

* Seepage line for Earth dam without Filter.

Same Steps like earth dam with filter but with the following differences :

- * The Focus is at the ~~DS~~ toe of the dam
- * The base parabola cuts the D.S. Slope of the Dam at point D and will extend beyond the dam
- * practically the seepage line will emerge at C meeting the DS Face tangentially, so a DS correction is required as follows

α	$\frac{\Delta a}{(a + \Delta a)}$
30	0.36
60	0.32
90	0.26
120	0.18
135	0.14
150	0.1
180	0

نقطة $(a + \Delta a)$ من الراس
 $a + \Delta a = DF$

نوع نقطة C $\rightarrow \Delta a \rightarrow$ $\frac{\Delta a}{a + \Delta a}$ من الجدول

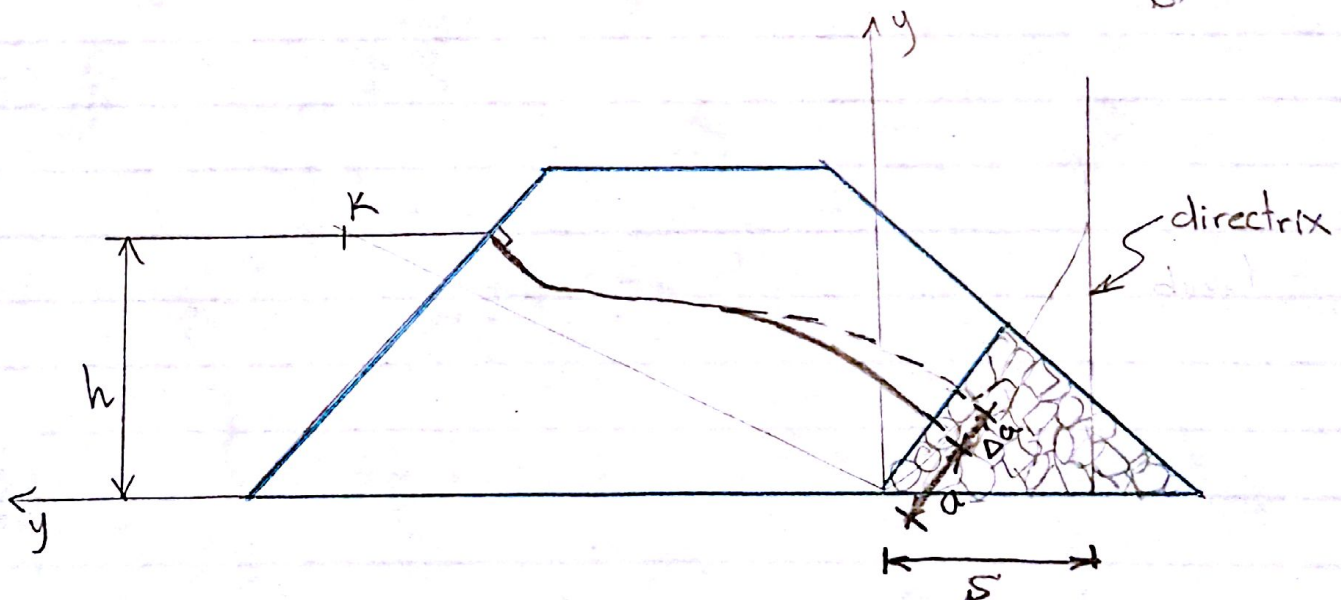
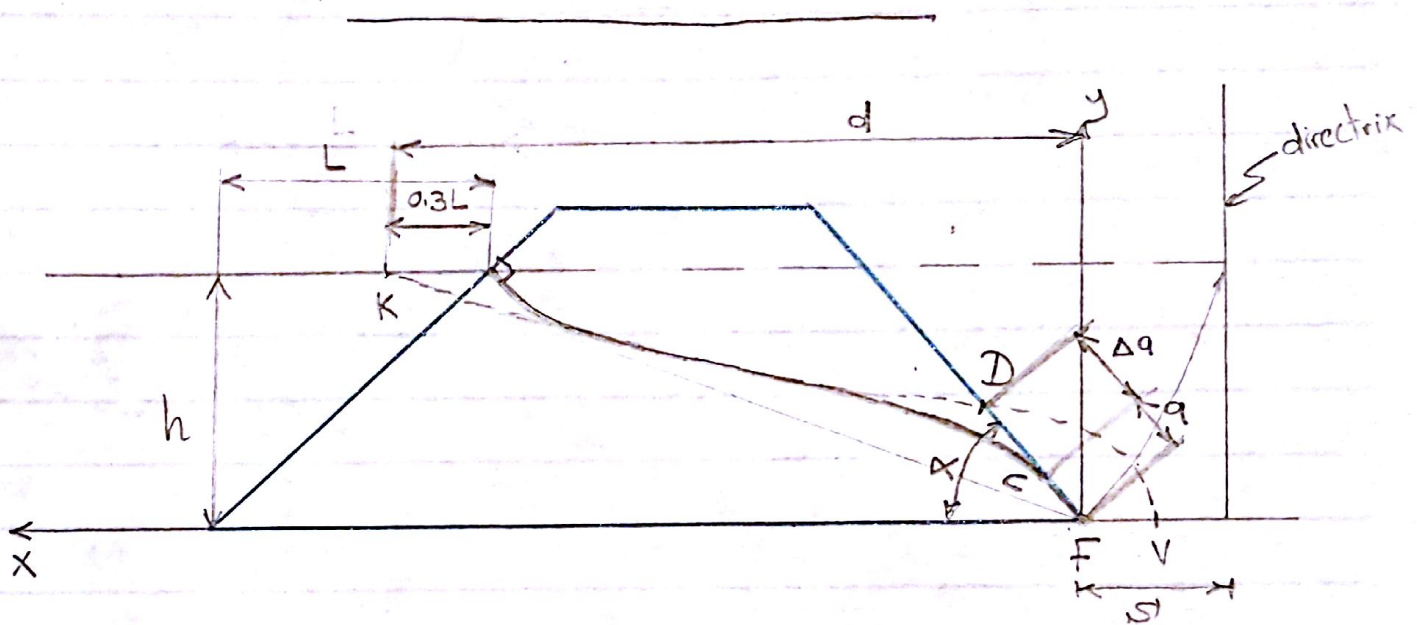
- where α is the angle between horizontal & Discharge face
- CF is the discharge face
- For Horizontal filter $\alpha = 180$
- For rock toe $\alpha = 90$ or more
- For dam without drainage system $\alpha =$ less than 90

The seepage discharge can be calculated from

$$q = K (\sqrt{h^2 + d^2} - d)$$

$d = hL$ distance between K and F

For $\alpha < 30^\circ$ $q = K a \sin^2 \alpha$ can be used.



Flow net Construction (For homogeneous isotropic soil)

- 1) draw the phreatic line
- 2) the ^{under the water line} us face of dam is an equipotential line (a_g)
- 3) the base of the dam is a flow line (g_c)
- 4) Determine the number of drops that the flow net will
Assume have.
$$\Delta h = \frac{h}{N_d}$$
- 5) Draw the head lines (spaced Δh) on the x-sec. of the dam.
- 6) The points of intersection of the head lines & phreatic line are the points from which the equipotential lines should start
- 7) Draw the flow net by trial & error in order to make the equipotential lines & flow lines intersect at right angles & form curvilinear squares
- 8) Seepage through the earth dam can be calculated using
$$q = K h \left(\frac{N_f}{N_d} \right)$$

Where N_f = is number of flow channels
& N_d = is number of equipotential drops

