

**A  
REPORT  
ON  
“ACADEMIC VISIT TO UKAI DAM”**

**(Date: 27<sup>th</sup> February 2017)**

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## **ACKNOWLEDGEMENTS**

We take this opportunity to acknowledge that who has been great sense of support inspiration thought, the academic visit successful. We are grateful to our college for giving us the opportunity to have an academic visit to Ukai Dam .

On the behalf of Civil Engineering Department and the Principal Dr. Vaishali Mungurwadi of Sarvajanik College of Engineering and Technology, Surat, we thank the authorities of the Ukai dam to give us permission to visit the corresponding place and giving us sufficient knowledge about the technical details of Ukai dam and infiltration galleries and working of the hydroelectric power plant .We once again extend our sincere thanks to all those who knowingly or unknowingly helped us with the visit.

As a part of GTU curriculum, an academic visit to UKAI dam under the subject of “Applied Fluid Mechanics” were planned for the students of B.E – III Civil Engineering Department and M.E – I Environmental Engineering on 27th February 2017.

### **Introduction about Ukai Project :**

The river Tapi is the second largest west –flowing river of India. The Tapi river has its origin at Mulati in Betul District of Madhya Pradesh( Lat  $21^{\circ} 43' N$ ,  $78^{\circ} 16'$ ). The river has a Total length of 720 km out of which 208 km lies in the Madhya Pradesh, 323 km in the Maharashtra and 189 km in Gujarat. It ultimately meets the Arabian Sea approximately 19.2 km west of surat in Gujarat. Ukai is the largest Multipurpose Project undertaken by the state and is only next to Narmada Project, so far as benefits are concerned. Ukai forms the terminal reservoir harnessing nearly half the water of the Tapi. The Gujarat Government has developed the lower Tapi in two stages.

The Karapar weir and its Canal system having estimated cost of Rs. 18 crores forms the first stage. This Project was commissioned in the year 1954 and the canal system provides seasonal irrigation facilities to 2,27,530 ha from the run off the river.

The second stage is the Ukai Multipurpose Project with estimated cost of Rs. 136-00 crores. The dam is located across the river Tapi about 29 km up stream of the Kakrapar weir.

The functions of the Project are:

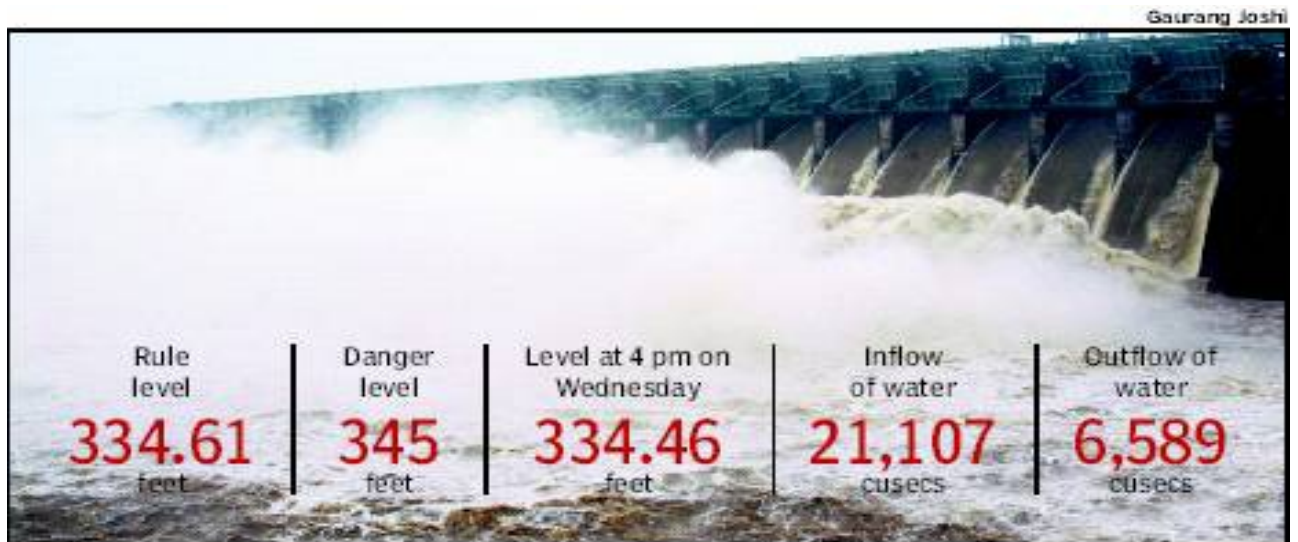
1. Irrigation
2. Power Generation
3. Flood Protection
4. Fisheries development

The Foundation ceremony of the dam was performed by the then Union Finance Minister , Shri Morarji Desai in November,1959. The planning commission in 1961 accepted the project but the work could not gather momentum due to set back created by the Chinese hostilities in 1962 and the Pakistan aggression in 1965. The dam work were geared up in a big way from 1966 onwards and essentially completed in 1972. Late Prime Minister Smt. Indira Gandhi performed opening ceremony on 29<sup>th</sup> January 1972.

## 1. UKAI DAM

The **Ukai Dam**, constructed across the Tapi River, is the largest reservoir in Gujarat. It is also known as Vallabh Sagar. Constructed in 1972, the dam is meant for irrigation, power generation and flood control. Having a catchment area of about 62,255 km<sup>2</sup> and a water spread of about 52,000 hectares, its capacity is almost same as that of the Bhakra Nangal Dam. The site is located 94 km from Surat. The storage capacity of Ukai dam is almost 46% of the total capacity of all the other existing dams in Gujarat if put together. Thus it can be concluded that the rest of the dams have as little as 0.1% average storage capacity. During the last 40 years, the actual irrigation potential is attained through all the major and medium water resources projects in the State, which comprises only 14 million hectares. The dam

is an earth-cum-masonry dam. Its embankment wall is 4,927 m long. Its earth dam is 80.77 meter high, whereas the masonry dam is 68.68 meter high. The dam's left bank canal feeds water to an area of 1,522 km<sup>2</sup>. and its right canal provides water to 2,275 km<sup>2</sup> of land



#### Salient Features of Ukai Reservoir Project :

HYDROLOGY	
1. Catchment area	62225 km <sup>2</sup>
2. Mean annual rainfall in the watershed	785 mm
3. Maximum annual rainfall in the watershed	1191 mm
4. Mean annual runoff at the site	17220 mm <sup>3</sup>
5. Design flood	17.48 lac cusecs
6. Probable flood cusecs	12.16 lac



#### DAM DETAILS

1. Length of Dam	
a) Length of masonry section incl. Spillway	868.83 m
b) Length of earth dam section	4057.96 m
2. Maximum height of main dam	
a) Earth dam above river bed	68.58 m
b) Masonry dam above deepest foundation	80.772 m
3. Total earth work m <sup>3</sup>	23240 *10 <sup>6</sup>
4. Total quantity of masonry concrete	1484* 10 <sup>3</sup> m <sup>3</sup>

## 2. SPILLWAY

A **spillway** is a structure used to provide the controlled release of flows from a dam or levee into a downstream area, typically being the river that was dammed. they may be known as **overflow channels**. Spillways release floods so that the water does not overtop and damage or even destroy the dam. Except during flood periods, water does not normally flow over a spillway. In contrast, an *intake* is a structure used to release water on a regular basis for water supply, hydroelectricity generation, etc. Floodgates and fuse plugs may be designed into spillways to regulate water flow and dam height. Other uses of the term "spillway" include bypasses of dams or outlets of a channels used during high water, and outlet channels carved through natural dams such as moraines.



#### **SPILLWAY DETAILS.**

<b>1. Crest level of spillway</b>	<b>91.135 m</b>
<b>2. Length of spillway</b>	<b>425.195 m</b>
<b>3. Top of radial crest gate</b>	<b>105.461 m</b>
<b>4. Type of gate</b>	<b>Radial</b>
<b>5. Size of gate</b>	<b>15.54 * 14.78 m</b>
<b>6. No. Of gate</b>	<b>22 nos.</b>
<b>7. Discharge capacity from all 22 gates</b>	
a) At FRL -345'	<b>13.37 lac cusecs</b>
b) At HFL -351'	<b>16.34 lac cusecs</b>

### **3. HYDROPOWER STATION**

The Ukai Hydro Power Station is located at Ukai Dam on Tapi River in Tapi District. There are four units of hydro turbine each of 75 MW with a total installed capacity of 300 MW. All the above units are of BHEL make. Commissioning dates of unit no. 1 to 4 are 08.07.1974, 3.12.1974, 22.04.1975 and 04.03.1976 respectively. The Ukai Left Bank Canal (LBC )Hydro Power Station is located at Left Bank Cannel of Ukai Dam on Tapi River in Tapi District. There are two units of hydro turbine each of 2.5 MW with a total installed capacity of 5 MW. All the above units are of BHEL make. Commissioning dates of unit no. 1 and 2 are 08.12.1987 and 19.02.1988 respectively



#### POWER SECTION (HYDRO)

1. NO. & Size of Penstock dia	4 Nos. Of 7.01m
2. Installation of 4 units of 75 MW each	300 MW
3. Generation at 35 load factor	193 MW
4. Annual energy(Units)	670 * 106 K.WH

#### IRRIGATION REQUIREMENT

1. Ukai left bank main canal Maft.	0.59
2. Kakrapar left & right bank main canals Maft.	2.62

The students showed their enthusiasm and inquisitiveness by asking the questions to the site engineers. The experts and site engineers were overwhelmed with their response. And thus their visit proved to be very informative and fruitful.



## Glimpses of Ukai Dam :



