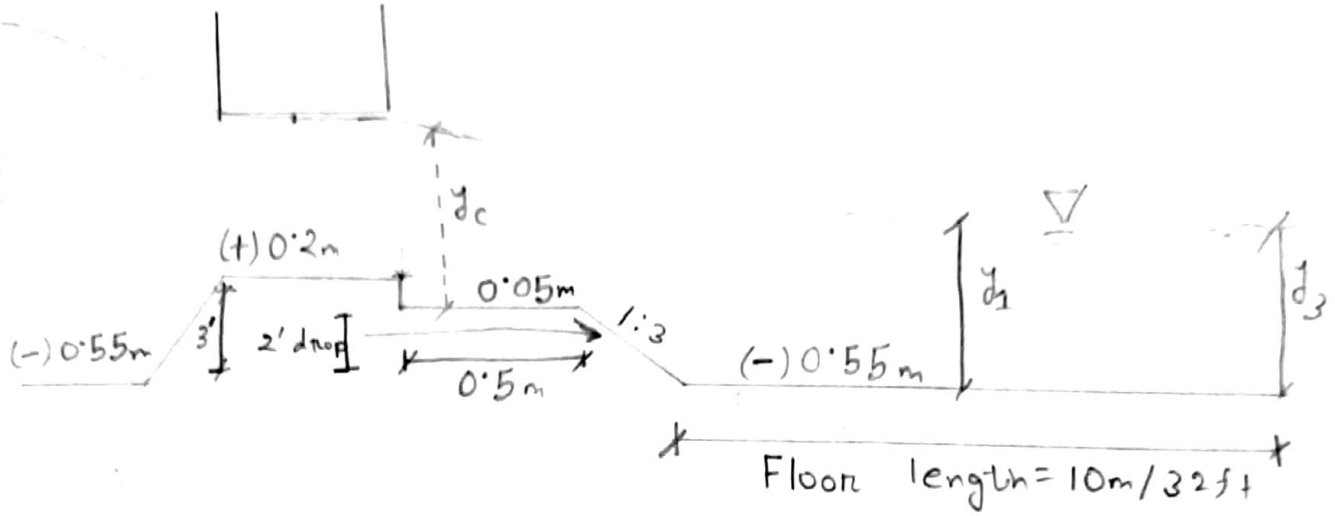
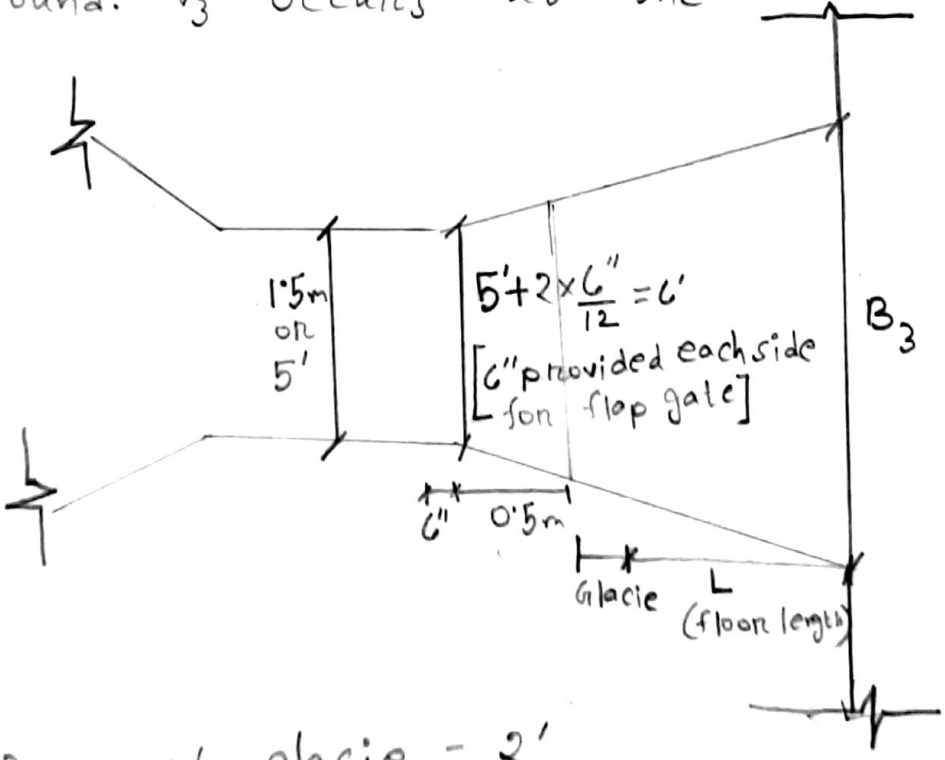
Explanation of the terms:-



From the above figure, Exit velocity V_3 would be found. V_3 occurs at the end of the floor



Drop of glacie = 2'

$\therefore$ length " " = 2' x 3 = 6' (1:3 slope provided)

From End of Barrel to End of floor Total length:-

0.5m (length for extended part of embankment) (PVC water stopper)
+ 0.6 × 3 (1:3 drop of glacie) + 10m (floor length)

Total = 12.3m =
Flaring for this length = $12.3 \times 2 \times \tan 7°$ ($\frac{\tan 7° \times 12.3}{12.3}$)
Width B_3 at the end = $6' + (12.3 \times 3.28 \times \tan 7°)$

$= 16'$

$$\therefore V_3 = \frac{10 \times 35.2 \text{ (Discharge)}}{16' \times y_3}$$

$$= \frac{352}{16' \times 7.5'}$$

This y_3 is tailwater depth assumed from the low water level. The procedure is described below.

$$Q = \frac{1}{n} A R^{2/3} S_f^{1/2} \text{ [S.I]} \quad / \quad Q = \frac{1.49}{n} A R^{2/3} S_f^{1/2} \text{ [fps]}$$

Q is the discharge of Khal taken from hydrological design calculation 98 cusec.

$$98 = \frac{1.49}{0.03} \times (b + sh) \times h \times \left[\frac{(b+sh)\,h}{b+2sh}\right]^{2/3} \times \left[\frac{5}{100 \times 1000}\right]^{1/2}$$

$S_f \rightarrow$ Bed slope $\rightarrow$ 5cm/km $\rightarrow \frac{5/100}{1000}$

Taking bed width of Khal from design section, $b = 16.4$ ft ,

$$98 = \frac{1.49}{0.03} \times (16.4 + 1.5y)\,y \times \left[\frac{(16.4 + 1.5y)\,y}{16.4 + 2\times 1.5y}\right]^{2/3} \times 0.007 \quad [s = 1:1.5]$$

Solving this equation

$$y = 9.3' = 2.83m$$

level of water in Khal $= -0.55 + 2.83$ m

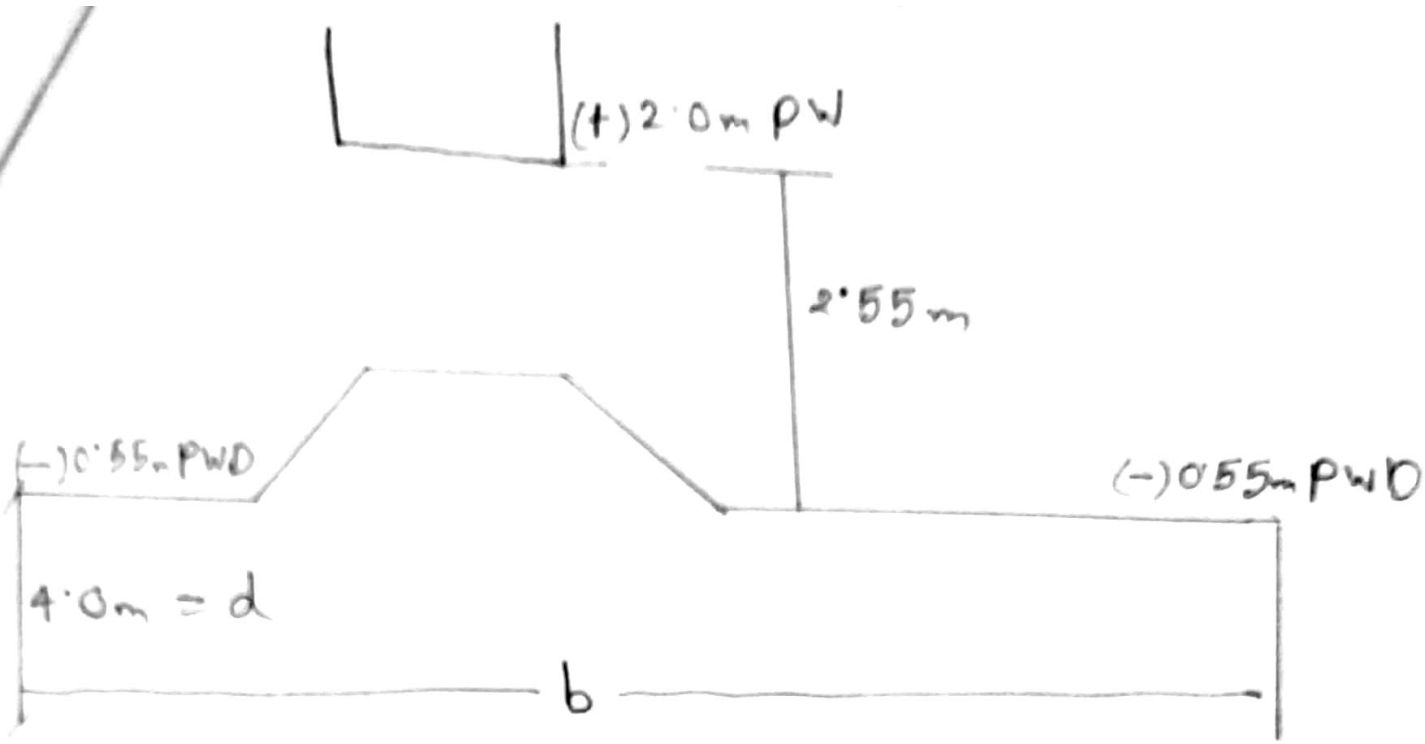
$= 2.28$ m

$= 7.5$ ft .

$$\text{So } V_3 = \frac{352}{16 \times 7.5} = 2.93 \text{ fps}$$

$= 0.9 \text{ m s}^{-1} < 1 \text{ m s}^{-1}$ [Ok]

Floor length by exit Gradiant



$H = 2 \cdot 55\,m \quad d = 4 \cdot 0\,m \quad G_E = 1/7$

$$G_E = \frac{H}{d} \times \frac{1}{\pi\sqrt{A}}$$

$$= \frac{2 \cdot 5}{4 \cdot 0} \times \frac{1}{3 \cdot 1416 \times \sqrt{\lambda}}$$

$$\sqrt{\lambda} = \frac{2 \cdot 5 \times 7}{4 \cdot 0 \times 3 \cdot 1416}$$

$$\lambda = 1 \cdot 93$$

$$\lambda = \frac{1 + \sqrt{1 + \alpha^2}}{2} \Rightarrow 1 \cdot 93 = \frac{1 + \sqrt{1 + \alpha^2}}{2}$$

$$\alpha = 2 \cdot 7$$

$$\alpha = \frac{b}{d} = \frac{b}{4 \text{ (from above picture)}}$$

$$\therefore \frac{b}{4} = 2 \cdot 7$$

$$b = 4 \times 2 \cdot 7 m \quad = 10 \cdot 8 m$$

So, $b = 10 \cdot 8 m$ which is very much less than the total length (sheet pile to sheet pile).