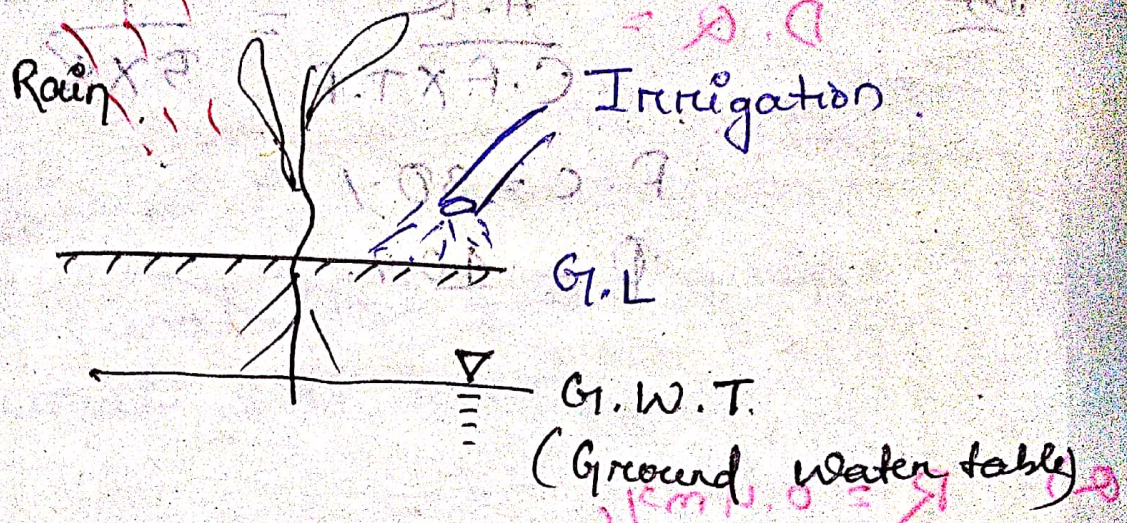
chap-4

WATER LOGGING & RECLANATION



→ Water logging means Saturation of soil with water.

→ void is killed by water.

→ In water logging, G.W.T rise up & Causes Flooding to root zone of plant.

So

→ Cultivation operation is not easy in wet soil.

→ salinity is rise up due to water logging.

→ salinity means % of salt

Effects of Water logging :-

→ Temp of soil decreases.
→ Rise of salt in surface layer
→ Difficult to Cultivation.
→ Disease attack on plants.
→ Growth of root is restricted.

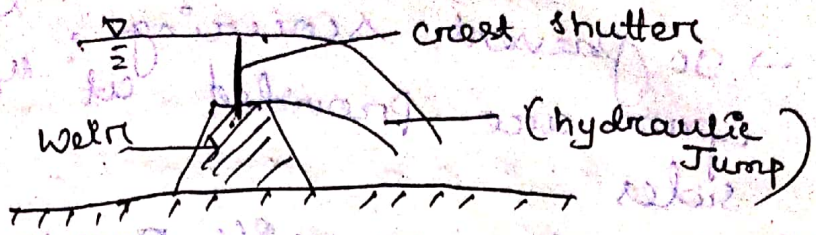
Causes OF WATER LOGGING :-

→ Over irrigation
→ Heavy Rainfall
→ Absence of drainage system.
→ Seepage of water from neighbouring high Land
→ Irregular tropography
→ Impervious layer.
→ Seepage water from unlined canal.

PREVENTIVE measures OF WATER LOGGING :-

→ Reducing Intensity of irrigation
→ Provide a good drainage system.
→ Crop rotation. [Some crops are required more water. / Few crops are required less water.
→ Canal lining.
→ Introduce lift irrigation.

WEIR & BARRAGE



→ Weir are constructed across the river to raise water load on up stream side, & divert the water into canal.

→ Ponding of water on u/p side due to crest shutter

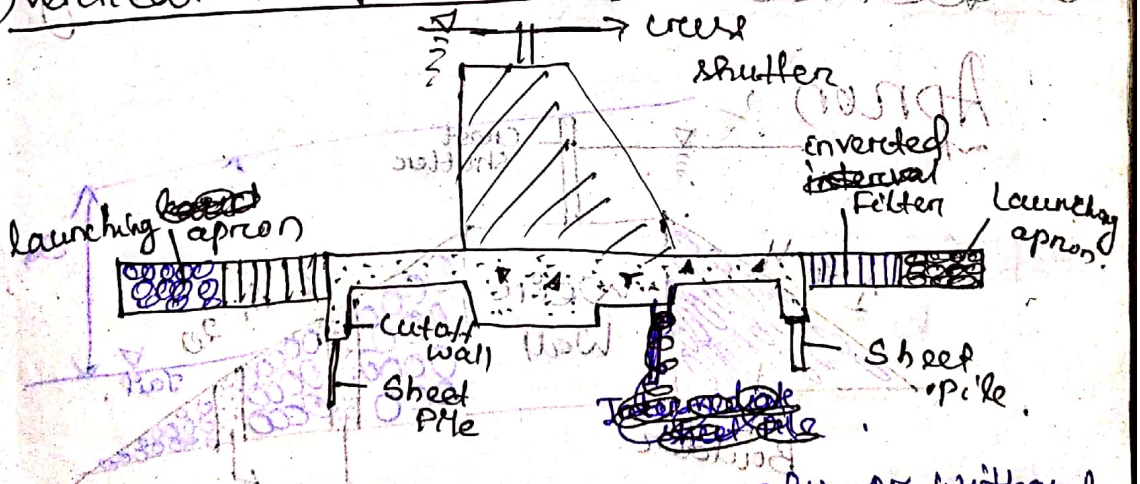
→ Weir allows water to flow above crest.

Weir :-

Based on shape = 3 type.

(i) Vertical Drop weir
(ii) Rock fill Weir with sloping apron
(iii) Concrete weir with down stream glacis.

(i) Vertical Drop weir :-



→ V.D.W. is constructed with or without crest gate.

→ sheet pile are provided at u/s & down stream and to reduce seepage.

→ To prevent scouring, launching apron are provided at u/s & d/s sides.

→ To release uplift pressure, inverted filter are provided.

→ This weir is suitable for any type of foundation.

NOTE :-

★ **Sheet pile :-**

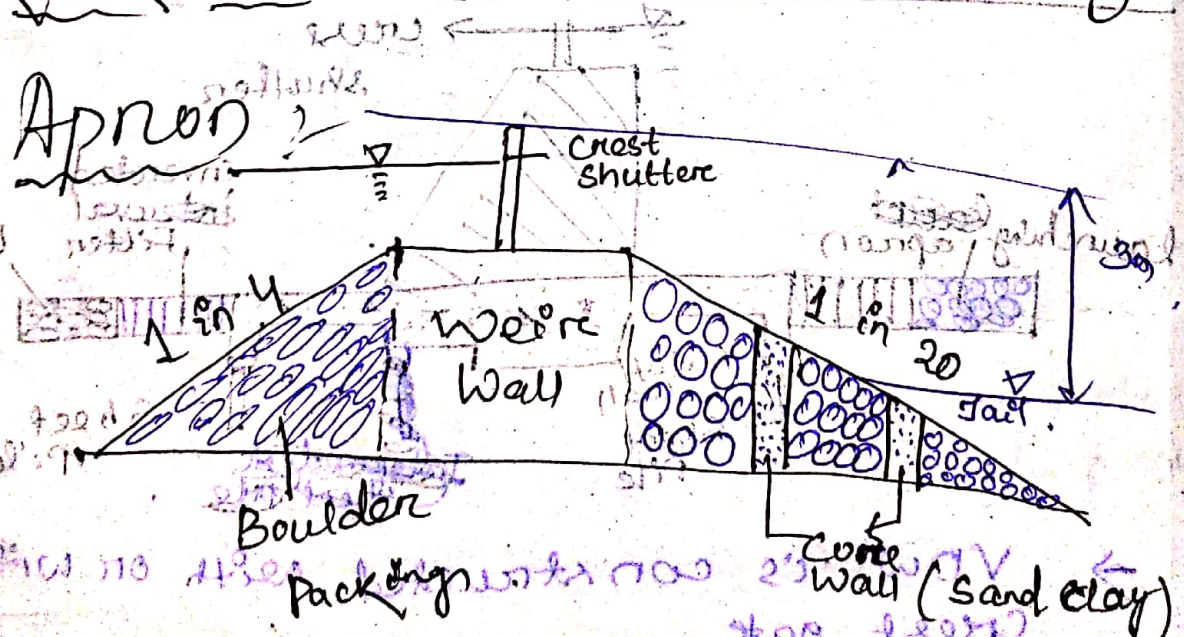
→ Protect the str. from uplift pressure

→ Protect the str. from scouring.

★ **Inverted filter :-**

This weir is designed based on Bligh's creep theory.

2) Rock fill Weir with Sloping Apron :-



→ It is suitable in sandy foundation or soil.

→ Sloping apron are provided to reduced hydraulic jump.

→ When weir is used where difference in weir crest & D/s side of River is 3m.

→ U/s side is constructed with boulder having slope 1 in 4.

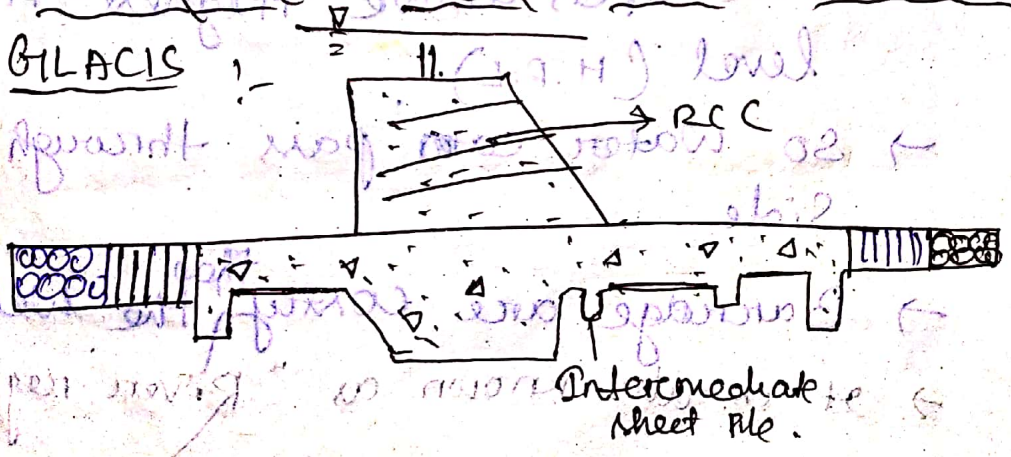
→ Boulders are grounted with cement mortar.

→ Intermediate core wall are filled with boulder to maintain slope of 1 in 20.

→ For this weir large quantity of stones are required.

eg :- Okhla weir across the yamuna river (New Delhi)

③ CONCRETE WIER WITH DOWNSTREAM GLACIS :-



→ This types of weir is designed based on khosla's theory.

→ Sheet piles are provided at sufficient depth at U/s & D/s side of flow

→ Some times intermediate pile is also provided.

→ various protective measures like sheet pile, launching apron, inverted filter are used.

→ This type of weir may be constructed eg Pervious foundation.

→ Crest shutter are also provided, but crest shutter is drop down during flood.

Barrage :-

→ It is same as weir but difference is crest kept at lower level in barrage.

→ Ponding of water is found due to gate. During flood, gates are open above Highest Flood level (H.F.L)

→ So water can pass through d/s side.

→ Barrages are costly than the weir.

→ It is also known as "River regulator".

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BARRAGE	WIER
→ It is costly	→ It is cheaper
→ Construction Period is more	→ CP is less.
→ Perfect control on river flow	→ less control
→ Gates are greater height	→ Crest shutter are small (3m factor)
→ gates are opened during flood	→ shutters are closed during flood.
→ Affluxion is min during flood	→ Afflux is max during flood
→ Silting is control by gates. (Silting is less)	→ Silting is more.

Function of Weir & barrage :-

→ Flood control.
→ Water level rise at upside of river.
→ control silting.
→ Divert water from river to Canals.
→ storage of water is more throughout the year.

Chap-5 Diversion head works & Regulatory Structure

Diversion Head Work :-

Structure are constructed at upstream side to divert the water in to canals for various purpose. This is called diversion head work.

Objectives of diversion head work :-

→ Flood control
→ Water level raise at upstream side of river.
→ Control silting.
→ Divert water from river to canal
→ Storage of water is more through out the year

Scouring :-

→ The under sluices are the openings provided in the weir wall with their crest at a low level.
→ These openings are fully controlled by gates.
→ They are located on the same side as the off taking canals.
→ The discharge capacity of the under sluices (Scouring sluices) is provided as the maximum of following.
- 200 times the maximum discharge of the off taking canal
- Maximum - Winter discharge
- 20% of the maximum flood discharge.

Canal head Regulator :-

→ A canal head regulator is a structure constructed at the head of a canal taking off from the upstream of a weir (or) a barrage.

→ It consists of a number of spans separated by piers which support the gates vided for regulation of flow into the canal.

Breast wall :-

→ Breast wall is a RCC wall provided from the pond level upto river HFL (Highest Flood level) to avoid spilling of the water over the canal regulator gates.

→ Breast wall span for the entire length of the regulator & will rest over the piers of the regulator bays.

→ Breast wall is subjected to vertical self weight & horizontal water pressure acting against it from the upstream side.

Weir or Barrage Regulation :-

→ The silt can be removed from the entering water by operating the under sluices of the barrage or weir.

→ The supplies entering the canal which takes off from the upstream of a weir (or) a barrage can be regulated in the following two ways.

1. Still pond regulation
2. Semi open flow regulation.

1. Still pond regulation:-

→ In this method of regulation, all the gates of the undersluices are kept closed while the canal is running. Hence the undersluices pocket draws only as much discharge as is required for the canal.

→ This is very useful method to control the amount of silt entering the canal.

→ This method is possible only when the crest of the canal head regulator is high above the upstream floor of the undersluices.

2. SEMI OPEN FLOW REGULATION:-

→ This method does not provide proper control on entry of silt into the canal because turbulence created in the pocket tend to raise the coarser matter upwards & enter the canal.

Chapter 6

Cross Drainage Works

Function & necessity of cross drainage works :-

1. Aqueduct :-

→ An aqueduct is a hydraulic structure which carries a canal (through a trough (or duct) across & above the drainage. Similar to a bridge in which instead of road (or) a railway, a canal is carried over a natural drain.

→ In the case of an aqueduct, HFL of the drainage should main lower than the level of the underside of the canal trough.

→ The canal water is taken across the drain in a trough supported on piers.

Syphon :-

→ A syphon is similar to a syphon aqueduct with the difference that in the case of a syphon, the canal water is carried through the barrels under the drain.

→ The barrels in this case also act as inverted syphons through which the canal water flows under pressure.

SUPER PASSAGE :-

→ A super passage is also similar to a bridge in which the natural drain is carried over the canal.

→ A super passage is reverse of an aqueduct.

Cross drainage works admitting the drain water into the canal :-

→ In this type of cross drainage works, the canal water and the drain water are allowed to intermingle with each other.

→ This may be achieved by the following 2 types of the cross drainage works.

(i) level crossing
(ii) Inlet & Outlet.

Level crossing :-

→ A level crossing is a cross drainage work in which the drainage & the canal meet each other at approximately the same level.

→ It consist of a regular with quick falling shutters across the drain at its d/s junction with the canal.

→ Such an arrangement is adopted when both the canal & the drainage carry considerable discharge, the latter during the high flood season when syphoning either the canal (or) the stream proves to be extremely costly or else the head loss through the syphon barrels is very high. Arrangement is practically similar to that provided on a canal head work.

→ In this arrangement, the perennial discharge is used advantageously in order to increase the canal supplies.