uOttawa
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CVG 3109 Fall – 2015
SOIL MECHANICS I
ASSIGNMENT #3
Due on Oct 20, 2015

Elastic Theory

Q1. The plan of a flexible rectangular loaded area is shown in Fig. 1. The uniformly distributed load on flexible area, q is 80 kN/m^2. Determine the vertical stress increase, $\Delta\sigma_z$ vertically below points A, B, and C at a depth of z = 3.5 m (Use the chart on Page 2 to determine the influence value, I)

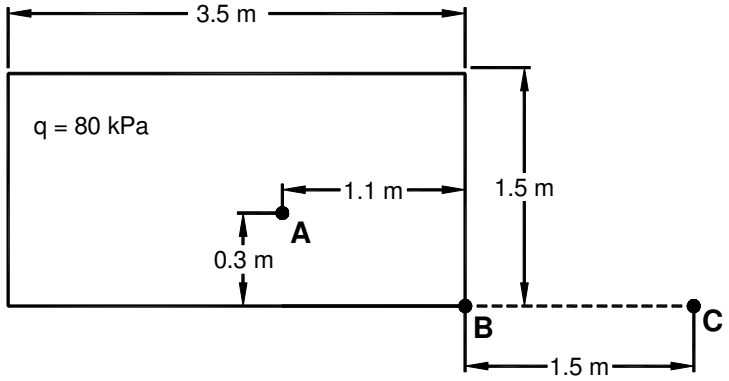
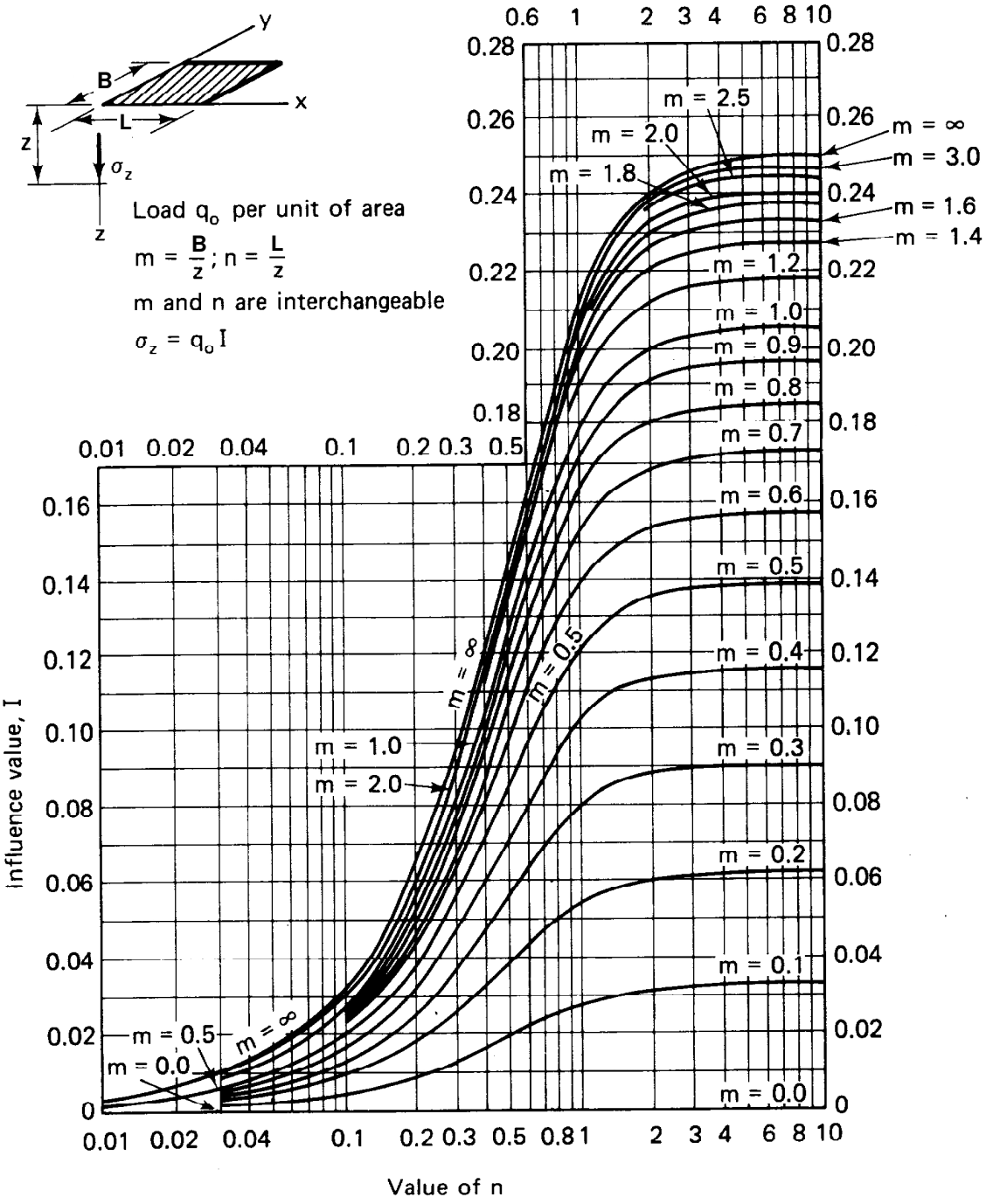


Figure 1


y
B
x
L
z
σ_z
z
Load q_o per unit of area
$m = \frac{B}{z}$; $n = \frac{L}{z}$
m and n are interchangeable
$\sigma_z = q_o I$
Influence value, I
Value of n
0.6 1 2 3 4 6 8 10
0.01 0.02 0.04 0.1 0.2 0.3 0.5 0.8 1 2 3 4 6 8 10
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0
m = 2.5
m = 2.0
m = 1.8
m = ∞
m = 3.0
m = 1.6
m = 1.4
m = 1.2
m = 1.0
m = 0.9
m = 0.8
m = 0.7
m = 0.6
m = 0.5
m = 0.4
m = 0.3
m = 0.2
m = 0.1
m = 0.0
m = ∞
m = 0.5
m = 1.0
m = 2.0
m = 0.5
m = 0.0

Q2. For the embankment loading shown in Figure 2, determine the vertical stress increase at points A, B, and C. (Use the chart on Page 4 to determine the influence value, I).

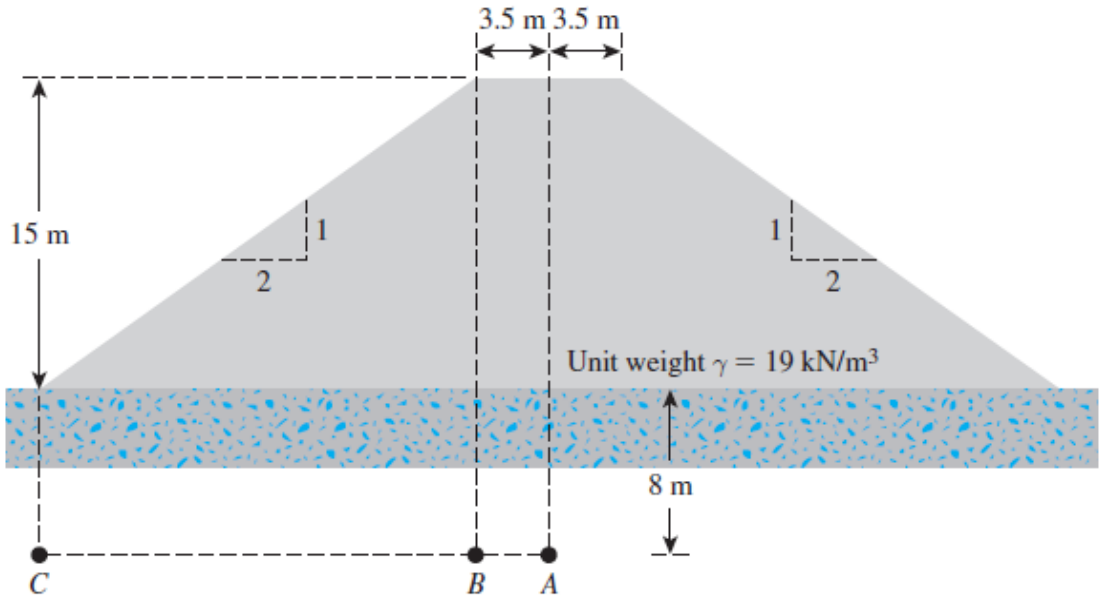
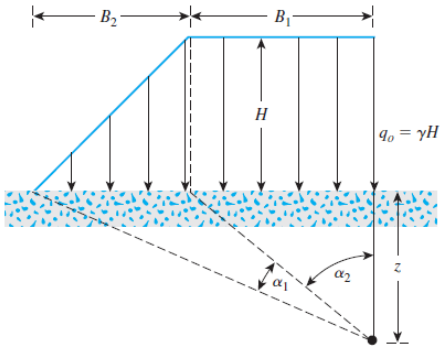
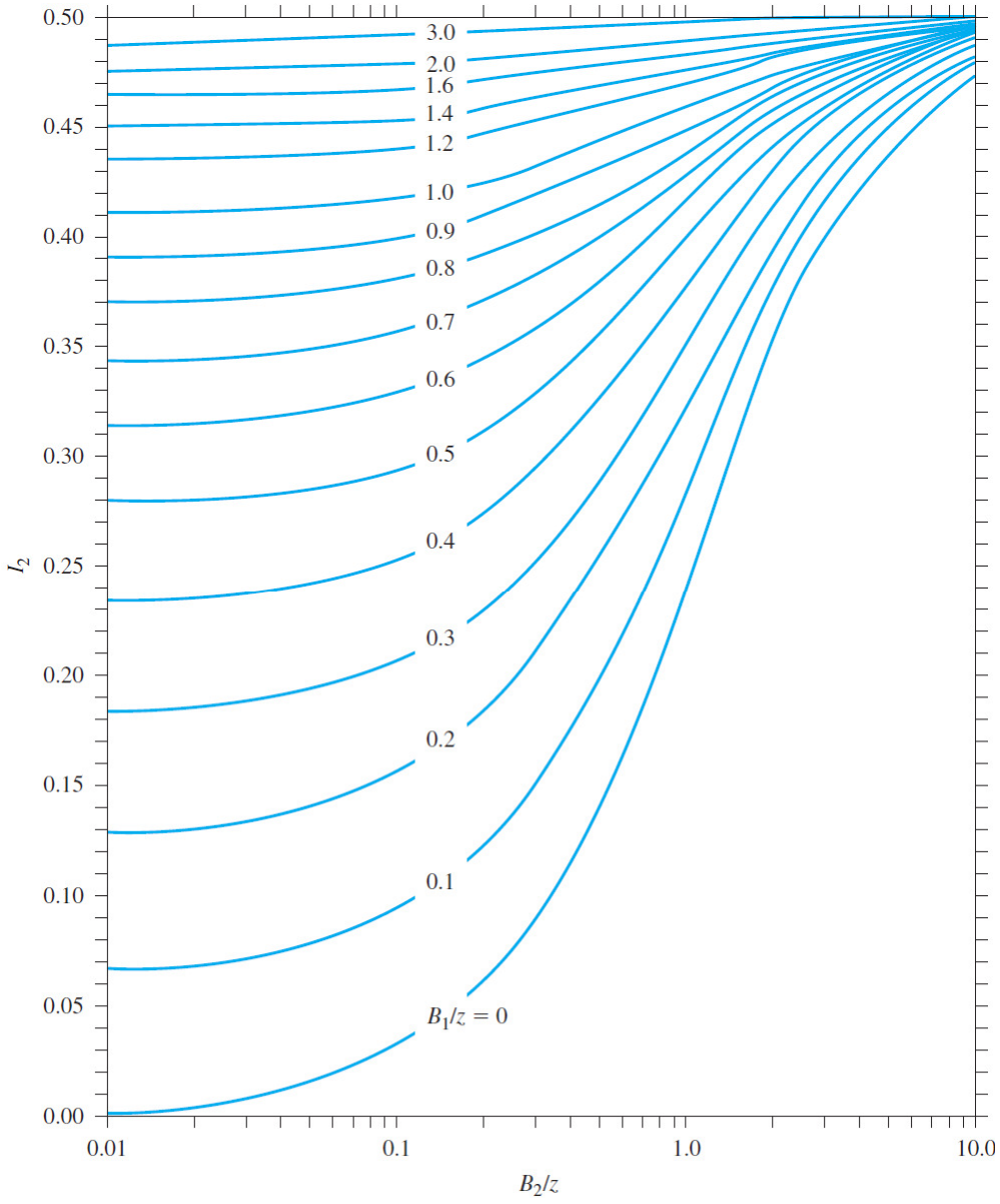


Figure 2

Stress due to Embankment Loading





Q3. A raft foundation of the size given in Figure 3 carries a uniformly distributed load of 300 kN/m^2. Estimate the vertical stress increase at a depth 9m below the point O marked in the Figure. (Use Newmark's chart on Page 6).

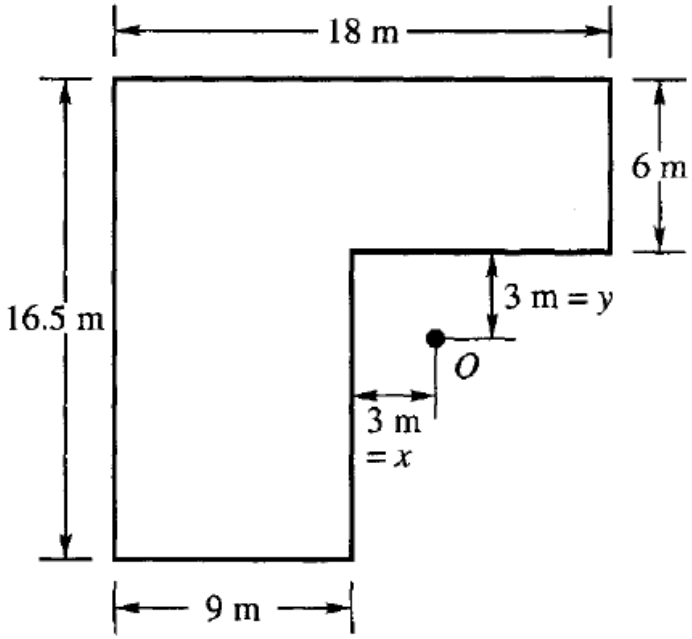
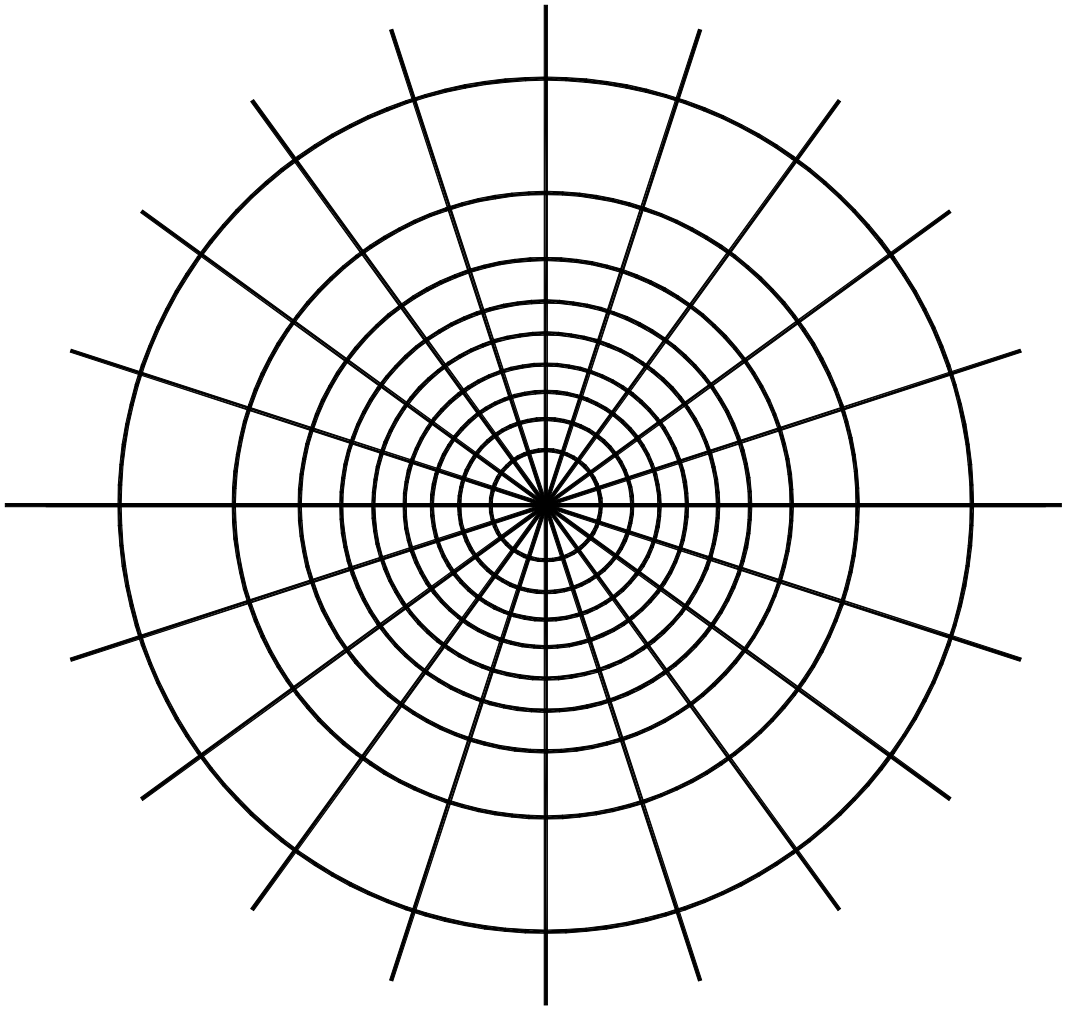


Figure 3



Depth scale

I_N = 0.005