FIRM:Your Firm | JOB NO. | SHEET NO: 1
MADE BY:KJH DATE:05-21-2006 | CHECKED BY: | DATE:
TITLE:Example SURFLOAD calculation

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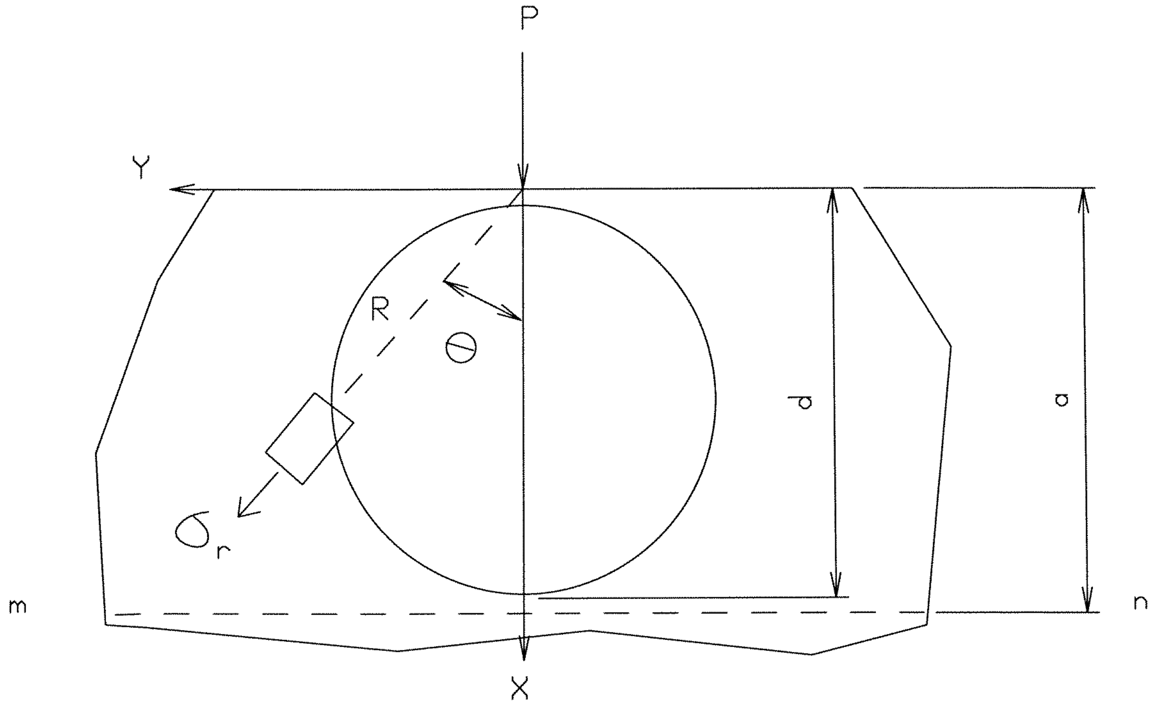
BOUSSINESQ STRESS SOLUTION:

DISCUSSION OF THEORY:



The calculation of stresses due in a point load on an infinite large plate is described in "Theory of Elasticity", by Timoshenko and Goodier. There is a basic solution called the simple radial distribution, which was derived by J. Boussinesq in 1892. Any element at a distance "R" from the point of application of the load "P" is subjected to a compression stress in the radial direction. In the above figure, all elements on the circle have the same radial compression stress.

The radial compression stress, σ_r , resolves into the components,

$\sigma_x = -2*P/(\pi *a) * \cos^4 \theta$ (Vertical stress)

$\sigma_y = -2*P/(\pi *a) * \sin^2 \theta \cos^2 \theta$ (Horizontal stress)

$\tau_{xy} = -2*P/(\pi *a) * \sin\theta \cos^3 \theta$ (Shear stress)

For strip loadings, this program applies the above equations by subdivding a surface load into 100 incremental "P" loads.

Comment: The AREMA manual presents formulas for lateral earth pressure on walls that is based on the above formulation, but lateral pressures are doubled (refer to AREMA Chapter 8, Section 20.3.2.3). This modification is based on experiments conducted by Spangler in the 1930's. Refer to J.E. Bowles, "Foundation Analysis and Design", 1988, p. 510 for a discussion.

FIRM:Your Firm JOB NO. SHEET NO: 2
MADE BY:KJH DATE:05-21-2006 CHECKED BY: DATE:
TITLE:Example SURFLOAD calculation

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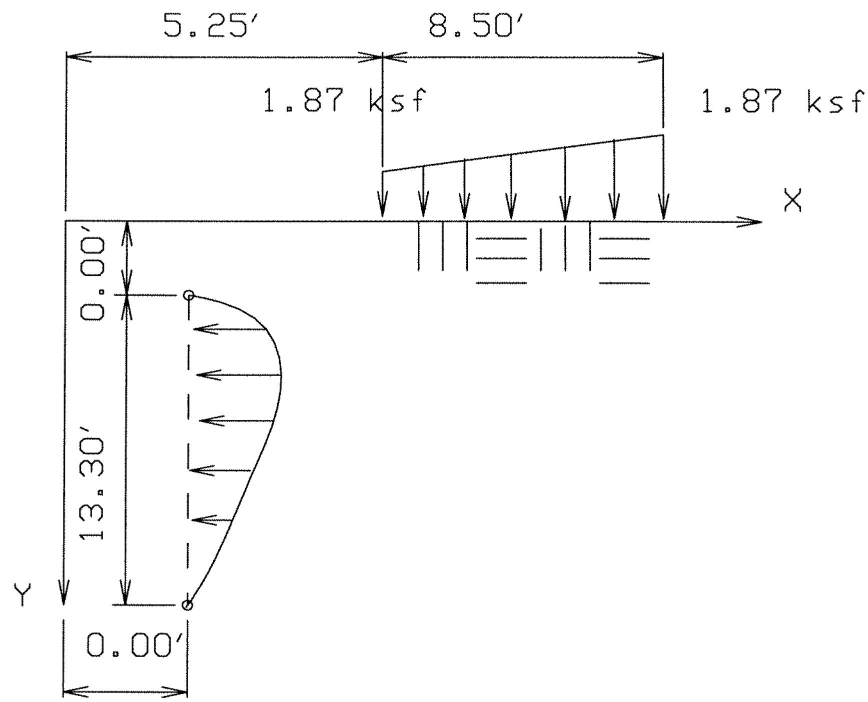
BOUSSINESQ STRESS SOLUTION:



LOAD 1:E80 SURCHARGE

Point	X (ft)	Y (ft)	Horizontal Stress* (ksf)	Vertical Stress (ksf)	Shear Stress (ksf)
1	0.000	0.000			
2	0.000	1.330	.174	0.005	0.030
3	0.000	2.660	.294	.036	.100
4	0.000	3.990	.346	0.091	.171
5	0.000	5.320	.348	.154	.224
6	0.000	6.650	.325	.212	.253
7	0.000	7.980	.290	.260	.265
8	0.000	9.310	.253	.296	.264
9	0.000	10.640	.218	.322	.255
10	0.000	11.970	.186	.338	.242
11	0.000	13.300	.159	.347	.227

(*) Note: For lateral pressures on retaining walls or sheeting, use double the horizontal stress. See "Comment" under "Discussion of Theory".