7 FLOW NET CONSTRUCTIONS

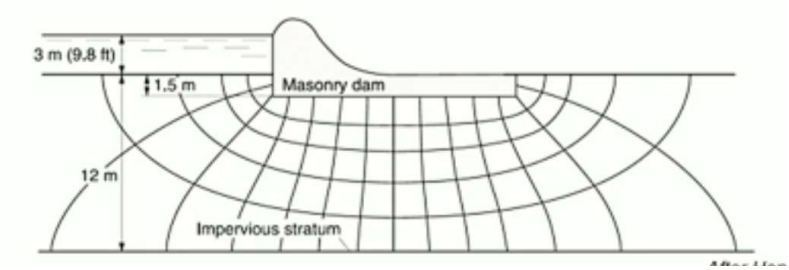
7.1 DRAWING

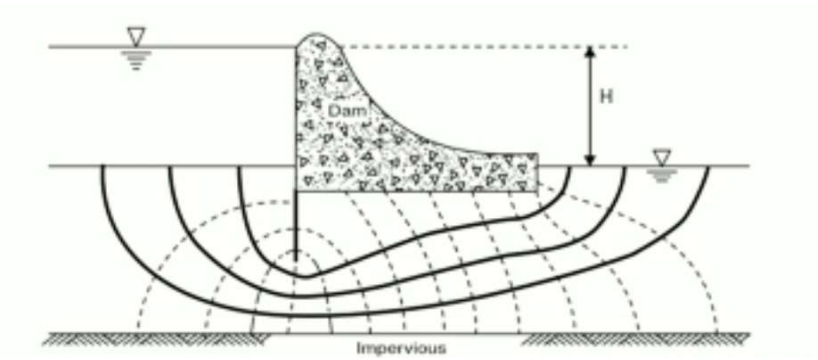
Rules:

- Right angle intersections
- No crossing flow lines
- No crossing equipotential lines
- Impermeable boundaries
    - Equipotential lines are normal to boundaries
    - Flow Lines are parallel to boundaries
- Flow lines are perpendicular to permeable boundaries
- Can draw circles in squares

STEPS:

1. Draw geo to scale
2. Identify boundaries and conditions
3. Determine water entry and exit
4. Sketch trial flow line
    a. All flow lines must be linked to the entrance and exit
    b. Draw more boundaries each stat further away from the last
5. Sketch equipotential lines
    a. Must intersect flow a right angle
    b. Must be circular square
6. Revise if necessary
7. Check if satisfys all rules





7.2 CALCULATE SEEPAGE AND PRESSURE

Bernoulli equation for soil and Darcy's law!!

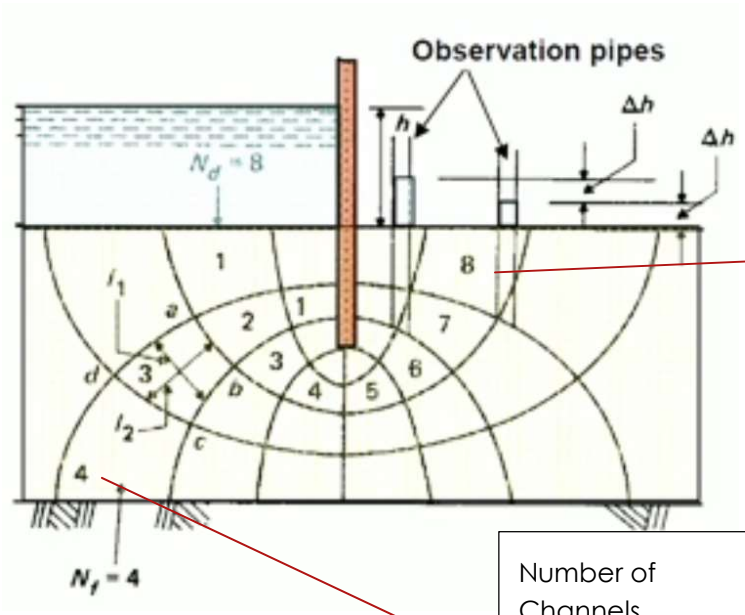
$$q = k\Delta h \; for \; single \; square$$

$$q = kh\frac{n_f}{n_d} \; for \; cross \; section \; (per \; m \; width)$$

$$\frac{n_f}{n_d} = \frac{(number \; of \; flow \; lines)}{number \; of \; equipotential \; lines}$$

$$h = difference \; in \; total \; head \; of \; upstream \; and \; downstream$$

$$k = usually \; given \; (Hydraulic \; conductivity)$$



8 Drops! Therefore, HEAD for one square =1/8 Δh

Pressure found using Bernoulli eq!

Number of Channels

=4

MUST SELECT DATUM FIRST!! Usually the bedrock/impermeable layer

- Pressure on a single equipotential line is THE SAME (Same energy and same head)
- Flow on a flow line is THE SAME

$$Total \; Head = h_1 - \frac{drops \; to \; point \; 2}{total \; number \; of \; drops} * \Delta h \; (bernoulli)$$

$$Pore \; water \; pressure = \frac{u}{\gamma_w} = h_2 - h_1 \; (bernoulli)$$

$$q = kh\frac{N_f}{N_d}$$