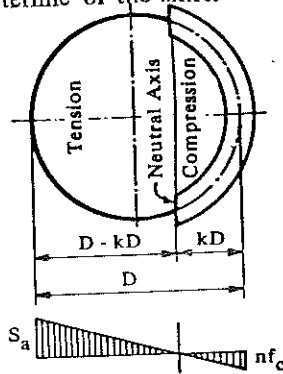


## DESIGN OF ANCHOR BOLT AND BASE RING

When a tower is under wind or earthquake load, on the windward side tensional stress arises in the steel and on the opposite side compressive stress in the concrete foundation. It is obvious then that the area of the bolting and the area of the base ring are related. As the anchor bolt area increased, the base ring area can be decreased. With the design method given here, the minimum required anchor bolt area for a practical size of base ring can be found. The strength of the steel and the concrete is different, therefore, the neutral axis does not coincide with the centerline of the skirt.



### Design procedure:

1. Determine the value of  $k$
2. Calculate the required size and number of anchor bolts. See page 58, Table B
3. Determine the inside and outside diameter of the base ring
4. Check the stresses in the anchor bolts and foundation
5. If the deviation between the allowable and actual stresses are too large, repeat the calculation
6. Calculate the base ring thickness
7. Use gusset plates, anchor chairs or compression ring if it is necessary for better stress distribution in the base ring or skirt

**TABLE D**  
Values of Constants  
as Functions of  $k$

$k$	$C_c$	$C_t$	$j$	$z$
0.00	0.000	3.142	0.750	0.500
.05	0.600	3.008	.760	.490
.10	0.852	2.887	.766	.480
.15	1.049	2.772	.771	.469
.20	1.218	2.661	.776	.458
.25	1.370	2.551	.779	.448
.30	1.510	2.442	.781	.438
.35	1.640	2.333	.783	.427
.40	1.765	2.224	.784	.416
.45	1.884	2.113	.785	.404
.50	2.000	2.000	.785	.393
.55	2.113	1.884	.785	.381
.60	2.224	1.765	.784	.369
.65	2.333	1.640	.783	.357
.70	2.442	1.510	.781	.344
.75	2.551	1.370	.779	.331
.80	2.661	1.218	.776	.316
.85	2.772	1.049	.771	.302
.90	2.887	0.852	.766	.286
.95	3.008	0.600	.760	.270
1.00	3.142	0.000	.750	.250

**TABLE F**  
Bending moment per unit length of section of  
a plate perpendicular to X and Y axes respec-  
tively. Use greater value,  $M_x$  or  $M_y$ .

$l_1/b$	$M_x$	$M_y$
0.000	0.000	$-0.500 f_c l_1^2$
0.333	$0.0078 f_c b^2$	$-0.428 f_c l_1^2$
0.500	$0.0293 f_c b^2$	$-0.319 f_c l_1^2$
0.667	$0.0558 f_c b^2$	$-0.227 f_c l_1^2$
1.000	$0.0972 f_c b^2$	$-0.119 f_c l_1^2$
1.500	$0.123 f_c b^2$	$-0.124 f_c b^2$
2.000	$0.131 f_c b^2$	$-0.125 f_c b^2$
3.000	$0.133 f_c b^2$	$-0.125 f_c b^2$
$\infty$	$0.133 f_c b^2$	$-0.125 f_c b^2$

**TABLE E**  
Properties of Concrete Four Mixtures

Ultimate 28 day Strength psi	2000	2500	3000	3750
Allowable compr. Strength $f_c$ psi	800	1000	1200	1500
Safe bearing load $f_b$ psi	500	625	750	938
Factor $n$	15	12	10	8

### NOTE:

See Notations on following page.