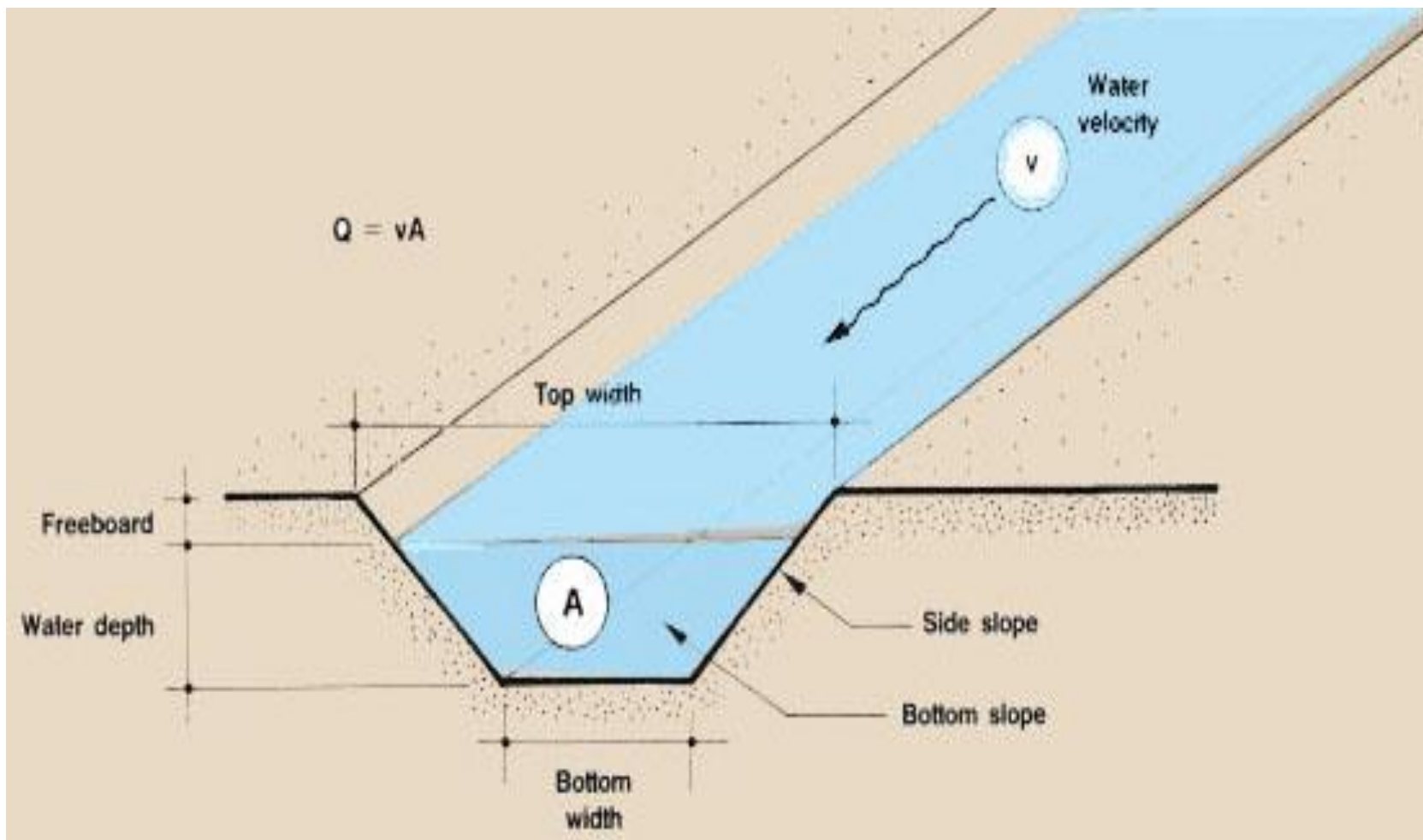


Water distribution system

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Water distribution structures for aqua farm

- **Types of open water canals**
- Different types of open water canals are used on fish farms to transport water, usually by **gravity***, for four main purposes:
- **feeder canals** to supply water from the main water intake to the fish ponds. In a large farm with several diversion pond units, there is usually a main feeder canal branching into secondary and even tertiary feeder canals;
- **drainage canals** to evacuate water from the fish ponds, for example toward an existing valley;
- **diversion canals** to divert excess water away from barrage ponds;
- **protection canals** to divert water runoff away from the fish ponds.





Area of trapezoidal section

$$A = BY + KY^2$$

Where,

A = Cross sectional area of the section (m^2)

Y = Depth of water (m)

K = Side slope of the channel, is the ratio of change in horizontal distance to 1 meter vertical distance

f = Free board of the channel

- All canals should be well designed to have the required **water carrying capacity**.
- In theory **the most efficient shape is a semi-circle**, but this is impractical for earthen canals.
- Side slope is determined by texture of soil as usual.

- **Manning equation** is used to calculate the velocity of water in canal.
- $v = (1/n) (R^{2/3}) (S^{1/2})$
- where
 - v** = water velocity in the canal;
 - n** = roughness coefficient of the canal sides;
 - R** = hydraulic radius of the canal (cross section area divided by wetted perimeter)
 - S** = effective slope.

Maximum permissible average velocities of water in canals and flumes

<u>Type of soil or lining</u>	<i>Maximum permissible average velocity (m/s)</i>
UNLINED CANALS	
Soft clay or very fine clay	0.2
Average sandy soil and good loam	0.7
Firm loam, clay loam	1.0
LINED CANALS	
Cast-in-place cement concrete	2.5
Precast cement concrete	2.0

Flumes/artificial	
Concrete or smooth metal	1.5-2.0
Wood	0.9-1.5

Example
Common characteristics of trapezoidal earthen feeder canals

<i>Canal dimensions</i>	<i>Small farm (Q = a few l/s)</i>	<i>Medium farm (Q = 20-50 l/s)</i>
Bottom width (m)	0.25	0.50
Water depth (m)	0.15-0.20	0.15-0.25
Freeboard (m)	0.10-0.20	0.20-0.30
Bottom slope (%)	0	0.1
Side slope	1.5:1	1.5:1
Top width (m)	1-1.45	1.55-2.15

Picture to show supply and drainage channels

