TRIBHUVAN UNIVERSITY

INSTITUTE OF ENGINEERING

PULCHOWK CAMPUS

DEPARTMENT OF CIVIL ENGINEERING

A REPORT ON:

EDUCATIONAL FIELD VISIT OF BAGMATI IRRIGATION PROJECT

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Submitted to:

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ACKNOWLEDGEMENT

We would like to express our sincere gratitude to everyone who contributed to the success of our irrigation tour from 2081 Magh 23 to Magh 25 at the Bagmati Irrigation Project, a project of National pride.

Firstly, I would extend my heartfelt thankfulness to our respected teachers Professor Bhola Nath Sharma Ghimire, Professor Prem Chandra Jha and Professor Vishnu Prasad Pandey for their invaluable support, guidance and encouragement throughout the field visit. Their insights and expertise greatly enhanced our understanding of irrigation systems and their practical applications.

I am also grateful to staffs and security personnels of the Bagmati Irrigation Project for their co-operation. I would also like to thank bus staffs and hotel staffs.

Lastly, I appreciate the support of our college and classmates, whose active participation made this experience both educational and enjoyable.

BACKGROUND ON BAGMATI IRRIGATION PROJECT (BIP):

The Bagmati Irrigation Project (BIP) is a major irrigation project managed by the government to support farming in Nepal's Terai region. It currently provides water to 37,000 hectares land in Sarlahi and Rautahat districts and aims to expand upto 122,000 ha. across Sarlahi, Rautahat, Mahottari and Dhanusha districts.

- Project Co-ordinates:

  Latitude → 26°46' to 27°6' North

  Longitude → 85°17' to 85°36' East

  Elevation variation → 60m to 130m above MSL.

  Average Annual Rainfall = 1440 mm (80% during June-September monsoon)

  Average River Discharge at Kamarjya section = 177 m^3/s

* OBSERVATIONS DONE IN THE SITE:-

(1) Diversion Headworks

Function:

- To regulate continuous supply of silt-free water with certain minimum head into the canal.
- To raise water level in the upstream side.
- It also provides some pondage creating small ponds.

The detailed study of diversion headworks is done by studying its following components:

(i) Barrage or Weir
(ii) Under Sluices
(iii) Divide wall
(iv) Fish Ladder
(v) Canal Head Regulator
(vii) Silt Ejector
(viii) River Training Works
(ix) By-Pass Channel

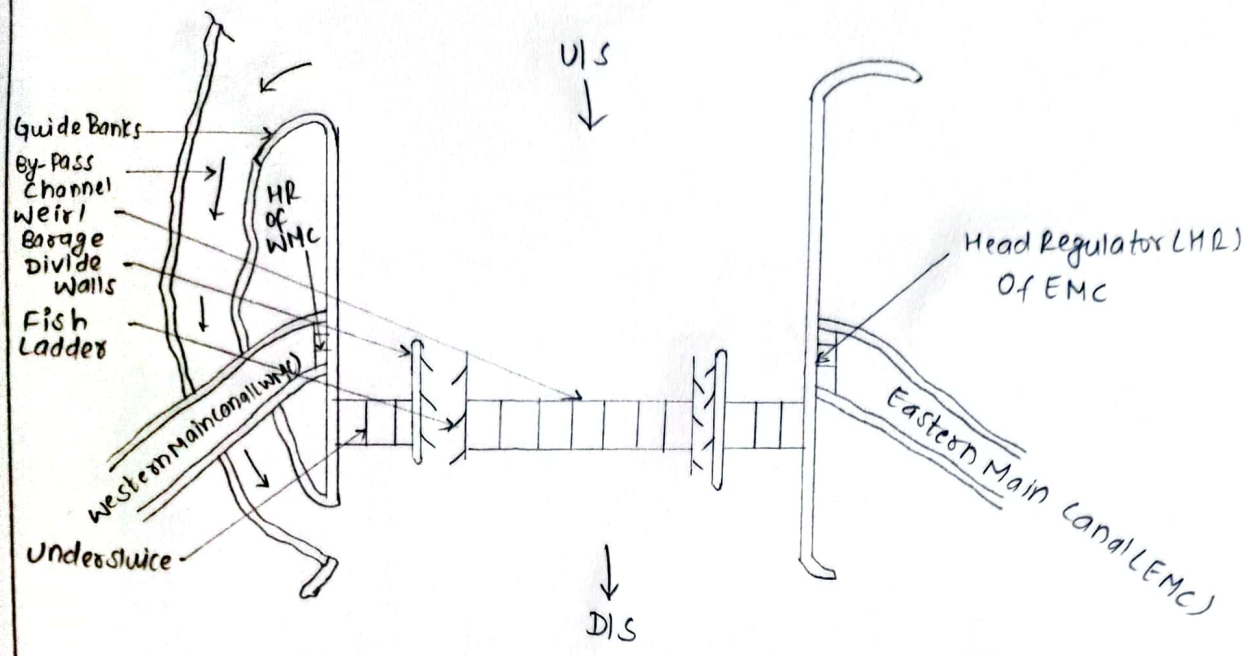


Fig : Components of Diversion Head Works.

(i) Weir/Barage

Functions:

(i) To raise the water level on upstream side of obstruction

(ii) To divert flash floods to irrigate areas for ground water recharging purpose.

Existing condition:

The most ponding was done by gate, thus the used barrages had following characteristics:

Design Discharge = 8000 m^3/s

Bypass channel = 2500 m^3/s

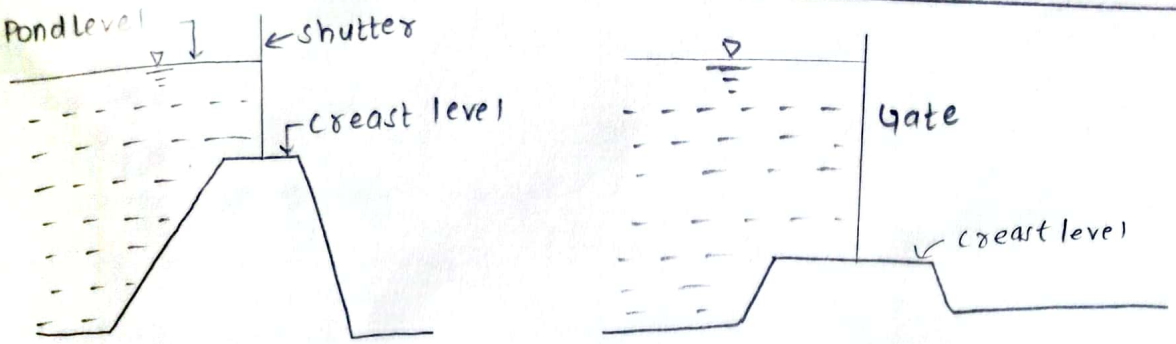
Total = 10500 m^3/s

Length = 403.5 m

Duty = 1.3 litre/sec.

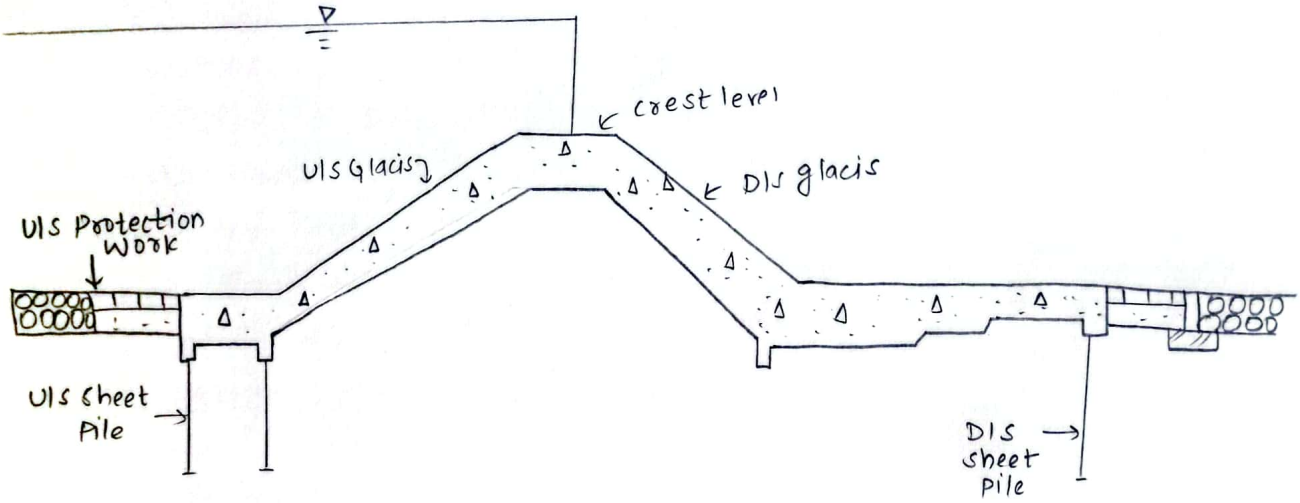
Total no. of Barrages = 50

All the barages were functioning well. However, some of them had leakages during the time of visit.

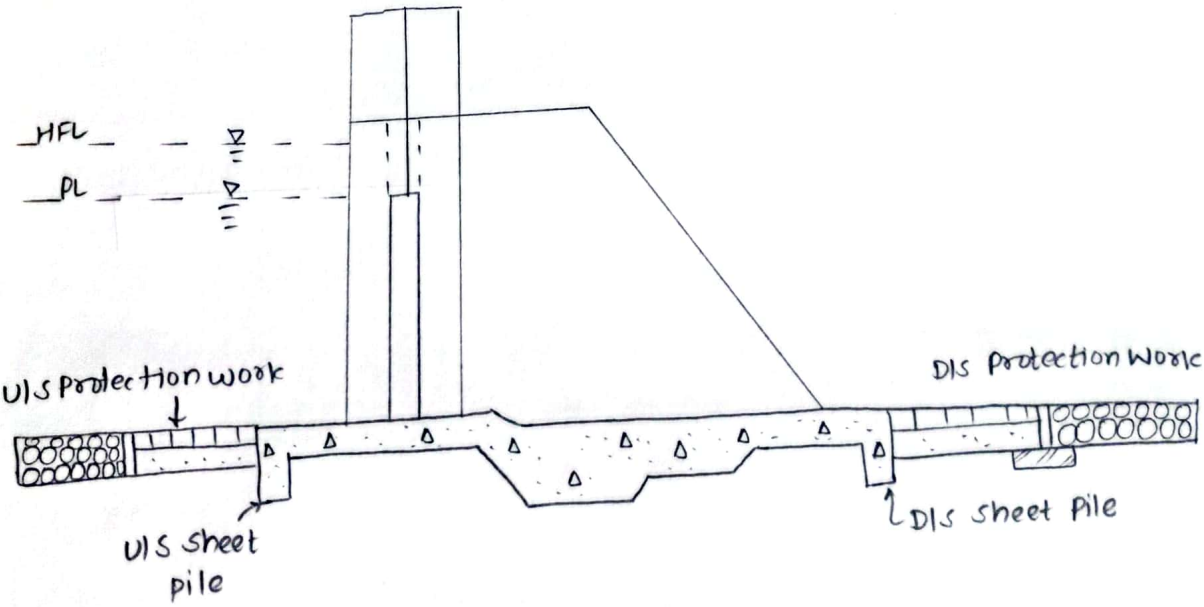


(a) Weir with shutter (b) Barrage with Gate

Fig: Weir and Barrage



(c) Weir section



(d) Barrage section

(ii) Undersluices

Functions

(i) To pass excess water downstream without impacting canal operation during flooding.

(ii) It helps in removing sediment and silt from River Bed.

Existing Condition:

During the time of visit, there were 6 Undersluices (8m * 4m), 3m on each side of trunk position. The undersluice wall was projected little longer to streamline the flow.

(iii) Divide wall

Functions

- It helps in providing a comparatively less turbulent pocket near canal head regulator
- As weir and undersluice have different crest level, they must be separated which is done by divide wall.
- It also keeps cross currents away from weir.
- It also creates a still pond infront of canal head regulator.

(iv) Fish Ladder

Functions

- It is constructed so that fishes pass upstream of weir without difficulty.

Existing condition:

The fish ladder was not functional. The holes through which fishes enter were in jammed condition.

(v) Canal Head Regulator

Functions

- It regulates the supply of water entering the canal.
- It controls the entry of silt in the canal.
- It prevents the river floods from entering the canal

Existing condition:

There are two canal head regulator in BIP. They are:-

(a) Eastern Head Regulator:

- It is located at head of eastern canal.
- Maximum Dischaoge = 64.4 m^3/s
- Number of gates = 7 (4 * 2m)

(b) Western Head Regulator

- It is located at western main canal
- Maximum discharge = 48.4 m^3/s
- Number of gate = 5 (4m × 2m)

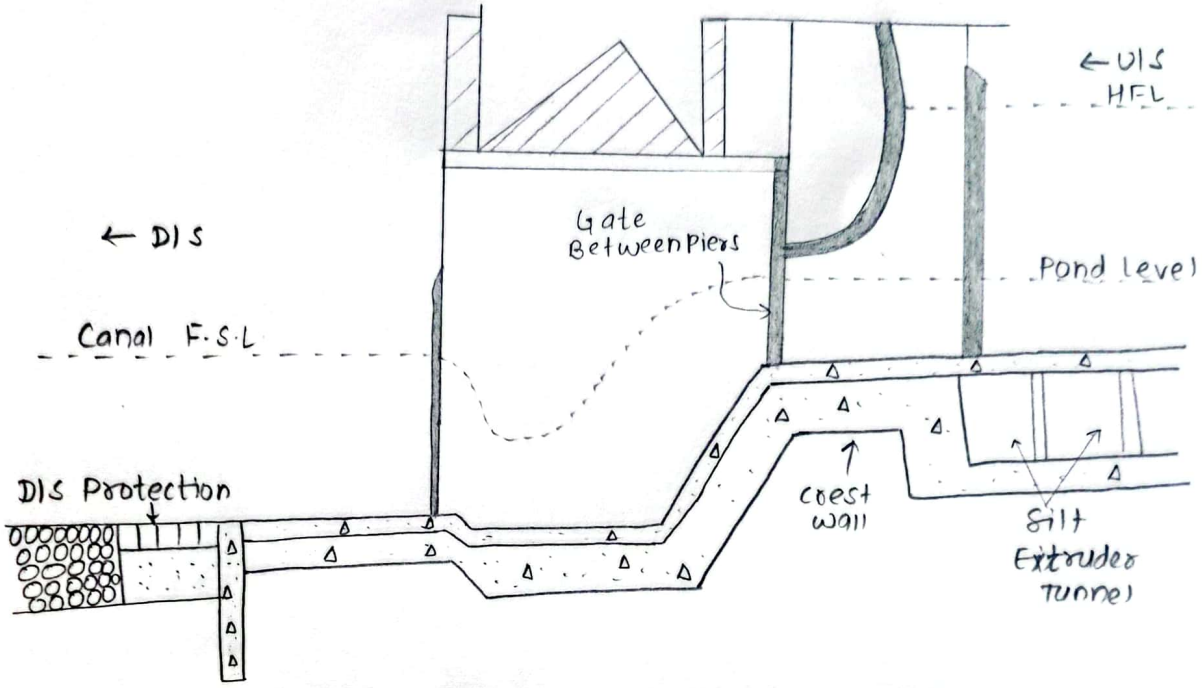


Fig: Typical section of Canal Head Regulator

(vi) By-Pass Channel

Functions:

- It acts as a secondary channel that diverts a portion of water from main river channel to the downstream side.
- It is essential in fish migration, sediment management and flood control.

Existing condition:

As the design flood of river was done for 8000 m^3/s, A 100 year flood that occured decades ago had a discharge of 10,000 (+) m^3/s (more than 10,000 m^3/s) which caused vast destruction of life and property of this area. In order to prevent this hazard in future, a bypass channel with discharge of 2500 m^3/s was created near western main canal.

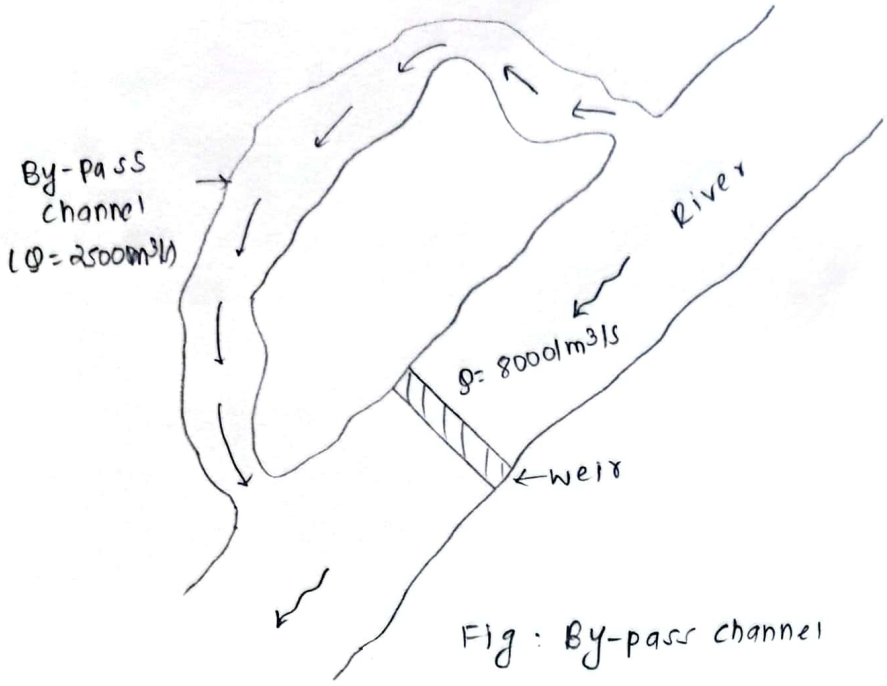


Fig : By-pass channel

(vii) Silt Ejector

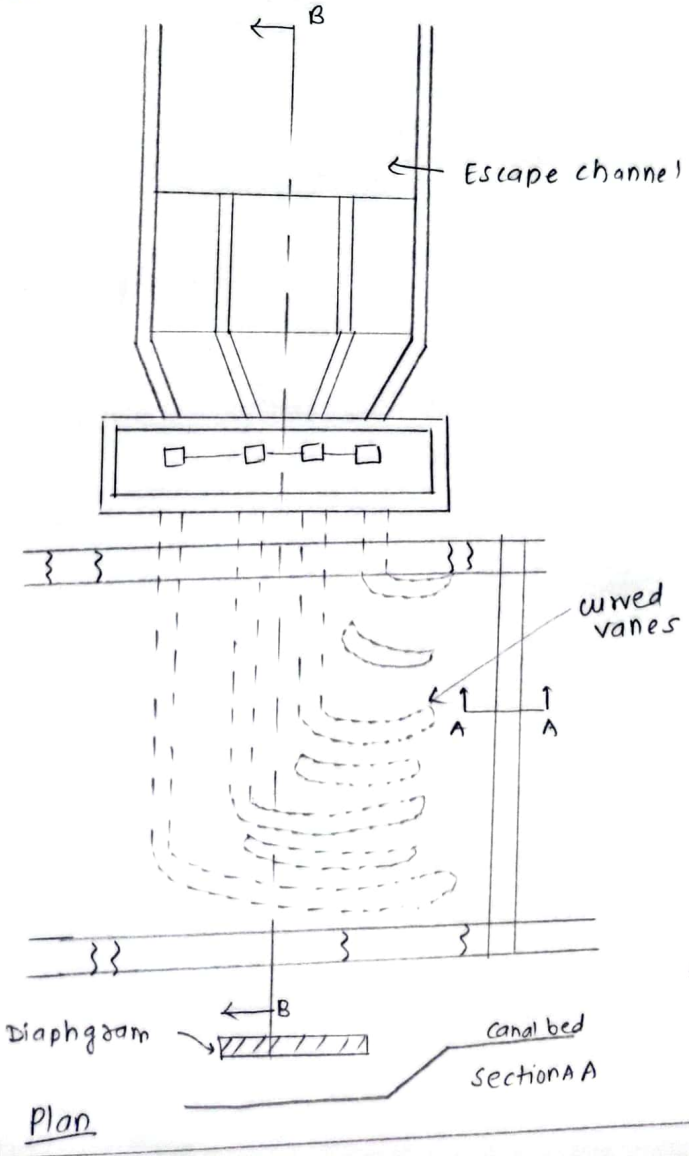


Fig : Silt ejector

Functions:

- It removes silt from canal water after the silt has travelled some distance in off-taking canal.

Existing condition:

- Functional but needs maintenance.

(viii) Guide Banks

Functions:

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

Existing condition

The face of guide band is protected by stone pitching so that flood do not damage the slope. Moreover, the Apron is laid (stone cover) beyond the toe to avoid scour at toe.

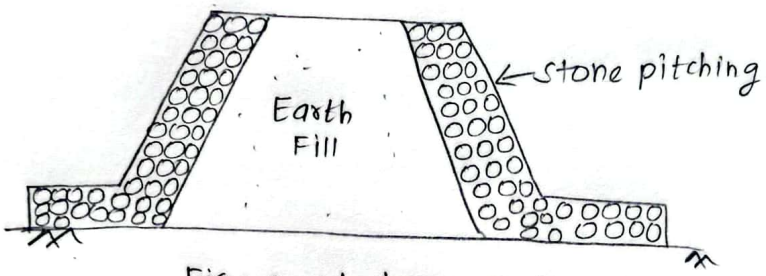


Fig: Guide bank section

(2) Cross-Drainage structures

(a) Siphon Aqueduct

Functions:

(i) To dispose drainage water without interupting the continuous canal supply of water when can passes over the drainage and high flood level of drainage is above canals bed level.

Existing Condition:

(i) It is functional. However, cracks can be seen in the structure which may cause leaks later.

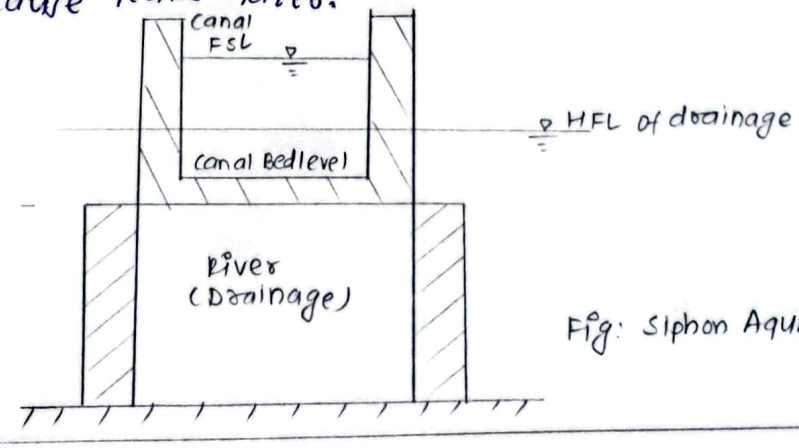


Fig: Siphon Aqueduct

(b) Syphon Super Passage

Functions:

- To dispose drainage water without interrupting the continuous supply of water when drainage passes over the irrigation canal and FSL of canal is above river bed level.

Existing condition:

Water was seen in canal.

(c) Level Crossing

Functions:

- To cross the drainage water and canal water without any interruption when the water level are same.

Existing condition

During this time of year, there was no water at site to observe its function.

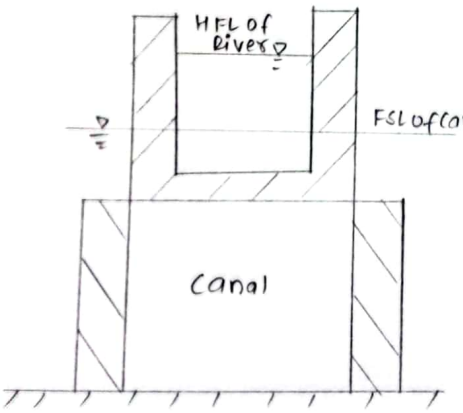


Fig: Syphon Superpassage

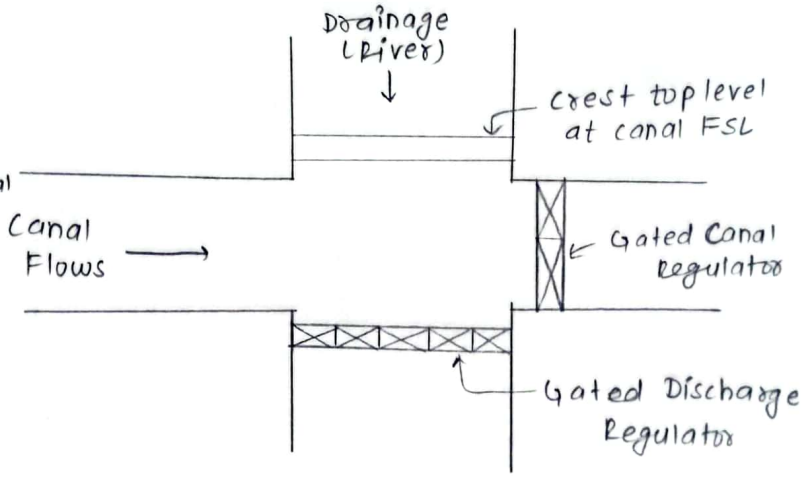


Fig: Level crossing

(d) Canal Inlet and outlet

When flow is small in drainage, it is absorbed into canal through inlets. And this flow is balanced (if necessary) by providing suitable outlets (escapes)

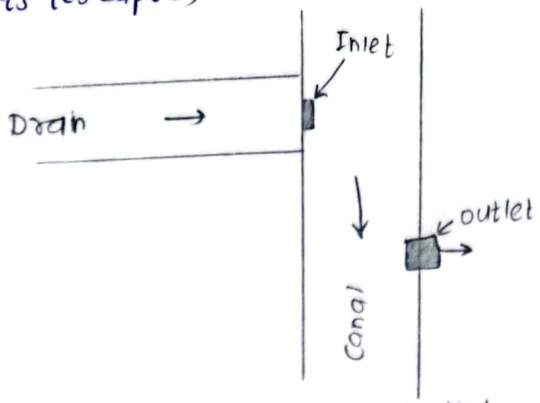


Fig: Inlet & Outlet

(3) Regulating structures

(a) Cross-Regulator:

Functions:

- To raise water level in parent channel in the upstream so that off taking channel can take full supply even when water level in parent channel is lower than F.S.L.
- It is used to close the supply in downstream area of parent channel.
- It also controls discharge of outfall of canal.

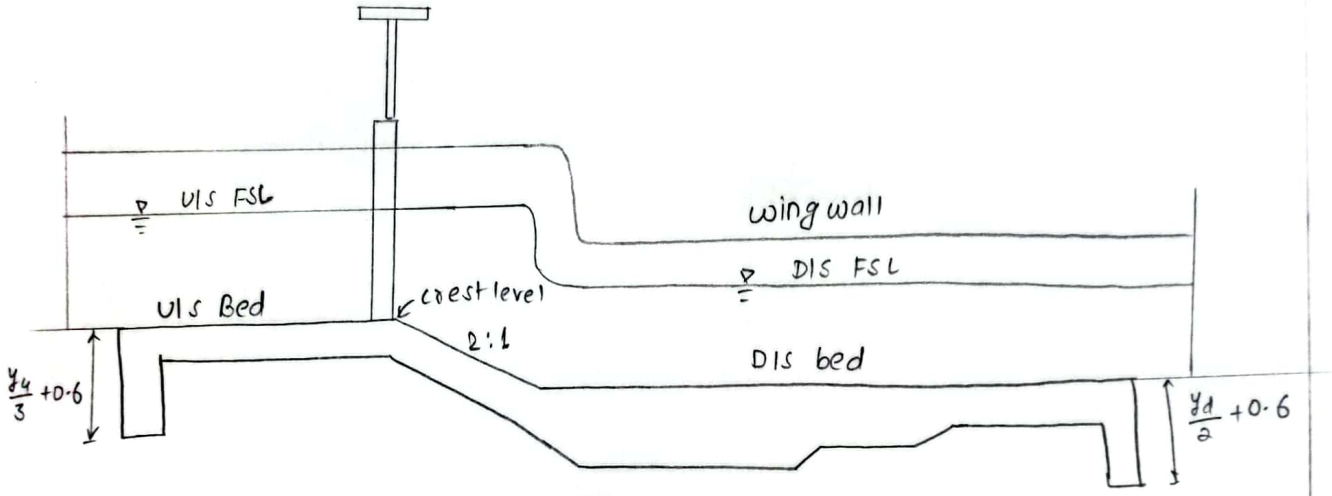


Fig: Cross-Regulator

During the time of visit, the cross regulator was fully working and water was supplied in off taking canal.

(b) Distributory Head-Regulator:

Functions:

- It regulates supply of water from parent channel to off taking channel.
- It controls entry of silt in off taking channel.

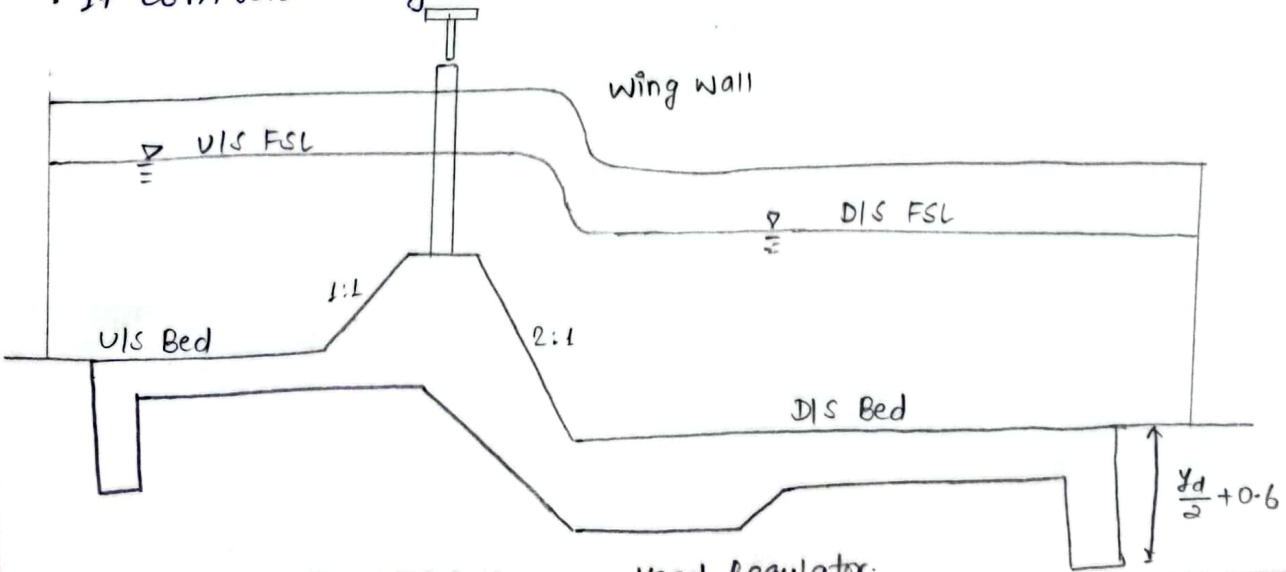


Fig: Distributory Head Regulator.

Existing condition

It was working and water was flowing in off taking canal from where water flowed in farmer course.

(c) Non - Modular outlet

Functions:

- To take water from distributory channel and supply to water course.

Existing condition:

As it was not the time for supplying water in field, the outlet was closed by dry rice straw.

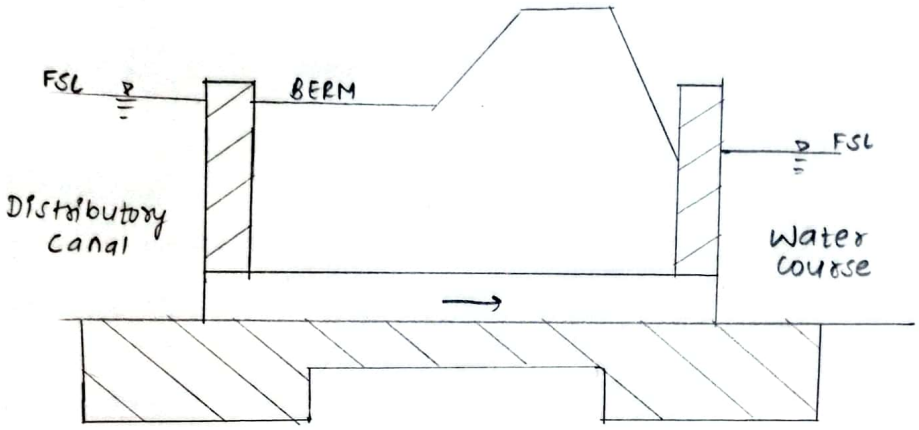


Fig: Non-Modular outlet

(d) Drop

Functions

- It lowers bed level and surface level of the channel.
- It provides safety against erosion in bed and bank due to excess energy flow.

Existing condition:

The drop (rectangular type) was found at ch. 0+380 m. As water was less in the u/s side of drop, only a part of drop was transferring water to d/s side.

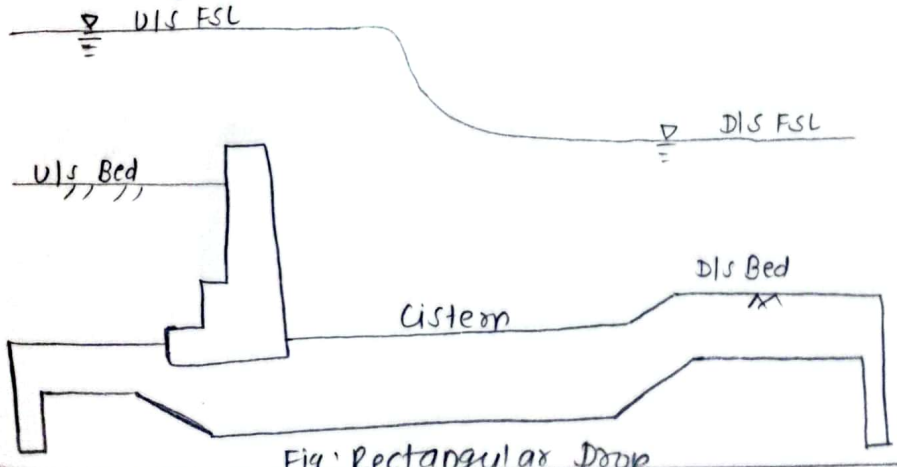


Fig: Rectangular Drop

(d) Escape

Functions:

- It helps to overflow extra surplus water from canal safety.
- It helps scouring of excess bed silt deposited in canals

Existing condition:-

- It is operating at silt ejector. However, canal was not in operation, the function of escape could not be observed

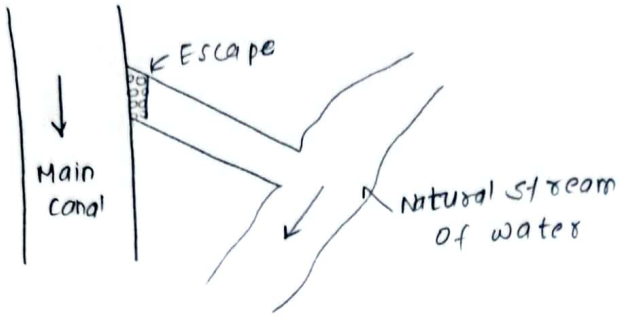


Fig: Escape

(4) Other structures

(a) Service Road:

It served as a village road as well as a path for canal inspection.

(b) Dowla:

It is a sand barrier provided at the side of road neighbouring canal

Function:

(i) To provide safety for riders in service road.
(ii) To prevent canal from entry of sand, dust, etc
(iii) To work like cycle lane.
(iv) Prevent vegetation encroachment.

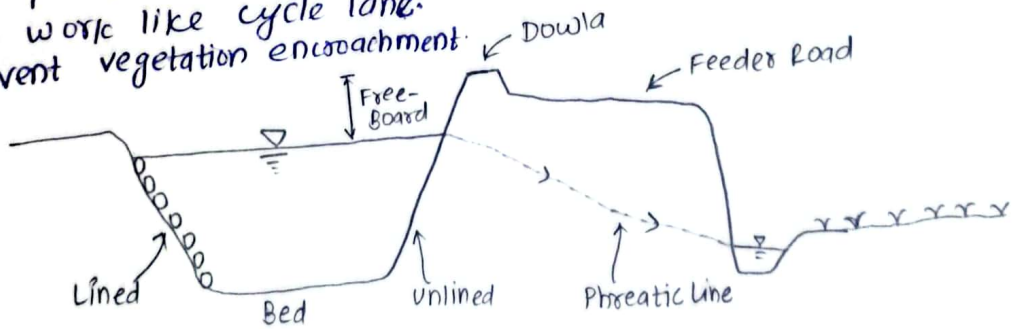


Fig: Dowla & Feeder road.

CONCLUSION

The Irrigation field-visit to the Bagmati Irrigation Project, Sarlahi and Rautahat (Magh 23- Magh 25) provided us with valuable practical insights into large-scale irrigation systems. By observing diversion headworks, canal networks, regulation structures, and other key components, we gained a deeper understanding of water management and distribution. The guidance from our respected teachers and their technical knowledge greatly enhanced our learning experience. This tour reinforced our theoretical knowledge with real-world applications, which will be beneficial for our academic and professional growth in the field of irrigation engineering