TEACHING LEARNING MATERIAL

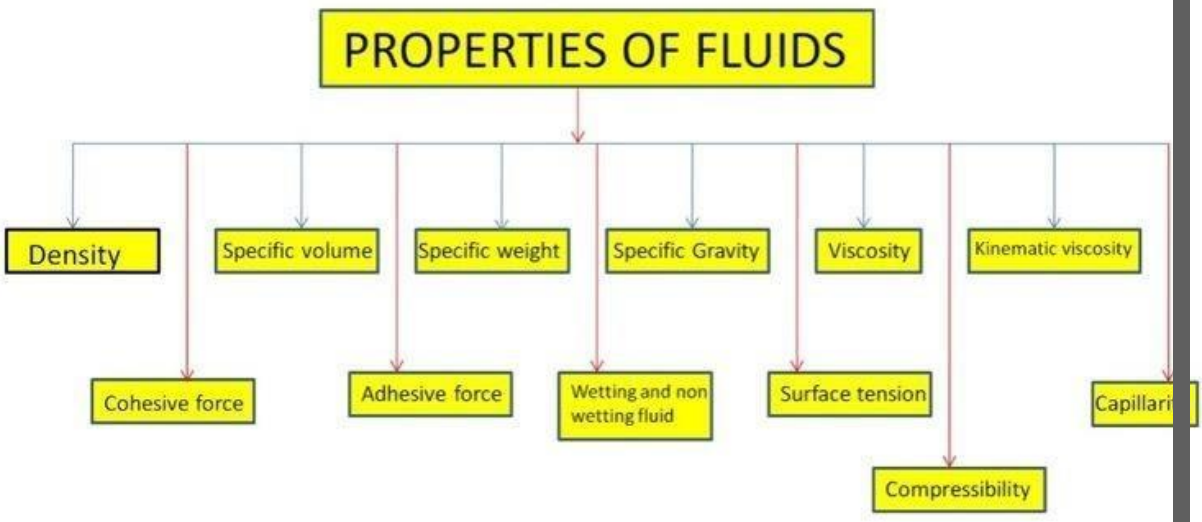
GANDHI SCHOOL OF ENGINEERING, BHABANDHA

BRANCH- CIVIL ENGINEERING

SUBJECT- HYDRAULICS & IRRIGATION ENGINEERING

SEMESTER- 4TH

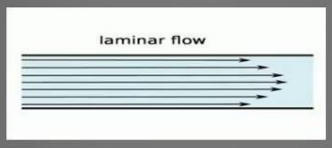
PREPARED BY- Er. ROJALI PATRA



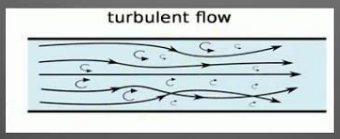
Fluid Kinematics

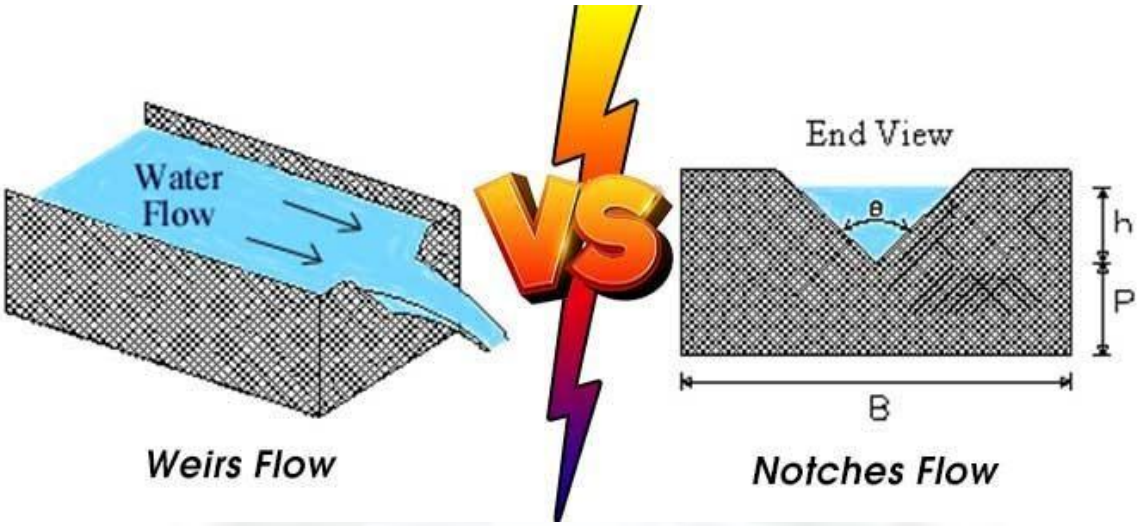
3. Laminar and Turbulent flow

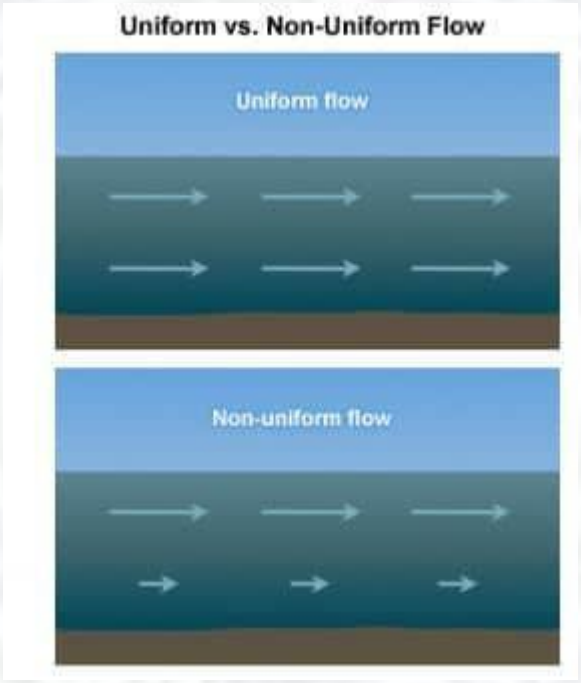
If fluid or fluid particles move in well defined path or layers or laminas, then the flow is called as Laminar flow.



If fluid or fluid particles move in zig-zag manner, then the flow is called as Turbulent flow.

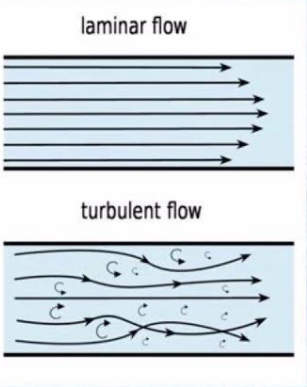



Water
Flow
VS
End View
θ
h
P
B
Weirs Flow
Notches Flow

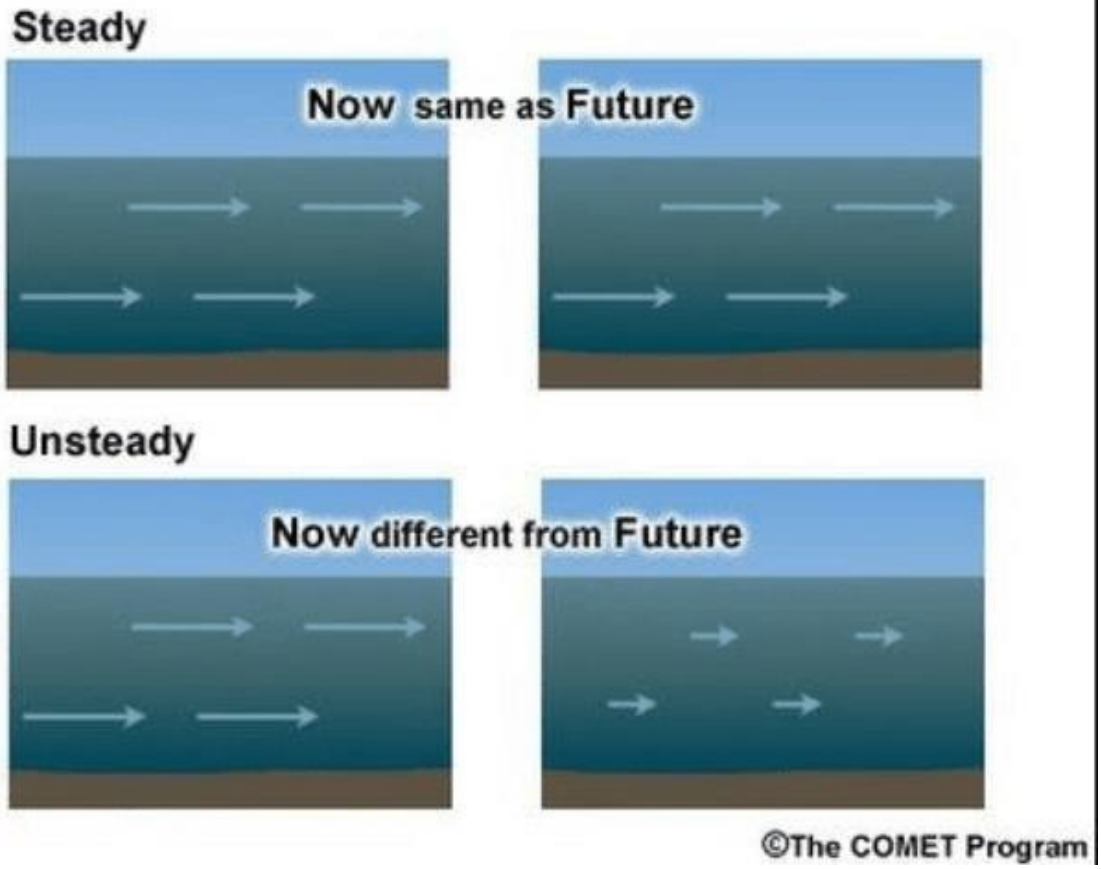

Uniform vs. Non-Uniform Flow
Uniform flow
Non-uniform flow

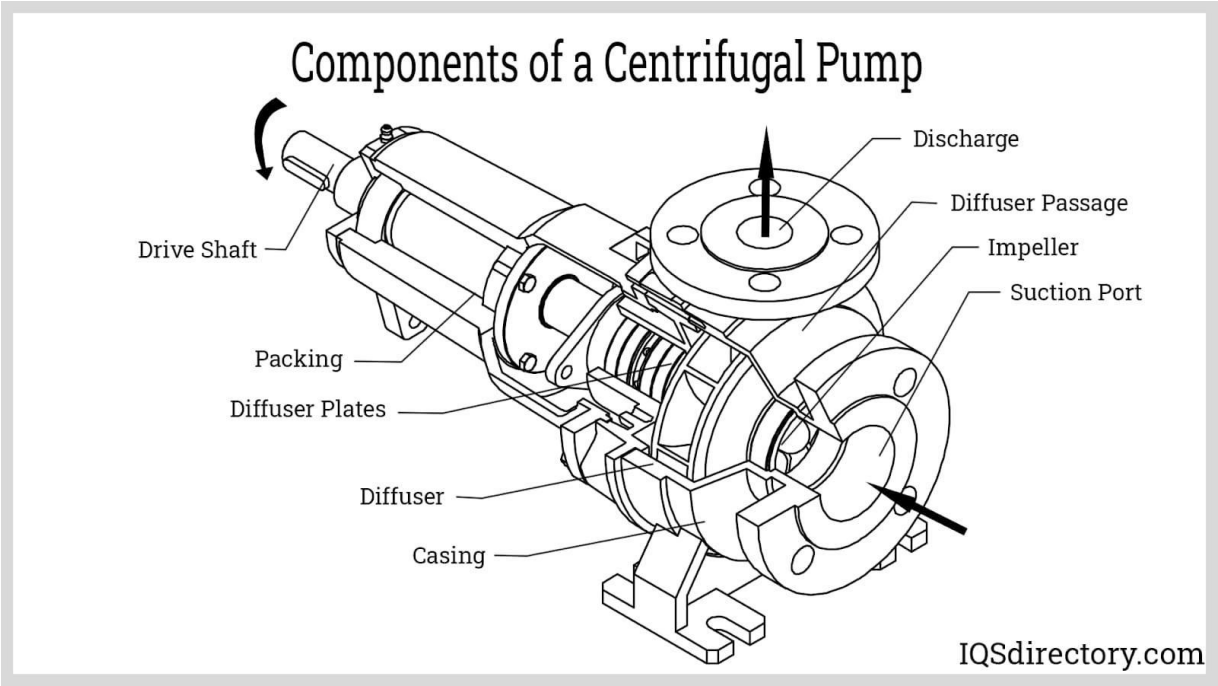
Laminar Flow and Turbulent Flow:

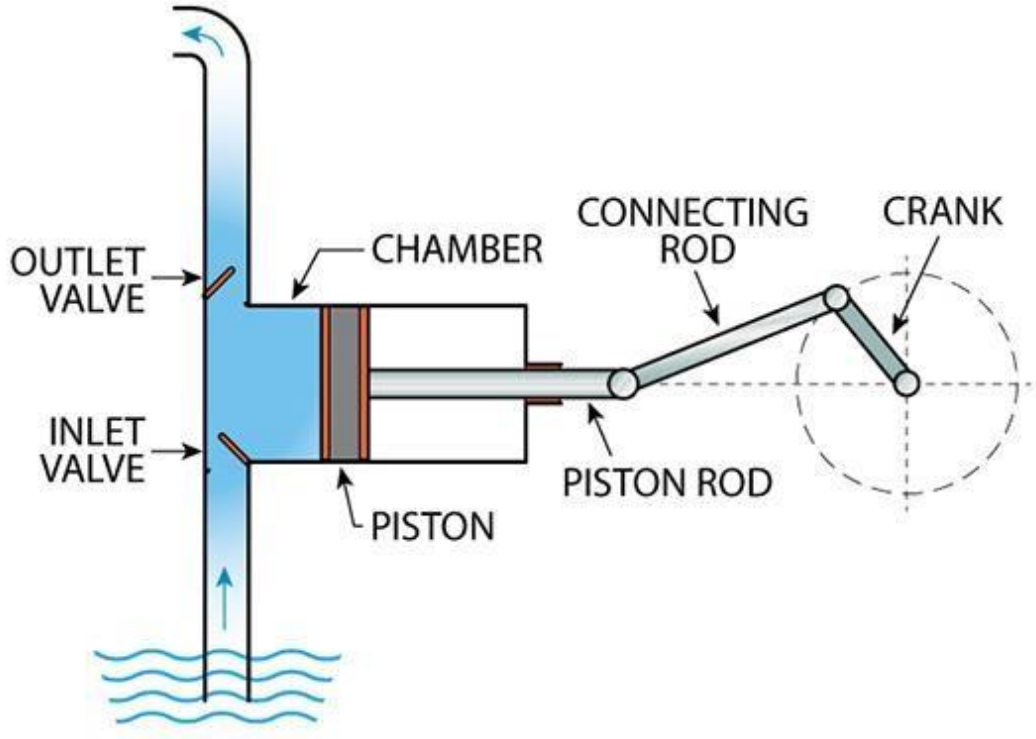
- **Laminar Flow:**
  - If the flow is smooth and if the layers in the flow do not mix macroscopically then the flow is called laminar flow. In laminar flow layers will glide over each other without mixing.
- **Turbulent Flow:**
  - In turbulent flow fluid layers mix macroscopically and the velocity/temperature/mass concentration at any point is found to vary over a time period.



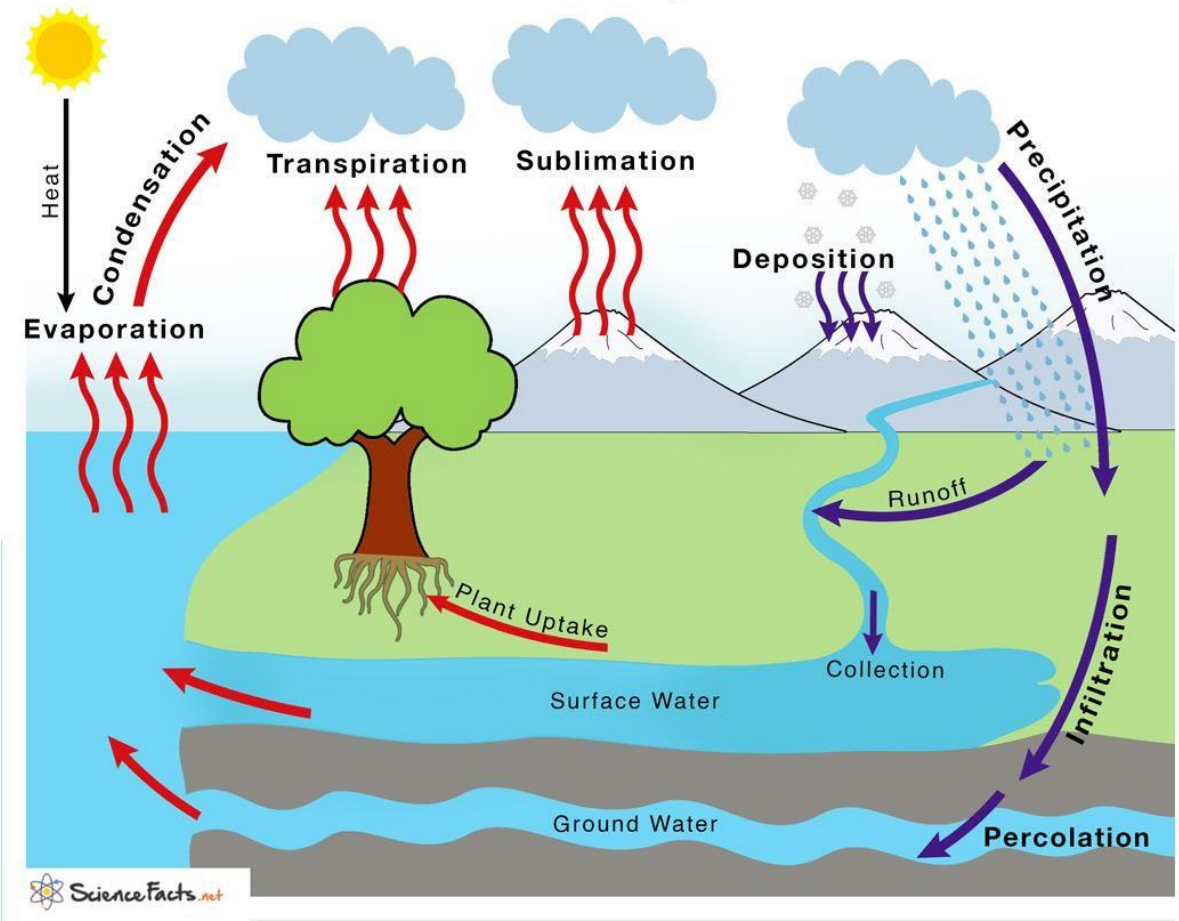
Steady vs. Non-Steady Flow




Components of a Centrifugal Pump
Discharge
Diffuser Passage
Impeller
Suction Port
Drive Shaft
Packing
Diffuser Plates
Diffuser
Casing
IQSdirectory.com


OUTLET VALVE
CHAMBER
CONNECTING ROD
CRANK
INLET VALVE
PISTON ROD
PISTON

Water Cycle


Heat
Condensation
Evaporation
Transpiration
Sublimation
Deposition
Precipitation
Runoff
Plant Uptake
Collection
Surface Water
Infiltration
Ground Water
Percolation
ScienceFacts.net

Canals

WATERLOGGING

Diversion Head-Works

- The works which are constructed at the head of the canal in order to divert the river water toward the canal, so as to ensure a regulated continuous supply mostly silt free water with certain minimum head into the canal, are known as diversion headworks.

What is Cross Drainage Works?

- In an Irrigation project, when the network of main canals, branch canals, distributaries, etc. sometimes crosses the natural drainage or streams Eg. River, nalla etc.
- So structure which is constructed in above case to avoid the mixing of canal water in to natural drainage Cross Drainage Work .

Aqueduct

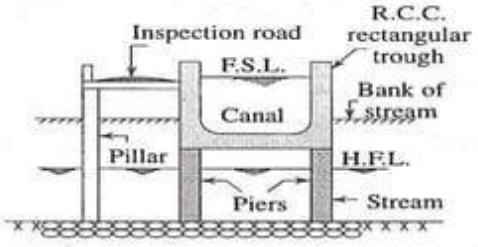


Fig: Aqueduct

Siphon Aqueduct

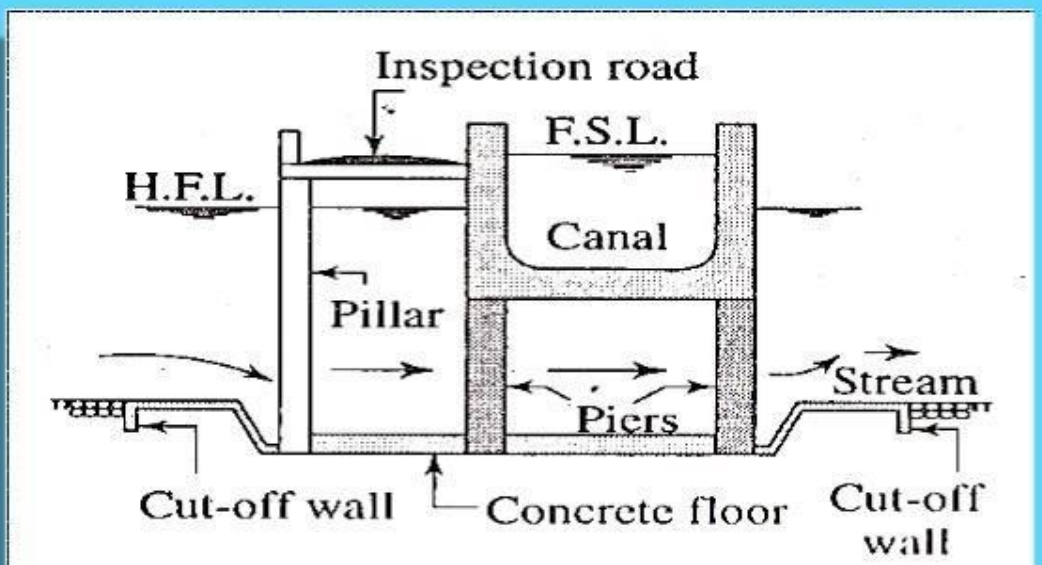


Fig: Siphon Aqueduct

Types of Cross Drainage Works

Siphon Super Passage

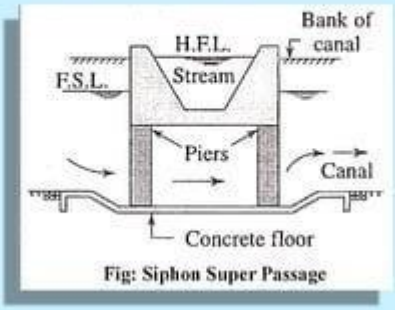
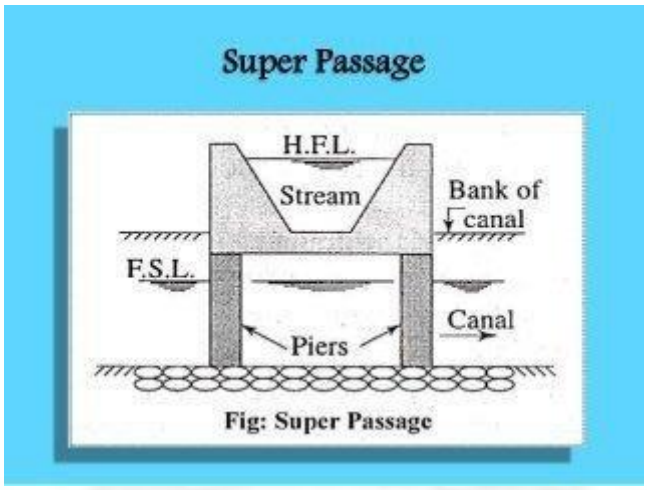
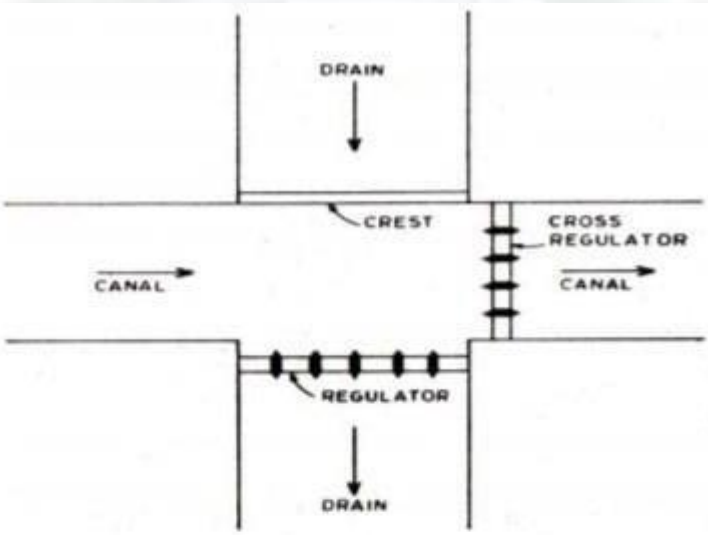
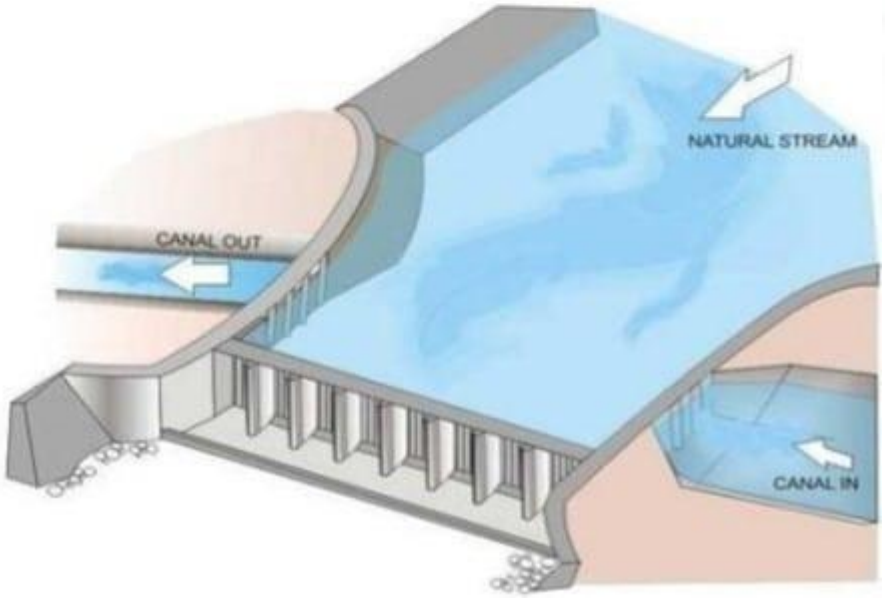


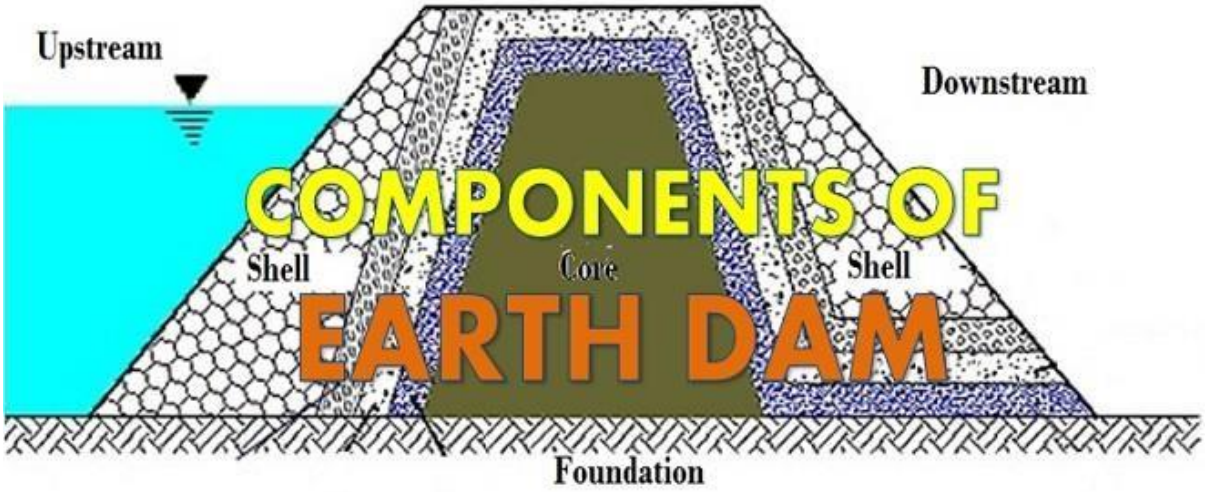
Fig: Siphon Super Passage





Level Crossing





GRAVITY DAM

- A gravity dam is an engineering structure that by its own weight, resists the forces imposed with a desired factor of safety.
- They are classified according to the material used for constructing them –
  - Masonry Dams: This type of dam is constructed with masonry. It could be either of rubble or coursed masonry.
  - Concrete Dams: They are constructed block by block by pouring good quality concrete.

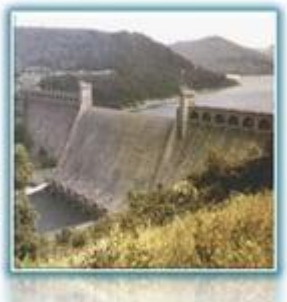


FIGURE 6. Outflow from a free-falling weir , properly ventilated from below

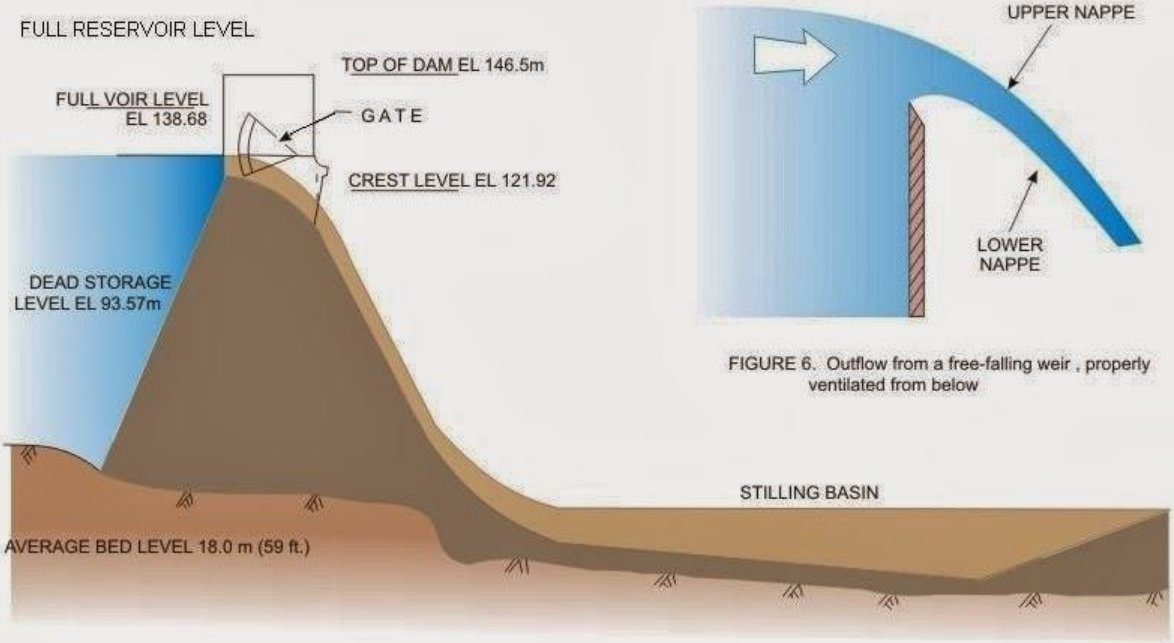


FIGURE 7. Ogee spillway & apron of Sardar Sarovar Dam spillway