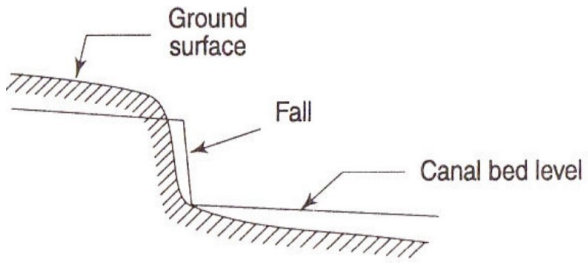
Canal drop or Fall

A canal fall or drop is an irrigation structure constructed across a canal to lower down its bed level to maintain the designed slope when there is a change of ground level to maintain the designed slope when there is change of ground level.

This falling water at the fall has some surplus energy. The fall is constructed in such a way that it can destroy this surplus energy



Types of Canal Fall:

1. Ogee Fall - to provide smooth transition and to reduce disturbance and impact

2. Rapid Fall - consists of a glacis sloping at 1: 0 to 1:20. Very high cost of construction

3. Stepped Fall - next development of rapid fall. Cost of construction is high

4. Notch Fall - the fall is consists of one or more trapezoidal notches

5. Vertical Drop Fall - high velocity jet enters the deep pool of water in the cistern and dissipation of energy is affected by turbulent diffusion

6. Glacis Type Fall - utilizes standing wave phenomenon for dissipation of energy

Types:

a) Straight Glacis Type

b) Parabolic Glacis Type of Montague type

Ogee Fall

In this type of fall, an ogee curve (a combination of convex curve and concave curve) is provided for carrying the canal water from higher level to lower level. This fall is recommended when the natural ground surface suddenly changes to a steeper slope along the alignment of the canal.

- The fall consists of a concrete vertical wall and concrete bed.
- Over the concrete bed the rubble masonry is provided in the shape of ogee curve.
- The surface of the masonry is finished with rich cement mortar (1:3).
- The upstream and downstream side of the fall is protected by stone pitching with cement grouting.
- The design consideration of the ogee fall depends on the site condition.

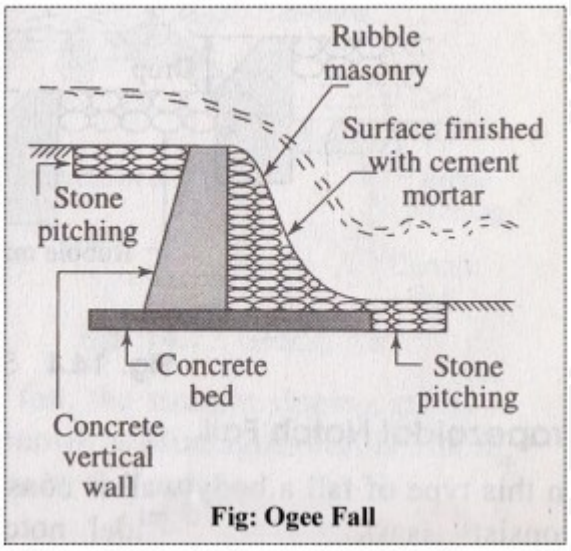


Fig: Ogee Fall

Rapid Fall

The rapid fall is suitable when the slope of the natural ground surface is even and long. It consists of a long sloping glacis with longitudinal slope which varies from 1 in 10 to 1 in 20.

- Curtain walls are provided on the upstream and downstream side of the sloping glacis.
- The sloping bed is provided with rubble masonry.
- The upstream and downstream side of the fall is also protected by rubble masonry.
- The masonry surface is finished with rich cement mortar (1: 3).

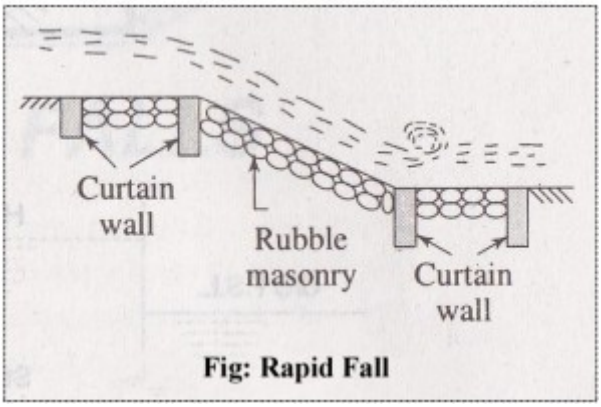


Fig: Rapid Fall

Stepped Fall

Stepped fall consists of a series of vertical drops in the form of steps. This fall is suitable in places where the sloping ground is very long and requires long glacis to connect the higher bed level with lower bed level.

- This fall is practically a modification of the rapid fall.
- The sloping glacis is divided into a number of drops so that the flowing water may not cause any damage to the canal bed. Brick walls are provided at each of the drops.
- The bed of the canal within the fall is protected by rubble masonry with surface finishing by rich cement mortar (1:3).

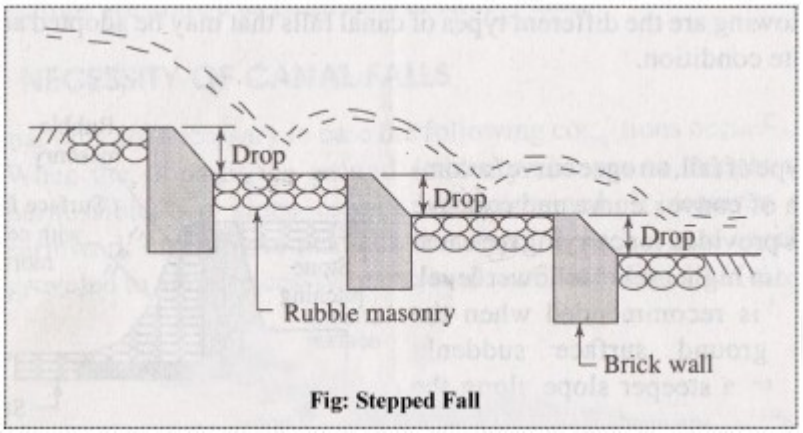


Fig: Stepped Fall

Trapezoidal Notch Fall

In this type of fall a body wall is constructed across the canal. The body wall consists of several trapezoidal notches between the side piers and the intermediate pier or piers. The sills of the notches are kept at the upstream bed level of the canal.

- The body wall is constructed with masonry or concrete.
- An impervious floor is provided to resist the scoring effect of the falling water.
- The upstream and downstream side of the fall is protected by stone pitching finished by cement grouting.
- The size and number of notches depends upon the full supply discharge of the canal.

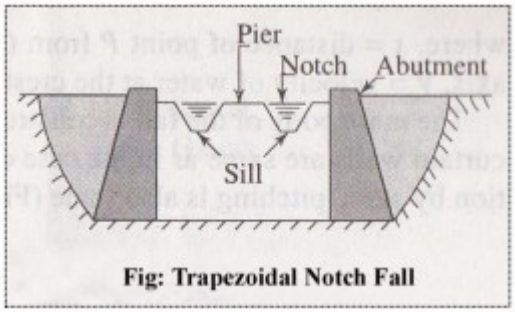


Fig: Trapezoidal Notch Fall

Vertical Drop Fall

It consists of a vertical drop walls which is constructed with masonry work. The water flows over the crest of the wall. A water eastern is provided on the downstream side which acts as a water cushion to dissipate the energy of falling water.

- A concrete floor is provided on the downstream side to control the scouring effect of the flowing water.
- Curtain walls are provided on the upstream and downstream side.
- Stone pitching with cement grouting is provided on the upstream and downstream side of the fall to protect it from scouring.

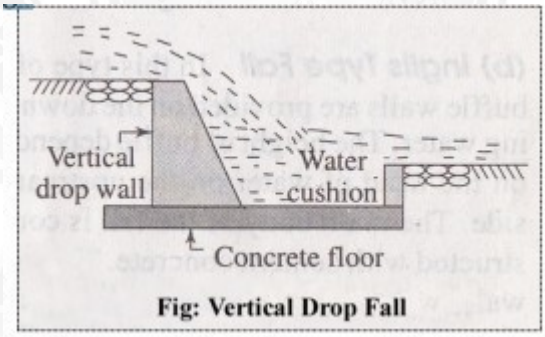


Fig: Vertical Drop Fall

Glacis Fall

It consists of a straight sloping glacis provided with a crest. A water cushion is provided on the downstream side to dissipate the energy of flowing water.

- The sloping glacis is constructed with cement concrete.
- Curtain walls and toe walls are provided on the upstream and downstream side.

- The space between the toe walls and curtain walls is protected by stone pitching.
- This type of fall is suitable for drops up to 1.5 m.

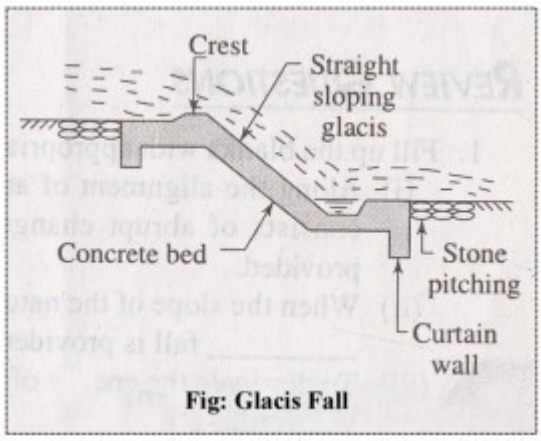


Fig: Glacis Fall

For the improvement in energy dissipation, the glacis falls have been modified as follows:

(a) Montague Type Fall

In this type of fall, the straight sloping glacis is modified by giving parabolic shape which is known as Montague profile. Taking "0" as the origin, the Montague profile is given by the equation,

$$X = v\sqrt{\frac{4Y}{g}} + Y$$

Where, x = distance of point P from OX axis,

Y = distance of point P from OY axis, υ = velocity of water at the crest,

g = acceleration due to gravity

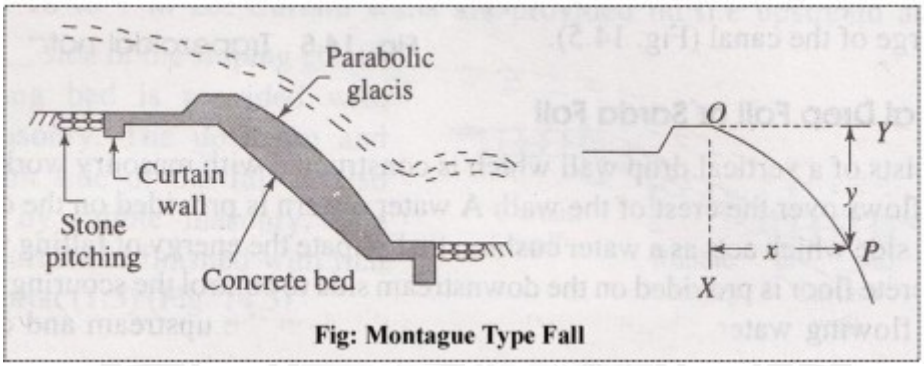


Fig: Montague Type Fall

The main body of the fall is constructed with cement concrete. Toe walls and curtain walls are same as in the case of straight sloping glacis. The bed protection by stone pitching is also same.

(b) Inglis Type Fall

In this type of fall, the gracis is straight and sloping, but buffle walls are provided on the downstream floor to dissipate the energy of flowing water.

- The height of buffle depends on the head of water on the upstream side.
- The main body of the fall is constructed with cement concrete.
- The toe walls and curtain walls are same as straight glacis.
- The protection works with stone pitching are also same. Sometimes, this fall is known as buffle fall.

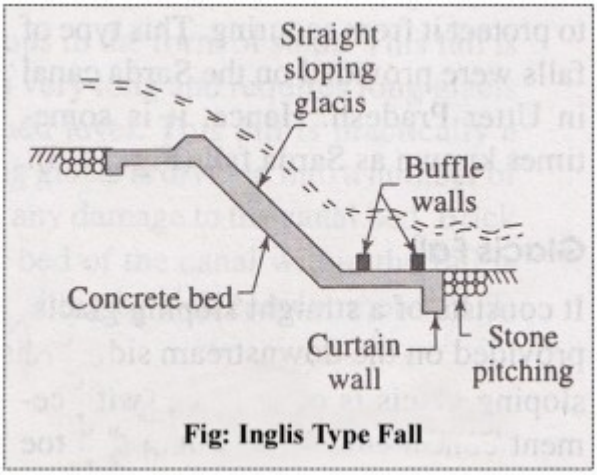


Fig: Inglis Type Fall