

## Design of Foundation :

\* Combined Foundation of Foundation Slab thickness  $200 \text{ mm}$

& Piles  $d = 0.9 \text{ m}$  | length  $L = 16 \text{ m}$

\* 70% of Load goes to Piles 30% of load taken by Foundation Slab.

\* No. of heavy loaded Column =  $3390 \text{ KN}$  | Design load on pile =  $0.7 \times 3390$

Load Design of pile =  $2373 \text{ KN}$

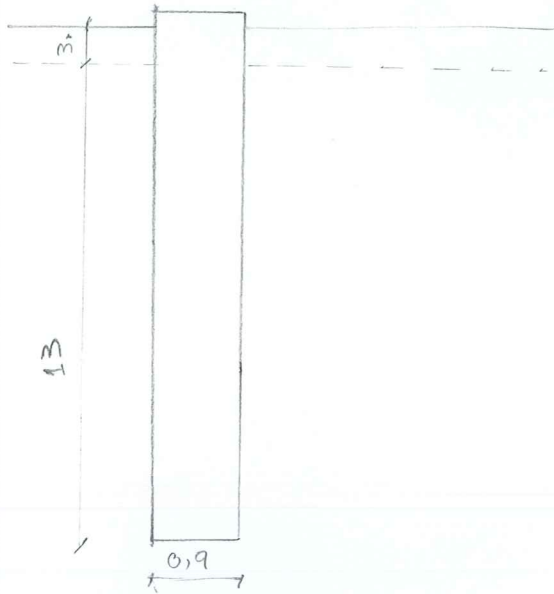
\* Ch. Load on pile =  $\frac{2373}{1.4} = 1695 \text{ KN}$

\* Load bearing Capacity of pile: According to Foundation 1 class procedure

\* Dp. Soil. Section consist of  $3.0 \text{ m}$  Soft clay &  $4.0 \text{ m}$  stiff clay below with consistency index IC. Borehole is supported by bentonite clay & the pile will be converted at the Maximum within 8 hours after boring.

\*  $E_c = 23600 \text{ Mpa}$  \* Pile:  $d = 0.9 \text{ m}$ ;  $L = 16 \text{ m}$

Soil:  $f_c = 0.6$ ;  $C_u = 60 \text{ kPa}$ ;  $f_s = 8 \text{ Mpa}$ ;  $S_u = 0.010 \text{ m}$  (caution Settlement)



## Shaft Resistance:

$$R_{SK} = m_2 * C_p * \sum_{i=1}^n D_i * C_{ui}$$

$$m_2 = 0,5 \text{ (bentonite slurry)}$$

$$C_p = 2\pi r = 2\pi * 0,45 = \underline{2,83} \text{ m (perimeter of the pile)}$$

$$D_i = D_p = 3 \text{ m} = 16 - 3 = \underline{13} \text{ m (height of the pile contributing to skin friction)}$$

$$C_{ui} = C_u = \underline{60} \text{ Kpa}$$

$$R_{SK} = 0,5 * 2,83 * 13 * 60 = \underline{1352} \text{ KN}$$

## Pile Resistance At fully Mobilized Skin Friction:

$$R_{y_n} = \frac{R_{SK}}{1+B}; \quad B = B_i * C_u$$

$$B_i = F(D/D); \quad \frac{D}{d} = \frac{13}{0,9} = \underline{14,5} \rightarrow \text{Table \#1 } B_i = \underline{0,08}$$

$$C_u = F(D_p/D; k); \quad \frac{D_p}{d} = \frac{16}{0,9} = \underline{17,8}$$

$$k = \frac{E_c}{E_s} = \frac{2300}{8} = \underline{287,5} \rightarrow \text{Table \#2 } C_u = \underline{0,93}$$

$$B = 0,08 * 0,93 = \underline{0,0744}$$

$$R_{y_n} = \frac{R_{SK}}{1+B} = \frac{1352}{1+0,0744} = \underline{1460} \text{ KN}$$

## Resistance Of pile Toe:

$$R_{bt} = m_u * A * C_{ub} * N_c = 0,7 * 0,7854 * 9 * 60 = \underline{266,8842} \text{ KN}$$

$$m_u = 0,7$$

$$N_c = 1 * q * f_c = 9 \text{ (bearing of Capacity)}$$

$$A = \pi r^2 = \pi * \frac{0,9^2}{4} = \underline{0,7854} \text{ m}^2 \text{ (Area of toe a Contact with Subsoil)}$$

$$C_{ub} = C_u = \underline{60} \text{ Kpa}$$

## Total Resistance of the pile Under Compression:

$$R_{cd} = \frac{R_{bk}}{\gamma_b} + \frac{R_{sk}}{\gamma_s} ; \gamma_b = \underline{1,25} ; \gamma_s = \underline{1,0}$$

$$R_{cd} = \frac{266,9}{1,25} + \frac{1460}{1,0} = \underline{1700 \text{ KN}} \geq N_{Ed} = \underline{1695 \text{ KN}}$$

The pile is calculated for Settlement Maximum = 10mm Under Characteristic Load.