

## CANAL LINING CH-06

### OBJECT OF CANAL LINING -:

- (a) To control seepage -: The seepage loss is the maximum loss in unlined canal. Due to seepage the duty of canal water is much reduced which involves enhancement of storage capacity of a reservoir by constructing high dam thus the expenditure of the project is increased so, to control the seepage loss through the ~~road~~ bed and sides of the canal. the lining of the canal is necessary.
- (b) To prevent water logging -: Along the course of the canal, there may be low lying areas on one side or both sides of the canal. Due to the seepage of water through the side of the canal, these areas may not be converted into marshy lands. This water logging makes the land alkaline which is unsuitable for agriculture. This water-logged area may become the breeding place of mosquitos which are responsible for many infectious diseases.
- (c) To increase the command area -: If the lining is provided in the canals the various losses can be controlled and ultimately the command area of the project may be enhanced.

### Types of Lining -:

The following are the different types of linings which are generally recommended according to the various site conditions.

- (1) Cement Concrete Lining
- (2) Pre-cast Concrete Lining
- (3) Cement Mortar Lining
- (4) Lime concrete Lining
- (5) Brick Lining
- (6) Boulder Lining
- (7) shot crete Lining
- (8) Asphalt Lining
- (9) Bentonite and clay Lining
- (10) Soil-cement Lining.

1. CEMENT CONCRETE LINING :- This lining is recommended for the canal in full banking. The cement concrete lining (cast in-situ) is widely accepted as the best impervious lining. It can resist the effect of scouring and erosion very efficiently. The velocity of flow may be kept above 2.5 m/sec. It can eliminate completely growth of weeds. The lining is done by the following steps:

(a) Preparation of sub-grade :- The sub-grade is prepared by ramming the surface properly with a layer of sand (about 15cm) then a slurry of cement and sand (1:3) is spread uniformly over the prepared bed.

- (a) The sub-grade is prepared by properly reworking the soil with a layer of sand. The bed is levelled so that the slabs can be placed easily.
- (b) The slabs are stacked as per estimate along the course of the canal. The slabs are placed with cement mortar (1:6) by setting the rebats properly. The joints are finished with cement mortar (1:3).
- (c) The curing is done for a week.

3. CEMENT MORTAR LINING :- This type of lining is recommended for the canal fully in cutting where hard soil or clayey soil is available. The thickness of the cement mortar (1:4) generally 2.5 cm. The sub-grade is prepared by reworking the soil after cutting then over the compacted sub-grade, the cement mortar is laid uniformly and the surface is finished with neat cement polish. This lining is impervious, but is not durable. The curing should be done properly.

4. LIME CONCRETE LINING :- When hydraulic lime, surki and brick ballast are available in plenty along the course of the canal or in the vicinity of the irrigation project, then the lining of the canal may be made

by the lime concrete of proportion 1:1:6 the procedure of laying this concrete is same as that of the cement concrete lining. Here, the thickness of concrete varies from 150mm to 225mm and the curing should be done for longer period. This lining is less durable than the cement concrete lining however. It is recommended because of the availability of the materials and also because of the economics.

5. BRICK LINING - This lining is prepared by the double layer brick flat soiling laid with cement mortar (1:6) over the compacted sub-grade. The first class brick should be recommended for the work. The surface of the lining is finished with cement plaster (1:3). The curing should be done perfectly.

This lining is always preferred for the following reasons.

- (1) This lining is economical.
- (2) Work can be done very quickly.
- (3) Expansion joints are not required.
- (4) Repair works can be done easily.
- (5) Bricks works can be manufactured from the excavated earth near the site.

However this lining has certain disadvantages:-

- (a) It is not completely impervious.
- (b) It has low resistance against erosion.
- (c) It is not so much durable.

## 6. BOULDER LINING :- In hilly areas

where the boulders are available in plenty this type of lining is generally recommended. The boulders are laid in single or double layer maintaining the slope of the bank and the bed level of the canal. The joints of the boulders are grouted and finished with cement mortar (1:6). The surface is finished with mortar (1:3). Curing is necessary in this lining too. This lining is very durable and impervious. But the transporting cost of the materials is very high, so it cannot be recommended for all cases.

## 7. SHOT CRETE LINING :- In this system the cement mortar (1:4) is directly applied on the sub-grade by an equipment known as cement gun.

## Advantages and Dis-Advantages of canal lining :-

### Advantages :-

It reduces the loss of water due to seepage and hence the duty is enhanced.

It controls the water logging and hence the bad effects of water logging are eliminated.

It provides smooth surface and hence the velocity of flow can be increased.

Due to the increased velocity, the discharge capacity of a canal <sup>is also</sup> ~~increasing~~ increased.

Due to the increased velocity, the evaporation <sup>loss</sup> ~~loss~~ also reduced.

It eliminates the effects of scouring in the canal bed.

The increased velocity eliminates the possibility of silting in the canal bed.

It controls the growth of weeds along the canal side and bed.

It provides the stable section of the canal.

It reduces the requirement of land with <sup>for</sup> ~~for~~ the canal, because smaller section of the canal produce greater ~~the~~ discharge.

It prevents the sub soil salt to come in contact with the canal water.

It reduces the maintenance cost for the canal.

#### \* Dis-Advantages:-

1. The initial cost of the, <sup>canal lining is very high</sup> soil makes the project very expensive with respect to the output.
2. It involves much difficulties for repairing the damaged section of lining.
3. It takes too much time to complete the project work.
4. It becomes difficult, if the outlets are required to be shifted or new outlets are required to be provided because the dismantling of the lined section is difficult.

#### \* Selection of type of lining:-

The selection of particularly lining depends on the following factors.

##### ① Imperviousness:-

When the canal passes through the sandy soil, the seepage loss is maximum and the canal is unstable. So, to make the canal perfectly impervious and reasonably stable, the most impervious type of lining should be recommended. Such as cement concrete lining, precast concrete lining, boulder lining, etc.