Components of a Barrage

Definition

The only difference between a weir and a barrage is of gates, that is the flow in barrage is regulated by gates and that in weirs, by its crest height.

Barrages are costlier than weirs.

Weirs and barrages are constructed mostly in plain areas. The heading up of water is affected by gates put across the river. The crest level in the barrage (top of solid obstruction) is kept at low level.

During flood, gates are raised to clear of the high flood level. As a result there is less silting and provide better regulation and control than the weir.

Components of barrage

Main barrage portion:

1. Main body of the barrage, normal RCC slab which supports the steel gate. In the X-Section it consists of :
2. Upstream concrete floor, to lengthen the path of seepage and to project the middle portion where the pier, gates and bridge are located.
3. A crest at the required height above the floor on which the gates rest in their closed position.
4. Upstream glacis of suitable slope and shape. This joins the crest to the downstream floor level. The hydraulic jump forms on the glacis since it is more stable than on the horizontal floor, this reduces length of concrete work on downstream side.
5. Downstream floor is built of concrete and is constructed so as to contain the hydraulic jump. Thus it takes care of turbulence which would otherwise cause erosion. It is also provided with friction blocks of suitable shape and at a distance determined through the hydraulic model experiment in order to increase friction and destroy the residual kinetic energy.

Divide Wall

- A wall constructed at right angle to the axis of the weir separating the weir proper from the under sluices (to keep heavy turbulence at the nose of the wall, well away from upstream protection of the sluices)
- It extends upstream beyond the beginning of canal HR. Downstream it extends up to the end of loose protection of under sluices launching apron)
- This is to cover the hydraulic jump and the resulting turbulence.

The fish ladder:

- For movement of fish (negotiate the artificial barrier in either direction)
- Difference of level on the upstream and downstream sides on the weir is split up into water steps by means of baffle walls constructed across the inclined chute of fish ladder.
- Velocity in chute must not be more than 3m/s
- Grooved gate at upstream and downstream – for effective control.
- Optimum velocity 6-8 ft/s

Sheet piles:

Made of mild steel, each portion being 1/2′ to 2′ in width and 1/2″ thick and of the required length, having groove to link with other sheet piles.

Upstream piles:

Situated at the upstream end of the upstream concrete floor driven into the soil beyond the maximum possible scour that may occur.

Functions:

1. Protect barrage structure from scour
2. Reduce uplift pressure on barrage
3. To hold the sand compacted and densified between two sheet piles in order to increase the bearing capacity when barrage floor is designed as raft.

Intermediate sheet piles:

- Situated at the end of upstream and downstream glacis. Protection to the main structure of barrage (pier carrying the gates, road bridge and the service bridge) in the event of the upstream and downstream sheet piles collapsing due to advancing scour or undermining. They also help lengthen the seepage path and reduce uplift pressure.
- Downstream sheet piles: Placed at the end of downstream concrete floor. Their main funtion is to check the exit gradient. Their depth should be greater than the possible scour.

Inverted filter:

- Provided between the downstream sheet piles and the flexible protection. Typically 6″ sand, 9″ coarse sand and 9″ gravel. Filter may vary with size of particles forming the river bed. It is protected by placing over it concrete blocks of sufficient weight and size. Slits are left between the blocks to allow the water to escape.
- Length should be 2 x downstream depth of sheet.

  Functions:
- Check the escape of fine soil particles in the seepage water.

Flexible apron:

- Placed downstream of the filter
- Consists of boulder large enough not to be washed away by the highest likely velocity
- The protection provided is enough as to cover the slope of scour of 1 1/2 x depth of scour as the upstream side of 2 x depth of scour on the downstream side at the slope of 3.

The under sluices: scouring sluices

Maintaining a deep channel in front of the Head regulator on the downstream side.

Functions:

1. As the bed of under sluice is not lower level than rest of the weir, most of the day, whether flow unit will flow toward this pocket => easy diversion to channel through Head regulator
2. Control sil entry into channel
3. Scour the silt (silt excavated and removed)
4. High velocity currents due to high differential head.
5. Pass the low floods without dropping

6. The shutter of the main weir, the raising of which entails good deal of labor and time.
7. Capacity of under sluices:
8. For sufficient scouring capacity, its discharging capacity should be at least double the canal discharge.
9. Should be able to pass the dry weather flow and low flood, without dropping the weir shutter.
10. Capable of discharging 10 to 15% of high flood discharge

River training works

To ensure smooth and axial flow of water, to prevent the river from out —— the works due to change in its course.

River Training Works

Guide banks:

Earthen embankments => stone pitching

Force the river into restricted channel, to ensure almost axial flow near the weir site. (embankments in continuation of G-Banks. To contain flood within flood plains)

Marginal Bunds:

Provided on the upstream in order to protect the area from submergence due to rise in HFL, caused by afflux.

Groans or spurs:

- Embankment type structures constructed transverse to river flood, extending from the banks into the river (also transverse dykes)
- Protect the bank from which they are extended by deflecting the current away from the bank.

Source: https://civilsolution.wordpress.com/category/civil-engineering/page/6/