SUBJECT: GEOTECH/FOUNDATION CALCS (v02)

CREATED BY: DATE: 16 JAN. 2016

CHECKED BY: _____ DATE: _____

Problem 16.4 (coduto et al)

$B := 700\ mm$ $D_f := 12\ m$ $z_w := 50\ m$ $p_a := 101.3\ kPa$ $\gamma_c := 24\ \frac{kN}{m^3}$

$s'_u := \begin{bmatrix} 70 \\ 85 \\ 120 \\ 180 \end{bmatrix} kPa$ $H := \begin{bmatrix} 0.7 \\ 3.9 \\ 5.4 \\ 0.5 \end{bmatrix} m$

Shear strength along first 1.5 m of shaft is ignored.

$FS := 3$

Toe bearing:

$q_t := 9 \cdot s'_{u_4} = 1620\ kPa$ $A_t := \pi \cdot \frac{B^2}{4} = 0.385\ m^2$ $Q_t := q_t \cdot A_t = 623.449\ kN$

Side friction:

$i := 1, 2 .. 4 = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix}$

No problems here

$\frac{s'_{u_3}}{p_a} = 1.777$ $\frac{s'_u}{p_a} = \begin{bmatrix} 0.691 \\ 0.839 \\ 1.185 \\ 1.777 \end{bmatrix}$

Problems arise here

$$\alpha'_i := \begin{cases} 0.55 & \text{if } \frac{s'_{u_i}}{p_a} \le 1.5 \\ 0.55 - 0.1 \cdot \left(\frac{s'_{u_i}}{p_a} - 1.5\right) & \text{else if } 1.5 \le \frac{s'_{u_i}}{p_a} \le 2.5 \end{cases} = ?$$

$A'_s := \pi \cdot B \cdot H = \begin{bmatrix} 1.539 \\ 8.577 \\ 11.875 \\ 1.1 \end{bmatrix} m^2$

Error: This value must be an integer.

$F_s := \sum_{i=1}^{4} \left(\alpha'_i \cdot s'_{u_i} \cdot A'_{s_i}\right) .. 0 = ?\ kN$

This value should equal 1347 kN.

$W_f := \pi \cdot \frac{B^2}{4} \cdot D_f \cdot \gamma_c = 110.835\ kN$

Downward capacity:

$P_{a_down} := \frac{Q_t + F_s - W_f}{FS} = ?$

Upward capacity:

$FS := 6$ $F_s := 0.75 \cdot F_s$

$P_{a_up} := \frac{F_s + W_f}{FS} = ?$