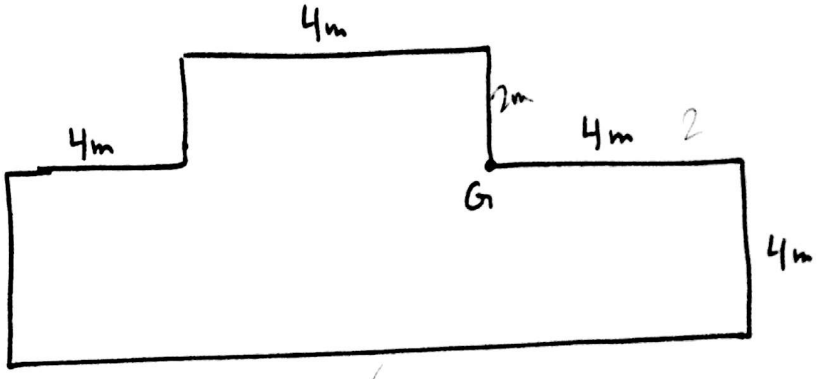
Problem:

The T shaped foundation is loaded with a uniform load of 100KN/m² as shown. Find the pressure at 6m below point G.



Related theory:

The vertical stress underneath the centre of a uniformly loaded circular area has been shown to be

$$\sigma_z = q\left[1 - \frac{1}{\left\{1 + \left(\frac{R}{z}\right)^2\right\}^{3/2}}\right]$$

The equation may be rewritten in the form:

$$\frac{R}{z} = \sqrt{\left(1 - \frac{\sigma_z}{q}\right)^{-\frac{2}{3}} - 1}$$

If a series of values is assigned for the ratio $\frac{\sigma_z}{q}$, such as 0, 0.1, 0.2, ..., 0.9 and 1, a corresponding set of values for the relative radii $\frac{R}{z}$ may be obtained.

If a particular depth is specified, then a series of concentric circles may be drawn.

Since the 1st has a zero radius and the eleventh has infinite radius, in practice, only nine circles are drawn.

The relative radii for newmark's influence chart

S. no. of circle	$\frac{\sigma_z}{q}$	Relative radii $\frac{R}{z}$	Value of 'R' for z = 6m
1	0	0	0
2	0.1	0.27	1.62
3	0.2	0.4	2.4
4	0.3	0.518	3.108
5	0.4	0.637	3.822
6	0.5	0.766	4.596
7	0.6	0.918	5.508
8	0.7	1110	6.66
9	0.8	1.387	8.322
10	0.9	1.908	11.448
11	1	∞	∞

Scale:

1 cm = 2m

1 cm = 200 cm

1 : 200

1m = $\frac{1}{2}$ cm

1.62 m = $\frac{1}{2} \times 1.62$

No. of circles = 10

No. of rays = 20

Influence value = IV = $\frac{1}{10 \times 20} = 0.005$

Stress at depth z is given by

$\sigma_z = \Sigma . IV . (\text{No. of influence units})$

$= 100 \times 0.005 \times 67$

$\boxed{\sigma_z = 335 \text{ kN/m}^2}$

SCALE

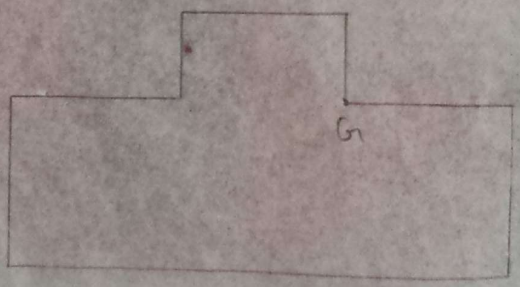
1 cm = 2 m

1 m = $\frac{1}{2}$ cm

4 m = $\frac{1}{2}$ x 4 cm = 2 cm

16 m = 6 cm

Foundation According to Scale:



Influence Chart for Vertical Pressure: