#3 TEE SECTION PROPERTIES

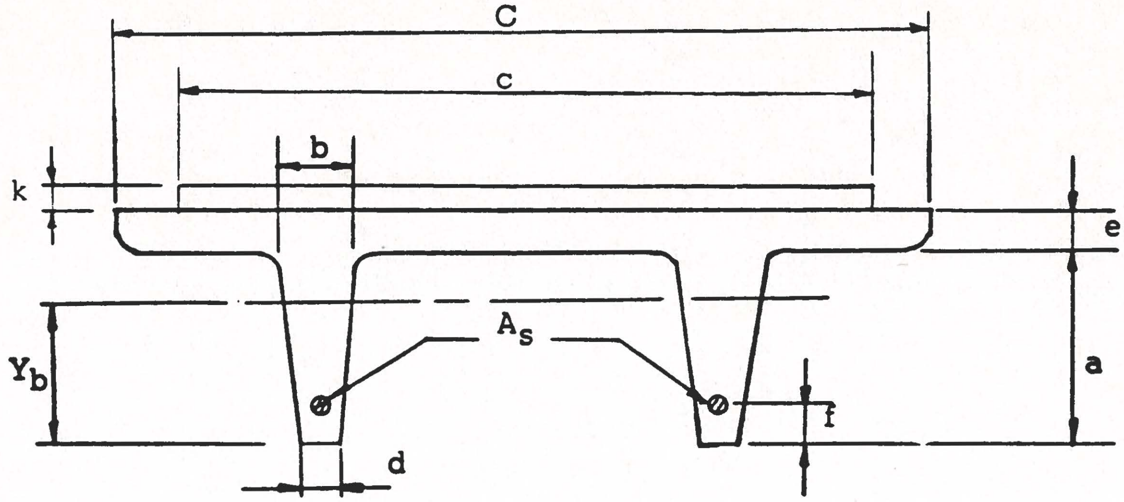
ABSTRACT

This program computes the precast and composite section properties for double tees and single tees with or without sloping webs. Flanges must be uniform in thickness. Transformed section properties can also be computed if steel is to be considered.

Price $60.00

INPUT	OUTPUT
Dimensions of tee	Centroid for top and bottom
Elasticity of steel and concrete	Moment of inertia
Area and location of steel	Section modulus for top and bottom
Transformed topping width	Area

SECTION PROPERTIES



C.P. - 3

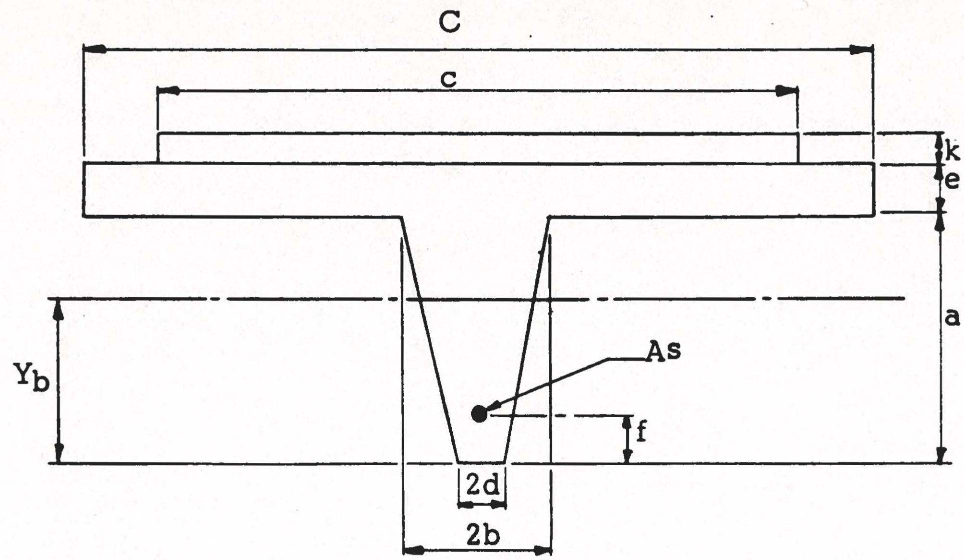
Data:

Depth of stem (a)	=	28	in.
Width of stem (b)	=	6	in.
Width of flange (c)	=	96	in.
Width of stem (d)	=	3.25	in.
Modulus of Elasticity of steel (E_s)	=	30000	ksi.
Modulus of Elasticity of concrete (E_c)	=	3000	ksi.
Area of Steel reinforcement (A_s)	=	3.0	$in.^2$
Flange Thickness (e)	=	4	in.
Center of gravity of steel (f)	=	2	in.

Calculations:

Distance from bottom to neutral axis (Y_b)	=	23.1282	in.
Moment of Inertia (I)	=	63979.2773	$in.^4$
Section Modulus -- bottom (S_b)	=	2766.2886	$in.^3$
Distance from top to neutral axis (Y_t)	=	6.8718	in.
Area (.A)	=	673.0000	$in.^2$
Section Modulus -- Top S_t	=	7211.5328	$in.^3$
Thickness of topping (k)	=	3	in.
Transformed width of topping (C)	=	60	in.
Area of composite section (A_t)	=	853.0000	$in.^2$
Centroid of composite section (Y_b)	=	25.3168	in.
Centroid of composite section (Y_t)	=	9.6832	in.
Inertia of composite section (I_t)	=	79391.5260	$in.^4$
Section modulus wrt. bottom (S_b)	=	3135.9226	$in.^3$
Section modulus wrt. top (S_t)	=	8198.8935	$in.^3$

SECTION PROPERTIES



C.P. - 3

Data:

Depth of stem (a)	=	20 in.
Width of stem (b)	=	5 in.
Width of flange (c)	=	80 in.
Width of stem (d)	=	2 in.
Modulus of Elasticity of steel (E_s)	=	29000 ksi.
Modulus of Elasticity of concrete (E_c)	=	4000 ksi.
Area of Steel reinforcement (A_s)	=	2 $in.^2$
Flange Thickness (e)	=	3 in.
Center of gravity of steel (f)	=	2 in.

Calculations:

Distance from bottom to neutral axis (Y_b)	=	17.2091 in.
Moment of Inertia (I)	=	17011.9200 $in.^4$
Section Modulus -- bottom (S_b)	=	988.5421 $in.^3$
Distance from top to neutral axis (Y_t)	=	5.7909 in.
Area (A)	=	391.5000 $in.^2$
Section Modulus -- Top S_t	=	2937.6988 $in.^3$
Thickness of topping (k)	=	2 in.
Transformed width of topping (C)	=	65 in.
Area of composite section (A_t)	=	524.5000 $in.^2$
Centroid of composite section (Y_b)	=	18.0922 in.
Centroid of composite section (Y_t)	=	6.1078 in.
Inertia of composite section (I_t)	=	21564.4409 $in.^4$
Section modulus wrt. bottom (S_b)	=	1141.4467 $in.^3$
Section modulus wrt. top (S_t)	=	3530.6396 $in.^3$

#7 FIXED END MOMENTS AND REACTIONS

ABSTRACT

This program computes fixed end moments and reaction for beams with any number and/or combination of loads such as point loads, triangular loads, uniform loads, and applied moments. Triangular and uniform loads may be partially or fully distributed on the beam. End joints can be pinned or fixed on either end or on both ends.

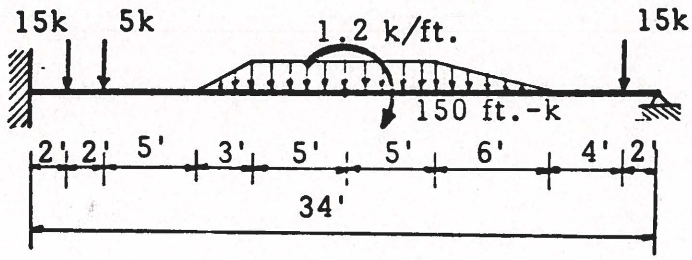
Price $60.00

INPUT	OUTPUT
Load description	Left moment
Joint type	Right moment
Span length	Left reaction
	Right reaction

C. P. 7

SAMPLE PROBLEM

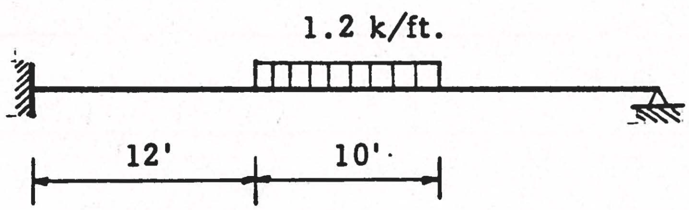
Given:



Ja = 1
Jb = 0
Span Length L= 34 ft.

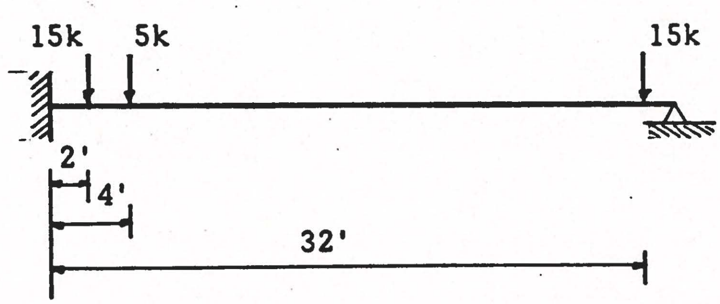
Solution: The beam must be broken down into the following five loadings.

Loading 1



Type of Loading = 1
W = 1.2 k/ft.
A = 12 ft.
B = 10 ft.

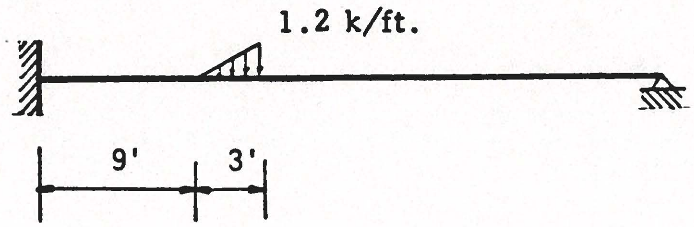
Loading 2



Type of Loading = 2
Number of Loads, N = 3
P(1) = 15 k
A(1) = 2 ft.
P(2) = 5 k
A(2) = 4 ft.
P(3) = 15 k
A(3) = 32 ft.

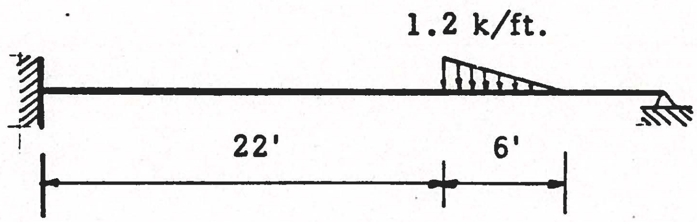
Loading 3

Type of Loading = 3
W = 1.2 k/ft.
S = +1
A = 9 ft.
B = 3 ft.



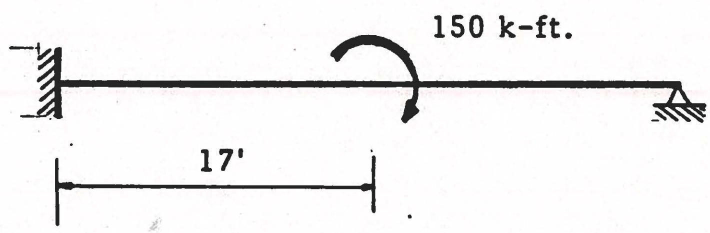
Loading 4

Type of Loading = 3
W = 1.2 k/ft.
S = -1
A = 22 ft.
B = 6 ft.



Loading 5

Type of Loading = 4
Mo = 150 k-ft.
A(1) = 17'



Data:

Left Joint Type, Ja	1	S
Right Joint Type, Jb	0	S
Span Length, L	34	S
Loading 1, Type of Loading →	1	S
Applied Uniform Load, W	1.2	S
Distance from Left Support, A	12	S
Distance Load is Applied, B	10	S
Left Reaction, Ra →	8.1852	e0
Right Reaction, Rb →	3.8148	E0
Left Moment, Ma →	-74.2941	f0
Right Moment, Mb →	0.0000	F0
Loading 2, Type of Loading →	2	S
Number of Loads, N	3	S
P(1)	15	S
A(1)	2	S
P(2)	5	S
A(2)	4	S
P(3)	15	S
A(3)	32	S
Summation of Ra, Loading 1 and 2 →	29.3294	e0
Summation of Rb, Loading 1 and 2 →	17.6706	E0
Summation of Ma, Loading 1 and 2 →	-133.2558	f0
Summation of Mb, Loading 1 and 2 →	0.0000	F0
Loading 3, Type of Loading →	3	S
Maximum Value of Triangular Load, W	1.2	S
Slope of Triangular Load	1	S
Distance from Left Support, A	9	S
Distance Load Is Applied, B	3	S
Summation of Ra, Loading 1,2 and 3 →	30.8764	e0
Summation of Rb, Loading 1,2 and 3 →	17.9236	E0
Summation of Ma, Loading 1,2 and 3 →	-144.4538	f0
Summation of Mb, Loading 1,2 and 3 →	0.0000	F0
Loading 4, Type of Loading →	3	S
Maximum Value of Triangular Load, W	1.2	S
Slope of Triangular Load	-1	S
Distance from Left Support, A	22	S
Distance Loas Is Applied, B	6	S
Summation of Ra, Loading 1,2,3 and 4 →	32.4162	e0
Summation of Rb, Loading 1,2,3 and 4 →	19.9838	E0
Summation of Ma, Loading 1,2,3 and 4 →	-160.8070	f0
Summation of Mb, Loading 1,2,3 and 4 →	0.0000	F0
Loading 5, Type of Loading →	4	S
Applied Moment, Mo	150	S
Distance from Left Support, A(1)	17	S
Summation of Ra, Loading 1,2,3,4 and 5 →	27.4530	e0
Summation of Rb, Loading 1,2,3,4 and 5 →	24.9470	E0
Summation of Ma, Loading 1,2,3,4 and 5 →	-142.0570	f0
Summation of Mb, Loading 1,2,3,4 and 5 →	0.0000	F0

Conclusions:

Left Reaction, Ra = 27.45 kips

Right Reaction, Rb = 24.95 kips

Left Moment, Ma = -142.06 k-ft.

Right Moment, Mb = 0

#10 BEAM DEFLECTION ANALYSIS

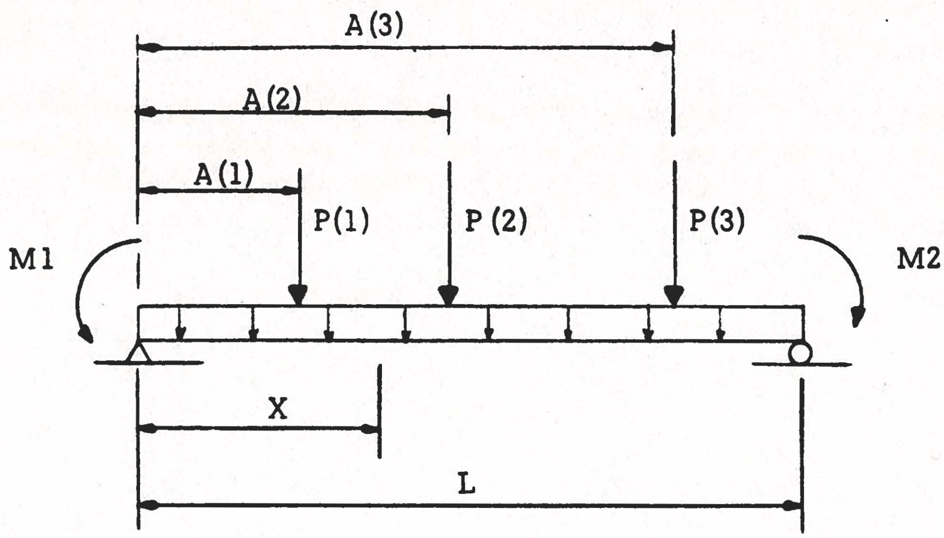
ABSTRACT

This program computes the deflection at any point X along the span due to applied end moments, uniform load, and any number of point loads. Deflection due to each load type plus total deflection is output.

Price $65.00

INPUT	OUTPUT
Span length	Deflection due to uniform load
Elasticity and inertia	Deflection due to end moments
Location of desired deflection - X	Deflection due to each point load
End moments	Total deflection at X
Uniform and point loads	

DEFLECTION ANALYSIS



C.P. 10

Data:

Span length (L)	=	40	ft.
Modulus of elasticity (E)	=	30000	ksi.
Moment of inertia (I)	=	705	$in.^4$
Location of desired deflection (X)	=	15	ft.
Moment at left end (M1)	=	200	k-ft.
Moment at right end (M2)	=	150	k-ft.
Uniform load on span (W)	=	0.6	k/ft.

Calculations:

$D_w = 72(W)X(L^3 - 2\ L(X)^2 + X^3)/E(I)$ = 1.5127 in.

$D_m = \frac{288(X-L)X}{E(I)L}\left[L(2M1+M2) + X(M2-M1)\right]$ = -2.7127 in.

Location of load P(1)	=	10	ft.
Load P(1)	=	25	kips
Deflection at X due to P(1)	=	1.8617	in.
Total deflection at X	=	0.6617	in.

Location of load P(2)	=	25	ft.
Load P(2)	=	26	kips
Deflection at X due to P(2)	=	2.2902	in.
Total deflection at X	=	2.9519	in.

etc.

#22 SECTION PROPERTIES

ABSTRACT

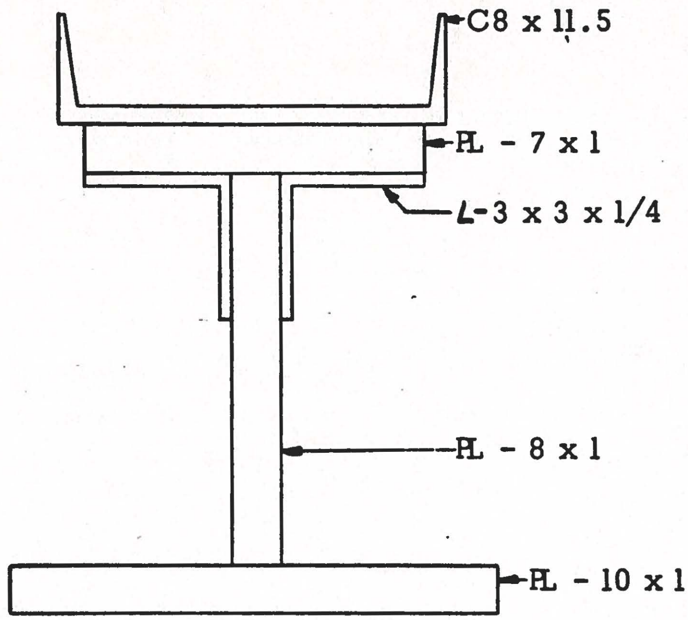
This program computes the section properties for any shape that can be represented by rectangles, triangles, circles, and rolled sections. Circles may be subtracted or added from the shape. Listed below are some of the sections the program will solve. Price $75.00

- Single and double tees
- ASSHO girders
- Hollowcore slabs
- Rolled sections with plates added
- Section built up out of plates
- Combination of rolled sections with plates

INPUT	OUTPUT
Element type	Area
Element dimensions	Centroid with respect to top and bottom
	Moment of inertia
	Radius of gyration
	Section modulus with respect to top and bottom

SAMPLE PROBLEM - CP 22

Given:



Conclusions:

Area of section (A)	=	31.2600	in.^{2}
Centroid of section wrt. base (Y_b)	=	5.4613	in.
Moment of inertia of section (I)	=	519.0743	in.^{4}
Section modulus wrt. base (S_b)	=	95.0459	in.^{3}
Radius of gyration (r)	=	4.0749	in.
Section modulus wrt. base (S_t)	=	76.4615	in.^{3}
Centroid of section wrt. top (Y_t)	=	6.7887	in.

<u>SECTION PROPERTIES</u>

Data: C.P. 22

Number of rectangles (NR)	=	3
Number of rolled shapes (NRO)	=	2
Number of triangles (NT)	=	0
Number of circles (NC)	=	0
Width of rectangle 1 (B1)	=	10 in.
Depth of rectangle 1 (D1)	=	1 in.
Distance to centroid rectangle 1 (Y1)	=	0.5 in.
Width of rectangle 2 (B2)	=	1.0 in.
Depth of rectangle 2 (D2)	=	3 in.
Distance to centroid rectangle 2 (Y2)	=	5 in.
. .		
. .		
Width of rectangle NR (B_{NR})	=	7 in.
Depth of rectangle NR (D_{NR})	=	1 in.
Distance to centroid rectangle NR	=	9.5 in.
Area of rolled shape 1 (A1)	=	3.38 $in.^2$
Distance to centroid of shape 1 (Y1)	=	10.57 in.
Inertia of shape 1 about its centroid (I1)	=	1.32 $in.^4$
. .		
. .		
Area of rolled shape N (AN)	=	2.38 $in.^2$
Distance to centroid of shape N (YN)	=	8.158 in
Inertia of shape N about its centroid (IN)	=	2.49 $in.^4$
Width of triangle 1 (B1)	=	in.
Depth of triangle 1 (D1)	=	in.
Distance to centroid of triangle 1 (Y1)	=	in.
. .		
Width of triangle NT	=	in.
Depth of triangle NT	=	in.
Distance to centroid of triangle NT	=	in.

Radius of circle 1	=		in.
Distance to centroid of circle 1	=		in.
Radius of circle 2	=		in.
Distance to centroid of circle 2	=		in.
Radius of circle NC	=		in.
Distance to centroid of circle NC	=		in.

Computations;

Area of section (A)	=	31.2600	$in.^2$
Centroid of section wrt. base (Y_b)	=	5.4613	in.
Moment of inertia of section (I)	=	519.0743	$in.^4$
Section modulus wrt. base (S_b)	=	95.0159	$in.^3$
Radius of gyration (r)	=	4.0719	in.
Total depth of section (d)	=	12.25	in.
Section modulus wrt. top (S_t)	=	76.4615	$in.^3$
Centroid of section wrt. top (Y_t)	=	6.7887	in.

#25 BEAM ANALYSIS

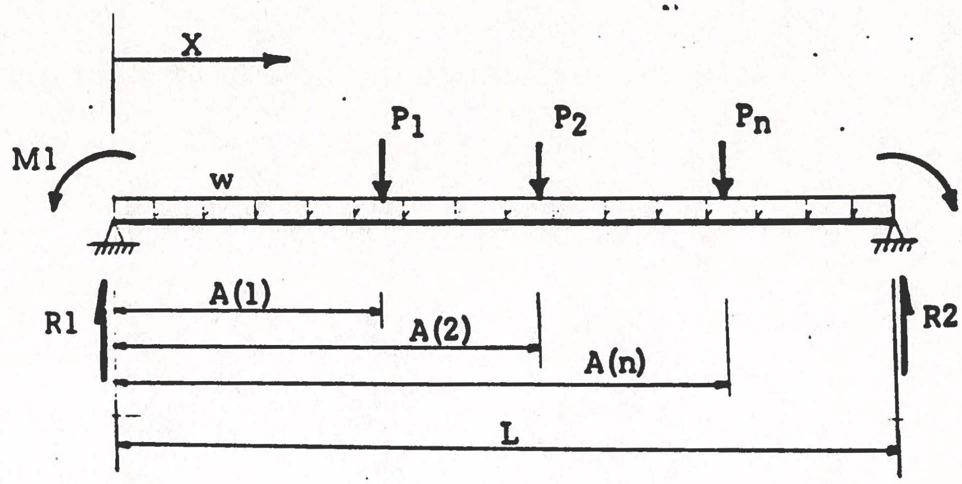
ABSTRACT

This program computes the reactions and then the shear and moment at any number of locations along the beam due to point loads, uniform load and end moments. Maximum positive moment and points of inflection are easily obtained.

Price $60.00

INPUT	OUTPUT
Point loads and locations	Reactions
Span length	Shear at X
End moments	Moment at X
Uniform load	
Location of desired analysis	

STRUCTURAL ANALYSIS



C.P. - 25

Data:

Uniform continuous load (w)	=	1.3	k/ft.
Number of point loads (N)	=	3	
Span length (L)	=	40	ft.
Applied moment at left (M1)	=	100	k-ft.
Applied moment at right (M2)	=	100	k-ft.
Location of load 1 A(1)	=	10	ft.
Value of load P(1)	=	3	k
Location of load 2 A(2)	=	20	ft
Value of load P(2)	=	3	k
Location of load 3 A(3)	=	30	ft.
Value of load P(3)	=	3	k

Left Reaction (R1)	=	30.5000	k
Right Reaction (R2)	=	30.5000	k
Location from left support (X)	=	10	ft.
Shear at X	=	14.5000	k
Moment at X	=	140.0000	k-ft.
Location from left support (X)	=	20	ft.
Shear at X	=	-1.5000	k
Moment at X	=	220.0000	k-ft.
Location from left support (X)	=	30	ft.
Shear at X	=	-17.5000	k
Moment at X	=	140.0000	k-ft.