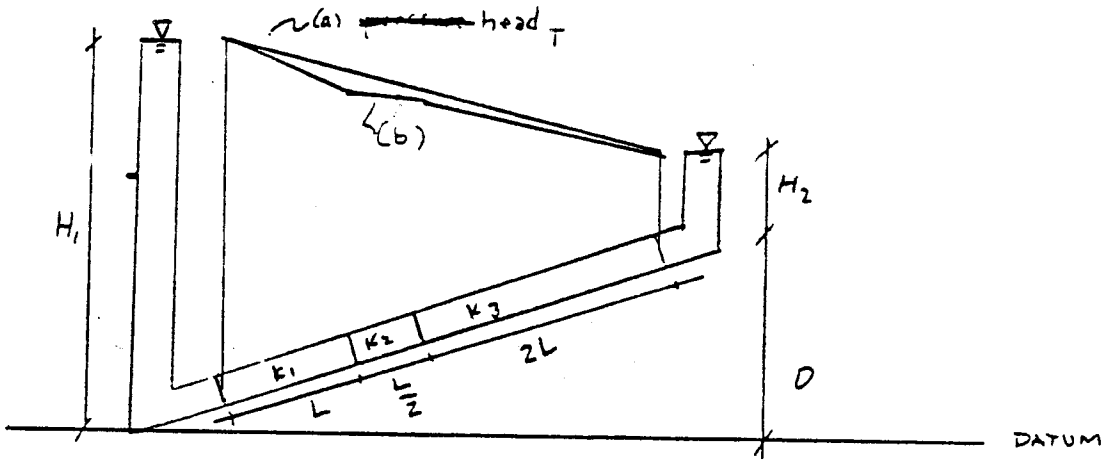
CVE 381
12
7.26
23 OCT 85

P 7-26

KNOWN



REQ'D

EXPRESS THE HEAD AT A, B, C, D, W/ RESP TO DATUM INDICATED

a) $k_1 = k_2 = k_3$

b) $3k_1 = k_2 = 2k_3$

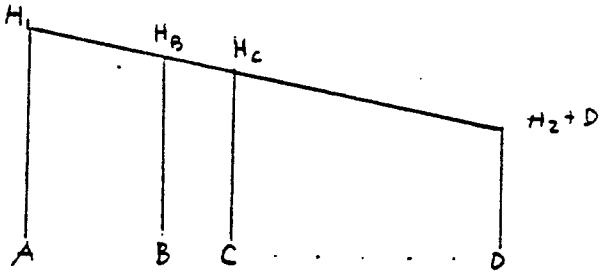
a) $H_T = H_p + H_e$

$H_1 > H_2 + D$

for $k_1 = k_2 = k_3$

H_T @ A = H_1

B = $H_2 + D$



b) Q = CONST

A = CONST

$\therefore$

$V_1 A = V_2 A = V_3 A$ CONTINUITY

$V_1 = V_2 = V_3$

for $2k_1 = k_2 = 2k_3$

$V = ki$

$V_1 = k_1 i_1$

$V_2 = k_2 i_2$

$V_3 = k_3 i_3$

$k_1 i_1 = k_2 i_2 = k_3 i_3$

$k_1\left(\frac{H_1 - H_B}{L}\right) = k_2\left(\frac{H_B - H_C}{L/2}\right) = k_3\left(\frac{H_C - H_2 + D}{2L}\right)$

$\frac{H_1 - H_B}{L} = \frac{6(H_B - H_C)}{L}$ $\quad H_1 - H_B = 6H_B - 6H_C$

$H_1 + 6H_C = 7H_B$

$\frac{8(H_B - H_C)}{L} = \frac{H_C - H_2 + D}{L}$ $\quad 8H_B - 8H_C = H_C - H_2 + D$

$8H_B + H_2 - D = 9H_C$

$7H_B = H_1 + 6H_C$

$8H_B = D + 9H_C - H_2$

$H_B = \frac{3}{5}H_1 - \frac{2}{5}D + \frac{2}{5}H_2$

$H_C = (H_1 - 7D - 7H_2)\frac{1}{15}$

7-29 GIVEN: Foundation soil @ toe of a dam has porosity $n = 41\%$ and $\rho_s = 2.68\ Mg/m^3$. To assure safety against piping, the specifications states that upward gradient must not exceed 25% of the gradient at which a quick condition occurs.

REQ'D: What is the maximum permissible upward gradient?

SOL'N: $i_{allow} = 0.25$

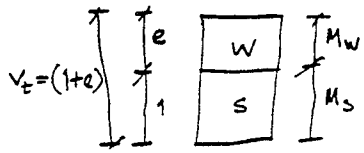
$$i_c = \frac{\rho'}{\rho_w} = \frac{\rho_{SAT} - \rho_w}{\rho_w}$$

ρ_{SAT} ; $n = 41\%$

$\rho_s = 2.68\ Mg/m^3$

Assume $V_s = 1 m^3$.

Then $V_T = 1 + e$

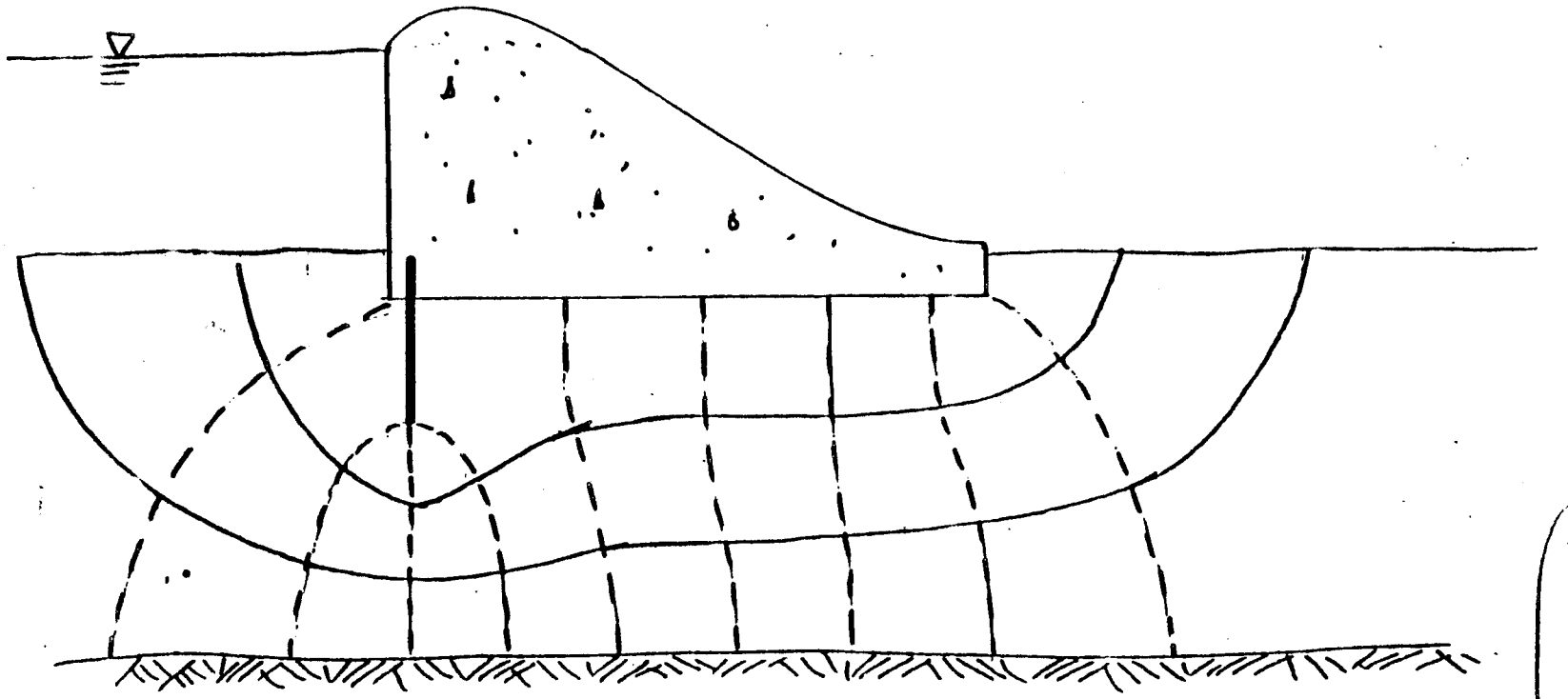


$$e = \frac{n}{1-n} = \frac{.41}{1-.41} = 0.69$$

$$\therefore i_c = \frac{\rho_s - \rho_w}{(1+e)\rho_w} = \frac{(2.68 - 1.00)\ Mg/m^3}{(1+.69)\ 1.00\ Mg/m^3}$$

$$= 0.99$$

$$i_{allow} = .25\, i_c = .25(.99) \simeq 0.25$$



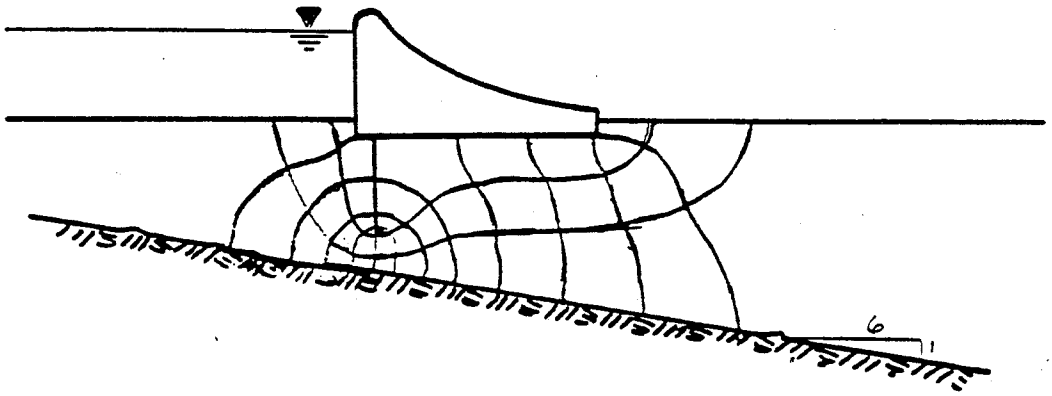
P. 7.36

SCALE 1cm : 5m

P 7-36

Prob 7-37,
P 7-38

7-37 C [illegible]: Draw a flow net for Fig. P-7-37



SCALE: 1" = 10 m.

7-38 C : "For the completed flow net in Fig P.7-37."

$K = 3.5 \times 10^{-4}$ cm/sec
$N_f = 3$
$N_d \approx 9.4$

$$q_{\text{per ft of dam}}^{\text{per 1m.}} = k h_L \left[\frac{N_f}{N_d}\right]$$

$$= 3.5 \times 10^{-4} \frac{\text{cm}}{\text{sec}} \times \frac{\text{m}}{100\text{cm}} \times 6.3\text{m} \times \left[\frac{3}{9.4}\right] \times 1\text{m}$$

$$= 7.04 \times 10^{-6} \frac{\text{m}^3}{\text{sec}} = 7.04 \frac{\text{cm}^3}{\text{sec}}$$