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CASE STUDY OF RUBBER DAM

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ABSTRACT—The purpose of the study was to estimate the patients' attitude towards the use of rubber dam and determine wether any clinical factors influence it. Inflatable rubber dams are cylindrical rubber fabrics placed across channels, streams and weir or dam crests to raise the upstream water level when inflated with air or water. The membrane is a multi-layer fabric made of synthetic fibre (usually nylon) and rubberized on one or both sides. The tube material is highly elastic. Resistant to abrasion, corrosion free and robustly withstands rigorous aging. Also an asymmetric arrangement of the weir is feasible, as are horizontally and vertically curved configurations.A layer of stainless steel mesh or ceramic chips can be embedded in the surface layer to reduce or prevent vandal damage

1. INTRODUCTION

Inflatable rubber dams are cylindrical rubber fabrics placed across channels, streams and weir or dam crests to raise the upstream water level when inflated with air or water. The membrane is a multi-layer fabric made of synthetic fibre (usually nylon) and rubberized on one or both sides. The tube material is highly elastic. Resistant to abrasion, corrosion free and robustly withstands rigorous aging. Also an asymmetric arrangement of the weir is feasible, as are horizontally and vertically curved configurations.A layer of stainless steel mesh or ceramic chips can be embedded in the surface layer to reduce or prevent vandal damage.

2. PURPOSE:

The inflatable flexible membrane dams (IFMD) or rubber dams were developed in the early 1950s - Flexidam - Imbertson. They are installed in stream and river beds, generally being bolted into a concrete foundation. They are used to divert water for irrigation, temporarily raising existing dams, flood control, water retention for aquifer recharge, reducing or preventing salt water intrusion into fresh water areas, protect low-lying coastal areas from tidal flooding, enabling fish passage past diversion works, by deflation, for sewage retention/separation during flood events and for beautification purpose .

3. LOCATION OF PROJECT:

The first rubber dam of India is constructed on river Jhanjavati at Vijayanagaram district A.P. (A.P. –Orissa border).
The second rubber dam of India located in Hyderabad, A.P. Constructed on river Musi which is located at a chainage of 21.1 km. Opposite to High court of A.P. and at a chainage of 22.1 km. Opposite to Salarjung museum.
This project is being implemented by Greater Hyderabad Municipal Corporation (GHMC) as per the instructions of the former chief minister Dr.Y.S.RajaSekhara Reddy and was executed by Hydro-Construct, Austria. The cost of the project is 16.125 crores.

4. COMPONENTS OF RUBBER DAM:

- WEIR
- WEIR PLATES
- NOTCH
- DAM PORTION
- STILLING BASIN

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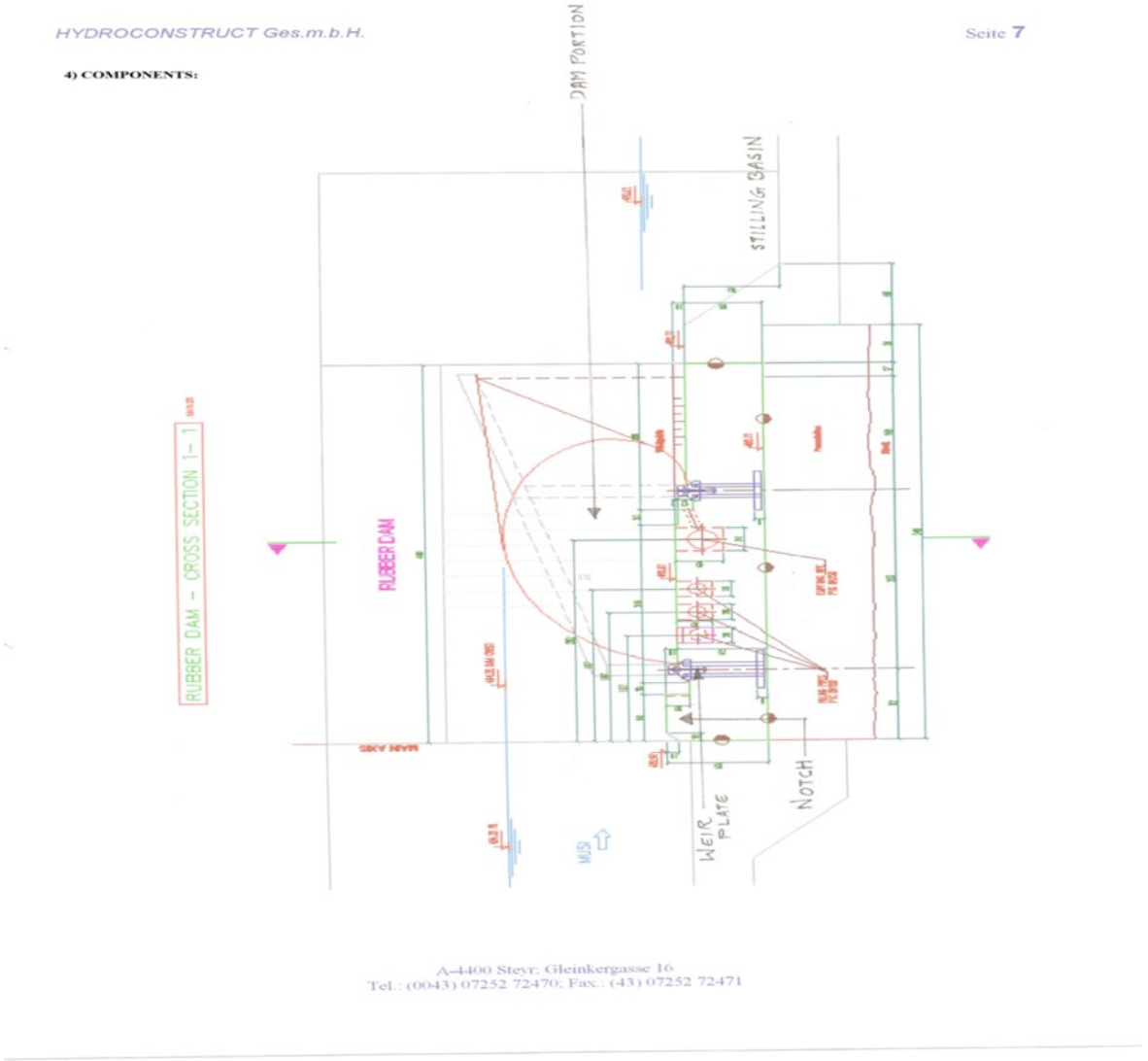
5. COMPONENTS OF THE DAM



6. SPECIFICATIONS:

6.1) RUBBER DAM OPP.HIGH COURT (Ch 21.1km)

- Length of the dam:80 mts
- Height of the dam :1.35 mts
- Volume of water in the rubber dam: 2.65 lakhs litres

6.2) RUBBER DAM OPP. S.J. MUSEUM (Ch 22.1km)

- Length of the dam:73 mts
- Height of the dam :1.20 mts
- Volume of water in the rubber dam:2.25 lakhs litres.

NOTE: The below mentioned design parameters are same for both the dams.

- ❖ TOTAL WIDTH OF DAM:25 mts
  - ▪ Width of the Notch portion: 6.5 mts
  - ▪ Width of the dam portion : 6.0 mts
  - ▪ Width of the Stilling basin: 12.5 mts
- ❖ Diameter of inlet pipes :0.15mts
- ❖ Diameter of outlet pipes: 0.3 mts
- ❖ Thickness of Rubber foil : 10 mm
- ❖ Grade of concrete in C.C bed : M20

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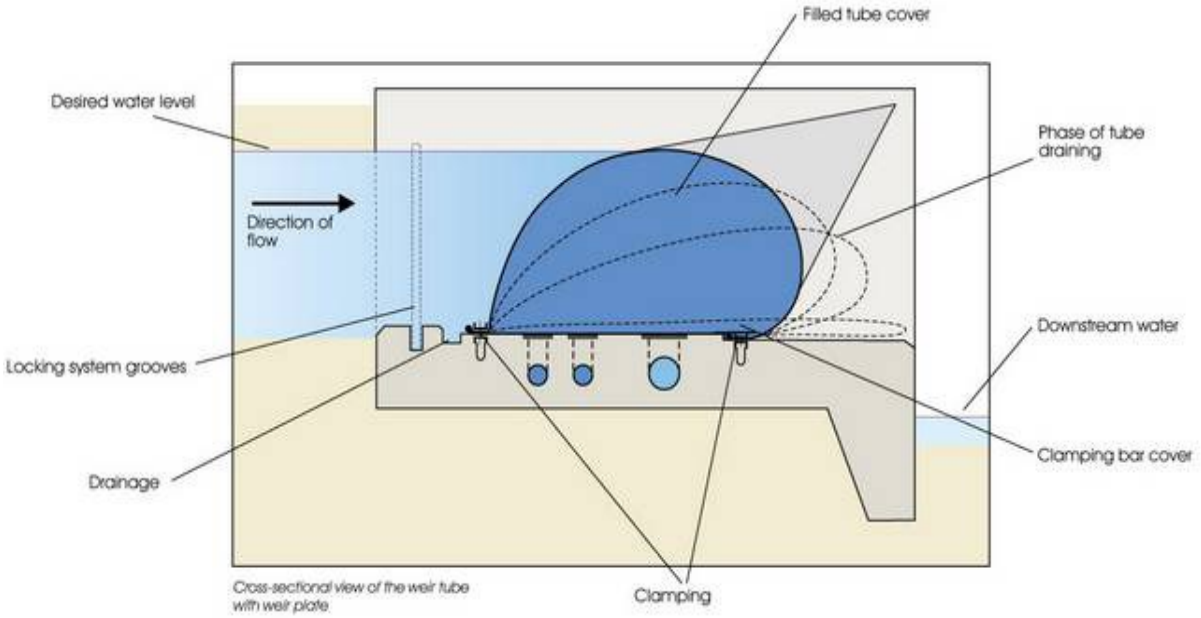
- Grade of concrete in stilling basin:M25
- Grade of steel in foundation :Fe415

7. FIXING OF RUBBER FOIL:

The stilling basin which is at a depth of 1.2 m than the bed level of the dam is levelled to the bed level of the dam by filling river sand. Then the rubber sheet is placed on the levelled surface. One end of the sheet is fixed with the help of weir plates on the downstream side. It is then folded against the upstream side of the river and is fixed using a channel plate throughout the length of the dam using nut-bolt system.The lateral sides of the rubber foil are fixed to the weirs with the help of channel plates by using nut-bolt system.

FIXING OF RUBBER FOIL



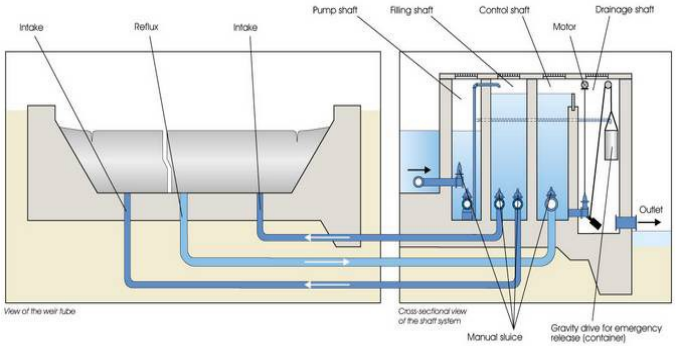
7.6)

PIPEWORK FOR FILLING AND DRAINAGE:

Pipework of the dam consists of 3 inlet pipes of 150mm dia. Originates from the filling shaft which enter into the rubber dam. The first pipe extends up to 1/4th of the length, the second pipe extends upto ½ of the length and the 3rd pipe extends upto 3/4th of the length of the dam. The purpose of these pipes is to inflate the rubber uniformly by allowing the water to flow through them under gravity. Pumps are also used to inflate the rubber. An outlet pipe of 300mm dia. is provided.

8. REFLUX PIPE:

Reflux pipe is used to deflate the rubber. This is done during maintenance and at the time of floods exceeding the limit.



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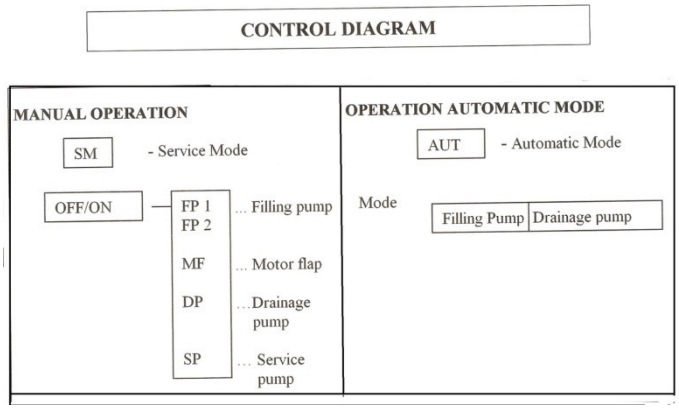
Selection:

- Manual Operation
- Operation in automatic mode

Operation of the Rubber- Dam:

The main Steps of operation and the sequence of control are as follows:



9. TROUBLE SHOOTING

In case of grid failure:

- In case one or two of the phases owe going off during normal operation, you find the red lamps "Error" on.

For the pumps:

- check if pumps are submerged and the floats are swimming
- check at main-control-board, if the motor-protection-switch is on, afterwards quit error

at button "Error acknowledge".

For the motorflap:

- Check the drainage shaft if the motorflap is free – if necessary to clean, please open by hand-wheel only.
- Check at main-control-board, if the motor-protection-switch is on – afterwards quit errorat button "Error acknowledge".

I. Power cut- off:

The emergency for deflation consists of:

- One manual- sluice in the wall between the control-shaft and the drainage shaft
- Overflow in the control shaft. In case storage- level is rising, the filling water will pass the overflow and the dam is lowering.
- Emergency release of the water from the control- shaft is secured in any case by the gravity driven drainage-valve.

Description Overflow in the control- shaft:

If the storage- level is rising, by the own pressure water will be forced out of the membrane and it will pass the overflow and go via the drainage- shaft downstreams.

The height of the overflow is adjusted to the maximum storage level.

Swimmer- pocket- driven drainage-valve

For additional security in case of power- cuts a swimmer-pocket- driven drainage-valve will open in case the maximum storage level will be exceeded. The weir crest will be lowered as much as necessary to prevent a flood.

After restoration of the power- supply the pumps will be activated and the membrane will be filled up again to achieve the storage- level as desired.

The distance between 2 rubber dams is 1 km. There will be a continuous sheet of water in between 2 rubber dams with depth varying from 1.30 mts to 0.20 mts. During floods, the rubber dam gets deflated and in normal flow seasons, the rubber dam can store water in inflated condition. The rubber foil was imported from Austria and installation was done by Austrian company.

The material is tested for temperature up to 75 °C.

By the water filled into the membrane a cooling effect is given anytime.

Additionally there is the possibility to improve the cooling by pumping and circulating fresh water in the membrane.

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10. CLEANING OF THE SHAFTS:

To give access to the shafts for cleaning or maintenance you may drain them without lowering the storage- level. For this purpose the manual- sluices for filling and also for the drainage- pipes have to be closed.

By opening the flushing- valves DN 100 the water from the shafts will flow via drainage- shaft downstream and you can do the cleaning.

After finishing the work close the flushing-valves open the manual sluices (inlet – and drainage) and start pumps for filling.

Cleaning of the membrane inside:

From experience it is known that sedimentation in the tubes is very little, because of the water circulation. Although an annual flushing is recommended during flood situation with fully deflated rubber dam by opened outlet- roves and running filling pump

TABLE 10.1 MAINTENANCE SCHEDULE

Work to do	Intervall				
	weekly	Monthly	6 month	1 year	5 years
Visual check of the weir and base plate	X				
Visual control of the foil if any damage	X				
Remove debris if any	X				
Test of the valves if operable		X			
Control of drainage system		X			
Control of filling-pump		X			
Flushing and cleaning of the shafts			X		
Flushing of the tube				X	
General maintenance by specalist					X

11. ADVANTAGES IN COMPARISON WITH CONVENTIONAL WEIR LOCKS:

→ A flexible weir structure, allowing through-flow of flotsam and ice.
→ Stable and seamless control of the reservoir level.
→ Safe flood relief-excess floodwater automatically triggers lowering of barrier tube without the need for mechanical help.
→ Ideal for damming wide expanses of water in sections of upwards of 50 meters each.
→ Easy renovation of existing weir structures, regardless of shape and configuration.
→ Absence of mechanical components eliminates corrosion risk.
→ No lubricants needed – protects the environment.
→ Low maintenance costs.
→ Low operating costs due to minimal energy requirements.

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