



# River training works

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# River training works

- ❖ The river flowing in alluvial plains meander in wide widths. River discharges also vary widely.
- ❖ In certain years, the flood season discharges may be as high as 500 times the discharge of low flow season. Therefore, rivers carry different sediment loads at different times of the year according to variation in discharge .
- ❖ Due to non uniform variation in discharge and sediment load , the rivers enlarge and contract their channel width and gradually change their courses from time to time.
- ❖ When a barrage is constructed across a river , the river is made to forced or guided to flow through it.



- ❖ More ever , **fluming of water ways barrages results in afflux**, which may some times be several feet.
- ❖ The effect of afflux is felt up to several miles up stream of the barrage . A **high afflux may submerged large tracts of costly land and properties along the river, if these are not protected.**
- ❖ Therefore **to insure that the river flows** through the barrage and protect the submerging of large tracts of costly land and property upstream , **certain works upstream of barrage are constructed.** These works are called river training works.



# River training works

1. Guide banks
2. Marginal banks
3. Spurs
4. Pitched island



# Guide banks

- ❖ The works required in the river to guide the passage of river water through weir or barrages are called guide banks.
- ❖ The guide banks consist of two heavily built set of embankments with heavily protected curved ends in the shape of bell mouth. The width of water way is kept equal to the width of the structure from abutments. The river side slopes of guide banks are pitched with stones.

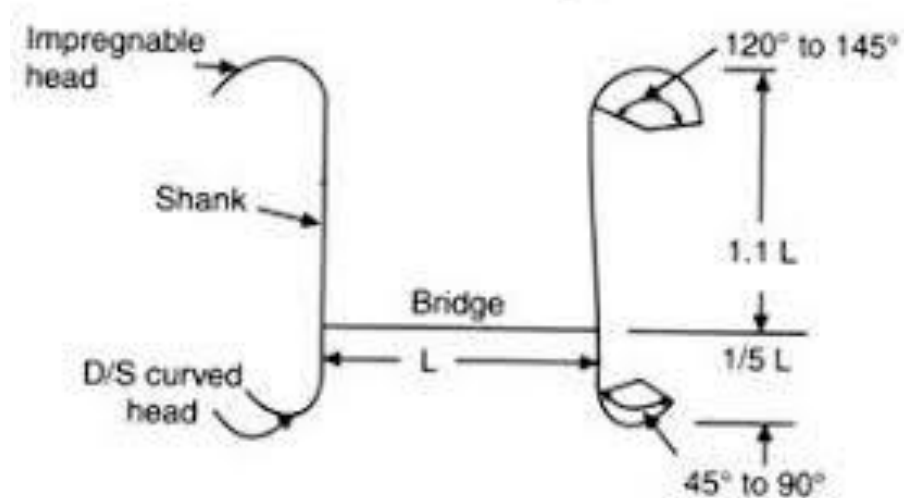
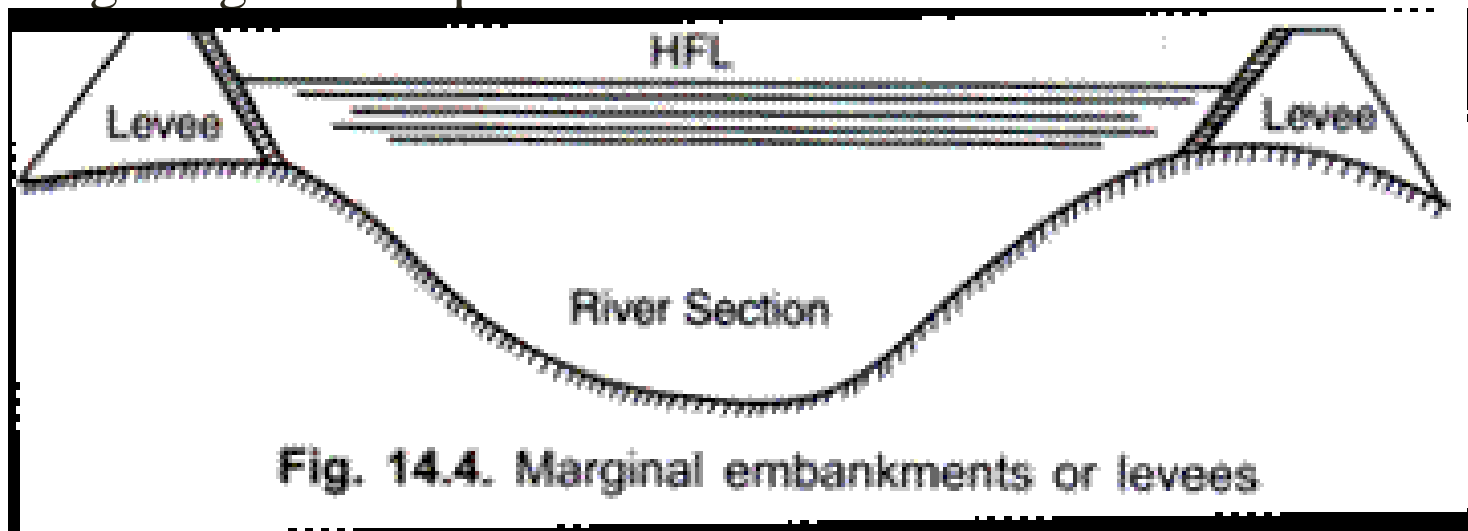


Fig. 14.6. Dimensions of guide banks



# The marginal banks

- ❖ With the construction of weir or barrage, the **level of water in the river upstream is raised by a few feet in all season. This is called afflux.** The rise of water level is **felt up to several miles upstream.** If this rise is felt unattended, it will part from threatening the safety of structure , will submerge large areas upstream.



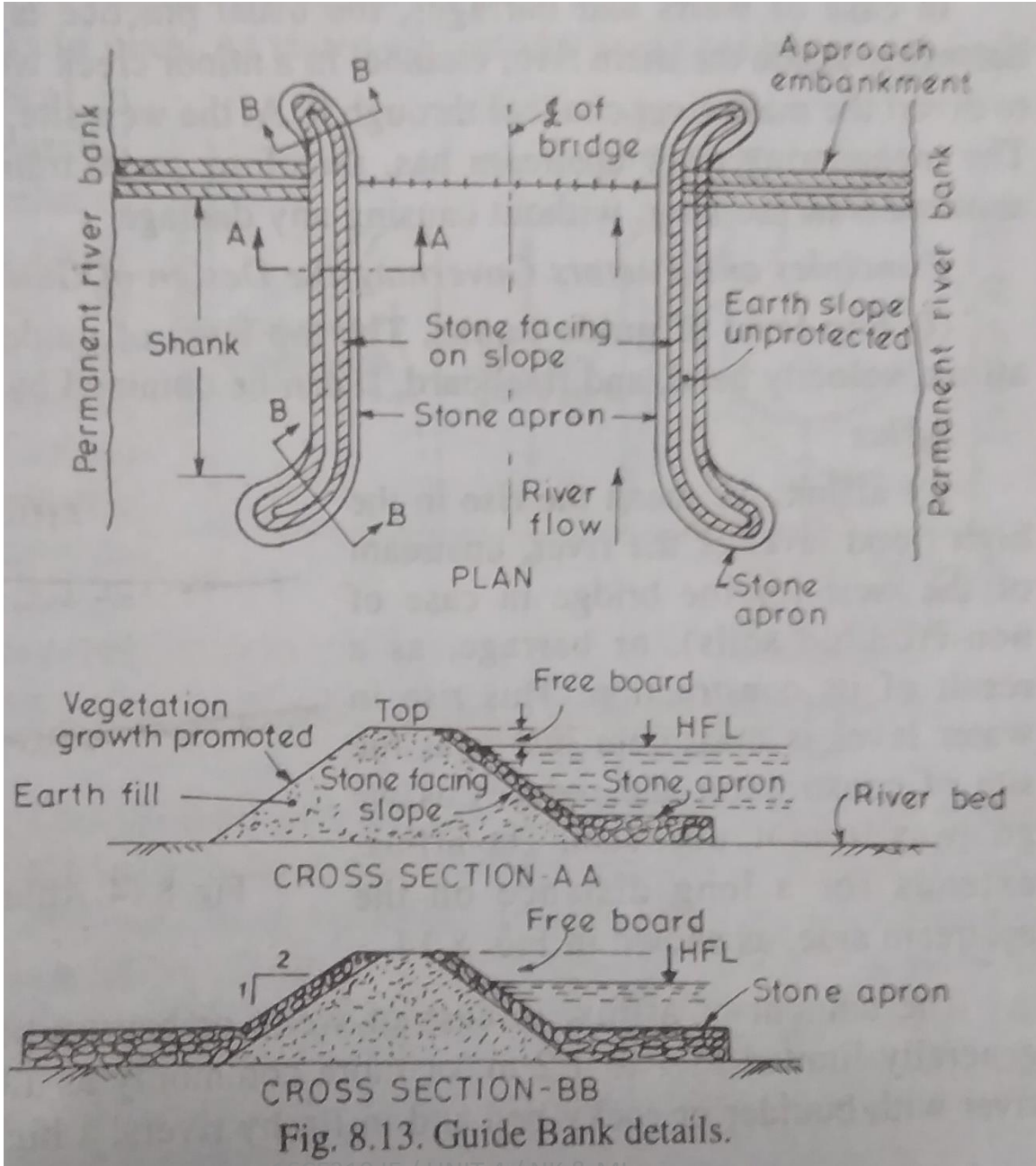
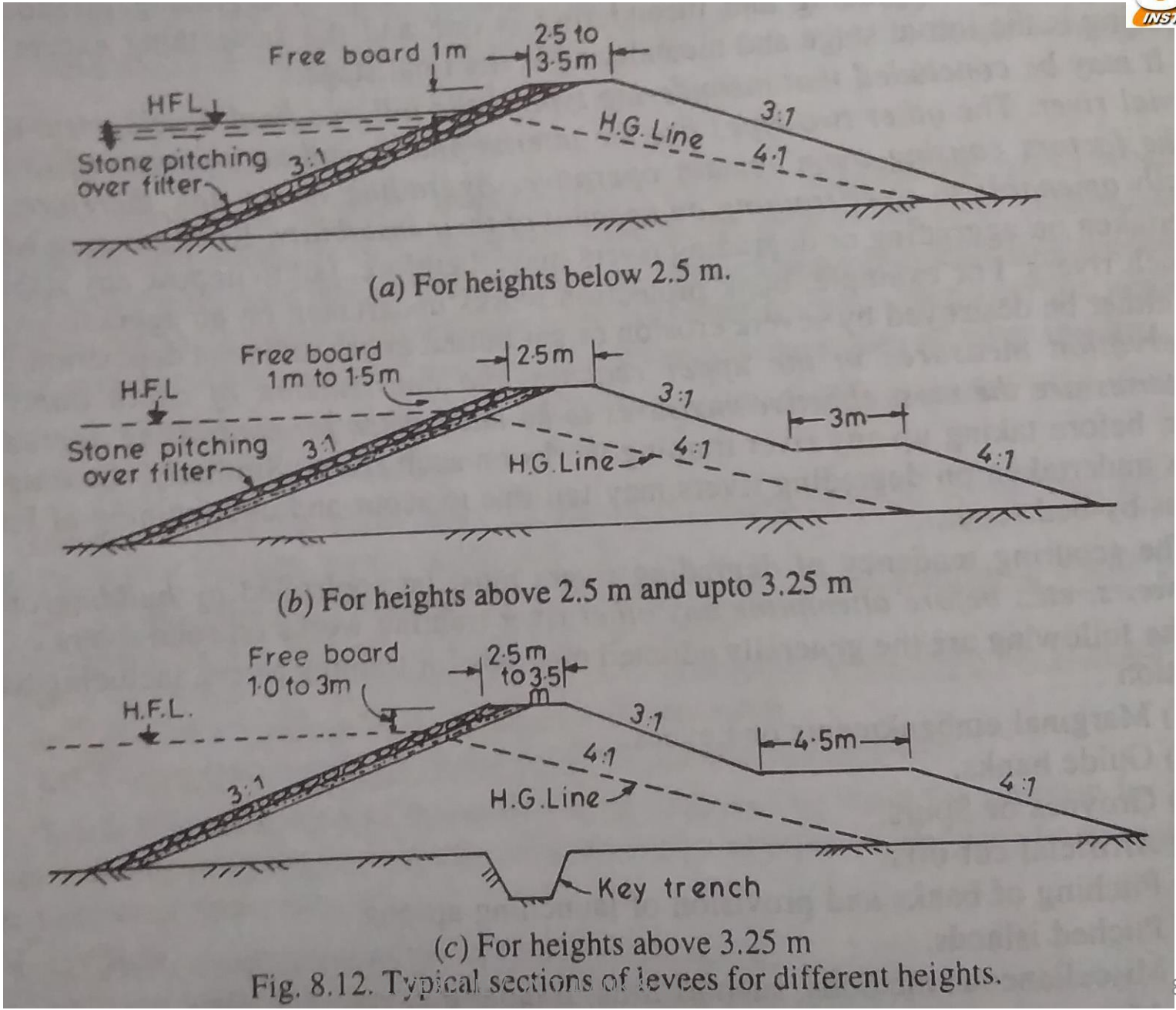


Fig. 8.13. Guide Bank details.





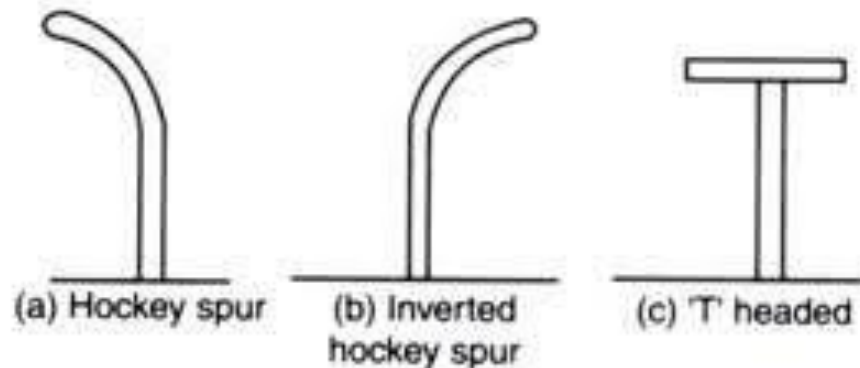


- ❖ Marginal banks - to protect properties from submergence and destruction, a set of embankments are constructed both sides of the river upstream of the barrage.
- ❖ The marginal banks are permanent structures these are aligned in such a way that they do not interfere with the river meander.
- ❖ They are tied or joined to the high ground upstream so that the river flows within the two marginal banks and is not allowed to out flank the barrage and also not submerged areas upstream.
- ❖ It is usually provided with a top width of 6m with river side slope 3:1 to 5:1 and land side slope of 4:1 to 6:1. the river side slope is protected with stone pitching and flexible stone apron.

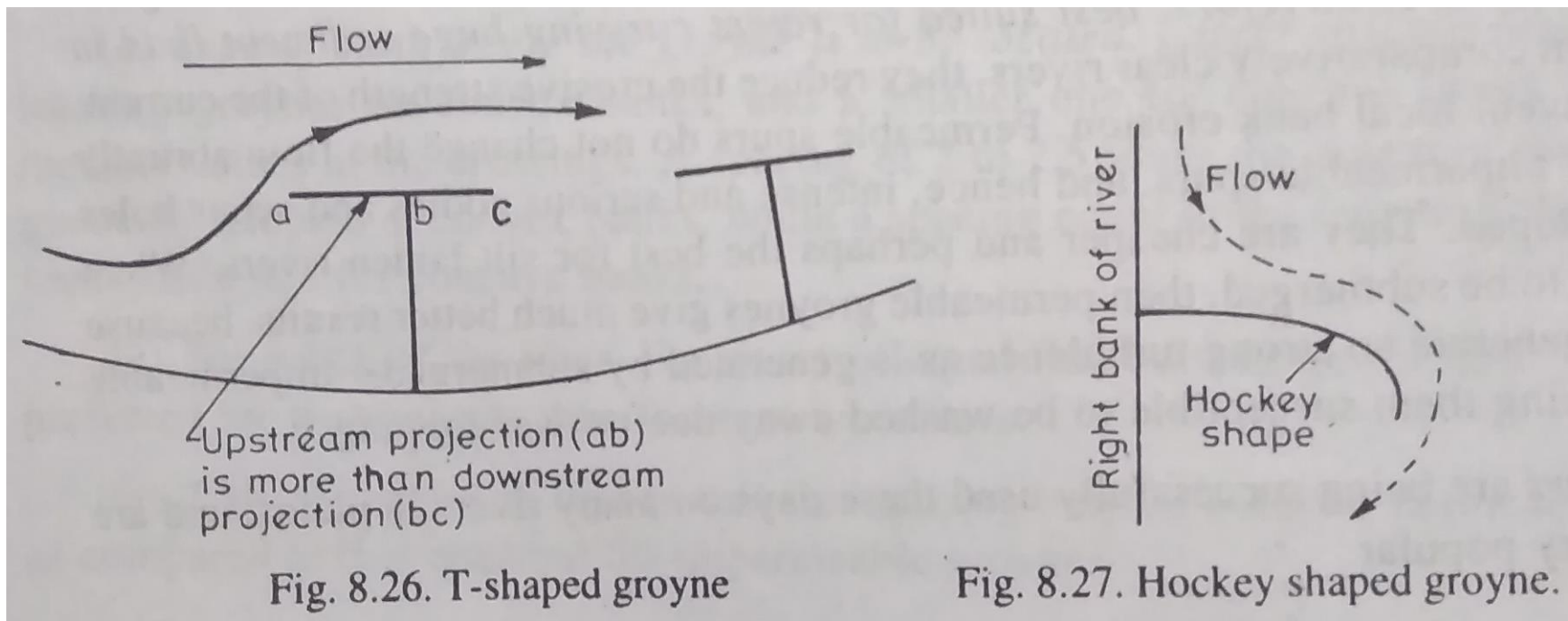


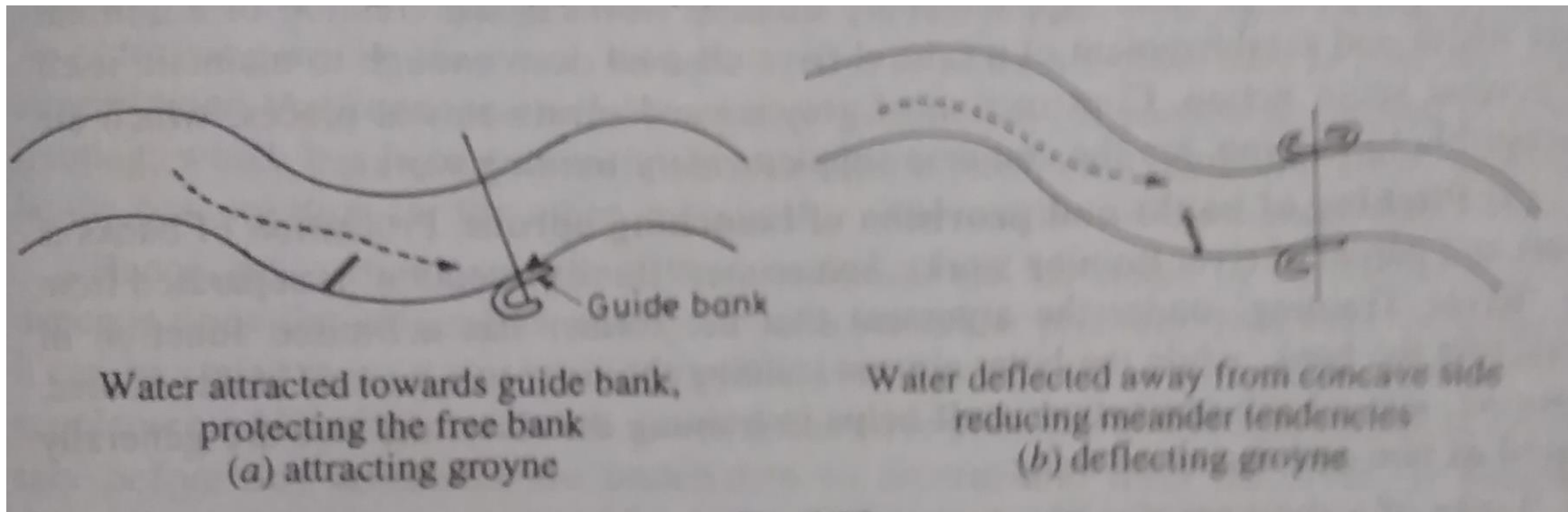
# Spurs

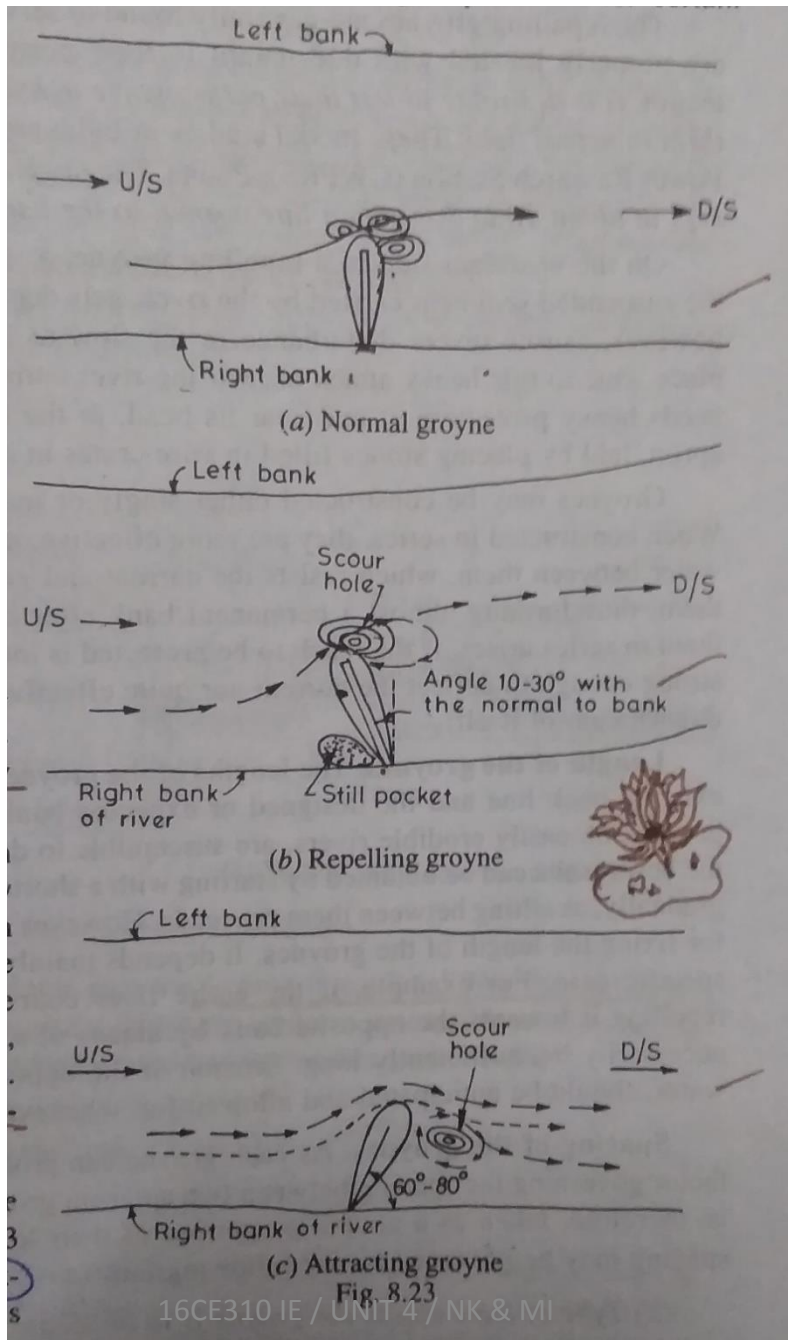
- ❖ Spurs are **heavily fortified embankments constructed in the river bed transverse to the river banks.**
- ❖ Their main function is **to control the river channel** so that it may **run along a specified course and protect the river banks from scouring by keeping the river course away from it.**
- ❖ Spurs may be aligned in such a way that they may hold, repel or attract a river course.



**Fig. 14.11. Special types of spurs or groyne**









# Types of spurs according to alignment

- **Normal / Ordinary spurs:** spurs are constructed to the river current. They should be short in length and should be constructed perpendicular to the bank. Such spurs are utilized to hold the channel in position and protect the banks.
- **Attracting spurs:** spurs should be constructed pointing towards upstream of the flow to attract the river current towards the bank. The angle of inclination may vary from 60 degree to 80 degree. This attract river flow towards the banks from which the spurs are very strong in construction as they have to bear the full frontal attack of the river flow.



**Repelling spurs:** spurs constructed to repel the river current should be aligned pointing towards downstream. The angle of inclination with normal to bank varies from 40 to 60 degrees.

- ❖ The head of the spur should be heavily protected to resist swirling action of the current. The distance between the two spurs is kept 1 to 2 times the length of the spurs.
- ❖ On bends the distance between the spurs is kept more in case of convex banks and small for concave banks.



# Types of the spurs

- Impermeable spurs
- Permeable spurs





# Impermeable spurs

- Impermeable spurs as name implies are those spurs which **do not allow water to seep through them.**

## ❖ Types:

- Bar spurs
- Hockey spurs
- Inverted hockey spur
- T- head spur
- Sloping spur



# Permeable spurs

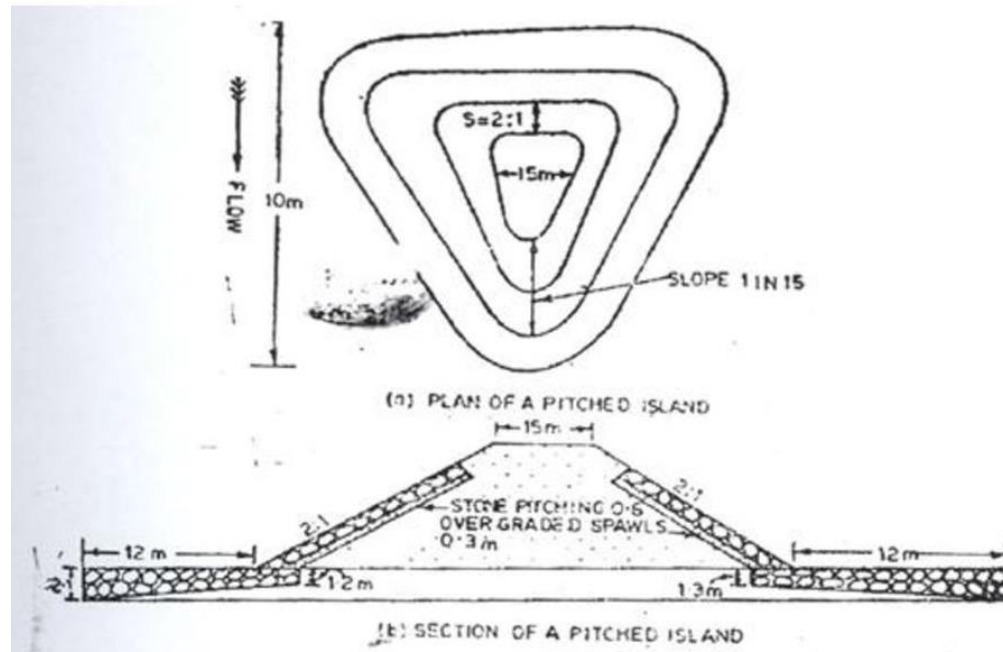
A permeable spur allows water to seep through it. However, as the silt water passes through the voids in the material of such spurs, its velocity is reduced considerably, which allows water to drop its entire silt load in the pores of spurs gradually making it full impermeable.

## Types :

- ❖ Tree spur
- ❖ Wire crated stone spur

# The pitched Island

- ❖ A pitched island is an **artificially created island in the river**. It is **made of earth with pitched side slopes and stone apron**. Sometimes an existing natural island in the river is reshaped and pitched and provided with aprons.





- ❖ Pitched island cause redistribution of tractive force, velocity and sediment charge of river flow.
- ❖ The tractive force near a pitched island begins to increase rapidly after construction of island which creates a deep scour around the island thus drawing the river channel near it and holding it there permanently.
- ❖ It is used to correct the river approach conditions by attracting the river course above the weir and holding it there.
- ❖ It decreases the intensity of flow along a marginal banks and guide banks and protect them from damage. It also deepens the river channel, which helps the silt distribution before the head regulator of off-taking channels and navigation purposes.
- ❖ It is particularly suitable in deep channels. In shallow channel with flash floods, they are not suitable.