
WEEK 7



RESISTANCE AU FROTTEMENT LATÉRAL UNITAIRE

κ SOL c' ϕ' c_u

$\times$ CONTRAINTES PRÉ-EXISTANTES

$$\sigma'_{h0} = K_0 \sigma'_{v0}$$



$\times$ PIÊU

Matériau

RUGOSITÉ

($\rightarrow$ lié à la construction)

$\times$ MISE EN ŒUVRE
FORAGE



$$\begin{aligned} \sim \sigma'_h &< \sigma'_{h0} \\ \sigma'_h &\approx K \sigma'_{v0} \end{aligned}$$

$$K_a < K < K_0$$

SANS RÉFOULEMENT

FONCAGE / BATTAGE



$$\sigma'_h > \sigma'_{h0}$$

$$K_0 < K < K_p$$

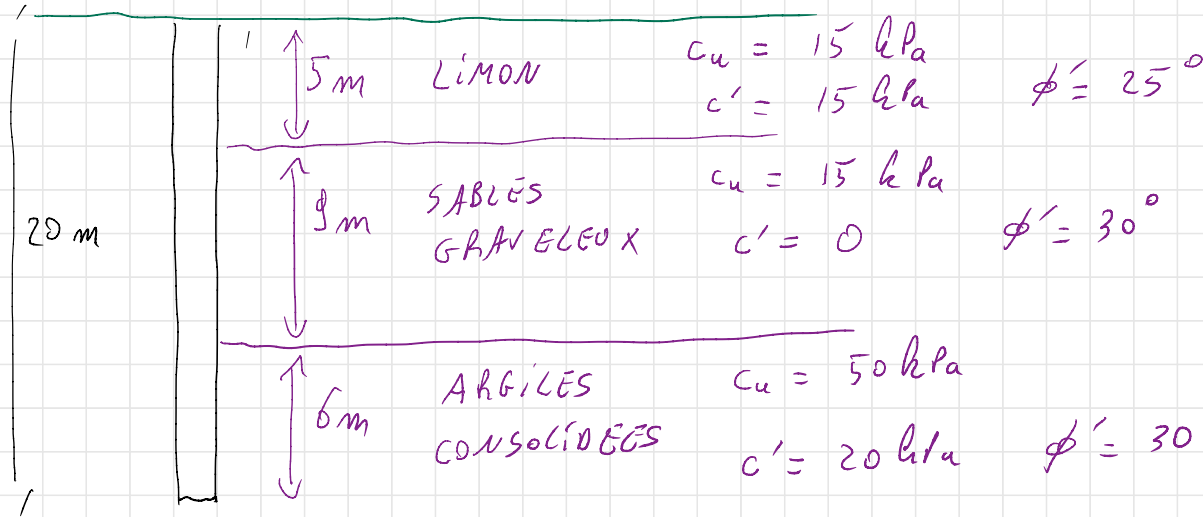
RÉFOULEMENT

EXAMPLE

CAPACITÉ

PORTEANTE

PIÊU ISOLÉ



PIÊU FORÉ

$D = 0.8 \text{ m}$

$L = 20 \text{ m}$

CALCULS

1) COURT TERME

2) LONG TERME

DTU

Long & Hucker

COURT TERME DTU

x) POINTE UNITAIRE $q_p = 7 \lambda c_u \equiv 455 \text{ kPa}$

$$\lambda = 1 + 0.3 \left(\frac{1}{1} \right) = 1.3$$

$$c_u = 50 \text{ kPa}$$

RÉSISTANCE POINTE

$$R_p = q_p A_p$$

$$= 228.7 \text{ kN}$$

$$A_p = \frac{\pi D^2}{4}$$

x) FROTTEMENT LATÉRAL

$$q_s = \beta c_u$$

$$\beta \text{ pieu Foré } \beta \approx 0.6$$

$$q_{s1}, q_{s2}, q_{s3}$$

RÉSISTANCE Frottement

$$R_s = \pi D \times \sum_{i=1}^3 l_i q_{si} = 769 \text{ kN}$$

$$R_u = R_p + R_s = 997.7 \text{ kN}$$

COURT TERME

LANG & HOVER

x) POINTE

$$q_p = 9 \text{ cu}$$

$$= 450 \text{ kN}$$

$$x = f\left(\phi', \frac{L}{d}\right)$$

$$R_p = 226$$

x) FLOTTEMENT

$$q_s = \frac{0.75}{0.6/0.9} \text{ cu}$$

$$q_{s1}, q_{s2}, q_{s3}$$

$$R_s = \pi D \times \sum_{i=1}^3 L_i q_{si} = 961.3$$

$$Q_u = R_p + R_s \approx 1187 \text{ kN}$$

a) confort AFTER avec Q DTU
 $\sim 1000 \text{ kN}$

LONG TERME

DTU

x] RESISTANCE de POINTE

unitaire

$$\varphi_p = 50 N_{qmax} + \lambda C' N_c$$
$$\lambda = 1 + 0.3 \left(\frac{B/\phi}{1} \right)$$

$$N_{qmax} = 10^{3.09 \tan \phi'}$$

$$N_c = (N_{qmax} - 1) \cot \phi'$$

$$\varphi_p = 5362.7 \text{ kPa}$$

$$R_p = \pi \frac{D^2}{4} \varphi_p = 2695 \text{ kN}$$

x] FROTTEMENT LATÉRAL

unitaire

$$\varphi_{si} \approx k \langle \sigma_v' \rangle \tan \delta$$

ici $\delta = \phi'$

$$k = k_a = \frac{1 - \sin \phi'}{1 + \sin \phi'}$$

on prend $\delta = 20^\circ \text{ mm}^3$

pour 11 LES COUCHES

$$\sigma_v' = \frac{1}{2} \gamma \frac{(z_{i+1}^2 - z_i^2)}{(z_i + z_{i+1})/2}$$

$$R_s = \pi D - \sum_{i=1}^3 L_i \varphi_{si} = 1373 \text{ kN}$$

$$Q_p = R_p + R_s = 4068 \text{ kN}$$

LONG TERM

LANG & HEUER

x) RESISTANCE POINTE

- unitaire

$$q_p = \chi \left(c' N_c + \overbrace{\langle \sigma_v' \rangle}_{8 \times 20} N_q \right) = 19908 \text{ kPa}$$

$$N_q = e^{\pi \tan \phi'} \tan \left(\frac{\pi}{4} + \frac{\phi'}{2} \right)^2$$

$$N_c = (N_q - 1) \cot \phi'$$

$$\chi = F \left(\frac{L}{D}, \phi'_{\text{pointe}} \right) = 2.5$$

$$R_p = \frac{\pi D^2}{4} q_p = 10006 \text{ kN}$$

x) FROTTEMENT LATERAL

$$q_{si} = c' + \langle \sigma_v' \rangle \underbrace{k \tan \delta}_{0.9}$$

$$R_s = \pi D \times \sum_{i=1}^3 L_i q_{si} = 3219 \text{ kN}$$

$$Q_p = R_p + R_s = 13226 \text{ kN}$$

$$\text{OTU} \\ 4068 \text{ kN!}$$