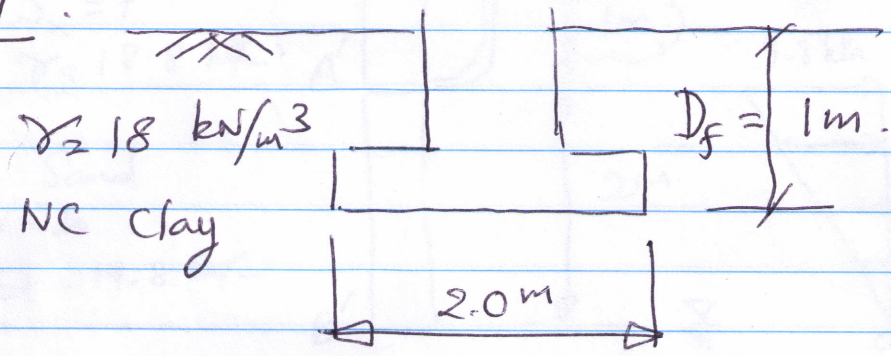
B = 2 m

L = 3 m

Q1.



S_u ⇒ Unconf. Comp Strength = 60 kPa.

S_u = 30 kPa

$$q_u = 5.14\, S_u\, (s_c\, d_c).$$

No eccentricity $e = 0$ → $B' = B = 2$ m, $L' = L = 3$ m.

$$s_c = 1 + 0.2\left(\frac{2}{3}\right) = 1.13$$

$\frac{D_f}{B'} < 1$, $d_c = 1 + 0.33\left(\frac{1}{2}\right) = 1.165$

$\left(= \frac{1}{2}\right)$

$$q_u = 5.14 \times 30 \times 1.13 \times 1.165$$

$$= 203 \text{ kPa}$$

Q2.

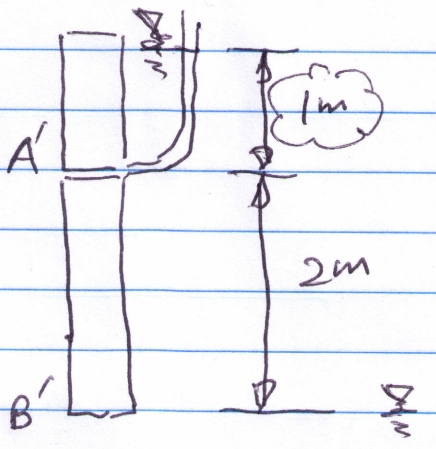
clay $S_u = 7$

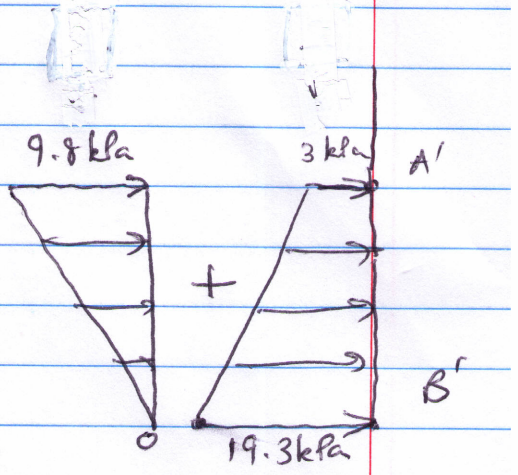
$\gamma_{sat} = 18.8\ kN/m^3$

Sand

$\phi' = 30°$

$\gamma_{sat} = 19.8\ kN/m^3$





POINT (A')

$\sigma_v = 18.8 \times 1 = 18.8\ kPa$

$u = 9.8 \times 1\ kPa = 9.8\ kPa$

$\sigma_v' = \sigma_v - u = \underline{9.0\ kPa}$

$(\sigma_x')^{A'} = K_a \sigma_v' = 9 \times 0.33 = \underline{3\ kPa}$

POINT (B')

$\sigma_v = 18.8 \times 1 + 19.8 \times 2$

$= 18.8 + 39.6$

$= 58.4\ kPa$

$u = 0\ kPa$

$\sigma_v' = \sigma_v - u = \underline{58.4\ kPa}$

$(\sigma_x')^{B'} = 58.4 \times 0.33 = \underline{19.3\ kPa}$

$K_a = \frac{1 - \sin\phi'}{1 + \sin\phi'} = \frac{1 - 0.5}{1 + 0.5} = \frac{0.5}{1.5}$

$= 0.33$