

## **Spillways**

A Spillway is a channel or passageway through which flood/surplus water escapes or release safely from a reservoir or dam . They are provided for all dams as a safety measure against overtopping and the consequent damages and failure. It acts as a safety value for the dam.

Or

A spillway is a hydraulic structure built at a dam site for diverting the surplus water from a reservoir after it has been filled to its maximum capacity.

# Types of Spillways

Different types of spillways are as follows:

1. Straight Drop Spillway
2. Ogee Spillway
3. Shaft Spillway
4. Chute Spillway
5. Side Channel Spillway
6. Siphon Spillway
7. Labyrinth Spillway

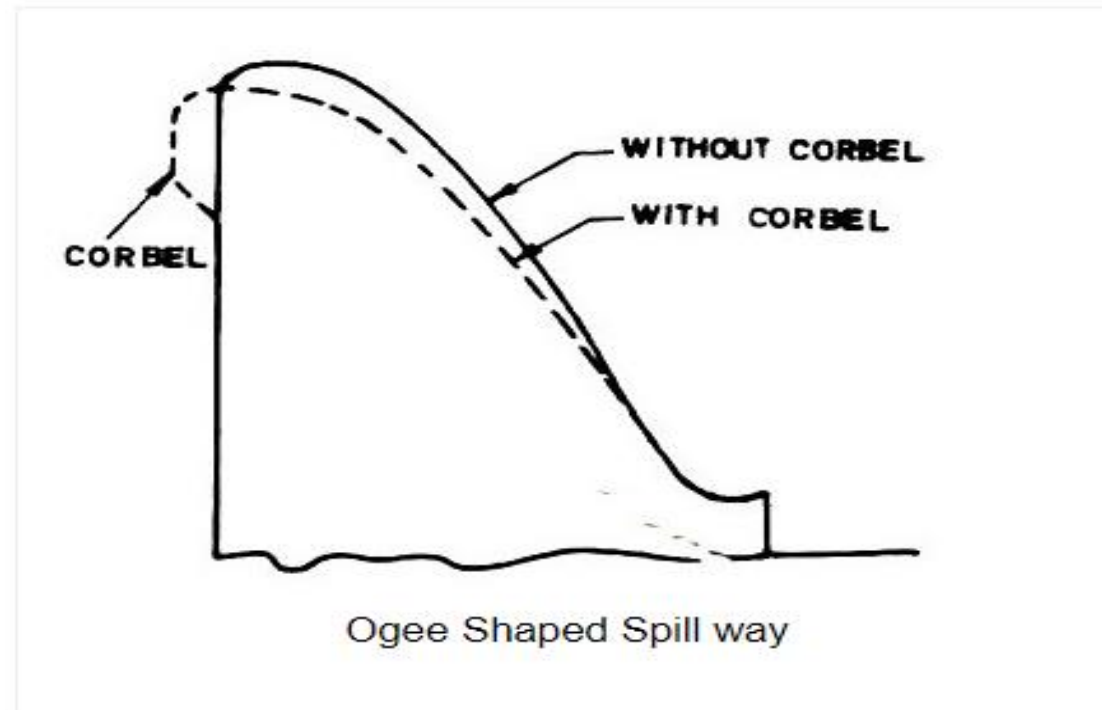
# 1. Straight Drop Spillway

A Straight drop spillway consists of low height weir wall having its downstream face roughly or perfectly vertical. When the water level in the reservoir rises above the normal pool level, the surplus water falls freely from the crest of the weir and hence it is known as **Straight drop spillway** or **free overfall spillway**.



## Ogee-shaped Spillway:

An Ogee-shaped (or Overflow) Spill way is the most commonly used spillway. It is widely used with gravity dams, arch dams & buttress dams. Several Earth & Rock fill dams are also provided with this type of spillway as a **superstructure**. An Ogee-shaped Spillway has a control weir of ogee-shaped, which is like the elongated English letter "S". The upper part of the spillway surface matches closely to the profile of the lower nappe of a ventilated sheet of water falling freely from a sharp-crested weir. Downstream & Upstream profile of Ogee spillway :



## Shaft Spillway:

A Shaft Spill way consist of a horizontal crest & vertical shaft, with its top surface at the crest level of the spillway and its lower end connected to a vertical shaft. The other end of the vertical shaft is connected to a horizontal conduit or **tunnel**, which extends through or around the dam and carries the water to the river downstream. A **shaft** spillway is used at the sites where the conditions are not favorable for an overflow or a chute spill-way.



## 4. Chute Spillway

Chute spillway is a type of spillway in which surplus water from upstream is disposed to the downstream through a steeply sloped open channel. It is generally constructed at one end of the dam or separately away from the dam in a natural saddle in a bank of the river.

Chute spillway is suitable for gravity dams, earthen dams, rockfill dams, etc. But it is preferred when the width of the river valley is very narrow. The water flows along the steeply sloped chute or trough or open channel and reaches the downstream of the river. Chute spillway is also called as trough spillway or open channel spillway.

The slope of chute spillway is designed in such a way that the flow should be always in supercritical condition. To dissipate energy from the falling water, energy dissipators can be provided on the bed of chute spillway.

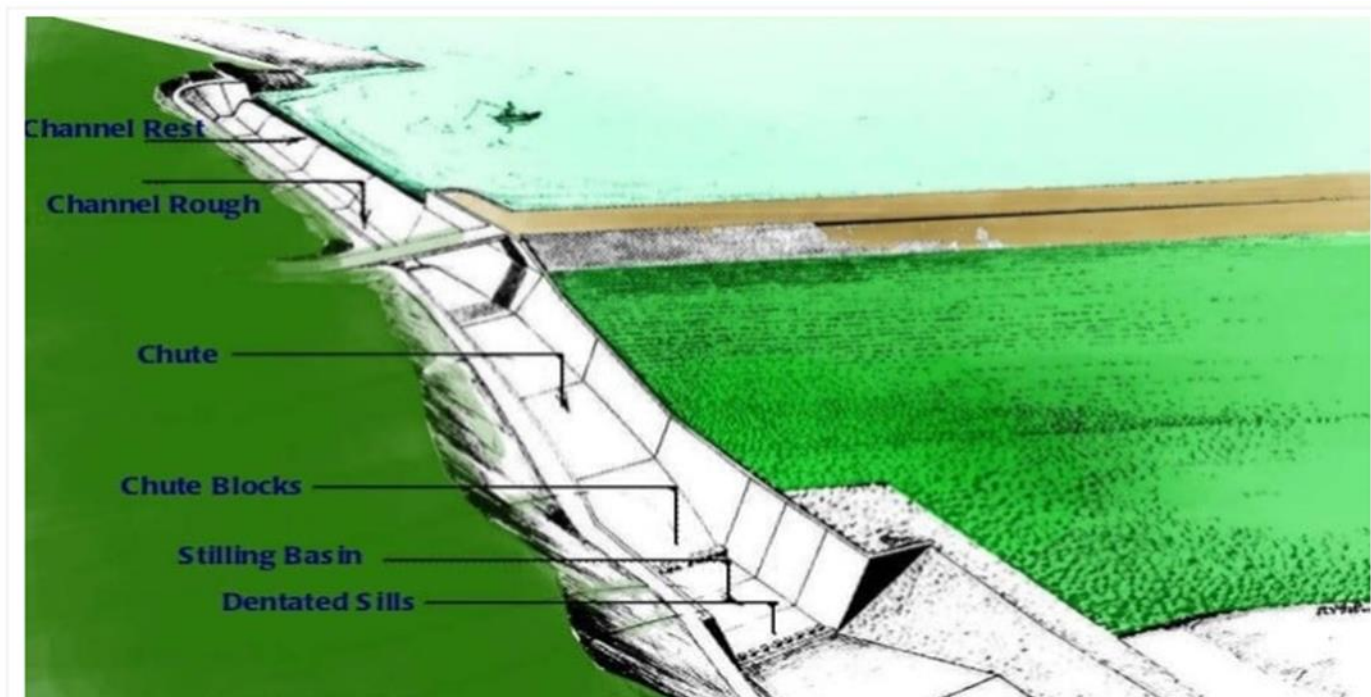




Chute Spillway

## 5. Side Channel Spillway

Side channel spillway is similar to chute spillway but the only difference is the crest of side channel spillway is located on one of its sides whereas crest of chute spillway is located between the side walls. In other words, the water spilling from the crest is turned to 90 degrees and flows parallel to the crest of side channel spillway unlike in chute spillway.

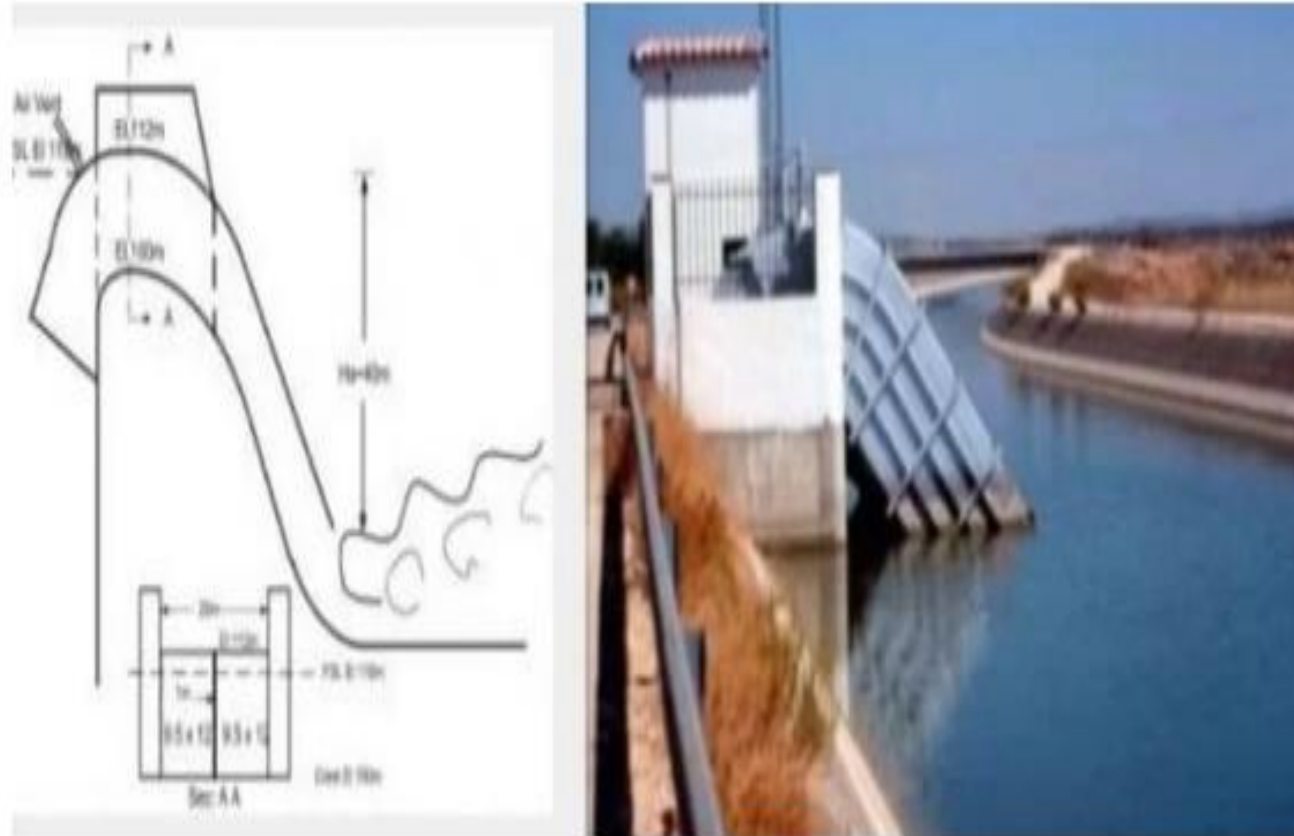




## 6. Siphon Spillway

A siphon spillway is a type of spillway in which surplus water is disposed to downstream through an inverted U shaped conduit. It is generally arranged inside the body or over the crest of the dam.

In both types of siphon spillways, air vents are provided at the bent portion of the upper passageway to prevent the entrance of water when the water level is below the normal pool level. Whenever the level rises above normal pool level, water enters into the conduit and is discharged to the downstream of the channel by siphonic action.



Siphon Spillway

## 7. Labyrinth Spillway

A labyrinth spillway is a type of spillway in which the weir wall is constructed in a zigzag manner in order to increase the effective length of the weir crest with respect to the channel width. This increase in effective length raises the discharge capacity of the weir and hence higher water flow at small heads can be conveyed to the downstream easily.



Labyrinth spillway

# Spillway

## Requirements of a spillway

- A Spillway should fulfill the following requirements
- The spillway should have sufficient capacity
- The location of spillway should provide safe disposal of water without toe erosion.
- Spillway should be hydraulically and structure sufficient
- Usually spillway should be accomplished by an energy dissipation work on its downstream side.



# Components Parts of a Spillway

- The various component parts of a spillway are as under

## **(i) Control Structure**

- Control Structure consists of a weir which may be sharp. It is a major component of a spillway. It regulates and controls the surplus water from the reservoir. It does not allow the discharge of water below from reservoir level and allows the discharge of water below from reservoir level and allows only when water surface in the reservoir rises above that level.

# **Components Parts of a Spillway**

## **(ii) Discharge Channel**

- Discharge Channel It is provided to convey the surplus water released through control structures to the stream bed below the dam safely. The discharge channel may be the downstream face of spillway itself, or open channel excavated along the ground surface or a closed conduit placed through or under a dam.



# Components Parts of a Spillway

## Energy Dissipaters

- They are usually provided on the downstream side of the spillway. High Velocity water coming through Spillway may cause serious damage to the toe of dam and to the adjacent structures. This high energy of flow must be dissipated before it flows back to river. For this, energy dissipaters are provided

# **Components Parts of a Spillway**

## **Entrance and Outlet Channels**

- They are not required in case of an overflow spillway. However entrance channels are provided to draw water from reservoir and convey it to control structure. Similarly Outlet channels are provided to carry the spillway flow in river channel below the dam. Similarly, outlet channels are provided to carry the spillway flow to river channels below the dam.