19)= -54,30 /EI	UR(20)= -91,55 /EI
UR(21)= -30,70 /EI	UR(22)= -0,29 /EI		

Example. EX4a Click AOAGAIN.

L9=46,56 m, H99=10,7 m, and V9=5
In TSTRINGPAR 46.56,10.7,5 Enter,
click PAR4 before going on!, the frame appears on the form.
For all members is given bending stiffness 1EI and strain stiffness EA=8EI.
The member loads for the three groups of members is given
OWH= 5,86 kN/m for the horizontalmembers,
OWP= 4,63 kN/m for the parabola members and
OWV= 2,15 kN/m for the vertical members.

To type in small text box TSTRINGPAR
OWH=5.86 Enter, OWP=4.63 kN/m, OWV=2.15 kN/m.
Or click EX$a.

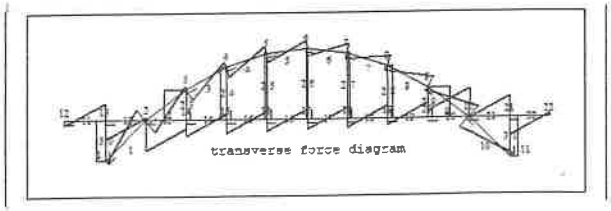
The first click on Show3 prints the member loads of 5,86 kN/m of the horizontal members on the form.

Fig.13.
Member 8, member end numbers 8 and 9.
The horizontal distance between joint 8 and 9 is 46,56/(V9*2+2)= 45,56/12= 3,88 m.
Click Coord to get the joint coordinates,
Y1(9)-Y1(8)= 3,85-1,71= 2,14 m.
(b/3,88)=(4,63/4,43) b=(4,63/4,43)*3,88= 4,06 m
(a/2,14)=(4,63/4,43) a=(4,63/4,43)*2,14= 2,24 m

The printed table shows, underlined, 4,05 and 2,24 kN/m, ok, for member 8. For member 3 the load has a minus sign, NQA(3)= -2,24 kN/m. The member axis system is always placed at the lowest member end number.

Click PAR4 to get back the drawn frame. The short stripes at the member ends indicate the beam axis system .

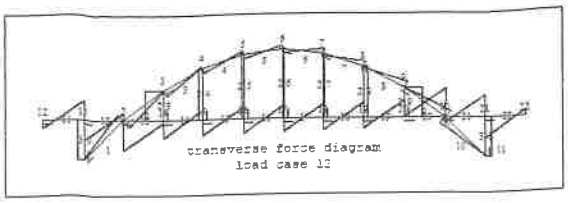
Calculation, click Again, Calculate and CalcT5M5N5MAX. A click on DRAWT5M5N5ELCURVE gives the picture here below.
A click on PFRES33 shows some member end forces and member end moments.



Beam end forces and moments.

D5(1, 2)= 235,12 kN	D5(2, 1)=-235,12 kN	D5(8, 9)= 231,11 kN	D5(9, 8)=-231,11 kN
D6(1, 2)=-258,05 kN	D6(2, 1)= 212,74 kN	D6(8, 9)= 121,01 kN	D6(9, 8)=-141,53 kN
MF(1, 2)= -12,18 kNm	MF(2, 1)= 43,35 kNm	MF(8, 9)= 6,29 kNm	MF(9, 8)= 8,46 kNm
D5(2, 3)= 306,46 kN	D5(3, 2)=-206,46 kN	D5(9,10)= 208,98 kN	D5(10, 9)=-208,98 kN
D6(2, 3)=-178,50 kN	D6(3, 2)= 155,80 kN	D6(9,10)= 156,55 kN	D6(10, 9)=-179,25 kN
MF(2, 3)= -13,63 kNm	MF(3, 2)= -16,36 kNm	MF(9,10)= 15,59 kNm	MF(10, 9)= 9,78 kNm
D5(3, 4)= 230,02 kN	D5(4, 3)=-230,02 kN	D5(10,11)= 231,47 kN	D5(11,10)=-231,47 kN
D6(3, 4)=-141,47 kN	D6(4, 3)= 120,95 kN	D6(10,11)= 209,88 kN	D6(11,10)=-235,20 kN
MF(3, 4)= -9,84 kNm	MF(4, 3)= -7,02 kNm	MF(10,11)= -40,35 kNm	MF(11,10)= 12,17 kNm
D5(4, 5)= 235,86 kN	D5(5, 4)=-235,86 kN	D5(12,13)= -4,37 kN	D5(13,12)= 4,37 kN
D6(4, 5)= -89,65 kN	D6(5, 4)= 70,73 kN	D6(12,13)= -5,20 kN	D6(13,12)= -17,53 kN
MF(4, 5)= -5,12 kNm	MF(5, 4)= -3,18 kNm	MF(12,13)= 0,00 kNm	MF(13,12)= 23,92 kNm
D5(5, 6)= 237,92 kN	D5(6, 5)=-237,92 kN	D5(3,13)= -4,69 kN	D5(13, 2)= 4,69 kN
D6(5, 6)= 237,92 kN	D6(6, 5)=-237,92 kN	D6(3,13)= -2,67 kN	D6(13, 2)= -20,07 kN

Some more clicks and the results shown on the left appear. UR(I) are the joint rotations being member end rotations as well. Since the member ends are assumed as 'real joints' no member end slopes HE(,) are calculated.



PAR=4 L9=46,56 m H99=10,7 m V9=5 H9=22 P9=31 QB=9,3 kN/m

Lcase 1	P= 11	T55MAX(1)=	35,07 kN	Lcase 2	P= 13	T55MAX(2)=	40,69 kN
Lcase 3	P= 13	T55MAX(3)=	52,63 kN	Lcase 4	P= 13	T55MAX(4)=	57,62 kN
Lcase 5	P= 13	T55MAX(5)=	61,23 kN	Lcase 6	P= 13	T55MAX(6)=	63,39 kN
Lcase 7	P= 13	T55MAX(7)=	64,17 kN	Lcase 8	P= 13	T55MAX(8)=	64,39 kN
Lcase 9	P= 13	T55MAX(9)=	64,23 kN	Lcase 10	P= 13	T55MAX(10)=	63,93 kN
Lcase 11	P= 13	T55MAX(11)=	63,76 kN	Lcase 12	P= 13	T55MAX(12)=	63,79 kN

TMAXXX= 64,389428182496 kN P=1 To 31 all members

(p.20)

Support reactions.

RV(1)=	488,8 kN	RH(1)=	412,1 kN	RV(11)=	490,9 kN	RH(11)=	-403,8 kN
RV(12)=	17,1 kN	RH(12)=	-8,2 kN	RV(22)=	13,9 kN		

Joint displacements.

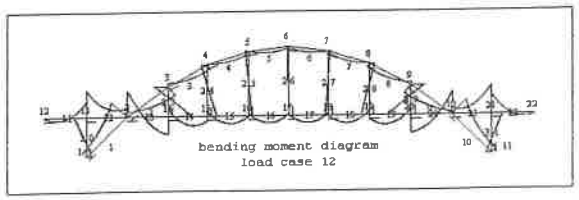
UV(1)=	0,0 /EI	UH(1)=	0,0 /EI	UV(2)=	536,9 /EI	UH(2)=	1,2 /EI
UV(3)=	1351,4 /EI	UH(3)=	286,2 /EI	UV(4)=	1856,3 /EI	UH(4)=	284,9 /EI
UV(5)=	2142,3 /EI	UH(5)=	156,0 /EI	UV(6)=	2244,2 /EI	UH(6)=	-28,7 /EI
UV(7)=	2171,5 /EI	UH(7)=	-216,7 /EI	UV(8)=	1913,8 /EI	UH(8)=	-355,4 /EI
UV(9)=	1432,4 /EI	UH(9)=	-370,7 /EI	UV(10)=	615,2 /EI	UH(10)=	-87,3 /EI
UV(11)=	0,0 /EI	UH(11)=	0,0 /EI	UV(12)=	0,0 /EI	UH(12)=	0,0 /EI
UV(13)=	43,0 /EI	UH(13)=	4,0 /EI	UV(14)=	1364,9 /EI	UH(14)=	-27,1 /EI
UV(15)=	1894,9 /EI	UH(15)=	-36,5 /EI	UV(16)=	2192,7 /EI	UH(16)=	-41,5 /EI
UV(17)=	2298,9 /EI	UH(17)=	-45,0 /EI	UV(18)=	2222,1 /EI	UH(18)=	-48,4 /EI
UV(19)=	1953,8 /EI	UH(19)=	-52,9 /EI	UV(20)=	1446,4 /EI	UH(20)=	-61,3 /EI
UV(21)=	46,6 /EI	UH(21)=	-93,4 /EI	UV(22)=	0,0 /EI	UH(22)=	-93,4 /EI

Joint rotations.

UR(1)=	0,31 /EI	UR(2)=	183,53 /EI	UR(3)=	110,26 /EI	UR(4)=	70,09 /EI
UR(5)=	35,21 /EI	UR(6)=	3,48 /EI	UR(7)=	-28,39 /EI	UR(8)=	-64,01 /EI
UR(9)=	-106,93 /EI	UR(10)=	-194,45 /EI	UR(11)=	-26,78 /EI	UR(12)=	0,00 /EI
UR(13)=	36,15 /EI	UR(14)=	157,02 /EI	UR(15)=	95,14 /EI	UR(16)=	47,65 /EI
UR(17)=	3,50 /EI	UR(18)=	-40,81 /EI	UR(19)=	-88,97 /EI	UR(20)=	-153,80 /EI
UR(21)=	-52,79 /EI	UR(22)=	0,00 /EI				

Zero-spring-calculated element HE(.):

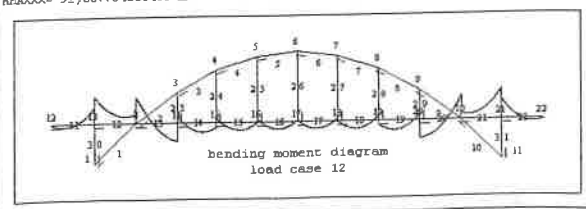
HE(12,13)= 16,98 /EI HE(22,21)= -10,06 /EI



PAR=4 L9=46,56 m H99=10,7 m V9=5 H9=22 P9=31 QB=9,3 kN/m

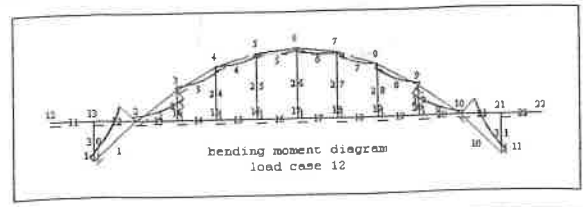
Lcase 1	P= 21	M55MAX(1)=	50,41 kNm	Lcase 2	P= 12	M55MAX(2)=	62,49 kNm
Lcase 3	P= 12	M55MAX(3)=	70,87 kNm	Lcase 4	P= 12	M55MAX(4)=	76,50 kNm
Lcase 5	P= 12	M55MAX(5)=	80,99 kNm	Lcase 6	P= 12	M55MAX(6)=	84,45 kNm
Lcase 7	P= 12	M55MAX(7)=	86,70 kNm	Lcase 8	P= 12	M55MAX(8)=	87,52 kNm
Lcase 9	P= 29	M55MAX(9)=	87,85 kNm	Lcase 10	P= 12	M55MAX(10)=	84,96 kNm
Lcase 11	P= 21	M55MAX(11)=	88,18 kNm	Lcase 12	P= 21	M55MAX(12)=	91,01 kNm

MMAXXX= 91,007764266465 kNm P=1 To 31



Lcase 1	P= 21	M55MAX(1)=	50,41 kNm	Lcase 2	P= 12	M55MAX(2)=	62,49 kNm
Lcase 3	P= 12	M55MAX(3)=	70,87 kNm	Lcase 4	P= 12	M55MAX(4)=	76,50 kNm
Lcase 5	P= 12	M55MAX(5)=	80,99 kNm	Lcase 6	P= 12	M55MAX(6)=	84,45 kNm
Lcase 7	P= 12	M55MAX(7)=	86,70 kNm	Lcase 8	P= 12	M55MAX(8)=	87,52 kNm
Lcase 9	P= 12	M55MAX(9)=	86,80 kNm	Lcase 10	P= 12	M55MAX(10)=	84,96 kNm
Lcase 11	P= 21	M55MAX(11)=	88,18 kNm	Lcase 12	P= 21	M55MAX(12)=	91,01 kNm

MMAXXX= 91,007764266465 kNm P=11 To 22



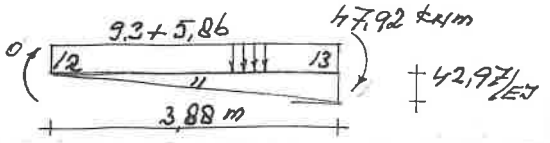
Lcase 1	P= 1	M55MAX(1)=	43,93 kNm	Lcase 2	P= 10	M55MAX(2)=	41,02 kNm
Lcase 3	P= 1	M55MAX(3)=	43,33 kNm	Lcase 4	P= 1	M55MAX(4)=	52,99 kNm
Lcase 5	P= 1	M55MAX(5)=	59,90 kNm	Lcase 6	P= 1	M55MAX(6)=	63,67 kNm
Lcase 7	P= 1	M55MAX(7)=	65,20 kNm	Lcase 8	P= 1	M55MAX(8)=	65,55 kNm
Lcase 9	P= 10	M55MAX(9)=	69,04 kNm	Lcase 10	P= 10	M55MAX(10)=	68,97 kNm
Lcase 11	P= 1	M55MAX(11)=	65,92 kNm	Lcase 12	P= 1	M55MAX(12)=	65,92 kNm

MMAXXX= 69,03733106779 kNm P=1 To 10

Going on with EX4a. EX4b

Member end number 12 of the first horizontal member 11 and member end 22 of the last horizontal member will be assumed to be hinges, so no 'real joints'. To type in large text box TSTRING NL(11)=1,NH(22)=1 Enter.
QB= 9,3 kN/m, in TSTRINGPAR QB=9.3 Enter.
Or click EX4b.
Click Again.
Click Cslculate, CalcT5M5N5MAX and wait some seconds until T5?M5?N5?ELCURVE gets visible..
Clicking PFRES33 several times gives two separately calculated member end slopes
HE(12,13)= 16,98/EI and HE(22,21)= -10,06/EI.

Fig.14.
Member 11 with member end numbers 12 and 13.



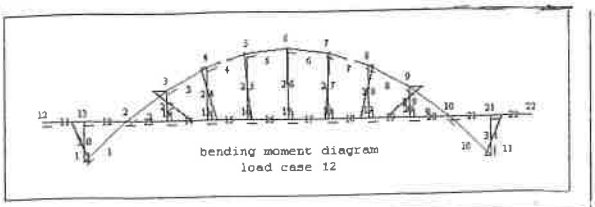
Loads are QB= 9,3 kN/m and own OWH= 5,86 kN/m.
With clicking PFRES33 can be found,
MF(12,13)=0 and MF(13,12)= 47,92 kNm.
Calculation of the slope at member end 12,
(UR(12)= 0,00/EI is printed, not of importance)
with formalas follow
(9,3+5,86)*3,88^^3/24EI= 36,90/EI to the right,
(42,97/EI)/3,88= 11,07/EI to the right,
and (47,92*3,88)/6EI= 30,99/EI to the left.
Assume the slope at member end 11 to the right,
(36,90 +11,07 -30,99)/EI= 16,98/EI and that is
HE(12,13)= 16,98/EI. ok

When clicking DRAWT5M5N5ELCURVE the second time the bending moment diagram appaers which can be printed for each group of members with the maximum values for each group.

First click on M5 (see T5 M5 N5) is **M5**, draws bending moments of members 11 to 22, like the total diagram a little difference.

Second click on **M5** for the bending moment diagrams of the parabola members 1 to 10, with Lcase 9 P=10 M55MAX(9)= 69,04 kNm, the lar gest of all cases.

Third click on **M5** for the beding moment diagrams of the vertical members, largest moment, Lcase 9 P=29 M55MAX(9)= 87,85 kNm.



Lcase 1	P= 23	M55MAX(1)=	44,58 kNm	Lcase 2	P= 23	M55MAX(2)=	44,31 kNm
Lcase 3	P= 29	M55MAX(3)=	44,77 kNm	Lcase 4	P= 29	M55MAX(4)=	49,01 kNm
Lcase 5	P= 29	M55MAX(5)=	55,22 kNm	Lcase 6	P= 29	M55MAX(6)=	63,42 kNm
Lcase 7	P= 29	M55MAX(7)=	73,46 kNm	Lcase 8	P= 29	M55MAX(8)=	83,76 kNm
Lcase 9	P= 29	M55MAX(9)=	87,85 kNm	Lcase 10	P= 23	M55MAX(10)=	74,28 kNm
Lcase 11	P= 23	M55MAX(11)=	73,79 kNm	Lcase 12	P= 23	M55MAX(12)=	73,86 kNm

MMAXXX= 87,8533470614018 kNm P=23 To 31

P=11 To 22 horizontal members

		Q3	Q4	L3	L4
NQB(11)=2	I				
	1	5,86	5,86	0,00	3,88
	2	9,30	9,30	0,00	3,88
NQB(13)=2	I				
	1	5,86	5,86	0,00	3,88
	2	9,30	9,30	0,00	3,88
NQB(15)=2	I				
	1	5,86	5,86	0,00	3,88
	2	9,30	9,30	0,00	3,88
NQB(17)=2	I				
	1	5,86	5,86	0,00	3,88
	2	9,30	9,30	0,00	3,88
NQB(19)=1	I				
	1	5,86	5,86	0,00	3,88
NQB(21)=1	I				
	1	5,86	5,86	0,00	3,88

		Q3	Q4	L3	L4
NQB(12)=2	I				
	1	5,86	5,86	0,00	3,88
	2	9,30	9,30	0,00	3,88
NQB(14)=2	I				
	1	5,86	5,86	0,00	3,88
	2	9,30	9,30	0,00	3,88
NQB(16)=2	I				
	1	5,86	5,86	0,00	3,88
	2	9,30	9,30	0,00	3,88
NQB(18)=2	I				
	1	5,86	5,86	0,00	3,88
	2	9,30	9,30	0,00	3,88
NQB(20)=1	I				
	1	5,86	5,86	0,00	3,88
NQB(22)=1	I				
	1	5,86	5,86	0,00	3,88

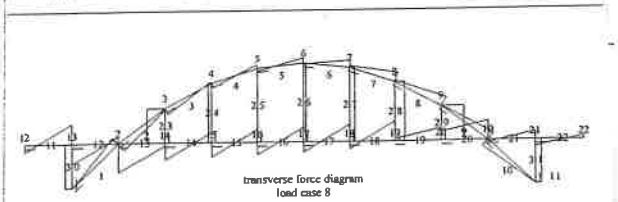
Beam end forces and moments.

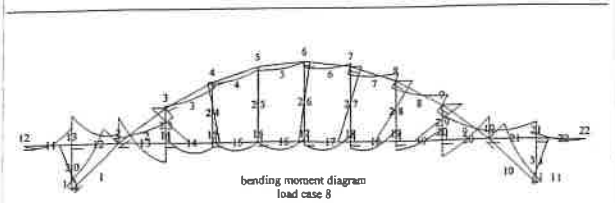
DA(1, 2)=	-0,50 kN	DA(2, 1)=	-17,47 kN	DA(8, 9)=	3,86 kN
NA(1, 2)=	546,40 kN	NA(2, 1)=	-528,57 kN	NA(8, 9)=	389,48 kN
MF(1, 2)=	-19,16 kNm	MF(2, 1)=	65,55 kNm	MF(8, 9)=	23,53 kNm
DA(2, 3)=	-19,98 kN	DA(3, 2)=	2,02 kN	DA(9,10)=	0,94 kN
NA(2, 3)=	433,73 kN	NA(3, 2)=	-419,86 kN	NA(9,10)=	369,61 kN
MF(2, 3)=	-18,03 kNm	MF(3, 2)=	-35,88 kNm	MF(9,10)=	24,33 kNm
DA(3, 4)=	-14,26 kN	DA(4, 3)=	-3,70 kN	DA(10,11)=	-18,02 kN
NA(3, 4)=	430,16 kN	NA(4, 3)=	-420,25 kN	NA(10,11)=	438,85 kN
MF(3, 4)=	-6,94 kNm	MF(4, 3)=	-16,46 kNm	MF(10,11)=	-63,13 kNm
DA(4, 5)=	-10,03 kN	DA(5, 4)=	-7,94 kN	DA(12,13)=	-16,03 kN
NA(4, 5)=	400,18 kN	NA(5, 4)=	-394,23 kN	NA(12,13)=	-64,65 kN
MF(4, 5)=	3,20 kNm	MF(5, 4)=	-7,46 kNm	MF(12,13)=	0,00 kNm
DA(5, 6)=	-6,50 kN	DA(6, 5)=	-11,38 kN	DA(2,13)=	14,72 kN
NA(5, 6)=	379,33 kN	NA(6, 5)=	-377,55 kN	NA(2,13)=	-50,43 kN
MF(5, 6)=	10,07 kNm	MF(6, 5)=	-0,72 kNm	MF(2,13)=	30,50 kNm
DA(6, 7)=	-2,35 kN	DA(7, 6)=	-15,61 kN	DA(2,14)=	-64,39 kN
NA(6, 7)=	373,62 kN	NA(7, 6)=	-375,60 kN	NA(2,14)=	5,90 kN
MF(6, 7)=	17,45 kNm	MF(7, 6)=	8,42 kNm	MF(2,14)=	-78,03 kNm
DA(7, 8)=	3,39 kN	DA(8, 7)=	-21,36 kN	DA(14,15)=	-37,09 kN
NA(7, 8)=	381,02 kN	NA(8, 7)=	-386,97 kN	NA(14,15)=	-32,80 kN
MF(7, 8)=	24,92 kNm	MF(8, 7)=	25,65 kNm	MF(14,15)=	-15,41 kNm

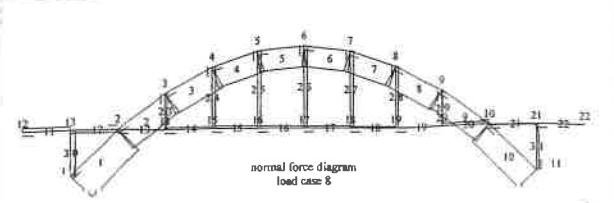
Beam end forces and moments.

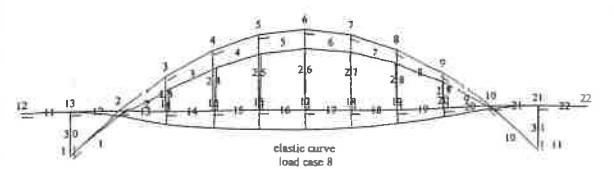
DA(15,16)=	-31,70 kN	DA(16,15)=	-27,12 kN	DA(21,22)=	-15,09 kN
NA(15,16)=	-39,78 kN	NA(16,15)=	39,78 kN	NA(21,22)=	0,00 kN
MF(15,16)=	-8,25 kNm	MF(16,15)=	-0,66 kNm	MF(21,22)=	-14,45 kNm
DA(16,17)=	-27,24 kN	DA(17,16)=	-31,58 kN	DA(3,14)=	38,69 kN
NA(16,17)=	-39,54 kN	NA(17,16)=	39,54 kN	NA(3,14)=	-37,96 kN
MF(16,17)=	-0,40 kNm	MF(17,16)=	8,82 kNm	MF(3,14)=	42,81 kNm
DA(17,18)=	-22,41 kN	DA(18,17)=	-36,41 kN	DA(4,15)=	6,99 kN
NA(17,18)=	-34,64 kN	NA(18,17)=	34,64 kN	NA(4,15)=	-64,48 kN
MF(17,18)=	7,98 kNm	MF(18,17)=	19,18 kNm	MF(4,15)=	13,26 kNm
DA(18,19)=	-16,01 kN	DA(19,18)=	-42,81 kN	DA(5,16)=	-0,24 kN
NA(18,19)=	-23,68 kN	NA(19,18)=	23,68 kN	NA(5,16)=	-68,16 kN
MF(18,19)=	17,87 kNm	MF(19,18)=	34,12 kNm	MF(5,16)=	-2,61 kNm
DA(19,20)=	4,21 kN	DA(20,19)=	-26,95 kN	DA(6,17)=	-4,90 kN
NA(19,20)=	-2,20 kN	NA(20,19)=	2,20 kN	NA(6,17)=	-68,71 kN
MF(19,20)=	27,01 kNm	MF(20,19)=	33,46 kNm	MF(6,17)=	-16,73 kNm
DA(10,20)=	41,49 kN	DA(20,10)=	-18,76 kN	DA(7,18)=	-10,96 kN
NA(10,20)=	45,01 kN	NA(20,10)=	-45,01 kN	NA(7,18)=	-66,23 kN
MF(10,20)=	66,57 kNm	MF(20,10)=	50,31 kNm	MF(7,18)=	-33,34 kNm

DA(22,21)=	-7,64 kN	DA(14, 3)=	-38,69 kN
NA(22,21)=	0,00 kN	NA(14, 3)=	31,52 kN
MF(22,21)=	0,00 kNm	MF(14, 3)=	73,11 kNm
DA(15, 4)=	-6,99 kN	DA(16, 5)=	0,24 kN
NA(15, 4)=	53,44 kN	NA(16, 5)=	54,36 kN
MF(15, 4)=	22,63 kNm	MF(16, 5)=	1,06 kNm
DA(17, 6)=	4,90 kN	DA(18, 7)=	10,96 kN
NA(17, 6)=	53,99 kN	NA(18, 7)=	52,42 kN
MF(17, 6)=	-16,80 kNm	MF(18, 7)=	-37,04 kNm



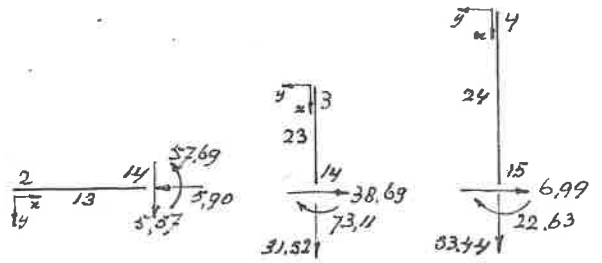






Going on with the same example EX4b.

Click T5?M5?N5?ELCURVE?, T5 appears and Load case 0 becomes visible. Click it to Load case 8, first 8 members 11 to 18 loaded with QB= 9,3 kN/m and own weight OWH= 5,86 kN/m. Click Show3 to get the loads of the horizontal members. (The QB= 9,3 kN/m is only visible below 5,63 kN/m for the load cases 1 to 11....) Click PFRES33 several times for the member end forces DA(,), NA(,) and moments MF(,), see the print on the left.



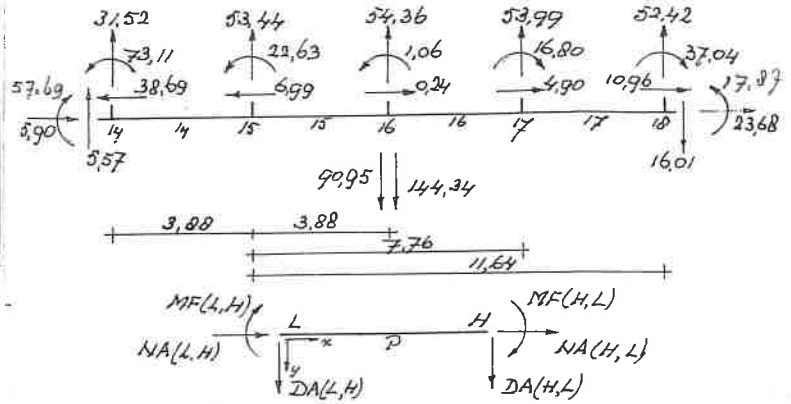


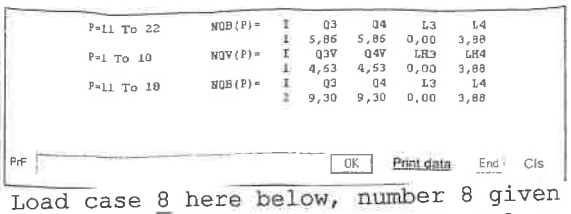
Fig.15.
A part is cut from the whole frame, the members 14 to 17. With PFRES33 is found

member 13		member 23	
DA(14,2)=	5,57 kN	DA(14,3)=	-38,69 kN
NA(14,2)=	-5,90 kN	NA(14,3)=	31,52 kN
MF(14,2)=	-57,69 kNm	MF(14,3)=	73,11 kNm
member 24		member 25	
DA(15,4)=	-6,99 kN	DA(16,5)=	0,24 kN
NA(15,4)=	53,44 kN	NA(16,5)=	54,36 kN
MF(15,4)=	22,63 kNm	MF(16,5)=	1,06 kNm

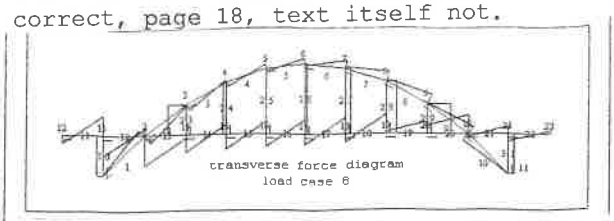
With the assumptions made for the directions of the member end forces and moments the forces and moments acting at the member ends are drwan with their real directions and values added. Positive answer the direction as assumed, neqative answer then opposite directed.
At the joints act forces and moments as large as but opposite directed.
Equilibrium? Of course....

(3,88*4)*5,86=	90,95 kN	OWH=	5,86 kN/m
(3,88*4)*9,30=	144,34 kN	QB=	9,30 kN/m

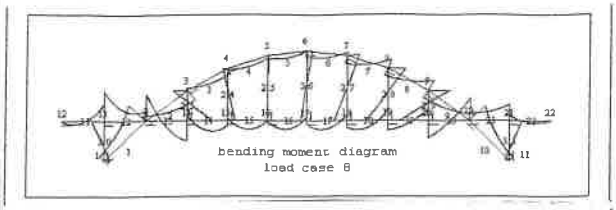
On the left the four diagrams for load case 8 which are printed by the printer when clicking PrPr-4FRTMNZvert.



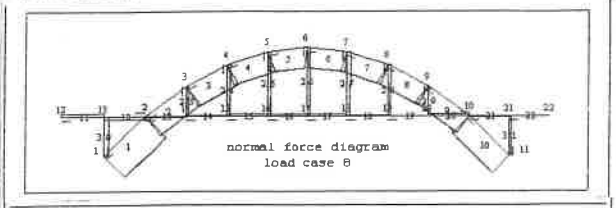
Load case 8 here below, number 8 given data in EX4c. Other cases 12... Values correct, page 18, text itself not.



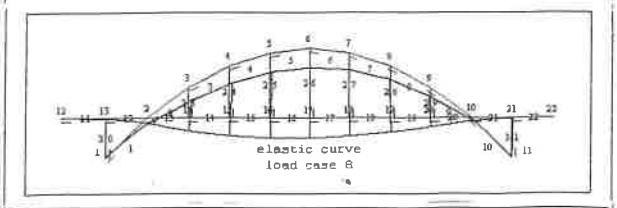
PAR=4 L9=46,56 m H99=10,7 m V9=5 N9=22 P9=31 QB=0 kN/m
Lcase 1 P= 13 T55MAX(1)= 64,39 kN
TMAXXX= 64,389408153486 kN P=1 To 31



PAR=4 L9=46,56 m H99=10,7 m V9=5 N9=22 P9=31 QB= kN/m
Lcase 1 P= 12 M55MAX(1)= 87,52 kNm
MMAXXX= 87,51701068034636 kNm P=1 To 31



PAR=4 L9=46,56 m H99=10,7 m V9=5 N9=22 P9=31 QB= kN/m
Lcase 1 P= 1 N55MAX(1)= 546,40 kN
NMAXXX= 546,402408613592 kN P=1 To 31



PAR=4 L9=46,56 m H99=10,7 m V9=5 N9=22 P9=31 QB= kN/m
Lcase 1 P= 16 Z55MAX(1)=2258,22 /EI
ZMAXXX= 2258,22402619943 /EI P=1 To 31

P= 1	MMAX=	-65,55 kNm	X=	5,47 m	P= 2	MMAX=	35,80 kNm	X=	4,90 m
P= 3	MMAX=	18,15 kNm	X=	3,52 m	P= 4	MMAX=	14,63 kNm	X=	2,29 m
P= 5	MMAX=	14,79 kNm	X=	1,44 m	P= 6	MMAX=	18,06 kNm	X=	0,52 m
P= 7	MMAX=	-25,65 kNm	X=	4,09 m	P= 8	MMAX=	-33,37 kNm	X=	4,43 m
P= 9	MMAX=	24,33 kNm	X=	0,00 m	P=10	MMAX=	-63,13 kNm	X=	0,00 m
P=11	MMAX=	-51,92 kNm	X=	3,88 m	P=12	MMAX=	-87,52 kNm	X=	0,00 m
P=13	MMAX=	-78,03 kNm	X=	0,00 m	P=14	MMAX=	29,96 kNm	X=	2,45 m
P=15	MMAX=	24,91 kNm	X=	2,10 m	P=16	MMAX=	24,07 kNm	X=	1,80 m
P=17	MMAX=	24,55 kNm	X=	1,48 m	P=18	MMAX=	-34,12 kNm	X=	3,88 m
P=19	MMAX=	-33,46 kNm	X=	3,88 m	P=20	MMAX=	-66,57 kNm	X=	3,88 m
P=21	MMAX=	-50,24 kNm	X=	3,88 m	P=22	MMAX=	-14,45 kNm	X=	0,00 m
P=23	MMAX=	73,11 kNm	X=	0,00 m	P=24	MMAX=	22,63 kNm	X=	0,00 m
P=25	MMAX=	2,61 kNm	X=	6,42 m	P=26	MMAX=	-16,80 kNm	X=	0,00 m
P=27	MMAX=	-37,04 kNm	X=	0,00 m	P=28	MMAX=	-61,12 kNm	X=	0,00 m
P=29	MMAX=	-83,76 kNm	X=	0,00 m	P=30	MMAX=	-35,60 kNm	X=	3,85 m
P=31	MMAX=	75,79 kNm	X=	3,07 m					

P= 1	ZMAX=	449,22 /EI	X=	5,47 m	P= 2	ZMAX=	1368,15 /EI	X=	4,90 m
P= 3	ZMAX=	1884,09 /EI	X=	4,43 m	P= 4	ZMAX=	2142,48 /EI	X=	4,09 m
P= 5	ZMAX=	2202,10 /EI	X=	1,49 m	P= 6	ZMAX=	2150,24 /EI	X=	0,00 m
P= 7	ZMAX=	1875,13 /EI	X=	0,00 m	P= 8	ZMAX=	1406,36 /EI	X=	0,00 m
P= 9	ZMAX=	836,90 /EI	X=	0,00 m	P=10	ZMAX=	145,21 /EI	X=	0,00 m
P=11	ZMAX=	43,83 /EI	X=	3,88 m	P=12	ZMAX=	577,59 /EI	X=	3,88 m
P=13	ZMAX=	1444,48 /EI	X=	3,88 m	P=14	ZMAX=	1972,57 /EI	X=	3,88 m
P=15	ZMAX=	2220,56 /EI	X=	3,88 m	P=16	ZMAX=	2258,22 /EI	X=	1,92 m
P=17	ZMAX=	2223,75 /EI	X=	0,00 m	P=18	ZMAX=	1993,95 /EI	X=	0,00 m
P=19	ZMAX=	1549,96 /EI	X=	0,00 m	P=20	ZMAX=	982,28 /EI	X=	0,00 m
P=21	ZMAX=	318,65 /EI	X=	0,00 m	P=22	ZMAX=	17,53 /EI	X=	0,00 m
P=23	ZMAX=	384,73 /EI	X=	3,00 m	P=24	ZMAX=	393,34 /EI	X=	5,14 m
P=25	ZMAX=	257,92 /EI	X=	6,42 m	P=26	ZMAX=	107,33 /EI	X=	0,00 m
P=27	ZMAX=	124,13 /EI	X=	0,00 m	P=28	ZMAX=	-153,10 /EI	X=	5,14 m
P=29	ZMAX=	136,69 /EI	X=	0,00 m	P=30	ZMAX=	31,35 /EI	X=	3,85 m
P=31	ZMAX=	109,78 /EI	X=	3,59 m					

Example. EX4c See page 18.

L9=46,56 m, H99=10,7 m, and V9=5
In TSTRINGPAR 46.56,10.7,5 Enter,
click PAR4 before going on!.

Click Form2 for input of member loads.
For the horizontal members 11 to 22 not in TSTRINGPAR OWH=5,86 Enter. Input with Form2.
P=,P1,P2,NQB,I,Q33,Q44,L33,L44
to type in TSTRING
P=,11,22,**NQB**,**1**,5.86,5.86,0,3.88 Enter.
Click Print data to see data put in.

The parabola members 1 to 10, own weight OWP=4.63 kN/m, vertical member loads.
P=,P1,P2,**NQV**,I,Q3V,Q4V,LH3,LH4
to type in TSTRING
P=,1,10,NQV,1,4.63,4.63,0,**3.88** Enter.
Click Print data.

Load case 8, 'Movable load' 9,3 kN/m.
First 8 members, 11 to 18, (18-11+1=8).
P=,P1,P2,NQB,I,Q33,Q44,L33,L44
to type in TSTRING
P=,11,18,NQB,**2,9.3,9.3**,0,3.88 Enter.
(18-11)+1=8 horizontal members loaded, case 8.

Own weight vertical members OWV=2,15 kN/m.
(NQA not programmed like done above.)

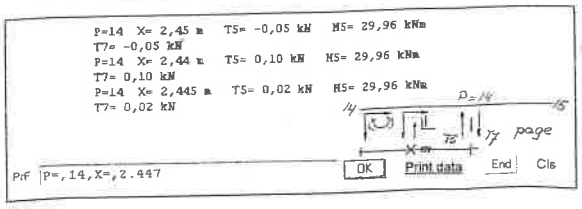
Type in TSTRINGPAR OWV=2.15 Enter.

Click Calculate, CalcT5M5N5MAX for the calculations for load case 8
and click DRAWT5M5N5ELCURVE, tranverse force diagram for case 8 appaers.
Lcase 1 is here load case 8... helas, written
Lcase 1 P=13 T55MAX(1)= 64,39 kN (1 is 8)
Click again DRAWT5M5N5ELCURVE, bending moment diagram for case 8 appears, with
Lcase 1 P=12 M55MAX(8)= 87,52 kNm

See T5 and M5 diagrams cases 1 to 12 on page 18 to compare the underlined values.

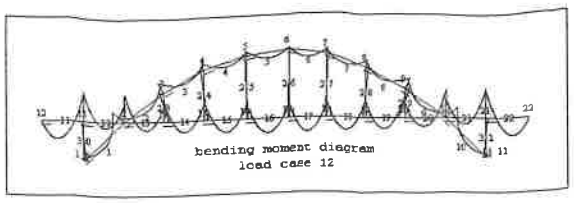
Click Cls, MAX and ZMAX for maximum values.
Member P=14 with MMAX=29,96 kNm at X= 2,45 m.

Type in TSTRING P=,14,X=,2.45 Enter transverse forces T5 and T7, and bending moment M5 are calculated for given X m. Another two times,
P=,14,X=,2.44 Enter and P=,14,X=,2.445 Enter.



For P=14 and X=2.477 m one will find T5=-0,01 kN, M5= 29,96 kNm and T7=-0,01 m.
T5=T7=0 ok, so bending moment a maximum value.

ZMAX= 1972,57/EI at 3,88 m from member end 15 of member 14, it is the vertical displcement of joint 15. With PFRES33 is UV(15)= 1972,57/EI



PAR=4 L9=46,56 m H99=10,7 m V9=5 E9=22 P9=31 QB=9,3 kN/m

Lcase 1	P= 11	M55MAX(1)=	20,34 kNm	Lcase 2	P= 12	M55MAX(2)=	27,23 kNm
Lcase 3	P= 13	M55MAX(3)=	34,51 kNm	Lcase 4	P= 13	M55MAX(4)=	53,71 kNm
Lcase 5	P= 13	M55MAX(5)=	63,90 kNm	Lcase 6	P= 13	M55MAX(6)=	61,36 kNm
Lcase 7	P= 13	M55MAX(7)=	50,76 kNm	Lcase 8	P= 18	M55MAX(8)=	40,18 kNm
Lcase 9	P= 19	M55MAX(9)=	29,92 kNm	Lcase 10	P= 12	M55MAX(10)=	28,55 kNm
Lcase 11	P= 12	M55MAX(11)=	28,27 kNm	Lcase 12	P= 12	M55MAX(12)=	28,31 kNm

MMAXXX= 63,8977126749133 kNm P=1 To 31

Support reactions:

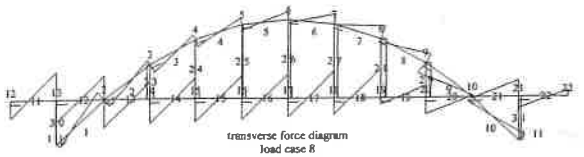
RV(1)= 482,84 kN	RH(1)= 400,82 kN	RV(11)= 482,80 kN	RH(11)=-400,97 kN
RV(12)= 22,53 kN	RH(12)= 0,14 kN	RV(22)= 22,59 kN	

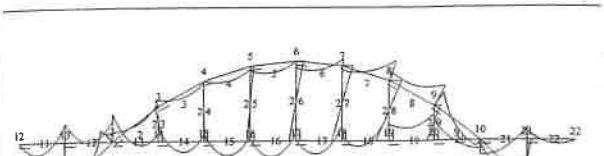
Joint displacements:

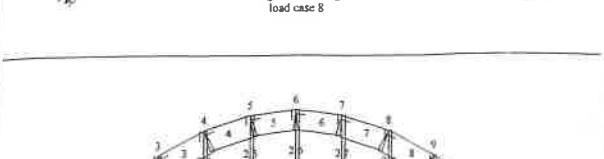
UV(1)= 0,00 /EI	UH(1)= 0,00 /EI	UV(2)= 12,08 /EI	UH(2)= -0,01 /EI
UV(3)= 27,10 /EI	UH(3)= 2,85 /EI	UV(4)= 42,69 /EI	UH(4)= 4,93 /EI
UV(5)= 55,50 /EI	UH(5)= 4,05 /EI	UV(6)= 60,42 /EI	UH(6)= 0,12 /EI
UV(7)= 55,35 /EI	UH(7)= -3,79 /EI	UV(8)= 42,41 /EI	UH(8)= -4,63 /EI
UV(9)= 26,74 /EI	UH(9)= -2,50 /EI	UV(10)= 11,78 /EI	UH(10)= 0,31 /EI
UV(11)= 0,00 /EI	UH(11)= 0,00 /EI	UV(12)= 0,00 /EI	UH(12)= 0,00 /EI
UV(13)= 2,10 /EI	UH(13)= 0,00 /EI	UV(14)= 29,10 /EI	UH(14)= 0,00 /EI
UV(15)= 46,27 /EI	UH(15)= 0,04 /EI	UV(16)= 60,13 /EI	UH(16)= 0,09 /EI
UV(17)= 65,39 /EI	UH(17)= 0,15 /EI	UV(18)= 59,98 /EI	UH(18)= 0,21 /EI
UV(19)= 46,09 /EI	UH(19)= 0,26 /EI	UV(20)= 28,74 /EI	UH(20)= 0,30 /EI
UV(21)= 9,09 /EI	UH(21)= 0,30 /EI	UV(22)= 0,00 /EI	UH(22)= 0,30 /EI

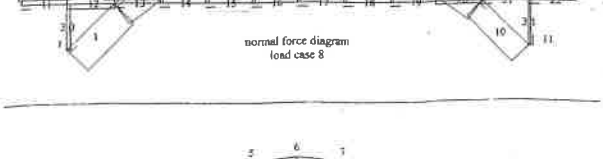
Joint rotations:

UR(1)= 2,31 /EI	UR(2)= 3,13 /EI	UR(3)= 2,43 /EI	UR(4)= 3,17 /EI
UR(5)= 2,06 /EI	UR(6)= -0,02 /EI	UR(7)= -2,10 /EI	UR(8)= -3,19 /EI
UR(9)= -2,44 /EI	UR(10)= -3,08 /EI	UR(11)= -2,22 /EI	UR(12)= 4,07 /EI
UR(13)= 0,40 /EI	UR(14)= 4,39 /EI	UR(15)= 4,00 /EI	UR(16)= 2,55 /EI
UR(17)= -0,03 /EI	UR(18)= -2,58 /EI	UR(19)= -4,03 /EI	UR(20)= -4,40 /EI
UR(21)= -0,25 /EI	UR(22)= -4,09 /EI		









Example.

Continuation of EX4c with
L9=46,56 m, H99=10,7 m, and V9=5
OWH= 5,86 kN/m, OWP= 4,63 kN/m, OWV=2.15 kN/m
and QB= 9,3 kN/m.
Until now for all members 1EI and EA=8EI.

Changing values of bending stiffness 'EI' and strain stiffness 'EA'.
Putting in data in TSTRING of Form2.

P=,P1,P2,'EI',EI,EA
P=,11,22,EI,6,400 Enter, horizontal members,
P=,1,10,EI,5,360 Enter, parabola members,
P=,23,31,EI,1,90 Enter, vertical members.
Arbitrary aasumed values.

Again, Calculate, CalcT5M5N5MAX, wait some seconds.... DRAWT5M5N5ELCURVE etc.

Largest bending moment now, some results,
Lcase 5 P=13 M55MAX(5)= 63,90 kNm,
and earlier found on page 18
Lcase 12 P=13 M55MAX(12)= 91,01 kNm.
The largest normal force now
Lcase 11 P=10 N55MAX= 572,82 Kn,
and to be find on page 18
Lcase 11 P=1 N55MAX= 561,31 kN.

Here below some results with PFRES33.

Beam end forces and moments:

DA(1, 2)= -6,67 kN	DA(2, 1)= -11,36 kN	DA(8, 9)= -7,41 kN	DA(9, 8)= -10,55 kN
NA(1, 2)= 569,88 kN	NA(2, 1)=-552,05 kN	NA(8, 9)= 458,69 kN	NA(9, 8)=-468,60 kN
MF(1, 2)= -2,61 kNm	MF(2, 1)= 15,26 kNm	MF(8, 9)= -4,01 kNm	MF(9, 8)= 10,96 kNm
DA(2, 3)= -8,98 kN	DA(3, 2)= -8,98 kN	DA(9,10)= -8,96 kN	DA(10, 9)= -9,00 kN
NA(2, 3)= 514,78 kN	NA(3, 2)=-500,91 kN	NA(9,10)= 500,86 kN	NA(10, 9)=-514,73 kN
MF(2, 3)= -6,63 kNm	MF(3, 2)= 6,63 kNm	MF(9,10)= -6,64 kNm	MF(10, 9)= 6,74 kNm
DA(3, 4)= -10,54 kN	DA(4, 3)= -7,43 kN	DA(10,11)= -11,31 kN	DA(11,10)= -6,66 kN
NA(3, 4)= 468,62 kN	NA(4, 3)=-458,71 kN	NA(10,11)= 552,23 kN	NA(11,10)=-570,07 kN
MF(3, 4)= -10,91 kNm	MF(4, 3)= 4,01 kNm	MF(10,11)= -15,32 kNm	MF(11,10)= 2,61 kNm
DA(4, 5)= -10,04 kN	DA(5, 4)= -7,93 kN	DA(12,13)= -22,53 kN	DA(13,12)= -36,29 kN
NA(4, 5)= 431,45 kN	NA(5, 4)=-425,51 kN	NA(12,13)= 0,14 kN	NA(13,12)= -0,14 kN
MF(4, 5)= -6,92 kNm	MF(5, 4)= 2,60 kNm	MF(12,13)= 0,00 kNm	MF(13,12)= 26,69 kNm
DA(5, 6)= -9,46 kN	DA(6, 5)= -8,51 kN	DA(2,13)= 26,79 kN	DA(13, 2)= 32,03 kN
NA(5, 6)= 410,45 kN	NA(6, 5)=-408,47 kN	NA(2,13)= 1,24 kN	NA(13, 2)= -1,24 kN
MF(5, 6)= -4,10 kNm	MF(6, 5)= 2,26 kNm	MF(2,13)= 18,15 kNm	MF(13, 2)= -28,31 kNm
DA(6, 7)= -8,50 kN	DA(7, 6)= -9,46 kN	DA(2,14)= -32,40 kN	DA(14, 2)= -26,42 kN
NA(6, 7)= 409,47 kN	NA(7, 6)=-410,45 kN	NA(2,14)= -0,99 kN	NA(14, 2)= 0,99 kN
MF(6, 7)= -2,24 kNm	MF(7, 6)= 4,12 kNm	MF(2,14)= -26,78 kNm	MF(14, 2)= 15,17 kNm
DA(7, 8)= -7,92 kN	DA(8, 7)= -10,05 kN	DA(14,15)= -30,62 kN	DA(15,14)= -28,20 kN
NA(7, 8)= 425,50 kN	NA(8, 7)=-431,44 kN	NA(14,15)= -4,29 kN	NA(15,14)= 4,29 kN
MF(7, 8)= -2,60 kNm	MF(8, 7)= 6,95 kNm	MF(14,15)= -20,76 kNm	MF(15,14)= 16,06 kNm

PFRES33 DRAWT5M5N5ELCURVE JDS=NO AGAGAIN End Reset PrF

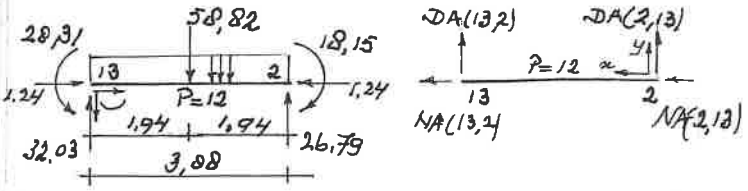


Fig.16.

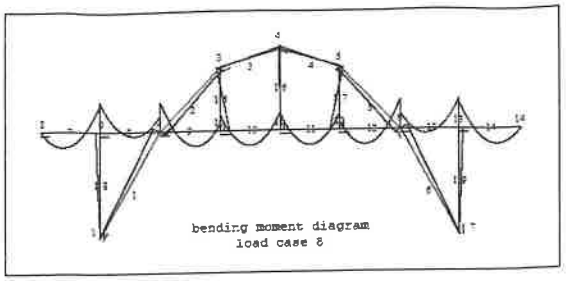
(3,88*(5,86+9,30)= 58,82 kN.
The member end forces and moments are drawn with their real directions. ∑ hor.= 0 ok

∑ vert.= 0 ? 58,82-32,03-26,79= 0 ok
∑ mom. about member end 2= 0 ?
32,03*3,88 +18,15-28,31 -58,82*1,94= 0,01 ok

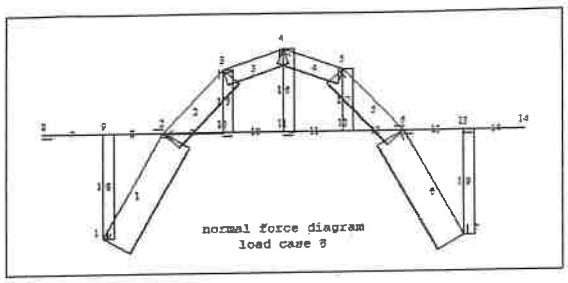
On the left the displacements,
joint 17 UV(17)= 65,39/EI
joint 17 UV(17)= 2298,9/EI p. 18 less rigid

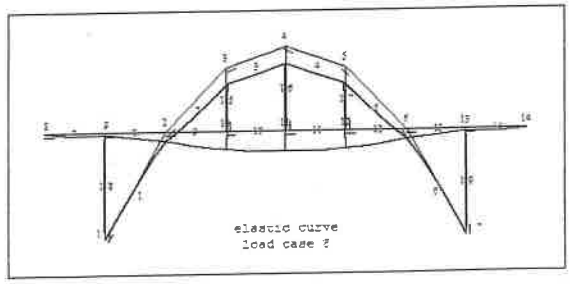
With PrPr-4FRTMNZvert the four diagrams.

NQB(7)=1	I	Q3	Q4	L3	L4	NQB(8)=1	I	Q3	Q4	L3	L4
	1	8,00	8,00	0,00	5,00		1	8,00	8,00	0,00	5,00
NQB(9)=2	I	Q3	Q4	L3	L4	NQB(10)=2	I	Q3	Q4	L3	L4
	1	8,00	8,00	0,00	5,00		1	8,00	8,00	0,00	5,00
	2	3,00	3,00	0,00	5,00		2	3,00	3,00	0,00	5,00
NQB(11)=2	I	Q3	Q4	L3	L4	NQB(12)=2	I	Q3	Q4	L3	L4
	1	8,00	8,00	0,00	5,00		1	8,00	8,00	0,00	5,00
	2	3,00	3,00	0,00	5,00		2	3,00	3,00	0,00	5,00
NQB(13)=1	I	Q3	Q4	L3	L4	NQB(14)=1	I	Q3	Q4	L3	L4
	1	8,00	8,00	0,00	5,00		1	8,00	8,00	0,00	5,00



PAR=4 L9=40 m H99=16 m V9=3 N9=14 P9=19 QB= 8 kN/m
Lcase 1 P= 7 M55MAX(1)= 37,86 kNm Lcase 2 P= 8 M55MAX(2)= 48,08 kNm
Lcase 3 P= 8 M55MAX(3)= 51,73 kNm Lcase 4 P= 9 M55MAX(4)= 55,10 kNm
Lcase 5 P= 8 M55MAX(5)= 56,49 kNm Lcase 6 P= 8 M55MAX(6)= 56,56 kNm
Lcase 7 P= 8 M55MAX(7)= 55,91 kNm Lcase 8 P= 13 M55MAX(8)= 55,98 kNm
MMAXXX= 56,5580077729963 kNm P=1 To 19 all members
OWH= kN/m OWP= kN/m OWV= kN/m





The second click on Show4-QB shows four cases with maximum moments for all load cases.

PAR=4 L9=40 m H99=16 m V9=3 N9=14 P9=19 QB= 8 kN/m
Lcase 1 P= 7 M55MAX(1)= 37,86 kNm Lcase 2 P= 8 M55MAX(2)= 48,08 kNm
Lcase 3 P= 8 M55MAX(3)= 51,73 kNm Lcase 4 P= 9 M55MAX(4)= 55,10 kNm
Lcase 5 P= 8 M55MAX(5)= 56,49 kNm Lcase 6 P= 8 M55MAX(6)= 56,56 kNm
Lcase 7 P= 8 M55MAX(7)= 55,91 kNm Lcase 8 P= 13 M55MAX(8)= 55,98 kNm
MMAXXX= 56,5580077729963 kNm P=7 To 14 horizontal members
OWH= kN/m OWP= kN/m OWV= kN/m

Lcase 1 P= 1 M55MAX(1)= 9,65 kNm Lcase 2 P= 8 M55MAX(2)= 9,61 kNm
Lcase 3 P= 3 M55MAX(3)= 11,09 kNm Lcase 4 P= 4 M55MAX(4)= 18,08 kNm
Lcase 5 P= 6 M55MAX(5)= 14,74 kNm Lcase 6 P= 6 M55MAX(6)= 19,62 kNm
Lcase 7 P= 1 M55MAX(7)= 14,35 kNm Lcase 8 P= 1 M55MAX(8)= 14,34 kNm
MMAXXX= 19,6249734568871 kNm P=1 To 6 parabola members
OWH= kN/m OWP= kN/m OWV= kN/m

Lcase 1 P= 15 M55MAX(1)= 10,25 kNm Lcase 2 P= 15 M55MAX(2)= 11,59 kNm
Lcase 3 P= 17 M55MAX(3)= 14,55 kNm Lcase 4 P= 16 M55MAX(4)= 25,19 kNm
Lcase 5 P= 17 M55MAX(5)= 31,58 kNm Lcase 6 P= 15 M55MAX(6)= 17,98 kNm
Lcase 7 P= 15 M55MAX(7)= 17,80 kNm Lcase 8 P= 15 M55MAX(8)= 17,78 kNm
MMAXXX= 31,5838147138165 kNm P=16 To 19 vertical members
OWH= kN/m OWP= kN/m OWV= kN/m

Example.

L9=40 m, H99=16, V9=3
In TSTRINGPAR 40,16,3 Enter,
click PAR4 before going on!, the frame appears on the form.
For all members is given bending stiffness 1EI and strain stiffness EA=8EI.

QB=8 kN/m a 'movable' distributed load for the V9*2+2= 8 horizontal members, length 40/8= 5 m, in TSTRINGPAR QB=8 Enter, P= 7 to 14.

Suppose a distributed load 3 kN/m over the members 9 to 12, input with the second form, click Form2.

P=,P1,P2,NQB,I,Q33,Q44,L33,L44, in its TSTRING
P=,9,12,NQB,2,3,3,0,5 Enter. (2 second load)

Click Show3, see the member loads on the top left, all horizontal members 7 to 14 with 8 kN/m, for members 9 to 12 is added 3 kN/m.

Click Calculate, CalcT5M5N5MAX, wait a second, second click on DRAWT5M5N5ELCURVE for the bending moment diagram, third click for the normal force diagram.

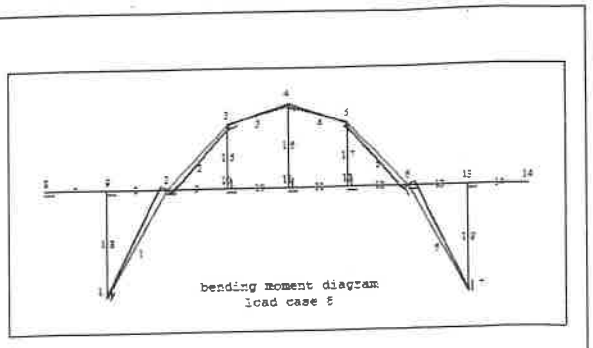
First click on PFRES33 gives member end forces and moments D5(,), D6(,), MF(,), go on clicking DA(,), NA(,) and MF(,) etc.

Beam end forces and moments.

DA(3,10)=	4,53 kN	DA(10, 3)=	-4,53 kN	DA(1, 9)=	0,85 kN	DA(9, 1)=	-0,85 kN
NA(3,10)=	-86,19 kN	NA(10, 3)=	86,19 kN	NA(1, 9)=	94,98 kN	NA(9, 1)=	-94,98 kN
MF(3,10)=	6,41 kNm	MF(10, 3)=	17,78 kNm	MF(1, 9)=	0,63 kNm	MF(9, 1)=	6,90 kNm
DA(4,11)=	0,00 kN	DA(11, 4)=	0,00 kN	DA(7,13)=	-0,85 kN	DA(13, 7)=	0,85 kN
NA(4,11)=	-95,73 kN	NA(11, 4)=	95,73 kN	NA(7,13)=	95,00 kN	NA(13, 7)=	-95,00 kN
MF(4,11)=	0,01 kNm	MF(11, 4)=	0,01 kNm	MF(7,13)=	-0,63 kNm	MF(13, 7)=	-6,90 kNm
DA(5,12)=	-4,53 kN	DA(12, 5)=	4,53 kN				
NA(5,12)=	-86,19 kN	NA(12, 5)=	86,19 kN				

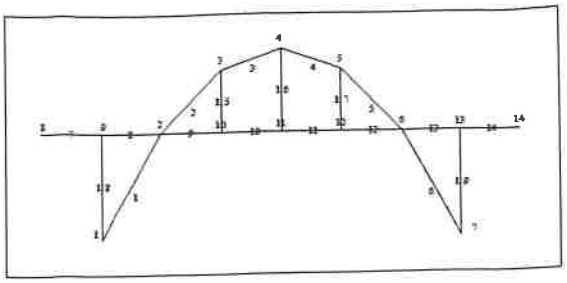
Beam end forces and moments.

D5(1, 2)=	128,01 kN	D5(2, 1)=-128,01 kN		D5(2, 9)=	-0,83 kN	D5(9, 2)=	0,83 kN
D6(1, 2)=	-224,83 kN	D6(2, 1)=	224,83 kN	D6(2, 9)=	-34,83 kN	D6(9, 2)=	-45,17 kN
MF(1, 2)=	-0,63 kNm	MF(2, 1)=	14,34 kNm	MF(2, 9)=	30,09 kNm	MF(9, 2)=	-55,95 kNm
D5(2, 3)=	126,70 kN	D5(3, 2)=-126,70 kN		D5(2,10)=	2,14 kN	D5(10, 2)=	-2,14 kN
D6(2, 3)=	-134,06 kN	D6(3, 2)=	134,06 kN	D6(2,10)=	-55,95 kN	D6(10, 2)=	-39,05 kN
MF(2, 3)=	10,69 kNm	MF(3, 2)=	-5,23 kNm	MF(2,10)=	-55,12 kNm	MF(10, 2)=	12,89 kNm
D5(3, 4)=	131,24 kN	D5(4, 3)=-131,24 kN		D5(10,11)=	-2,39 kN	D5(11,10)=	2,39 kN
D6(3, 4)=	-47,87 kN	D6(4, 3)=	47,87 kN	D6(10,11)=	-47,14 kN	D6(11,10)=	-47,86 kN



Lcase 1 P= 1 M55MAX(1)= 9,65 kNm Lcase 2 P= 8 M55MAX(2)= 9,61 kNm
Lcase 3 P= 3 M55MAX(3)= 11,09 kNm Lcase 4 P= 4 M55MAX(4)= 18,08 kNm
Lcase 5 P= 6 M55MAX(5)= 14,74 kNm Lcase 6 P= 6 M55MAX(6)= 19,62 kNm
Lcase 7 P= 1 M55MAX(7)= 14,35 kNm Lcase 8 P= 1 M55MAX(8)= 14,34 kNm
MMAXXX= 19,6249734568871 kNm P=1 To 6 parabola members
OWH= kN/m OWP= kN/m OWV= kN/m

Second click on T5 M5 N5 shows the bending moment diagram for the parabola members with maximum values for all load cases like shown on the left.



Beam end forces and moments.

D5(1, 2)=	-1,64 kN	D5(2, 9)=	6,48 kN	D5(9, 2)=	-6,48 kN
D6(1, 2)=	3,04 kN	D6(2, 9)=	-0,38 kN	D6(9, 2)=	0,38 kN
MF(1, 2)=	0,17 kNm	MF(2, 9)=	1,41 kNm	MF(9, 2)=	0,51 kNm
D5(2, 3)=	-3,84 kN	D5(3, 2)=	3,84 kN	D5(10, 2)=	4,18 kN
D6(2, 3)=	3,75 kN	D6(3, 2)=	-3,75 kN	D6(10, 2)=	0,33 kN
MF(2, 3)=	-1,12 kNm	MF(3, 2)=	-1,11 kNm	MF(10, 2)=	-0,89 kNm
D5(3, 4)=	-4,65 kN	D5(4, 3)=	4,65 kN	D5(11,10)=	3,47 kN
D6(3, 4)=	2,55 kN	D6(4, 3)=	-2,55 kN	D6(11,10)=	-0,88 kN
MF(3, 4)=	2,92 kNm	MF(4, 3)=	1,54 kNm	MF(11,10)=	1,55 kNm
D5(4, 5)=	4,41 kN	D5(5, 4)=	-4,41 kN	D5(12,11)=	2,53 kN
D6(4, 5)=	2,53 kN	D6(5, 4)=	-2,51 kN	D6(12,11)=	-0,92 kN
MF(4, 5)=	1,80 kNm	MF(5, 4)=	2,88 kNm	MF(12,11)=	2,78 kNm
D5(5, 6)=	3,56 kN	D5(6, 5)=	-3,56 kN	D5(12, 6)=	-1,68 kN
D6(5, 6)=	3,54 kN	D6(6, 5)=	-3,54 kN	D6(12, 6)=	-0,11 kN
MF(5, 6)=	-0,71 kNm	MF(6, 5)=	-0,61 kNm	MF(12, 6)=	-0,44 kNm
D5(6, 7)=	1,80 kN	D5(7, 6)=	-1,80 kN	D5(13, 6)=	-0,08 kN
D6(6, 7)=	3,26 kN	D6(7, 6)=	-3,26 kN	D6(13, 6)=	-0,16 kN
MF(6, 7)=	0,11 kNm	MF(7, 6)=	0,19 kNm	MF(13, 6)=	0,20 kNm
D5(8, 9)=	-6,42 kN	D5(9, 8)=	6,42 kN	D5(13,14)=	0,00 kN
D6(8, 9)=	-0,03 kN	D6(9, 8)=	0,03 kN	D6(13,14)=	0,06 kN
MF(8, 9)=	0,00 kNm	MF(9, 8)=	-0,15 kNm	MF(13,14)=	0,31 kNm

PFRES33 DRAWT5M5N5ELCURVE JDS=NO Show4-QB End Reset PrF

Beam end forces and moments.

D5(3,10)=	0,71 kN	D5(10, 3)=	-0,71 kN	D5(1, 9)=	-0,06 kN
D6(3,10)=	1,21 kN	D6(10, 3)=	-1,21 kN	D6(1, 9)=	0,41 kN
MF(3,10)=	-1,82 kNm	MF(10, 3)=	-1,97 kNm	MF(1, 9)=	-0,17 kNm
D5(4,11)=	0,94 kN	D5(11, 4)=	-0,94 kN	D5(7,13)=	-0,08 kN
D6(4,11)=	0,04 kN	D6(11, 4)=	-0,04 kN	D6(7,13)=	-0,10 kN
MF(4,11)=	-3,35 kNm	MF(11, 4)=	-3,36 kNm	MF(7,13)=	-0,19 kNm
D5(5,12)=	0,85 kN	D5(12, 5)=	-0,85 kN		
D6(5,12)=	-1,08 kN	D6(12, 5)=	1,08 kN		
MF(5,12)=	-2,17 kNm	MF(12, 5)=	-2,34 kNm		

Example.

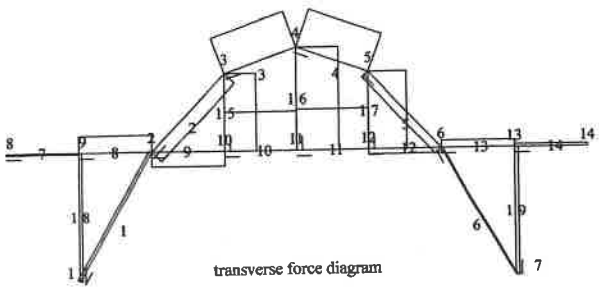
L9=40 m H99= 16 m V9=3
In small TSTRINGPAR 40,16,3 Enter and click PAR4.
Joint 4 is loaded with a horizontal for of 10 kN to the right, to type in large TSTRING FX(4)=10 Enter.
Click Calculate and DRAWT5M5N5ELCURVE to get the transverse force diagram drawn.
Click PFRES33 two times for the member end forces D5(,) and D6(,) and member end moments MF(,) to appear below the diagram. Click Show1 and Show2 for joint and member data here below.

I	FX	FY	FV	SV	XI	FX	FZ	ZZ	SS	YI	XX	ZR	DR	SK
1	0,00	1	0,0	0,0	5,00	0,00	1	0,0	0,0	16,00	0,00	0	0,5	0,0
2	0,00	0	-0,5	0,0	10,00	0,00	0	5,1	0,0	7,11	0,00	0	1,8	0,0
3	0,00	0	12,4	0,0	15,00	0,00	0	25,1	0,0	1,78	0,00	0	2,0	0,0
4	0,00	0	2,1	0,0	20,00	10,00	0	25,1	0,0	0,00	0,00	0	-1,7	0,0
5	0,00	0	-10,7	0,0	25,00	0,00	0	30,1	0,0	1,78	0,00	0	1,2	0,0
6	0,00	0	-3,3	0,0	30,00	0,00	0	15,5	0,0	7,11	0,00	0	1,5	0,0
7	0,00	1	0,0	0,0	35,00	0,00	1	0,0	0,0	16,00	0,00	0	1,8	0,0
8	0,00	1	0,0	0,0	0,00	0,00	1	0,0	0,0	7,11	0,00	0	0,0	0,0
9	0,00	0	-0,5	0,0	5,00	0,00	0	4,0	0,0	7,11	0,00	0	-0,3	0,0
10	0,00	0	11,6	0,0	15,00	0,00	0	10,7	0,0	7,11	0,00	0	1,6	0,0
11	0,00	0	2,0	0,0	20,00	0,00	0	12,8	0,0	7,11	0,00	0	-1,7	0,0
12	0,00	0	-10,0	0,0	25,00	0,00	0	14,4	0,0	7,11	0,00	0	0,7	0,0
13	0,00	0	0,1	0,0	35,00	0,00	0	15,4	0,0	7,11	0,00	0	0,5	0,0
14	0,00	1	0,0	0,0	40,00	0,00	0	15,4	0,0	7,11	0,00	0	-0,3	0,0

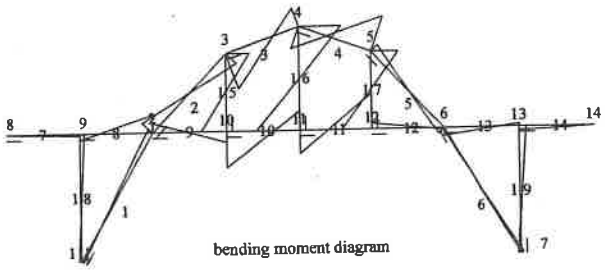
P	I1	I2	X1	Y1	X2	Y2	RP	EI	EA	LL	P	I1	I2	X1	Y1	X2	Y2	EI	EA	LL
1	1	2	0	0	1	0	0	1,0	8	10,20	11	11	12	0	0	11	0	0	1,0	8 5,00
2	2	3	0	0	2	0	0	1,0	8	7,31	12	6	12	0	0	12	0	0	1,0	8 5,00
3	3	4	0	0	3	0	0	1,0	8	5,31	13	6	13	0	0	6	0	0	1,0	8 5,00
4	4	5	0	0	4	0	0	1,0	8	5,31	14	13	14	0	0	13	0	0	1,0	8 5,00
5	5	6	0	0	5	0	0	1,0	8	7,31	15	3	16	0	0	10	0	0	1,0	8 5,33
6	6	7	0	0	6	0	0	1,0	8	10,20	16	4	11	0	0	11	0	0	1,0	8 7,11
7	8	9	0	0	8	0	0	1,0	8	5,00	17	5	12	0	0	12	0	0	1,0	8 5,33
8	2	8	0	0	9	0	0	1,0	8	5,00	18	1	9	0	0	1	0	0	1,0	8 8,89
9	2	10	0	0	2	0	0	1,0	8	5,00	19	7	13	0	0	7	0	0	1,0	8 8,89
10	10	11	0	0	10	0	0	1,0	8	5,00										

With a click on PrPr-4FRTMNZhor the printer prints the diagrams like shown here below.

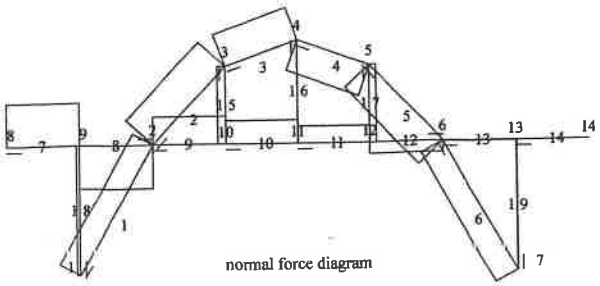
L9=40 m H99=16 m V9=3 FX(4)=10 kN



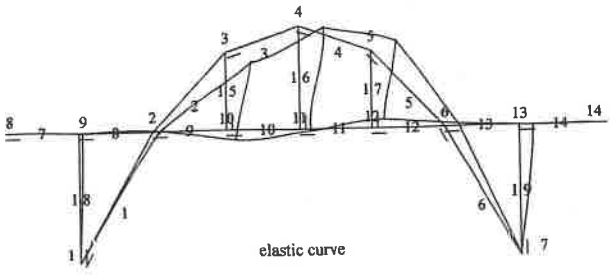
transverse force diagram



bending moment diagram

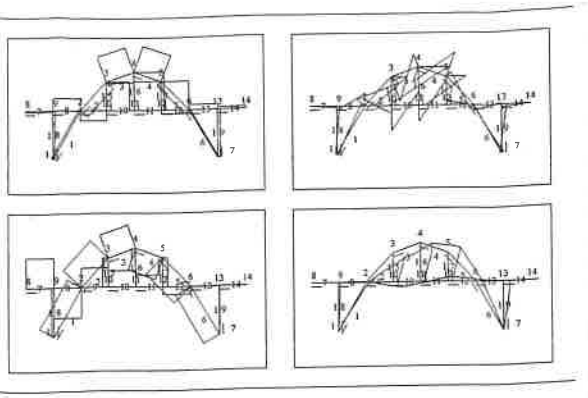


normal force diagram



elastic curve

PAR=4 L9=40 m H99=16 m V9=3 N9=14 P9=19



PAR=4 L9=40 m H99=16 m V9=3 N9=14 P9=19

Beam end forces and moments.

P=1
DA(1, 2)= 0,06 kN DA(2, 1)= -0,06 kN
NA(1, 2)= -3,46 kN NA(2, 1)= 3,46 kN
MF(1, 2)= 0,17 kNm MF(2, 1)= 0,45 kNm

P=2
DA(2, 3)= -0,30 kN DA(3, 2)= 0,30 kN
NA(2, 3)= -5,43 kN NA(3, 2)= 5,43 kN
MF(2, 3)= -1,12 kNm MF(3, 2)= -1,11 kNm

P=3
DA(3, 4)= 0,84 kN DA(4, 3)= -0,84 kN
NA(3, 4)= -5,23 kN NA(4, 3)= 5,23 kN
MF(4, 3)= 2,92 kNm MF(4, 3)= 1,54 kNm

P=4
DA(4, 5)= 0,88 kN DA(5, 4)= -0,88 kN
NA(4, 5)= 5,00 kN NA(5, 4)= -5,00 kN
MF(4, 5)= 1,81 kNm MF(5, 4)= 2,88 kNm

P=5
DA(5, 6)= -0,18 kN DA(6, 5)= 0,18 kN
NA(5, 6)= 5,02 kN NA(6, 5)= -5,02 kN
MF(5, 6)= -0,71 kNm MF(6, 5)= -0,61 kNm

P=6
DA(6, 7)= 0,03 kN DA(7, 6)= -0,03 kN
NA(6, 7)= 3,73 kN NA(7, 6)= -3,73 kN
MF(6, 7)= 0,11 kNm MF(7, 6)= 0,19 kNm

P=7
DA(8, 9)= -0,03 kN DA(9, 8)= 0,03 kN
NA(8, 9)= -6,42 kN NA(9, 8)= 6,42 kN
MF(8, 9)= 0,00 kNm MF(9, 8)= -0,15 kNm

P=8
DA(2, 9)= 0,38 kN DA(9, 2)= -0,38 kN
NA(2, 9)= -6,48 kN NA(9, 2)= 6,48 kN
MF(2, 9)= 1,41 kNm MF(9, 2)= 0,51 kNm

P=9
DA(2,10)= -0,33 kN DA(10, 2)= 0,33 kN
NA(2,10)= -4,18 kN NA(10, 2)= 4,18 kN
MF(2,10)= -0,74 kNm MF(10, 2)= -0,89 kNm

P=10
DA(10,11)= 0,88 kN DA(11,10)= -0,88 kN
NA(10,11)= -3,47 kN NA(11,10)= 3,47 kN
MF(10,11)= 2,86 kNm MF(11,10)= 1,55 kNm

P=11
DA(11,12)= 0,92 kN DA(12,11)= -0,92 kN
NA(11,12)= -2,53 kN NA(12,11)= 2,53 kN
MF(11,12)= 1,81 kNm MF(12,11)= 2,78 kNm

P=12
DA(6,12)= -0,11 kN DA(12, 6)= 0,11 kN
NA(6,12)= -1,68 kN NA(12, 6)= 1,68 kN
MF(6,12)= -0,11 kNm MF(12, 6)= -0,44 kNm

P=13
DA(6,13)= 0,16 kN DA(13, 6)= -0,16 kN
NA(6,13)= 0,08 kN NA(13, 6)= -0,08 kN
MF(6,13)= 0,62 kNm MF(13, 6)= 0,20 kNm

P=14
DA(13,14)= 0,06 kN DA(14,13)= -0,06 kN
NA(13,14)= 0,00 kN NA(14,13)= 0,00 kN
MF(13,14)= 0,31 kNm MF(14,13)= 0,00 kNm

P=15
DA(3,10)= -0,71 kN DA(10, 3)= 0,71 kN
NA(3,10)= 1,21 kN NA(10, 3)= -1,21 kN
MF(3,10)= -1,82 kNm MF(10, 3)= -1,97 kNm

P=16
DA(4,11)= -0,94 kN DA(11, 4)= 0,94 kN
NA(4,11)= 0,04 kN NA(11, 4)= -0,04 kN
MF(4,11)= -3,35 kNm MF(11, 4)= -3,36 kNm

P=17
DA(5,12)= -0,85 kN DA(12, 5)= 0,85 kN
NA(5,12)= -1,03 kN NA(12, 5)= 1,03 kN
MF(5,12)= -2,17 kNm MF(12, 5)= -2,34 kNm

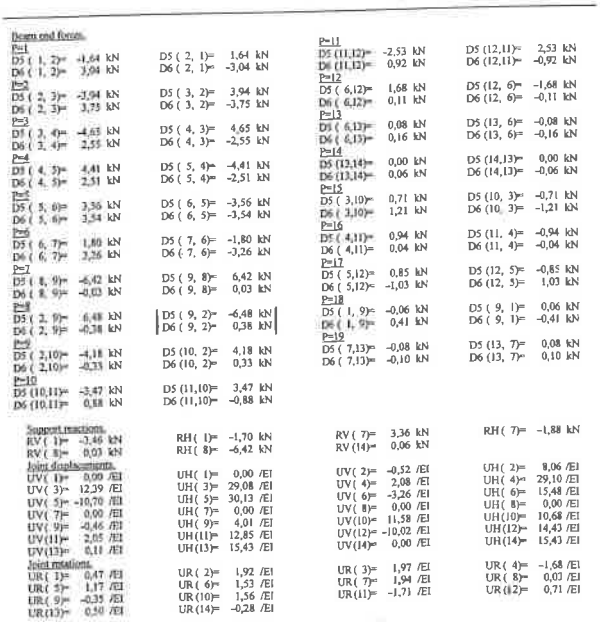
P=18
DA(1, 9)= -0,06 kN DA(9, 1)= 0,06 kN
NA(1, 9)= -0,41 kN NA(9, 1)= 0,41 kN
MF(1, 9)= -0,17 kNm MF(9, 1)= -0,35 kNm

P=19
DA(7,13)= -0,08 kN DA(13, 7)= 0,08 kN
NA(7,13)= 0,10 kN NA(13, 7)= -0,10 kN
MF(7,13)= -0,19 kNm MF(13, 7)= -0,51 kNm

Printer print.

Clicking
PrD5D6 No to PrD5D6 Yes,
Pr4FR-No to PrFR-Yes and
PrPr prints

the four diagrams, and
DA(,), NA(,), MF(,), next
D5(,) and D6(,) and
reactions and displacements.



Beam end forces.

P=1
D5(1, 2)= -1,64 kN D5(2, 1)= 1,64 kN
D6(1, 2)= 3,04 kN D6(2, 1)= -3,04 kN

P=2
D5(2, 3)= -3,94 kN D5(3, 2)= 3,94 kN
D6(2, 3)= 3,75 kN D6(3, 2)= -3,75 kN

P=3
D5(3, 4)= -4,65 kN D5(4, 3)= 4,65 kN
D6(3, 4)= 2,55 kN D6(4, 3)= -2,55 kN

P=4
D5(4, 5)= -4,41 kN D5(5, 4)= -4,41 kN
D6(4, 5)= 2,51 kN D6(5, 4)= -2,51 kN

P=5
D5(5, 6)= 3,56 kN D5(6, 5)= -3,56 kN
D6(5, 6)= 3,54 kN D6(6, 5)= -3,54 kN

P=6
D5(6, 7)= 1,80 kN D5(7, 6)= -1,80 kN
D6(6, 7)= 3,26 kN D6(7, 6)= -3,26 kN

P=7
D5(8, 9)= -6,42 kN D5(9, 8)= 6,42 kN
D6(8, 9)= -0,03 kN D6(9, 8)= 0,03 kN

P=8
D5(2, 9)= 6,48 kN D5(9, 2)= -6,48 kN
D6(2, 9)= -0,38 kN D6(9, 2)= 0,38 kN

P=9
D5(2,10)= -4,18 kN D5(10, 2)= 4,18 kN
D6(2,10)= -0,33 kN D6(10, 2)= 0,33 kN

P=10
D5(10,11)= -3,47 kN D5(11,10)= 3,47 kN
D6(10,11)= 0,88 kN D6(11,10)= -0,88 kN

P=11
D5(11,12)= -2,53 kN D5(12,11)= 2,53 kN
D6(11,12)= 0,92 kN D6(12,11)= -0,92 kN

P=12
D5(6,12)= 1,68 kN D5(12, 6)= -1,68 kN
D6(6,12)= 0,11 kN D6(12, 6)= -0,11 kN

P=13
D5(6,13)= 0,08 kN D5(13, 6)= -0,08 kN
D6(6,13)= 0,16 kN D6(13, 6)= -0,16 kN

P=14
D5(13,14)= 0,00 kN D5(14,13)= 0,00 kN
D6(13,14)= 0,06 kN D6(14,13)= -0,06 kN

P=15
D5(3,10)= 0,71 kN D5(10, 3)= -0,71 kN
D6(3,10)= 1,21 kN D6(10, 3)= -1,21 kN

P=16
D5(4,11)= 0,94 kN D5(11, 4)= -0,94 kN
D6(4,11)= 0,04 kN D6(11, 4)= -0,04 kN

P=17
D5(5,12)= 0,85 kN D5(12, 5)= -0,85 kN
D6(5,12)= -1,03 kN D6(12, 5)= 1,03 kN

P=18
D5(1, 9)= -0,06 kN D5(9, 1)= 0,06 kN
D6(1, 9)= 0,41 kN D6(9, 1)= -0,41 kN

P=19
D5(7,13)= -0,08 kN D5(13, 7)= 0,08 kN
D6(7,13)= -0,10 kN D6(13, 7)= 0,10 kN

Support reactions.
RV(1)= -3,46 kN RH(1)= -1,70 kN
RV(8)= 0,03 kN RH(8)= -6,42 kN
RV(7)= 3,36 kN RH(7)= -1,88 kN
RV(14)= 0,06 kN

Joint displacements.
UV(1)= 0,00 /EI UH(1)= 0,00 /EI
UV(3)= 12,39 /EI UH(3)= 29,08 /EI
UV(5)= -10,70 /EI UH(5)= 30,13 /EI
UV(7)= 0,00 /EI UH(7)= 0,00 /EI
UV(9)= -0,46 /EI UH(9)= 4,01 /EI
UV(11)= 2,05 /EI UH(11)= 12,85 /EI
UV(13)= 0,11 /EI UH(13)= 15,43 /EI
UV(2)= -0,52 /EI UH(2)= 8,06 /EI
UV(4)= 2,08 /EI UH(4)= 29,10 /EI
UV(6)= -3,26 /EI UH(6)= 15,48 /EI
UV(8)= 0,00 /EI UH(8)= 0,00 /EI
UV(10)= 11,58 /EI UH(10)= 10,68 /EI
UV(12)= -10,02 /EI UH(12)= 14,43 /EI
UV(14)= 0,00 /EI UH(14)= 15,43 /EI

Joint rotations.
UR(1)= 0,47 /EI UR(2)= 1,92 /EI UR(3)= 1,97 /EI UR(4)= -1,68 /EI
UR(5)= 1,17 /EI UR(6)= 1,53 /EI UR(7)= 1,94 /EI UR(8)= 0,03 /EI
UR(9)= -0,35 /EI UR(10)= 1,56 /EI UR(11)= -1,71 /EI UR(12)= 0,71 /EI
UR(13)= 0,50 /EI UR(14)= -0,28 /EI

Fig.20.
The figure shows a part of the whole construction, at the concerning member ends act member end forces and member end moments. At the construction act forces and moments as large as but opposite directed.

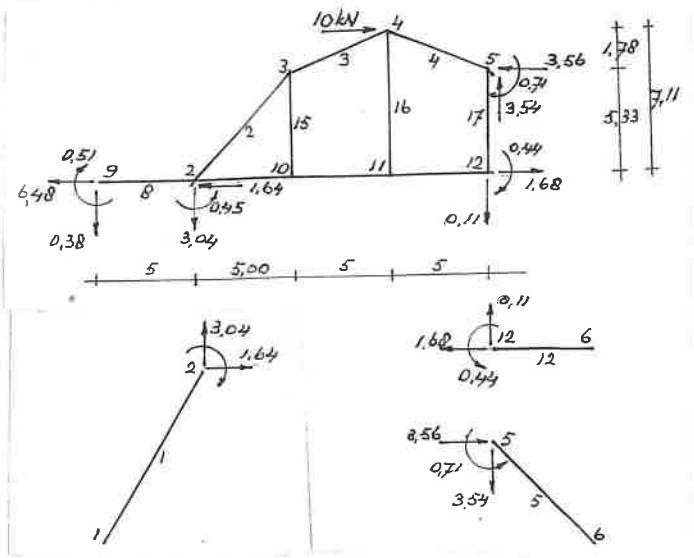


Fig.20.
Assumed directions of member end fotces D5(,) and D6(,) , and moments MF(,) .

Member end 9 of member 8, forces and moment acting at member end 9, in this case acting on the loosened part.

D5(9,2)= -6,48 kN, not as assumed to the right but to the left.
D6(9,2)= 0,38 kN, as assumed downward.
MF(9,2)= 0,51 kNm, as assumed to the right.

Member end 2 of member 1.

D5(2,1)= 1,64 kN, as assumed to the right, on the construction as large as but opposie directed, so to the left.
D6(2,1)= -3,04 kN, not as assumed downward but upward, on the construction as largeas but opposite directed, so downward.
MF(2,1)= 0,45 kNm, as assumed to the right, on the construction as large as but opposite directed, so to the left.

Similar way with member end 5 of member 5, member end 12 of member 12.
Equilibrium of the separated part.... Yes.

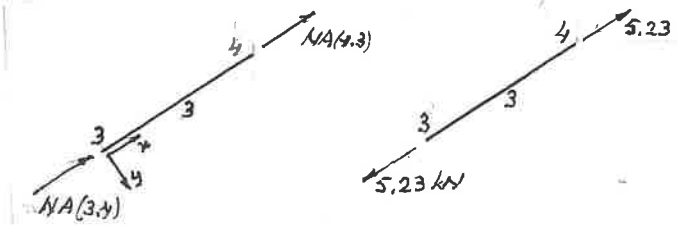
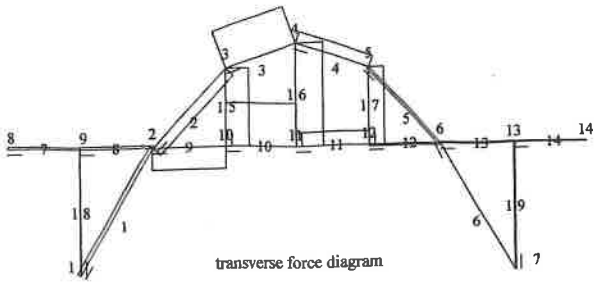
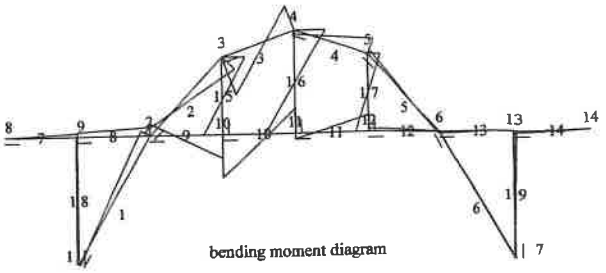


Fig.21.
NA(3,4)= -5,23 kN NA(4,3)= 5,23 kN
Left member with assumed directios, left member with forces drawn with their real directions. Member 3 is a tension member.

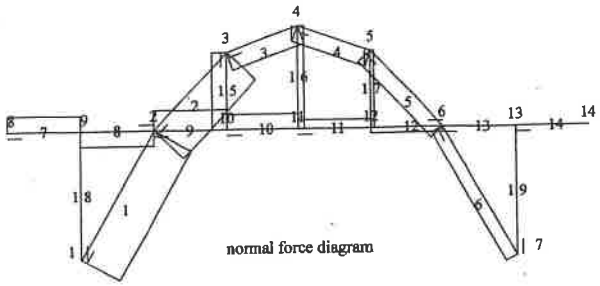
L9=40 m H99=16 m V9=3 FY(3)=10 kN



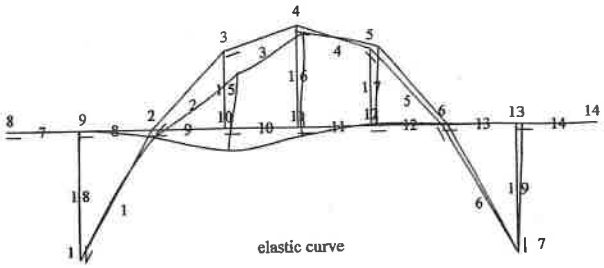
transverse force diagram



bending moment diagram



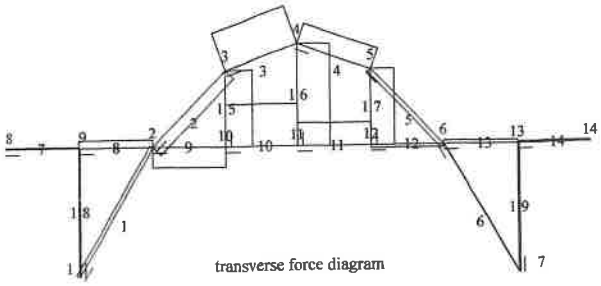
normal force diagram



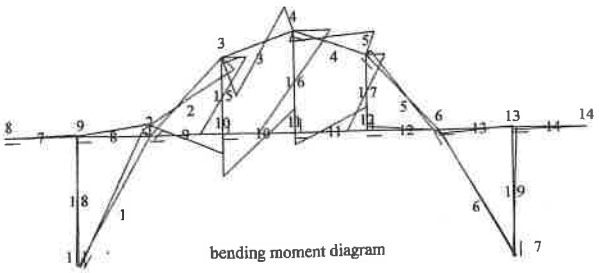
elastic curve

PAR=4 L9=40 m H99=16 m V9=3 N9=14 P9=19

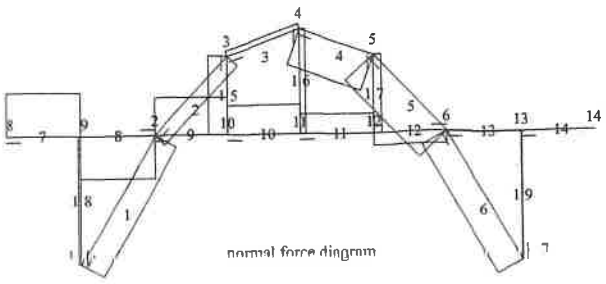
L9=40 H99=16 V9=3 FX(4)=10 kN FY(3)=10 kN



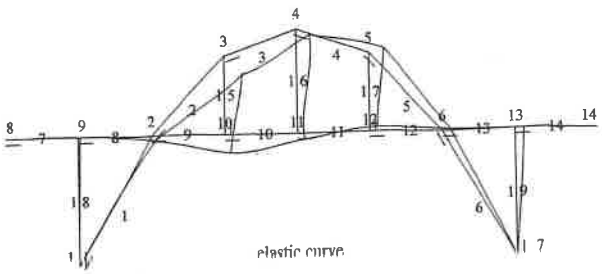
transverse force diagram



bending moment diagram



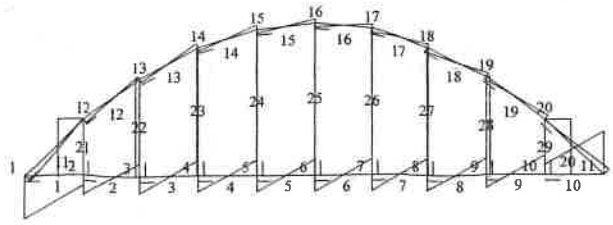
normal force diagram



elastic curve

PAR=4 L9=40 m H99=16 m V9=3 N9=14 P9=19

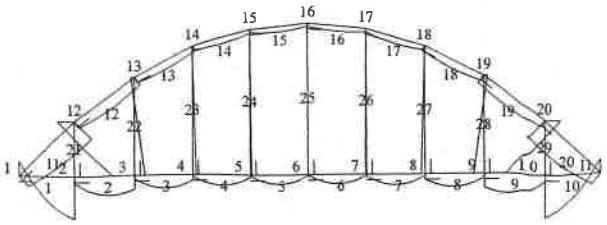
transverse force diagram
load case 10



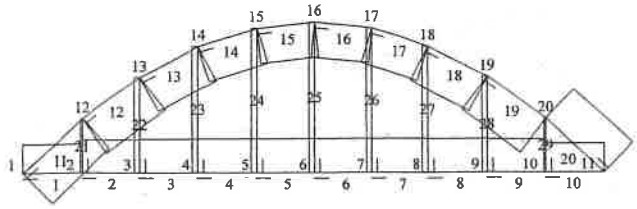
bending moment diagram
load case 10

EX2b

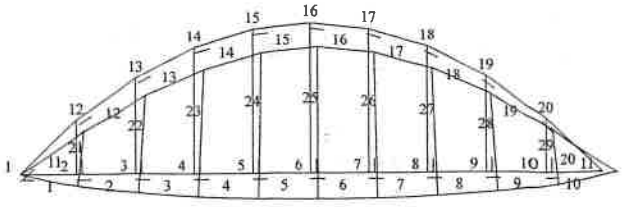
Calculate
CalcT5M5N5M
PrPr-4FRTMNZhor



normal force diagram
load case 10

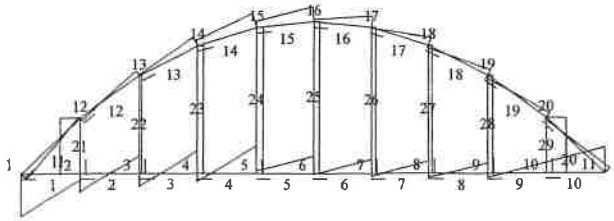


elastic curve
load case 10



PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=7 kN/m

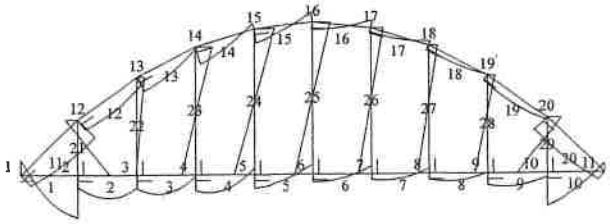
transverse force diagram
load case 4



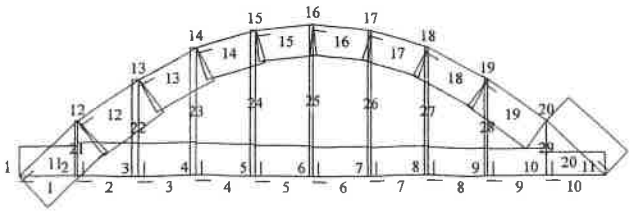
bending moment diagram
load case 4

EX2b

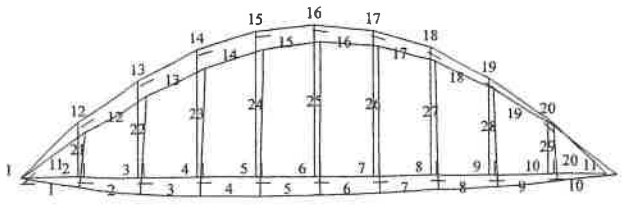
T5?M5?N5?ELCURVE?
Load case 4
PrPr-4FRTMNZhor



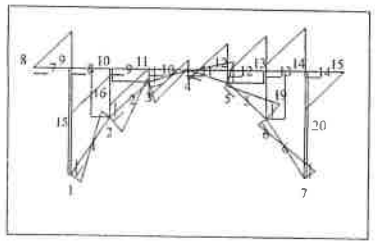
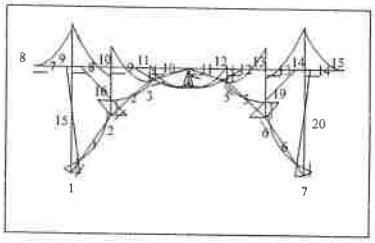
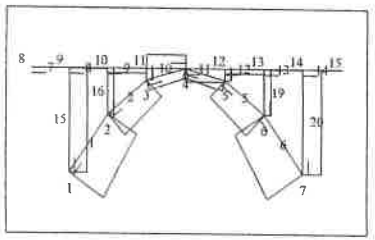
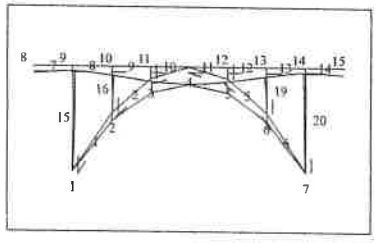
normal force diagram
load case 4



elastic curve
load case 4



PAR=2 L9=27,56 m H99=7,24 m V9=5 N9=20 P9=29 QB=7 kN/m

PAR=3 L9=15 m H99=5 m V9=3 N9=15 P9=20 QB=8 kN/m

Load case 8

Beam end forces and moments.

P=1

DA(1, 2)= -5,27 kN DA(2, 1)= -4,10 kN
NA(1, 2)= 76,49 kN NA(2, 1)= -62,60 kN
MF(1, 2)= -3,29 kNm MF(2, 1)= 1,34 kNm

P=2

DA(2, 3)= -7,97 kN DA(3, 2)= -1,41 kN
NA(2, 3)= 48,16 kN NA(3, 2)= -39,83 kN
MF(2, 3)= -7,38 kNm MF(3, 2)= -0,85 kNm

P=3

DA(3, 4)= -8,74 kN DA(4, 3)= -0,64 kN
NA(3, 4)= 18,97 kN NA(4, 3)= -16,19 kN
MF(3, 4)= -1,59 kNm MF(4, 3)= -6,33 kNm

P=4

DA(4, 5)= -0,64 kN DA(5, 4)= -8,74 kN
NA(4, 5)= 16,19 kN NA(5, 4)= -18,97 kN
MF(4, 5)= 6,33 kNm MF(5, 4)= 1,59 kNm

P=5

DA(5, 6)= -1,41 kN DA(6, 5)= -7,97 kN
NA(5, 6)= 39,83 kN NA(6, 5)= -48,16 kN
MF(5, 6)= 0,85 kNm MF(6, 5)= 7,38 kNm

P=6

DA(6, 7)= -4,10 kN DA(7, 6)= -5,27 kN
NA(6, 7)= 62,60 kN NA(7, 6)= -76,49 kN
MF(6, 7)= -1,34 kNm MF(7, 6)= 3,29 kNm

P=7

DA(8, 9)= 0,00 kN DA(9, 8)= -15,00 kN
NA(8, 9)= 0,00 kN NA(9, 8)= 0,00 kN
MF(8, 9)= 0,00 kNm MF(9, 8)= 14,06 kNm

P=8

DA(9,10)= -17,73 kN DA(10, 9)= 2,73 kN
NA(9,10)= 1,06 kN NA(10, 9)= -1,06 kN
MF(9,10)= -16,09 kNm MF(10, 9)= -3,09 kNm

P=9

DA(10,11)= -14,37 kN DA(11,10)= -0,63 kN
NA(10,11)= 8,79 kN NA(11,10)= -8,79 kN
MF(10,11)= -8,03 kNm MF(11,10)= -4,85 kNm

P=10

DA(4,11)= 3,99 kN DA(11, 4)= 11,01 kN
NA(4,11)= 23,79 kN NA(11, 4)= -23,79 kN
MF(4,11)= -5,53 kNm MF(11, 4)= -1,05 kNm

P=11

DA(4,12)= -3,99 kN DA(12, 4)= -11,01 kN
NA(4,12)= 23,79 kN NA(12, 4)= -23,79 kN
MF(4,12)= 5,53 kNm MF(12, 4)= 1,05 kNm

P=12

DA(12,13)= -0,63 kN DA(13,12)= -14,37 kN
NA(12,13)= 8,79 kN NA(13,12)= -8,79 kN
MF(12,13)= 4,85 kNm MF(13,12)= 8,03 kNm

P=13

DA(13,14)= 2,73 kN DA(14,13)= -17,73 kN
NA(13,14)= 1,06 kN NA(14,13)= -1,06 kN
MF(13,14)= 3,09 kNm MF(14,13)= 16,09 kNm

P=14

DA(14,15)= -15,00 kN DA(15,14)= 0,00 kN
NA(14,15)= 0,00 kN NA(15,14)= 0,00 kN
MF(14,15)= -14,06 kNm MF(15,14)= 0,00 kNm

P=15

DA(1, 9)= 1,06 kN DA(9, 1)= -1,06 kN
NA(1, 9)= 32,73 kN NA(9, 1)= -32,73 kN
MF(1, 9)= 3,29 kNm MF(9, 1)= 2,03 kNm

P=16

DA(2,10)= 7,72 kN DA(10, 2)= -7,72 kN
NA(2,10)= 11,64 kN NA(10, 2)= -11,64 kN
MF(2,10)= 6,04 kNm MF(10, 2)= 11,12 kNm

P=17

DA(3,11)= 15,00 kN DA(11, 3)= -15,00 kN
NA(3,11)= 11,65 kN NA(11, 3)= -11,65 kN
MF(3,11)= 2,44 kNm MF(11, 3)= 5,90 kNm

P=18

DA(5,12)= -15,00 kN DA(12, 5)= 15,00 kN
NA(5,12)= 11,65 kN NA(12, 5)= -11,65 kN
MF(5,12)= -2,44 kNm MF(12, 5)= -5,90 kNm

P=19

DA(6,13)= -7,72 kN DA(13, 6)= 7,72 kN
NA(6,13)= 11,64 kN NA(13, 6)= -11,64 kN
MF(6,13)= -6,04 kNm MF(13, 6)= -11,12 kNm

P=20

DA(7,14)= -1,06 kN DA(14, 7)= 1,06 kN
NA(7,14)= 32,73 kN NA(14, 7)= -32,73 kN
MF(7,14)= -3,29 kNm MF(14, 7)= -2,03 kNm

Maximum transverse forces.

P= 1 P= 2 P= 3
TMAX= 5,27 kN X= 0,00 m TMAX= 7,97 kN X= 0,00 m TMAX= 8,74 kN X= 0,00 m
P= 4 P= 5 P= 6
TMAX= -8,74 kN X= 1,96 m TMAX= -7,97 kN X= 2,51 m TMAX= -5,27 kN X= 3,35 m
P= 7 P= 8 P= 9
TMAX= -7,50 kN X= 0,00 m TMAX= 10,23 kN X= 0,00 m TMAX= 6,87 kN X= 0,00 m
P=10 P=11 P=12
TMAX= 3,51 kN X= 0,00 m TMAX= -3,51 kN X= 0,00 m TMAX= -6,87 kN X= 0,00 m
P=13 P=14 P=15
TMAX= -10,23 kN X= 0,00 m TMAX= 7,50 kN X= 0,00 m TMAX= -1,06 kN X= 0,00 m
P=16 P=17 P=18
TMAX= -7,72 kN X= 0,00 m TMAX= -15,00 kN X= 0,00 m TMAX= 15,00 kN X= 0,00 m
P=19 P=20
TMAX= 7,72 kN X= 0,00 m TMAX= 1,06 kN X= 0,00 m

Maximum bending moments.

P= 1 P= 2 P= 3
MMAX= -3,29 kNm X= 0,00 m MMAX= -7,38 kNm X= 0,00 m MMAX= 6,38 kNm X= 1,83 m
P= 4 P= 5 P= 6
MMAX= 6,38 kNm X= 0,14 m MMAX= -7,38 kNm X= 2,51 m MMAX= -3,29 kNm X= 3,35 m

EX3a Calculate, CalcT5M5N5MAX and click DRAWT5M5N5ELCURVE, 'and' to get the diagrams shown on the left, if not they look 'smaller'. Click No to Yes, PrD5D6 Yes, PrTMAX Yes, PrTMMAX Yes, PrTNMAX Yes, PrZMAX Yes, Pr4FR-Yes, PrPr.

Maximum normal forces

P= 1 P= 2 P= 3
NMAX= 76,49 kN X= 0,00 m NMAX= 48,16 kN X= 0,00 m NMAX= 18,97 kN X= 0,00 m
P= 4 P= 5 P= 6
NMAX= 18,97 kN X= 1,96 m NMAX= 48,16 kN X= 2,51 m NMAX= 76,49 kN X= 3,35 m
P= 7 P= 8 P= 9
NMAX= 0,00 kN X= 0,00 m NMAX= 1,06 kN X= 0,00 m NMAX= 8,79 kN X= 0,00 m
P=10 P=11 P=12
NMAX= 23,79 kN X= 0,00 m NMAX= 23,79 kN X= 0,00 m NMAX= 8,79 kN X= 0,00 m
P=13 P=14 P=15
NMAX= 1,06 kN X= 0,00 m NMAX= 0,00 kN X= 0,00 m NMAX= 32,73 kN X= 0,00 m
P=16 P=17 P=18
NMAX= 11,64 kN X= 0,00 m NMAX= 11,65 kN X= 0,00 m NMAX= 11,65 kN X= 0,00 m
P=19 P=20
NMAX= 11,64 kN X= 0,00 m NMAX= 32,73 kN X= 0,00 m

Maximum displacements.

P= 1 P= 2 P= 3
ZMAX= 18,14 /EI X= 3,35 m ZMAX= 44,15 /EI X= 2,51 m ZMAX= 65,89 /EI X= 1,96 m
P= 4 P= 5 P= 6
ZMAX= 65,89 /EI X= 0,00 m ZMAX= 44,15 /EI X= 0,00 m ZMAX= 18,14 /EI X= 0,00 m
P= 7 P= 8 P= 9
ZMAX= 28,67 /EI X= 0,00 m ZMAX= 25,17 /EI X= 1,88 m ZMAX= 46,28 /EI X= 1,84 m

Support reactions.

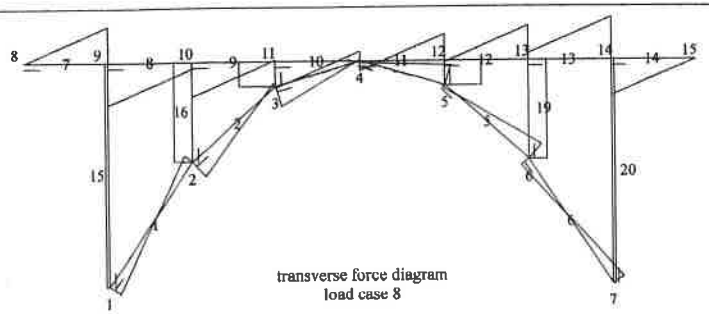
RV(1)= 99,08 kN RH(1)= 39,49 kN RV(7)= 99,08 kN RH(7)= -39,49 kN

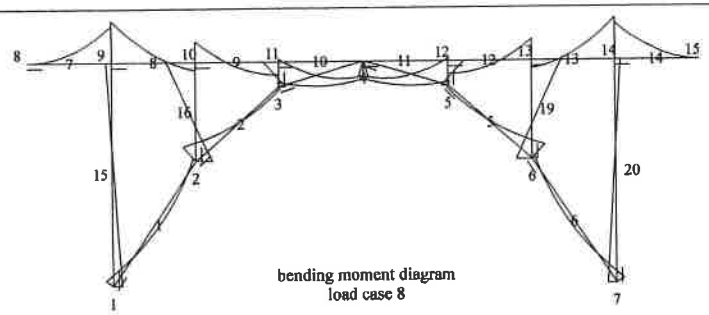
Joint displacements.

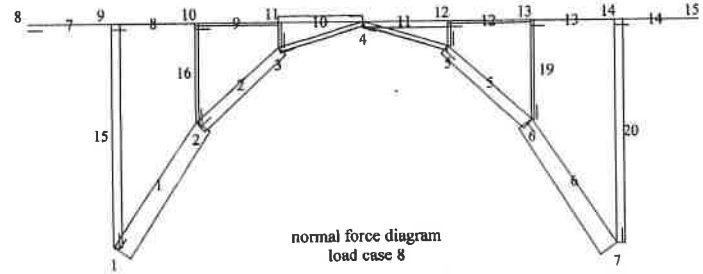
UV(1)= 0,00 /EI UH(1)= 0,00 /EI UV(2)= 34,30 /EI UH(2)= -1,27 /EI
UV(3)= 57,93 /EI UH(3)= 1,28 /EI UV(4)= 68,73 /EI UH(4)= 0,00 /EI
UV(5)= 57,93 /EI UH(5)= -1,28 /EI UV(6)= 34,30 /EI UH(6)= 1,27 /EI
UV(7)= 0,00 /EI UH(7)= 0,00 /EI UV(8)= 28,67 /EI UH(8)= 7,88 /EI
UV(9)= 20,46 /EI UH(9)= 7,88 /EI UV(10)= 37,53 /EI UH(10)= 7,63 /EI
UV(11)= 58,74 /EI UH(11)= 5,58 /EI UV(12)= 58,74 /EI UH(12)= -5,58 /EI
UV(13)= 37,53 /EI UH(13)= -7,63 /EI UV(14)= 20,46 /EI UH(14)= -7,88 /EI
UV(15)= 28,67 /EI UH(15)= -7,88 /EI

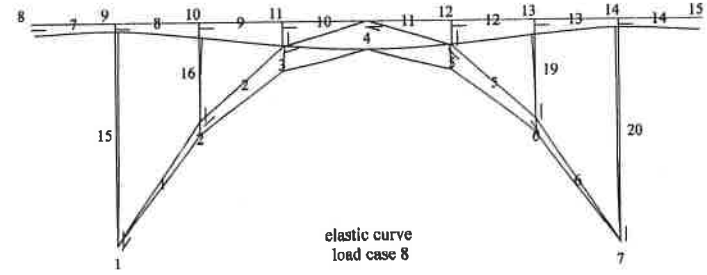
Joint rotations.

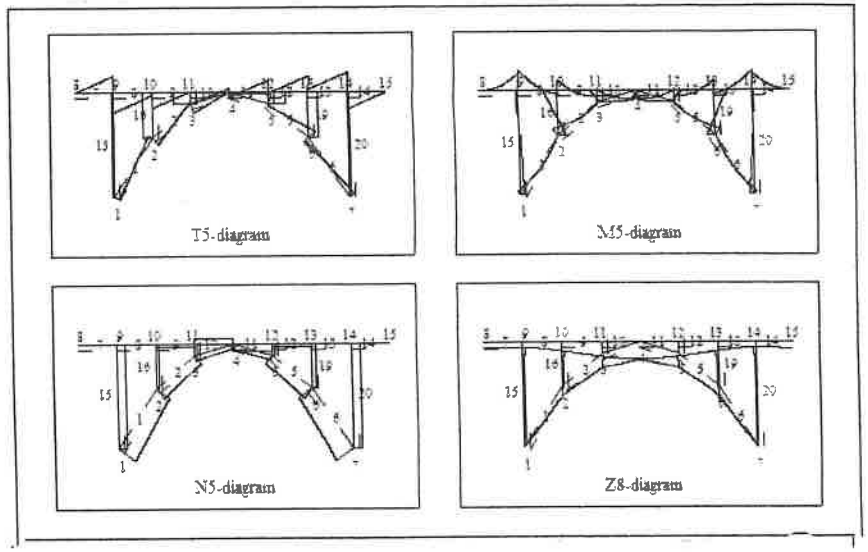
UR(1)= 5,37 /EI UR(2)= 4,36 /EI UR(3)= 7,63 /EI UR(4)= 0,00 /EI
UR(5)= -7,63 /EI UR(6)= -4,36 /EI UR(7)= -5,37 /EI UR(8)= -6,58 /EI
UR(9)= 2,21 /EI UR(10)= 10,01 /EI UR(11)= 8,59 /EI UR(12)= -8,59 /EI
UR(13)= -10,01 /EI UR(14)= -2,21 /EI UR(15)= 6,58 /EI





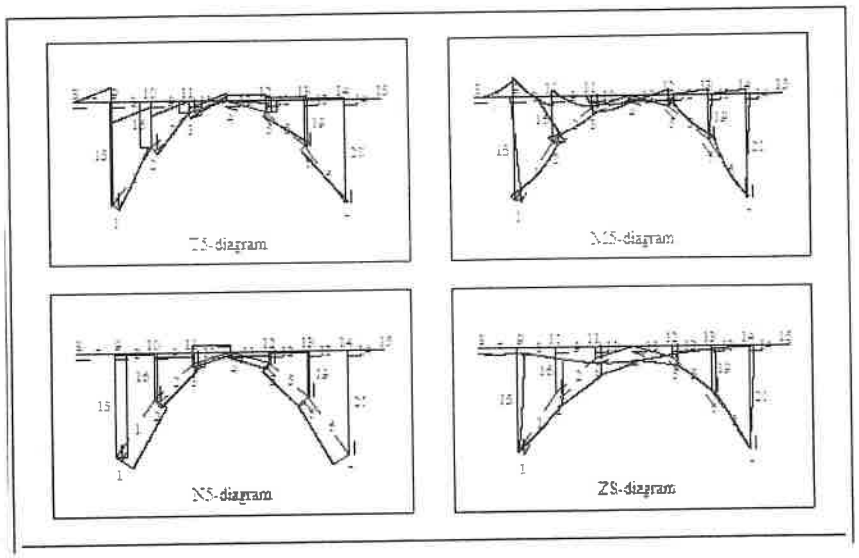


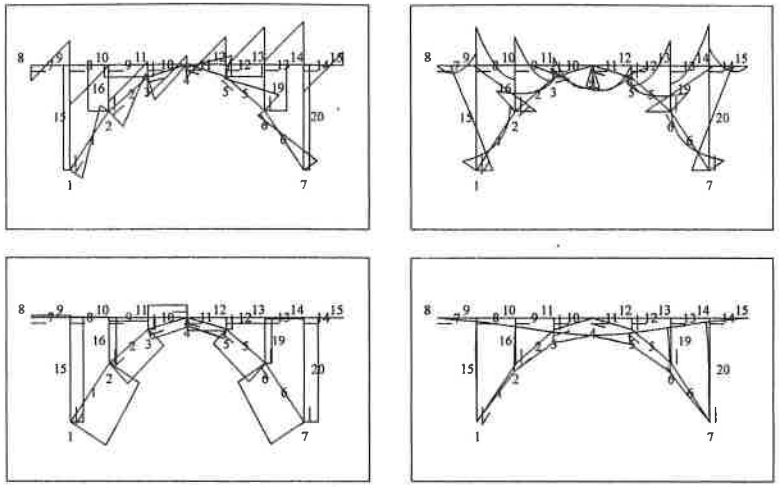




EX3a Calculate CalcT5M5N5M
A click on Draw4F shows the print here above,
for some 'strange reason' totally wrong.

Here below with PH(15)=1 for support 15,and and
and Load cas 4.





PAR=3 L9=15 m H99=5 m V9=3 N9=15 P9=20 QB=8 kN/m

Load case 8

Beam end forces and moments.

P=1			P=11	
DA(1, 2)= -5,52 kN	DA(2, 1)= -3,85 kN		DA(4,12)= -4,54 kN	DA(12, 4)= -10,46 kN
NA(1, 2)= 81,16 kN	NA(2, 1)= -67,27 kN		NA(4,12)= 24,73 kN	NA(12, 4)= -24,73 kN
MF(1, 2)= -4,60 kNm	MF(2, 1)= 1,80 kNm		MF(4,12)= 5,61 kNm	MF(12, 4)= -0,06 kNm
P=2			P=12	
DA(2, 3)= -7,96 kN	DA(3, 2)= -1,41 kN		DA(12,13)= -0,92 kN	DA(13,12)= -14,08 kN
NA(2, 3)= 51,11 kN	NA(3, 2)= -42,78 kN		NA(12,13)= 10,86 kN	NA(13,12)= -10,86 kN
MF(2, 3)= -7,83 kNm	MF(3, 2)= -0,39 kNm		MF(12,13)= 5,43 kNm	MF(13,12)= 6,92 kNm
P=3			P=13	
DA(3, 4)= -9,24 kN	DA(4, 3)= -0,13 kN		DA(13,14)= 1,28 kN	DA(14,13)= -16,28 kN
NA(3, 4)= 19,98 kN	NA(4, 3)= -17,20 kN		NA(13,14)= 2,29 kN	NA(14,13)= -2,29 kN
MF(3, 4)= -2,54 kNm	MF(4, 3)= -6,37 kNm		MF(13,14)= 5,08 kNm	MF(14,13)= 11,37 kNm
P=4			P=14	
DA(4, 5)= -1,25 kN	DA(5, 4)= -8,12 kN		DA(14,15)= -10,10 kN	DA(15,14)= -4,90 kN
NA(4, 5)= 15,27 kN	NA(5, 4)= -18,05 kN		NA(14,15)= 0,00 kN	NA(15,14)= 0,00 kN
MF(4, 5)= 6,36 kNm	MF(5, 4)= 0,35 kNm		MF(14,15)= -4,88 kNm	MF(15,14)= 0,00 kNm
P=5			P=15	
DA(5, 6)= -1,02 kN	DA(6, 5)= -8,35 kN		DA(1, 9)= 2,33 kN	DA(9, 1)= -2,33 kN
NA(5, 6)= 37,72 kN	NA(6, 5)= -46,05 kN		NA(1, 9)= 24,45 kN	NA(9, 1)= -24,45 kN
MF(5, 6)= 1,98 kNm	MF(6, 5)= 7,22 kNm		MF(1, 9)= 4,60 kNm	MF(9, 1)= 7,07 kNm
P=6			P=16	
DA(6, 7)= -3,26 kN	DA(7, 6)= -6,12 kN		DA(2,10)= 7,92 kN	DA(10, 2)= -7,92 kN
NA(6, 7)= 62,10 kN	NA(7, 6)= -75,99 kN		NA(2,10)= 13,69 kN	NA(10, 2)= -13,69 kN
MF(6, 7)= -0,17 kNm	MF(7, 6)= 4,96 kNm		MF(2,10)= 6,03 kNm	MF(10, 2)= 11,57 kNm
P=7			P=17	
DA(8, 9)= -5,66 kN	DA(9, 8)= -9,34 kN		DA(3,11)= 16,38 kN	DA(11, 3)= -16,38 kN
NA(8, 9)= -3,43 kN	NA(9, 8)= 3,43 kN		NA(3,11)= 12,83 kN	NA(11, 3)= -12,83 kN
MF(8, 9)= 0,00 kNm	MF(9, 8)= 3,45 kNm		MF(3,11)= 2,93 kNm	MF(11, 3)= 6,18 kNm
P=8			P=18	
DA(9,10)= -15,12 kN	DA(10, 9)= 0,12 kN		DA(5,12)= -13,87 kN	DA(12, 5)= 13,87 kN
NA(9,10)= -1,10 kN	NA(10, 9)= 1,10 kN		NA(5,12)= 11,38 kN	NA(12, 5)= -11,38 kN
MF(9,10)= -10,51 kNm	MF(10, 9)= -3,77 kNm		MF(5,12)= -2,33 kNm	MF(12, 5)= -5,37 kNm
P=9			P=19	
DA(10,11)= -13,81 kN	DA(11,10)= -1,19 kN		DA(6,13)= -8,57 kN	DA(13, 6)= 8,57 kN
NA(10,11)= 6,82 kN	NA(11,10)= -6,82 kN		NA(6,13)= 12,81 kN	NA(13, 6)= -12,81 kN
MF(10,11)= -7,81 kNm	MF(11,10)= -4,02 kNm		MF(6,13)= -7,05 kNm	MF(13, 6)= -12,00 kNm
P=10			P=20	
DA(4,11)= 3,36 kN	DA(11, 4)= 11,64 kN		DA(7,14)= -2,29 kN	DA(14, 7)= 2,29 kN
NA(4,11)= 23,20 kN	NA(11, 4)= -23,20 kN		NA(7,14)= 26,38 kN	NA(14, 7)= -26,38 kN
MF(4,11)= -5,61 kNm	MF(11, 4)= -2,15 kNm		MF(7,14)= -4,96 kNm	MF(14, 7)= -6,49 kNm

P=4		P=14	
D5 (4, 5)= 15,00 kN	D5 (5, 4)= -15,00 kN	D5 (14,15)= 0,00 kN	D5 (15,14)= 0,00 kN
D6 (4, 5)= 3,14 kN	D6 (5, 4)= -12,92 kN	D6 (14,15)= -10,10 kN	D6 (15,14)= -4,90 kN
P=5		P=15	
D5 (5, 6)= 28,87 kN	D5 (6, 5)= -28,87 kN	D5 (1, 9)= 2,33 kN	D5 (9, 1)= -2,33 kN
D6 (5, 6)= 24,30 kN	D6 (6, 5)= -36,84 kN	D6 (1, 9)= -24,45 kN	D6 (9, 1)= 24,45 kN
P=6		P=16	
D5 (6, 7)= 37,44 kN	D5 (7, 6)= -37,44 kN	D5 (2,10)= 7,92 kN	D5 (10, 2)= -7,92 kN
D6 (6, 7)= 49,65 kN	D6 (7, 6)= -66,41 kN	D6 (2,10)= -13,69 kN	D6 (10, 2)= 13,69 kN
P=7		P=17	
D5 (8, 9)= -3,43 kN	D5 (9, 8)= 3,43 kN	D5 (3,11)= 16,38 kN	D5 (11, 3)= -16,38 kN
D6 (8, 9)= -5,66 kN	D6 (9, 8)= -9,34 kN	D6 (3,11)= -12,83 kN	D6 (11, 3)= 12,83 kN
P=8		P=18	
D5 (9,10)= -1,10 kN	D5 (10, 9)= 1,10 kN	D5 (5,12)= -13,87 kN	D5 (12, 5)= 13,87 kN
D6 (9,10)= -15,12 kN	D6 (10, 9)= 0,12 kN	D6 (5,12)= -11,38 kN	D6 (12, 5)= 11,38 kN
P=9		P=19	
D5 (10,11)= 6,82 kN	D5 (11,10)= -6,82 kN	D5 (6,13)= -8,57 kN	D5 (13, 6)= 8,57 kN
D6 (10,11)= -13,81 kN	D6 (11,10)= -1,19 kN	D6 (6,13)= -12,81 kN	D6 (13, 6)= 12,81 kN
P=10		P=20	
D5 (4,11)= -23,20 kN	D5 (11, 4)= 23,20 kN	D5 (7,14)= -2,29 kN	D5 (14, 7)= 2,29 kN
D6 (4,11)= -3,36 kN	D6 (11, 4)= -11,64 kN	D6 (7,14)= -26,38 kN	D6 (14, 7)= 26,38 kN

Support reactions.

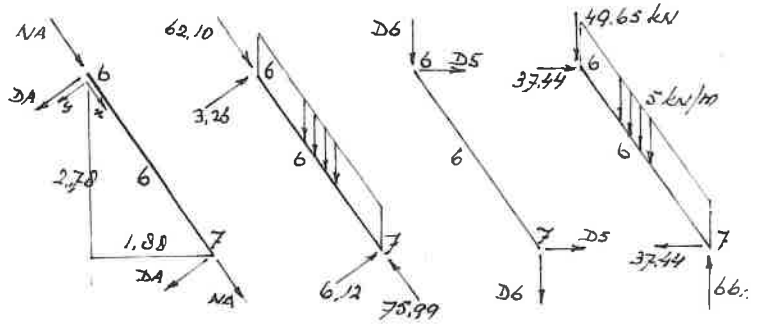
RV(1)= 94,81 kN	RH(1)= 43,16 kN	RV(7)= 92,79 kN	RH(7)= -39,73 kN
RV(8)= 5,66 kN	RH(8)= -3,43 kN	RV(15)= 4,90 kN	

Joint displacements.

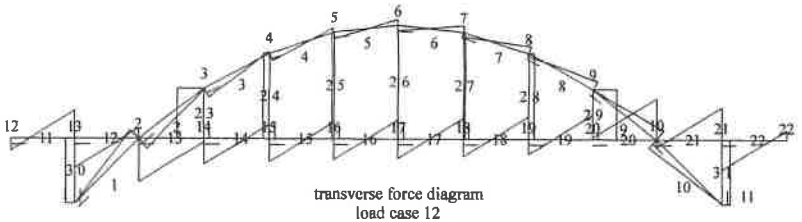
UV(1)= 0,00 /EI	UH(1)= 0,00 /EI	UV(2)= 32,68 /EI	UH(2)= -7,16 /EI
UV(3)= 57,09 /EI	UH(3)= -5,16 /EI	UV(4)= 70,33 /EI	UH(4)= -5,97 /EI
UV(5)= 61,73 /EI	UH(5)= -7,67 /EI	UV(6)= 37,25 /EI	UH(6)= -3,49 /EI
UV(7)= 0,00 /EI	UH(7)= 0,00 /EI	UV(8)= 0,00 /EI	UH(8)= 0,00 /EI
UV(9)= 15,28 /EI	UH(9)= 0,80 /EI	UV(10)= 36,48 /EI	UH(10)= 1,06 /EI
UV(11)= 57,98 /EI	UH(11)= -0,54 /EI	UV(12)= 62,52 /EI	UH(12)= -11,77 /EI
UV(13)= 40,81 /EI	UH(13)= -14,32 /EI	UV(14)= 16,49 /EI	UH(14)= -14,85 /EI
UV(15)= 0,00 /EI	UH(15)= -14,85 /EI		

Joint rotations.

UR(1)= 1,93 /EI	UR(2)= 3,88 /EI	UR(3)= 8,29 /EI	UR(4)= 1,56 /EI
UR(5)= -7,31 /EI	UR(6)= -5,65 /EI	UR(7)= -5,83 /EI	UR(8)= 9,27 /EI
UR(9)= 8,11 /EI	UR(10)= 10,04 /EI	UR(11)= 9,19 /EI	UR(12)= -8,15 /EI
UR(13)= -11,15 /EI	UR(14)= -9,65 /EI	UR(15)= -9,46 /EI	

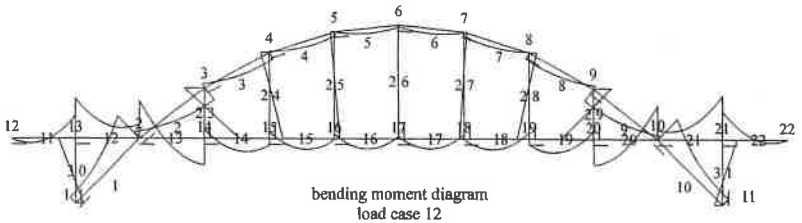


EX3b of page 15, QB=8 kN/m 4 and OWP= 5 kN/m.
Joint 8 is a hinge support, joint 15 is a roller support.
PrD5D6 Yes, Pr4FR Yes, PrPr.
D5(,) and D6(,) without member end moments MF(,), they are given with DA(,) and NA(,).

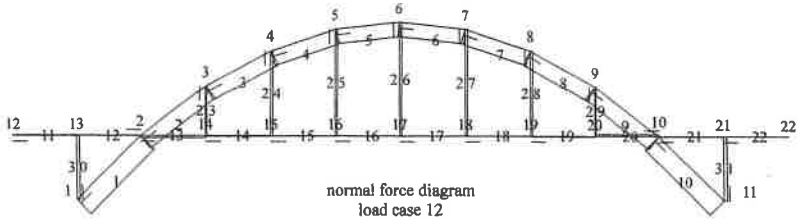


transverse force diagram
load case 12

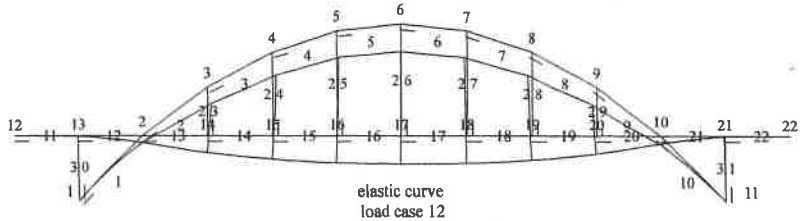
EX4b Calculate CalcT5M5N5M PrPr-4FRTMNZvert



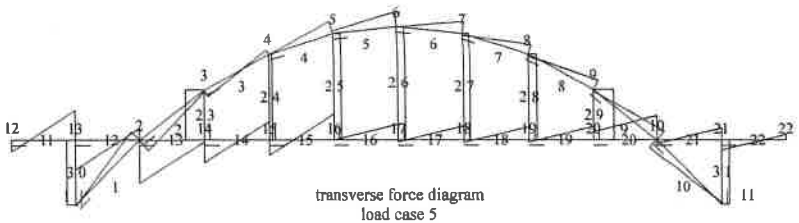
bending moment diagram
load case 12



normal force diagram
load case 12

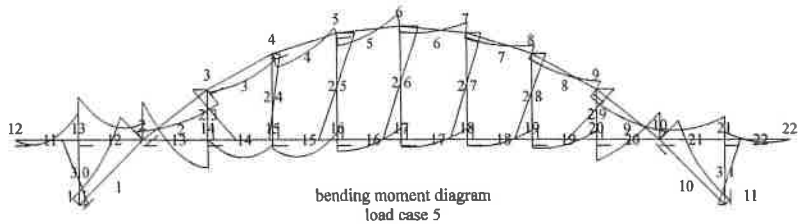


elastic curve
load case 12

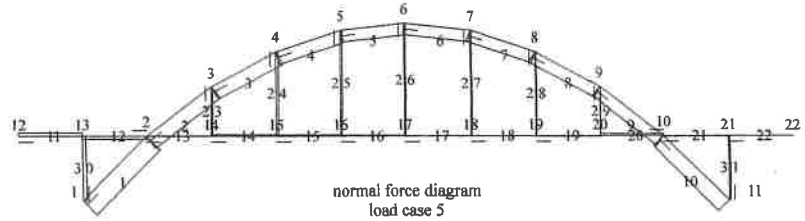


transverse force diagram
load case 5

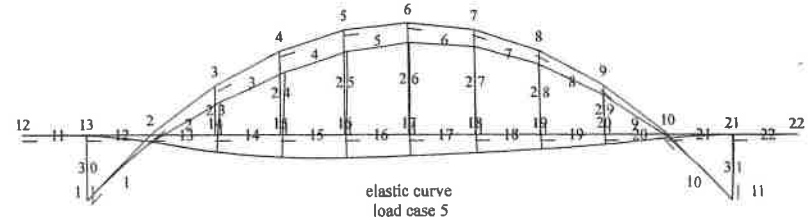
T5?M5?N5?ELCURVE? Load case 5 PrPr-4FRTMNZvert



bending moment diagram
load case 5

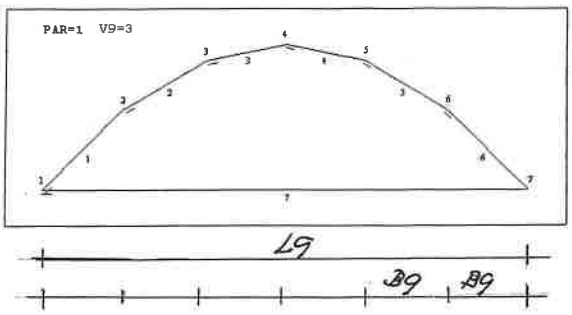


normal force diagram
load case 5



elastic curve
load case 5

```
Private Sub PROPAR1()
PAR=1
A9=H99
N9=V9*2+1      No P9 here!. page

'joint coordinates
B9=L9/(V9*2) : B=0
For I=1 To N9
X1(I)=B*B9 : B=B+1
YP(I)=
(-4*A9/(L9^2))*(X1(I)*L9/2)^2+A9
Y1(I)=A9-YP(I)
Next I

For P=1 To P9
If P<V9*2+1 Then
LL(P)=P : HH(P)=P+1 : BA(P)=P
Else
LL(P)=1 : HH(P)=V9*2+1 : BA(P)=1
End If
Next P
DRAWFRAME1              page
FRBASLINES              page
PROPAR1NUM              below
End Sub
```




```
Private Sub PROPAR1NUM()
FontName="Times New Roman"
FontSize=7
TW=TextWidth("1")
TH=TextHeight("3")
For I=1 To N9
If I<V9+2 Then
CurrentX=X11(I)-TW
Else
CurrentX=X11(I)-TW/2
End If
If I>9 Then
CurrentX=X11(I)-TW
CurrentY=Y11(I)-TH-60 : Print I
Next I

A=0 : B=0
For P=1 To P9 : L=LL(P) : H=HH(P)
XM=X11(H)-(X11(H)-X11(L))/2
YM=Y11(H)-(Y11(H)-Y11(L))/2
If P<V9+1 Then
CurrentX=XM-A*(TW/V9)+15
CurrentY=YM+30
Print P : A=A+1

ElseIf P>V9 And P<V9*2+1 Then
CurrentX=XM-TW-B*(TW/V9)
If P>9 Then CurrentX=CurrentX-TW
CurrentY=YM+30
Print B : B=B+1
```

Private Sub PROPAR1()

With a click on option button PAR1 a frame is printed on the form like shown on the figure on the left, here with L9=15 m, H99=5 m and V9=3. When clicking on P9= the horizontal member, here 7, can be removed, P9 becomes 6, or added, P9 becomes 7, see page .
The number of members is in subroutine PROPAR1 omitted, in the other three it is not.
For both possible frames the number of joints is N9=V9*2+1, here N9=3*2+1=7.
The joint coordinates are determinated as the code shows.
The member end numbers LL(P) and HH(P), and BA(P) for the place of the beam axis system, indicated with the short stripes at a member end.
If P9=V9*2+1 then P9=3*2+1=7.
For P=1 To P9=1 To 7
If P<V9*2+1 is If P<7 Then so 1 To 6, the parabola members.

	LL(P)=P	HH(P)=P+1	BA(P)=P
P=1	LL(1)=1	HH(1)=1+1=2	BA(1)=1
....			
P=6	LL(6)=6	HH(6)=6+1=7	BA(6)=6
Else			
	LL(P)=1	HH(P)=V9*2+1	BA(P)=1
P=7	LL(7)=1	HH(7)=3*2+1=7	BA(7)=1

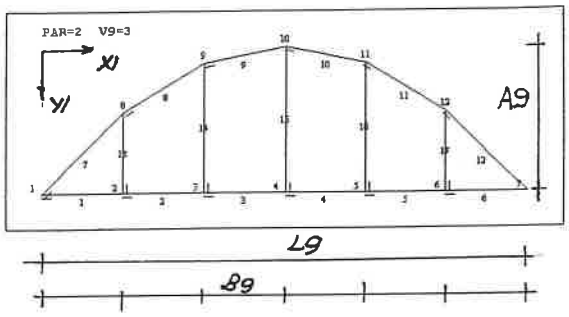
In case P=V9*2=6 then the code after Else is skipped over, because If P<V9*2+1 is If P<7, so 1 To 6.

Private Sub PROPAR1NUM()

With this subroutine the joints and members are numbered. The chosen font and size,
FontName="Times New Roman" and FontSize=7.
TW=TextWidth("1") is 75 twips, 0,132 cm.
TH=TextHeight("3") is 180 twips, 0,318 cm.
Above the joints the joint numbers are printed.
After some tries the code for CurrentX and CurrentY was written. First the joints
If I<V9+2=3+2=5 so 1 To 4 with
CurrentX=X11(I)-TW and Else, 5 To 7 with
CurrentX=X11(I)-TW/2.
If I>9 then one TW more to the left with
CurrentX=CurrentX-TW and for all numbers
CurrentY=Y11(I)-TH-60.
The member numbers, for A and B see page, are printed below about the middle of the members.
If P<V9+1=3+1=4, members left of the middle.
CurrentX=XM-TW-A*(TW/V9)+15 Eeach time A=A+1 so the number is printed more to the right.
ElseIf P>V9 and P<V9*2+1 is P>3 And P<7, the members right of the middle. This time each time something more to the left with
CurrentX=XM-TW-B*(TW/V9).
Else, in case P9=V9*2+1=7, then the number is printed in the middle of and below the horizontal member 7. A and B times (TW/V9) are rounded to 15 twips; a pixel is 15x15 twips.

```
Else
CurrentX=XM-TW/2
CurrentY=YM+30 : Print P
End If
Next P
End Sub
```

```
Private Sub PROPAR2()
PAR=2
A9=H99
N9=V9*4 : P9=V9*6-1

'joint coordinates
B9=L9/(V9*2)

B=0
For I=1 To N9
If I<V9*2+2 Then
X1(I)=B*B9 : Y1(I)=A9 : B=B+1
If I=V9*2+1 Then B=1

ElseIf I>V9*2+1 Then
X1(I)=B*B9 : B=B+1
YP(I)=
(-4*A9/(L9^2))*(X1(I)*L9/2)^2+A9
Y1(I)=A9-YP(I)
End If
Next I
```




```
'member end numbers
A=1 : B=V9*2+2 : C=2

For P=1 To P9
'horizontal members
If P<V9*2+1 Then
LL(P)=A : HH(P)=A+1 : BA(P)=A
A=A+1

'first parabola member
ElseIf P=V9*2+1 Then
LL(P)=1 : HH(P)=V9*2+2 : BA(P)=1
'parabola members
ElseIf P>V9*2+1 And P<V9*4 Then
LL(P)=B : HH(P)=B+1 : BA(P)=B
B=B+1
'last parabola member
ElseIf P=V9*4 Then
LL(P)=V9*2+1 : HH(P)=V9*4
BA(P)=HH(P)

'vertical members
ElseIf P>V9*4 And P<V9*6 Then
LL(P)=C : HH(P)=C+V9*2 : BA(P)=C
C=C+1
End If
Next P

'determining X11() and Y11() with
DRAWFRAME1              page

FRBASLINES              page

PROPAR2NUM         next page

End Sub
```

Private Sub PROPAR2()

On the left the figure with L9=15 m, H99=5 m and V9=3. A9=H99
N9=V9*4=3*4=12 and P9=V9*6-1=3*6-1=17.

Joint coordinates.
B9=L9/(V9*2)
B=0
For I=1 To N9=1 To 12
First of the horizontal members.
If I<V9*2+2=3*2+2=8, so 1 To 7.
I=1 X1(1)=B*B9=0*B9 Y1(1)=A9 B=B+1=0+1=1
I=V9*2+1? 1=3*2+1=7? no
I=2 X1(2)=1*B9 Y1(2)=A9 B=B+1=1+1=2
I=V9*2+1? 2=3*2+1=7? no
.....
I=6 X1(6)=5*B9 Y1(6)=A9 B=B+1=5+1=6
I=V9*2+1? 5=3*2+1=7? no
I=7 X1(7)=6*B9 Y1(6)=A9 B=B+1=6+1=7
I=V9*2+1? 1=3*2+1=7? yes then B=1 for the

Remaining parabola joints.
I=8
X1(8)=1*B9 B=B+1=1+1=2
YP(8) calculated with X1(8) as done on page for PROPAR1 after which follows Y1(8)=A9-YP(8).
Etc.

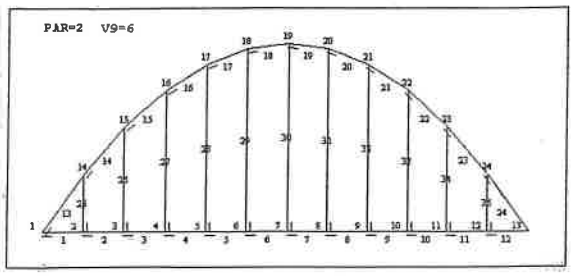
Member end numbers LL(P) and HH(P), and BA(P) for the place of the beam axis system. First

A=1 B=V9*2+2=3*2+2=8 C=2

For P=1 To P9=1 To 17
Horizontal members.
If P<V9*2+1 is P<3*2+1=7 thus 1 To 6.
P=1
LL(P)=A=1 HH(P)=A+1=1+1=2 BA(1)=A=1 A=A+1=2
P=2
LL(2)=2 HH(2)=2+1=3 BA(2)=2 A=A+1=3
Etc.
First parabola member, P=V9*2+1=3*2+1=7.
LL(7)=1 HH(7)=V9*2+2=3*2+2=8 BA(7)=1
Parabola members without first and last one.
ElseIf P>V9*2+1 And P<V9*4 Then
P>3*2+1 And P<3*4 is 8 To 11.
P=8
LL(8)=B=8 HH(8)=B+1=8+1=9 BA(8)=B=8 B=B+1=9
P=9
LL(9)=9 HH(9)=9+1=10 BA(9)=9 B=B+1=10
Etc.
Last parabola member, P=V9*4=3*4=12.
LL(12)=V9*2+1=3*2+1=7 HH(12)=V9*4=3*4=12
BA(12)=HH(12)=12

Vertical members.
ElseIf P>V9*4 (And P<V9*6) Then
P>3*4 And P<3*6 is 13 To 17.
P=13
LL(P)=C=2 HH(13)=V9*2+C=3*2+2=8 BA(13)=C=2
C=C+1=2+1=3
P=14
LL(14)=3 HH(14)=3*2+3=9 BA(14)=3
Etc.
DRAWFRAME1 to determine the form coordinates, FRBASLINES to draw the litlle stripes at the member ends with the beam axis system, and PROPAR2NUM to number joints and members.

```
Private Sub PROPAR2NUM()
FontName="Times New Roman"
FontSize=7
TW=TextWidth("8")
TH=TextHeight("8")

'joint numbering
For I=1 To N9

If I<V9*2+2 Then
CurrentX=X11(I)-2.5*TW
If I>9 Then CurrentX=X11(I)-3.5*TW

CurrentY=Y11(I)-TH : Print I

Else
CurrentX=X11(I)-TW                    1,5
If I>9 Then CurrentX=X11(I)-1.5*TW

CurrentY=Y11(I)-30-TH : Print I
End If
Next I
```

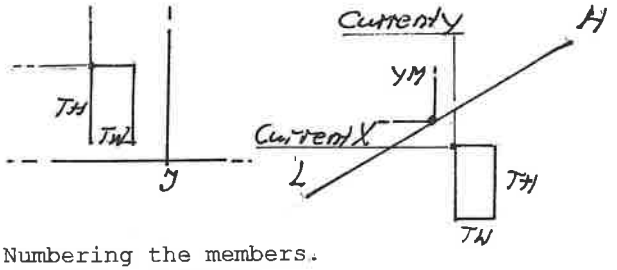



```
'member numbering
A=0 : B=0
For P=1 To P9 L=LL(P) : H=HH(P)
XM=X11(H)-(X11(H)-X11(L))/2
YM=Y11(H)-(Y11(H)-Y11(L))/2

'horizontal members
If P<V9*2+1 Then
CurrentX=XM-TW+30
If P>9 Then CurrentX=XM-2*TW+30
CurrentY=YM+30 : Print P

'parabola left
ElseIf P>V9*2 And P<V9*3+1 Then
CurrentX=XM-A*(TW/V9)
If P>9 Then CurrentX=CurrentX-TW/2
CurrentY=YM+60 : Print P
A=A+1

'parabola right
ElseIf P>V9*3 And P<V9*4+1 Then
CurrentX=XM-TW/2-B*(TW/V9)
If P>9 Then CurrentX=CurrentX-TW
CurrentY=YM+60 : Print P
B=B+1

Else
CurrentX=XM-TW/2
If P>9 Then CurrentX=CurrentX-TW
CurrentY=YM-TH/2 : Print P
End If
Next P

End Sub
```

Private Sub PROPAR2NUM()

Numbering joints and members of construction PAR=2 like shown on the left, with L9=20 m, H99= 8 m and V9=6.

Numbering the joints.
N9=V9*4=6*4=24
If I<V9*2+2=6*2+2=14 so 1 To 13
First the joints of the horizontal members printed 2,5 times TW left of the drawn joint, CurrentX=X11(I)-2.5*TW and TH twips above the horizontal members with CurrentY=Y11(I)-TH
Else, the joints 14 To 24 with CurrentX=X11(I)-TW and CurrentY=Y11(I)-TH-30. Results, rather good.



Numbering the members.
P9=V9*6-1=6*6-1=35
Horizontal members.
If P<V9*2+1=6*2+1=13 is 1 To 12
CurrentX=X11(I)-TW+30
CurrentY=Y11(I)+30 Sketchy shown above.

For the parabola and vertical members the coordinates XM and YM of the middle of the member are determinated first.

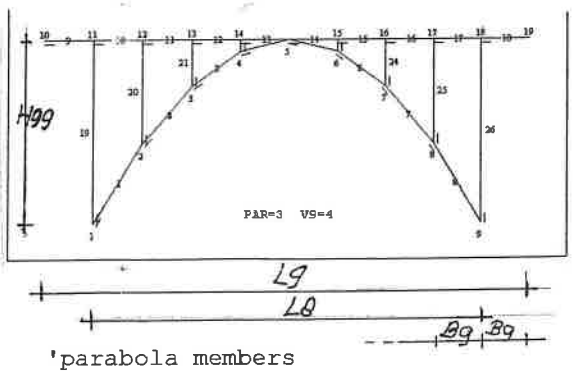
Parabola members on the left of the middle.
ElseIf P>V9*2 And P<V9*3+1 Then
P>6*2 And P<6*3+1 is 13 To 18
CurrentX=XM-A*(TW/V9)
For member 13 is A=0, CurrentX=XM-15.
For each following member the number is printed a little bit more to the left with A=A+1.

A pixel of the form is 15x15 twips, thus
A*(TW/V9) is rounded to a multiple of 15.
P=14 A*(TW/V9)=1*(75/6)= 12,5 is 15 twips,
P=15 2*(75/6)= 25,0 is 30 twips,
P=16 3*(75/6)= 37,5 is 30 twips,
P=17 4*(75/6)= 50,0 is 45 twips,
P=18 5*(75/6)= 62,5 is 60 twips.
Numbers larger than 9 are printed half TW more to the left, not one TW, therefore
If P>9 Then CurrentX=CurrentX-TW/2. Further CurrentY=YM+60 to print below the member.

Similar for the parabola members 19 to 24 on the right of the middle. Numbers now printed on the left of the member; using B in CurrentX=XM-TW/2-B*(TW/V9) and if P>9 then CurrentX=CurrentX-TW, further CurrentY=YM-TH/2.

Vertical members.
Else, members V9*4+1 To P9 is 25 To 35 with numbers printed in the middle. Some trying resultcd in the written code. Good result? Needed space could have been given the color of the back ground first before printing the numbers...

```
Private Sub PROPAR3()
PAR=3
A9=H99
N9=V9*4+3 : P9=V9*6+2

B9=L9/(V9*2+2) : L8=L9-2*B9

B=0
For I=1 To V9*2+1
X1(I)=B*B9 : B=B+1
YP(I)=
(-4*A9/(L8^2))*(X1(I)-L8/2)^2+A9
Y1(I)=A9-YP(I)
X1(I)=X1(I)+(L8/2)/V9
Next I

A=0
For I=V9*2+2 To V9*4+3
X1(I)=A*(L8/2)/V9 : Y1(I)=0 : A=A+1
If I=V9*3+2 Then A=A+1
Next I
```



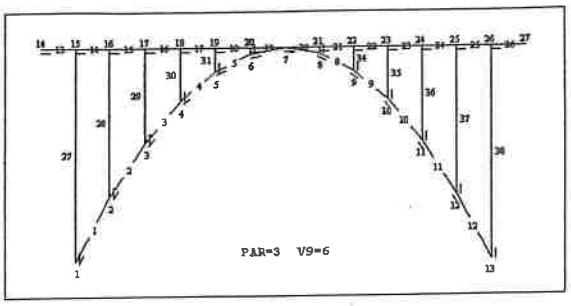

```
'parabola members
For P=1 To V9*2
LL(P)=P : HH(P)=P+1 : BA(P)=P
Next P

'horizontal members
For P=V9*2+1 To V9*4+2
If P<V9*3+1 Then
LL(P)=P+1 : HH(P)=P+2 : BA(P)=P+1

ElseIf P>V9*3+2 Then
LL(P)=P : HH(P)=P+1 : BA(P)=P

Else
P=V9*3+1 : L=V9+1 : H=P+1

LL(P)=L : HH(P)=H : BA(P)=H
P=P+1 : L=V9+1 : H=P+1
LL(P)=L : HH(P)=H : BA(P)=L
End If
Next P

'vertical members
A=V9*2+2 : B=1
For P=V9*4+3 To V9*6+2
LL(P)=B : HH(P)=B+A : BA(P)=B
If B=V9 Then B=B+1 : A=A-1
B=B+1
Next P

DRAWFRAME1          page
FRBASLINES          page
PROPAR3NUM          next page
End Sub
```

Private Sub PROPAR3()

See the figure on the left with L9=15 m, H9=5 m and V9=4. L9 the total length of the horizontal members. V9=4 the half of the spaces between the two supports of the parabola.
Parabola joint coordinates.
B=0
For I=1 To V9*2+1=1 To 4*2+1=1 To 9
I=1
X1(1)=0*B9=0 B=B+1=0+1=1 next calculation of YP(I) and then
X1(1)=X1(1)+(L8/2)/V9 (or +B9) Etc.
Horizontal member coordinates.
A=0
For I=V9*2+2 To V9*4+2=4*2+2 To 4*4+3=10 To 19
Because of one parabola joint coinciding with two member ends/joints an exception to add an extra length (L8/2)/V9, or B9,
If I=V9*3+2 Then A=A+1 is with V9=4
If I=4*3+2=14 Then A=A+1.

Horizontal members.
For P=V9*2+1 To V9*4+2=4*2+1 To 4*4+2=9 To 18
If P<V9*3+1=4*3+1=13, thus P=9 to 12
LL(P)=P+1 HH(P)=P+2 BA(P)=P+1
P= 9
LL(9)= 9+1=10 HH(9)=9+2= 11 BA(9)=9+1= 10
Etc.
ElseIf P>V9*3+2=4*3+2=14, thus 15 to 18.
LL(P)=P HH(P)=P+1 BA(P)=P
P=15
LL(15)=15 HH(15)=15+1=16 BA(15)=15
Etc.
Else, meaning P=13 and P=14, because of joint number V9+1=4+1=5 at the top of the parabola.
P=V9*3+1=4*3+1=13 L=V9+1=5 H=P+1=13+1=14
P=13
LL(P)=L HH(P)=H BA(P)=H
LL(13)=5 HH(13)=14 BA(13)=14
P=P+1=14 L=V9+1=5 H=P+1=15
P=14
LL(P)=L HH(P)=H BA(P)=L
LL(14)=5 HH(14)=14+1=15 BA(14)=5
Vertical members.
A=V9*2+2=4*2+2=10 B=1
For P=V9*4+3 To V9*6+2=4*4+3 To 4*6+2=19 To 26
LL(P)=B HH(P)=B+A BA(P)=B
P=19
LL(19)=1 HH(19)=1+10=11 BA(19)=1
B=V9? 1=4? no
B=B+1=1+1=2
P=20
LL(20)=2 HH(20)=2+10=12 BA(20)=2
B=V9? B=4? no
B=B+1=2+1=3
P=21
LL(21)=3 HH(21)=3+10=13 BA(21)=3
B=V9? B=4? no
B=B+1=3+1=4
P=22
LL(22)=4 HH(22)=4+10=14 BA(22)=4
B=V9? B=4? yes then
B=B+1=4+1=5 and A=A-1=10-1=9 then next line,
B=B+1=5+1=6 and then the vertical members on the right of joint 5 in the middle.
P=23
LL(23)=6 HH(23)=6+9=15 BA(23)=6
B=V9? B=4? no Etc.

```
Private Sub PROPAR3NUM()
FontName="Tomes New Roman"
FontSize=7
TW=TextWidth("5")
TH=TextHeight("7")

'joint numbering
For I=1 To N9
If I<V9*2+2 Then
CurrentX=X11(I)-TW/2
If I>9 Then CurrentX=X11(I)-1.5*TW
CurrentY=Y11(I)+TH/2 : Print I

ElseIf I>V9*2+1 Then
CurrentX=X11(I)-TW/2
If I>9 Then CurrentX=X11(I)-1.5*TW
CurrentY=Y11(I)-TH : Print I
End If
Next I

'member numbering
For P=1 To P9 : L=LL(P) : H=HH(P)
XM=X11(H)-(X11(H)-X11(L))/2
YM=Y11(H)-(Y11(H)-Y11(L))/2
```




```
'parabola left
If P<V9 Then
CurrentX=XM-TW/2 : CurrentY=YM-TH/2

XA=CurrentX-60 : XB=CurrentX+TW+60
CY=CurrentY-30
For Y=CY-30 To CY+TH+30 Step 15
Line (XA,Y)-(XB,Y),&H8000000F
Next Y

CurrentX=XM-TW/2 : CurrentY=YM-TH/2
If P>9 Then CurrentX=CurrentX-TW
Print P
'
'parabola right
ElseIf P>V9+1 And P<V9*2+1 Then
CurrentX=XM-TW/2 : CurrentY=YM-TH/2

XA=CurrentX-60 : XB=CurrentX+TW+60
CY=CurrentY-30
For Y=CY-30 To CY+TH+30 Step 15
Line (XA,Y)-(XB,Y),&H8000000F
Next Y
CurrentX=XM-TW/2 : CurrentY=YM-TH/2
If P>9 Then CurrentX=CurrentX-TW
Print P

'horizontal members
ElseIf P>V9*2 And P<V9*4+3 Then
CurrentX=XM-TW+30
If P>9 Then CurrentX=XM-2*TW+30
CurrentY=YM-TH/2 : Print P
```

```
Private Sub PROPAR3NUM()
```

As example is printed on the left the frame with L9=20 m, H99=10 m and V9=6.

N9=V9*4+3=27 and P9=V9*6+2=38

The joint numbers.
For I=1 To N9=1 To 27
The parabola joint numbers.
If I<V9*2+2=6*2+2=14 so 1 To 13 with
CurrentX=X11(I)-TW/2 and CurrentY=Y11(I)+TH/2
The horizontal member end/joints numbers.
Else I=14 To 27 with
CurrentX=X11(I)-TW/2 and CurrentY=Y11(I)-TH/2

The member numbers which are printed in the middle of the members
For P=1 To P9=1 To 38
First XM and YM with L=LL(P) and H=HH(P).
Parabola members left of the middle.
P<V9=3 P<6
CurrentX=XM-TW/2 and CurrentY=YM-TH/2
Then members are drawn. Before printing the numbers the space needed will be given the back color, erasing a piece of the drawn lines. More than the space needed for one TWxTH or two characters 2xTWxTH will get the back color is form color &H8000000F.
With 60 twips more on the left and on the right and 30 twips above and below the characters.
XA=CurrentX-60 and XB=CurrentX+60 (60 tw, a mm)
CY=CurrentY
With drawing horizontal lines the space is cleared.

```
For Y=CY-30 To CY+TH+30 step 15
Line (XA,Y)-(Xb,Y),&H8H000000F
Next Y
```

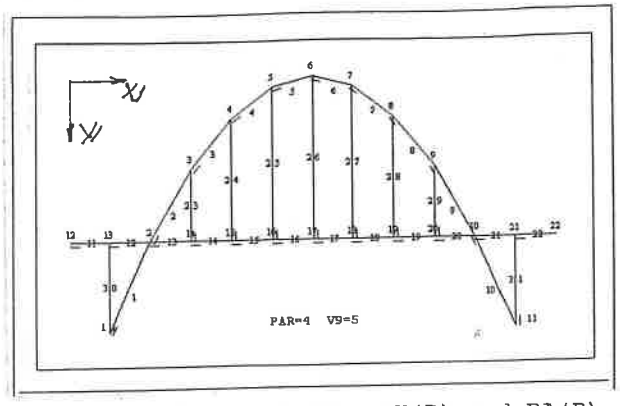
To print the numbers first again
CurrentX=XM-XM/2 and CurrentY=YM-TH/2, and
If P>9 Then CurrentX=CurrentX-TW, next Print P.
For the parabola members on the right of the middle is done the same, so in stead of two parts it could have been done in one part for P<V9*2+1.
Then the horizontal member numbers and finally the vertical member numbers; V9>1 then always larger than 9.
On the left of the middle left of the members,
If P>6*4+2 And P<6*5+2 is P>26 And P<32
with CurrentX=XM-3*TW, and
on the right of the middle right of the members
ElseIf P>V9*5+3 is P>33
with CurrentX=XM+TW/2.
To avoid 'printed misery' the members 32 and 33 are not numbered.

```
'vertical members
ElseIf P>V9*4+2 And P<V9*5+2 Then
CurrentX=XM-3*TW
CurrentY=YM-TH/2 : Print P

ElseIf P>V9*5+3 Then
CurrentX=XM+TW/2
CurrentY=YM-TH/2 : Print P
End If

Next P
End Sub
```

```
Private Sub PROPAR4()
PAR=4
A9=1199
N9=V9*4+2 : P9=V9*6+1

B9=L9/(V9^2+2) : L8=L9-2*B9

B=0
For I=1 To V9*2+1
X1(I)=B*B9 : B=B+1
YP(I)=
(-4*A9/(L8^2))*(X1(I)-L8/2)^2+A9
Y1(I)=A9-YP(I)
X1(I)=X1(I)+(L8/2)/V9
Next I

A=0
For I=V9*2+2 To V9*4+2
X1(I)=A*(L8/2)/V9 : Y1(I)=Y1(2)
A=A+1
If I=V9*2+3 Or I=V9*4 Then A=A+1
Next I

'parabola members
For P=1 To V9*2
LL(P)=P : HH(P)=P+1 : BA(P)=P
Next P

'horizontal members
For P=V9*2+1 To V9*4+2
If P=V9*2+1 Then
LL(P)=P+1 : HH(P)=P+2 : BA(P)=P+1
If P=V9*2+2 Then
LL(P)=2 : HH(P)=P+1 : BA(P)=P+1
If P=V9*2+3 Then
LL(P)=2 : HH(P)=P+1 : BA(P)=2

If P>V9*2+3 And P<V9*4 Then
LL(P)=P : HH(P)=P+1 : BA(P)=P
Next P

If P=V9*4 Then
LL(P)=V9*2 : HH(P)=P : BA(P)=P
If P=V9*4+1 Then
LL(P)=V9*2 : HH(P)=P : BA(P)=V9*2
If P=V9*4+2 Then
LL(P)=P-1 : HH(P)=P : BA(P)=P-1
Next P

'vertical members
A=V9*2+1 : B=V9*4
For P=V9*4+3 To V9*6-1
LL(P)=P-B : HH(P)=LL(P)+A
BA(P)=HH(P)
Next P

P=V9*6
LL(P)=1 : HH(P)=V9*2+3 : BA(P)=1
P=V9*6+1
LL(P)=V9*2+1 : HH(P)=V9*4+1
BA(P)=V9*2+1

'determining X11(I) and Y11(I) with
DRAWFRAME1                page

FRBASLINES                page
PROPAR4NUM

End Sub
```

Private Sub PROPAR4()

See the figure below for V9=5, L9=15 and H9=8. The number of joints is N9=V9*4+2=5*4+2=22 and the number of members is P9=V9*6+1=5*6+1=31. Coordinates for the parabola like PROPAR3. Next the coordinates for the joints of the horizontal members, see PROPAR3 for differences.
For I=V9*2+2 To V9*4+2=10+2 To 20+2=12 To 22.
This time Y1(I)=Y1(2) like joint 2 of the parabola. Joint 2, and joint 10 can be skipped over.
If I=V9*2+3 Or I=V9*4 Then A=A+1, that's the second A=A+1 before the next joint, in case if I=5*2+3=13 or I=5*4=20.



Then determination of LL(P), HH(P) and BA(P). Parabola members like PROPAR3.

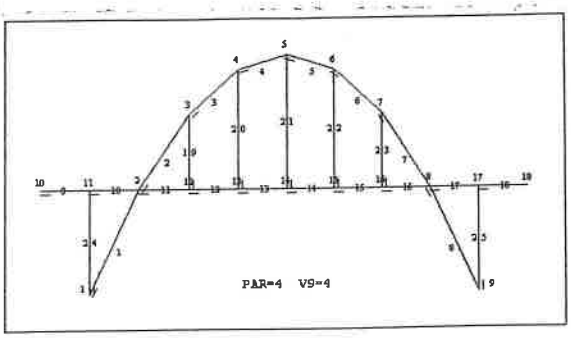
Horizontal members.
For P=V9*2+1 To V9*4+2=10+1 To 20+2=11 To 22.
First three members taken apart.
If P=V9*2+1=11 Then
LL(11)=11+1=12 HH(11)=11+2=13 BA(11)=12+1=13
If P=V9*2+2=12 Then
LL(12)=2 HH(12)=12+1=13 BA(12)=12+1=13
If P=V9*2+3=13 Then
LL(13)=2 HH(13)=13+1=14 BA(13)=2
For other V9's also joint 2!
Next the members P>V9*2+3 And P<V9*4,
P>5*2+3 And P<5*4 is P>13 And P<20, simple.
Then the last three horizontal members, taken apart as well;, note joint V9*2=5*2=10!
If P>V9*2+3 And P<V9*4 is If P>13 And P<20.

Vertical members above the horizontal members.
First A=V9*2+15*2+1=11 and B=V9*4=5*4=20

For P=V9*4+3 To V9*6-1 is For P=23 To 29
LL(P)=P-B HH(P)=LL(P)+A BA(P)=HH(P)
P=23
LL(23)=23-20=3 HH(23)=3+11=14 BA(23)=14
P=24
LL(24)=24-20=4 HH(24)=4+11=15 BA(24)=15
P=25
....
Last two vertical members.
On the left P=V9*6=5*6=30
LL(P)=1 HH(P)=V9*2+3 BA(P)=1
LL(30)=1 HH(30)=5*2+3=13 BA(30)=1
On the right P=V9*6+1=5*6+1=31
LL(P)=V9*2+1 HH(P)=V9*4+1 BA(P)=V9*2+1
LL(31)=5*2+1=11 HH(31)=5*4+1=21 BA(31)=11

Finally numbering joints and members with PROPAR4NUM, see next page.

```
Private Sub PROPAR4NUM()
FontName="Tomes New Roman"
FontSize=7
TW=TextWidth("5")
TH=TextHeight("7")

'joint numbering
For I=1 To N9
If I<V9*2+2 Then

If I=1 Then
CurrentX=X11(I)-2*TW-15
CurrentY=Y11(I)-TH : Print I

ElseIf I=V9*2+1 Then
CurrentX=X11(I)+2*TW-15
CurrentY=Y11(I)-TH : Print I

Else
CurrentX=X11(I)-TW
If I>9 Then CurrentX=X11(I)-1.5*TW
CurrentY=Y11(I)-TH-60 : Print I
End If

ElseIf I>V9*2+1 Then
CurrentX=X11(I)-TW/2
If I>9 Then CurrentX=X11(I)-1.5*TW
CurrentY=Y11(I)-TH-30 : Print I
End If
Next I
```




```
'member numbering
A=0 : B=0
For P=1 To P9 : L=LL(P) : H=HH(P)
XM=X11(H)-(X11(H)-X11(L))/2
YM=Y11(H)-(Y11(H)-Y11(L))/2

'parabola left
If P<V9+1 Then
CurrentX=XM-A*(TW/V9)     page
If P>9 Then CurrentX=CurrentX-TW/2
CurrentY=YM+60 : Print P
A=A+1

'parabola right
ElseIf P>V9 And P<V9*2+1 Then
CurrentX=XM-TW/2-B*(TW/V9)
If P>9 Then CurrentX=CurrentX-TW
CurrentY=YM+60 : Print P
B=B+1

'horizontal members
ElseIf P>V9*2 And P<V9*4+3 Then
CurrentX=XM-TW
CurrentY=YM-TH/2 : Print P
```

Private Sub PROPAR4NUM()

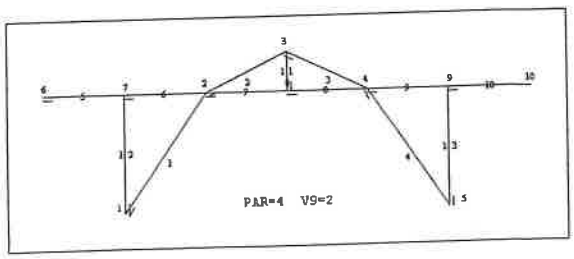
On the left as example the frame with L9=20, H99=9 and V9=4.

N9=V9*4+2=4*4+2=18 and P9=V9*6+1=4*6+1=25.

The joint numbers.
For I=1 To N9=1 To 18
The parabola joint numbers.
If I<V9*2+2=4*2+2=10 so I=1 To 9.
An exception is made for joint 1 and V9*2+1 of the supports.
If I=1 Then and ElseIf I=V9*2+1=4*2+1=9.
Joint 1 printed on the left and joint V9*2+1 on the right of the support, both with CurrentY=Y11(I)-TH.
The other joints of the parabola after Else with CurrentY=Y11(I)-TH-60.
For PAR=2 on page it was Y11(I)-TH-30. A difference of about half a millimeter.
Next the joints/ends of the horizontal members.

Numbering the members.
The parabola members are numbered like for PAR=2, there after the horizontal members.
ElseIf P>V9*2 And P<V9*4+3
P>4*2 And P<4*4+3=19 is 9 To 18.
Here the horizontal members are numbered with
CurrentX=XM-TW/2
If P>9 Then CurrentX=XM-1.5*TW and
CurrentY=YM-TH/2, no cleared spaces.

N.B. A try with V9=1 brings misery, 'Overflow' but V9>1 works well.



Vertical members.
Not to mix the numbers with the drawn members one digit will be printed left of and the other right of the member. With V9>1 always P>9.
The number, e.g. P=25, seen as string is divided into T1 and T2 with
T1=Mid(P,1,1)=2 and T2=Mid(P,2,1)=5, and printed like the code shows below.

```
'vertical members
ElseIf P>V9*4+2 Then
T1=Mid(P,1,1)
T2=Mid(P,2,1)
'left of
CurrentX=XM-TW-15
CurrentY=YM-TH/2 : Print T1
'right of
CurrentX=XM+45
CurrentY=YM-TH/2 : Print T2
End If

Next P
End Sub
```