ALLOWABLE BEARING CAPACITY FOR MATS

The **net allowable bearing capacity** for mats constructed over granular soil deposits can be adequately determined from the standard penetration resistance numbers. From Eq. (12.54), for shallow foundations, we have

$$q_{net}\,(kN/m^2) = \frac{N_{60}}{0.08}\left(\frac{B+0.3}{B}\right)^2 F_d\left(\frac{S_e}{25}\right)$$

Where

$\mathbf{N_{60}}$= standard penetration resistance

B= width (m)

$\mathbf{F_d}$ =1 -0.33(Df /B) ≤ 1.33

$\mathbf{S_e}$ = settlement, (mm)

What will be the net allowable bearing capacity of a mat foundation with dimensions of 13 m × 9 m constructed over a sand deposit? Here, $D_f = 2$ m, allowable settlement = 25 mm, and average penetration number $N_{60} = 10$.

Solution

From Eq. (12.60), we have

$$q_{all(net)} = \frac{N_{60}}{0.08}\left[1 + 0.33\left(\frac{D_f}{B}\right)\right]\left[\frac{S_e}{25}\right] \le 16.63\,N_{60}\left[\frac{S_e}{25}\right]$$

$$= \frac{10}{0.08}\left[1 + \frac{(0.33)(2)}{9}\right]\left(\frac{25}{25}\right) \approx \mathbf{134\ kN/m^2}$$

■

Determine the net ultimate bearing capacity of a mat foundation measuring 12 m × 8 m on a saturated clay with $c_u = 80$ kN/m^2, $\phi = 0$, and $D_f = 2$ m.

Solution

From Eq. (12.58), we have

$$q_{net(u)} = 5.14c_u\left[1 + \left(\frac{0.195B}{L}\right)\right]\left[1 + 0.4\left(\frac{D_f}{B}\right)\right]$$

$$= (5.14)(80)\left[1 + \left(\frac{0.195 \times 8}{12}\right)\right]\left[1 + 0.4\left(\frac{2}{8}\right)\right]$$

$$= \mathbf{512\ kN/m^2}$$

■