#120 STEEL BASE PLATE DESIGN

ABSTRACT

This program designs rectangular steel base plates supporting eccentrically loaded steel columns in accordance with the seventh edition of the AISC Specification (1969) and the ACI Building code.

Price $60.00

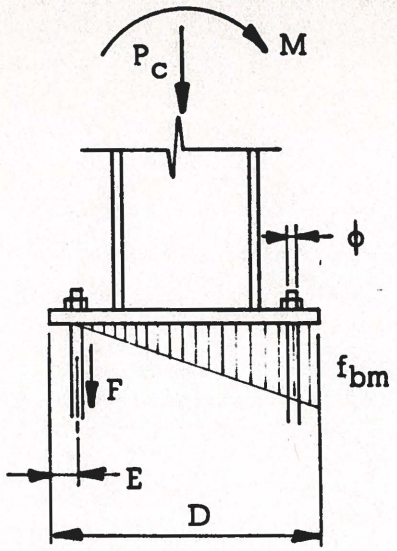
INPUT

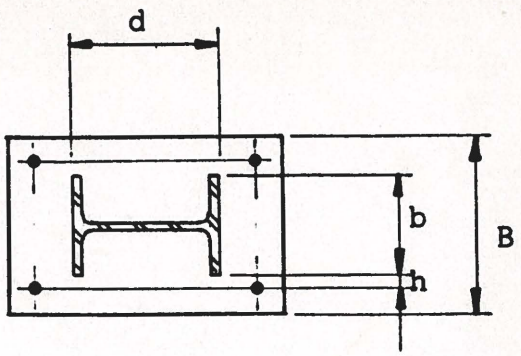
Number and size of bolts
Plate dimensions
Allowable bending stress
Concrete compressive strength
Axial load
Applied moment

OUTPUT

Eccentricity of load
Length of soil pressure diagram
Tensile force per bolt
Tensile stress per bolt
Maximum bearing stress
Allowable bearing stress
Required plate thickness

BASE PLATE DESIGN





Data: C. P. 120

Size of bolts (ϕ)	=	1.5	in.
Number of bolts on tension side (NB)	=	2	bolts
Length of plate (D)	=	34.75	in.
Distance from center of bolts to plate edge (E)	=	2.5	in.
Width of plate (B)	=	17	in.
Axial load (Pc)	=	300	kips
Allowable steel bending stress for plate (f_s)	=	27	ksi
Compressive strength of concrete (f'c)	=	3	ksi
Applied moment (M)	=	500	k - ft.

Calculations:

Eccentricity of load: $e = 12M/P$	=	20.0000	in.
Three roots of cubic equation R1	=		
R2	=	0.0000	
R3	=	16.0452	
Length of soil pressure diagram (Y)	=	16.0452	in.
Tension force per bolt; $F = Pt/NB$	=	44.4586	kips
Bolt stress; $fa = 4F/\pi\phi^2$	=	25.1584	ksi
Maximum bearing stress in concrete (f_{bm})	=	2.8516	ksi
Allowable bearing stress; $fb = .375f'c$	=	1.1250	ksi
Width of column (b)	=	10	in.
Depth of column (d)	=	15	in.
Bolt eccentricity in Y direction (h)	=	3	in.
Plate moment; $M_x = Pt((D - d)/2 - E)$	=	655.7650	k - in.
Thickness = $\sqrt{6M_x/Bf_s}$	=	2.9277	in.
Plate moment; $My = F(h)$	=	133.3758	k - in.
Thickness = $\sqrt{6My/(E + G)f_s}$	=	1.7324	in.
Plate moment; $M_{xx} = f_{bm}(B)(m)^2/2$	=	2546.5679	k - in.
Thickness = $\sqrt{6M_{xx}/Bf_s}$	=	5.7696	in.
Plate moment; $Myy = f_{bm}(E + G)n^2/2$	=	285.1148	k - in.
Thickness = $\sqrt{6Myy/(E + G)f_s}$	=	2.5329	in.