

RIVER ENGINEERING

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CLASSIFICATION OF RIVER TRAINING WORKS

1. High water training:

- Also called as “TRAINING FOR DISCHARGE”.
- It is trained for providing sufficient and efficient C/S area for the expeditious passage of maximum flood.
- It concerns mainly with the alignment and height of embankments for a given flood discharge.

2. Low water training:

- Also called as “TRAINING FOR DEPTH”.
- It is trained for providing sufficient depth for navigation during low stage of river.
- This is achieved by contraction of the width of the channel.

3. Mean water training:

- Also called as “TRAINING FOR SEDIMENT”.
- The river is trained to correct the configuration of river bed for efficient transport and also keeps the channel in good shape.
- Mean water training is the most important one and based on this the high and low mean training are designed.

TYPES OF RIVER TRAINING WORKS

GUIDE BANK SYSTEM:

- They are made for guiding the stream near a structure.
- This confines it in a reasonable width of the river.
- As it was designed by Bell, it is so called as Bell's Bund and further developed by spring and is known as guide bank.
- It consist of a heavily built embankment.
- This is in shape of a bell mouth on both sides of the channel.
- Usually only one embankmenty is required if the other end of the bank is high and stable.

GROYNES OR SPURS

- It is constructed transverse to the river flow.
- It extends from the bank into the river upto a limit.
- They are also known as spurs, dikes and transverse dikes.

TYPES OF GROYNES

1. ACCORDING TO THE MATERIALS USED:

- Permeable groyne
- Solid impermeable groyne

2. ACCORDING TO ITS HEIGHT BELOW HIGH WATER:

- Submerged groyne
- Non- submerged groyne

3. ACCORDING TO THE FUNCTION IT SERVES:

- Attracting groyne
- Deflecting groyne
- Repelling groyne
- Sedimenting groyne

4. SPECIAL TYPES OF GROYNES:

- Denehy's T-headed groyne
- Hockey type groyne
- Burma type groyne

FACTORS INFLUENCING THE CHOICE AND OF DESIGNING GROYNES

- Fall velocity of the river
- Width of the river @ high, low and mean water
- Depth of water way, height and nature of flood rise
- Character of bed materials like sand or silt, shingles.
- Materials available and funds
- Amt of materials carried in stream

PURPOSE OF A GROUYNE

- Contracts a river channel to improve its depth.
 - Protects the river bank
 - Silt up in the vicinity by creating a slack flow
 - Trains the flow along a certain course
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REPELLING GROUYNE

- The groyne is pointing towards the upstream at an angle of 10` to 30` to the line normal to the bank.
- This deflects the current in a perpendicular direction to itself.
- This current that comes in contact with the still water area adjacent causes eddies and deep scour.
- The head of the groyne should be strong to resist the swirling action of this current.
- A still water pocket is formed on the upstream and the suspended load that is brought by the river gets deposited in this pocket.

DEFLECTING GROYNES

- The deflecting groyne has a shorter length than a repelling groyne
- The river is laid perpendicular to the bank.
- It deflects the flow alone.

ATTRACTING GROYNES

- This type of groyne points downwards the direction of normal flow.
- Thus, this causes scour holes; therefore, they tend to maintain the deep currents close to the bank.
- Thus the upstream face bears the frontal attack of the river.
- Hence a heavy protection is not required on the downstream slope.

LENGTH OF THE GROYNES

- The length of the groyne depends upon the magnitude of river training required.
- A longer length of the groyne is required if the current has to be thrown on the other end of the bank.
- So initially a shorter length is designed and as the silting is done the length is extended.

IMPERMEABLE GROYNES

- Impermeable or solid groynes do not permit any flow through them.
- The core of it is made up of materials like sand, clay and gravel.
- The sides are heavily protected by stone pitching or concrete blocks.
- The side slope is varying from 2:1 to 3:1 and front slope varying from 3:1 to 5:1.
- An apron is provided at the bottom of the slope to prevent the slipping of the stones.

PERMEABLE GROYNES

- They permit the flow of water through them.
- The erosive action is reduced in the stream.
- In case river water carries sedimented load, it gets deposited near the groyne as the velocity is reduced.

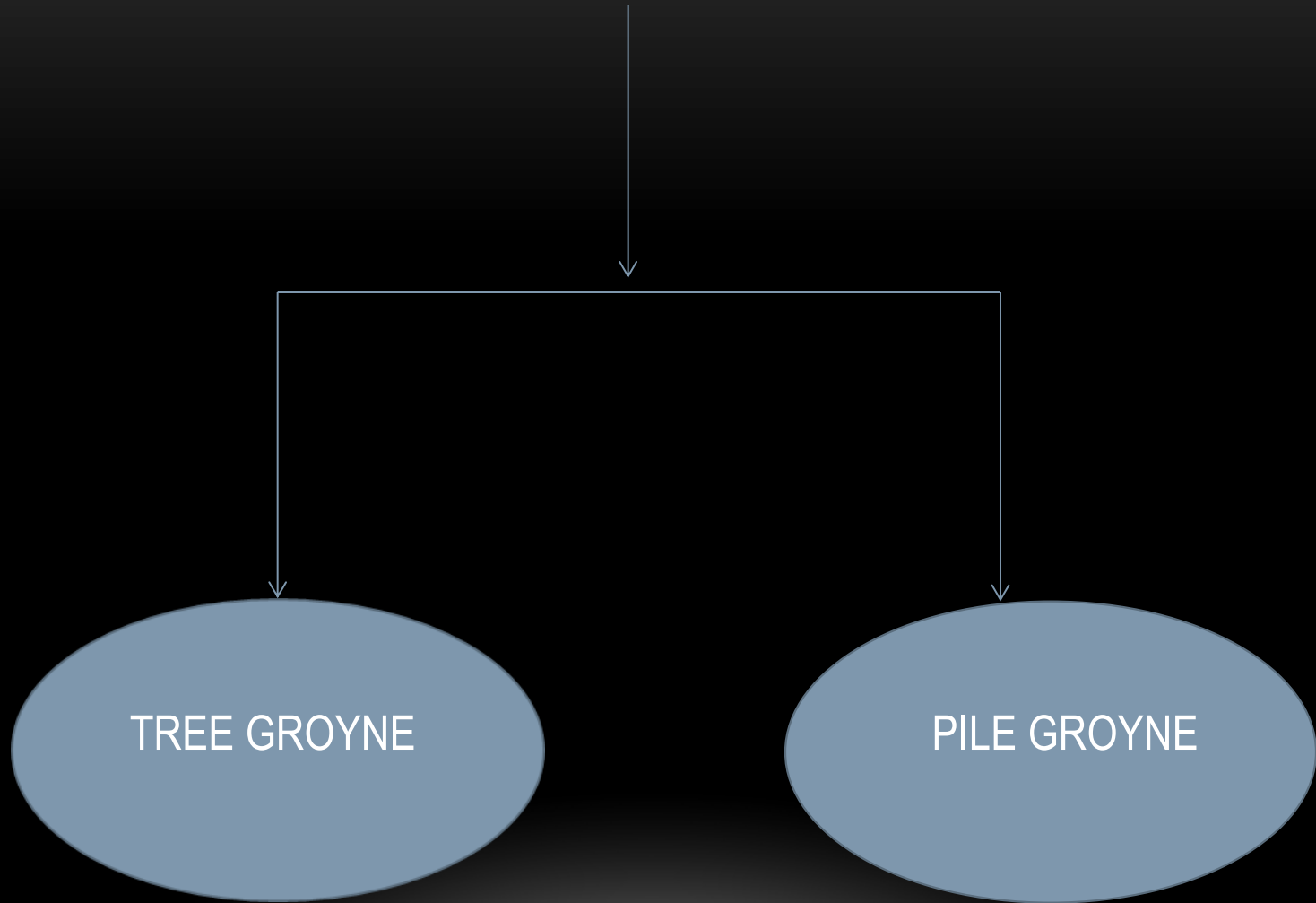
ADVANTAGES OF PERMEABLE GROUYNE:

- Cost of construction is cheap.
- Small quantity of stone is required hence this is used in places where the stones are scarce.
- It has better performance.
- This doesn't change the flow, hence no eddies and scours are formed.
- Suitable for deep narrow rivers.

DISADVANTAGES OF PERMEABLE GROUYNE:

- They do not resist shock and pressures caused by floating ice logs.
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TYPES OF PERMEABLE GROYNES



TREE GROUYNE

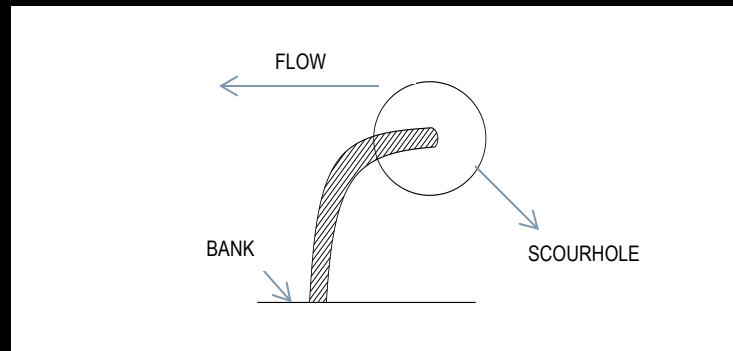
- A tree is being held in position with the weir along the bank and ties to a heavy buoy.
- The tree should be very leafy and with many braches.
- This reduces the velocity of the flowing waters and helps in sedimentation.
- This deflects the currents
- It is used for closing a river channel and opening the other.
- It checks the flow.

PILE GROUYNE

- They are constructed with timber piles.
- This is driven up to a depth of 9m.
- Two or three rows of main verticals are braced together by transverse and diagonals.
- Spacing between the main verticals is 2 to 3m.
- Two intermediates can be embedded at least 1.5m below.
- This is filled with alternate layers of brush woods and stones.
- Sometimes they filter the sand and act as a solid groyne.
- To safeguard it against the scour, an apron is built @ 1m of stone.

HOCKEY GROUYNE

- This groyne has a curved head.
- Thus it is termed as hockey groyne.
- It increases the attracting tendency of the groyne.
- It does not protect the bank.



DENEHY'S GROUYNE

- They are earthen embankments from a marginal bund.
- It has a T-shape head.
- The front perpendicular arm is 100m in length, parallel to the current.
- As the head has a longer portion, it looks like an inverted "L".
- The head has a slope and is protected by stone.

