



**A Report on Technical Visit at
Sardar Sarovar Dam and Statue of unity**

12th February, 2018

**Organized by Civil Engineering
Department**

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CHHOTUBHAI GOPALBHAI PATEL INSTITUTE OF TECHNOLOGY

UKA TARSADIA UNIVERSITY, MALIBA CAMPUS, BARDOLI



CIVIL ENGINEERING DEPARTMENT

The visit at Sardar sarovar Dam and Statue of Unity was organized by Civil Engineering Department of CGPIT, Maliba Campus, Bardoli, Surat of Uka Tarsadia University on 12/02/2019 with 257 students and 10 faculty members.

Schedule of visit:

Time		Location
4:45 AM	10:30 AM	Surat to Sardar sarovar dam site
8:30 AM	9:00 AM	Breakfast
10:30 AM	2:30 PM	Statue of unity visit
3:00 PM	4:00 PM	Lunch
4:30 PM	6:30 PM	Dam visit
7:00 PM	7:30 PM	Laser show at statue of unity
7:45 PM	-	Depart from Sardar sarovar
9:00 PM	10:00 PM	Dinner
10:00 PM	12:30 AM	Surat

Date of Visit: 12/02/2019

Total No. of Student: 257

Total No. of Faculty: 10

Faculty Coordinator: Dr. Manoj Gundalia, Prof. Anuj Chandiwala, Prof. Palak V. Trivedi

Other Faculty:- Prof. Gunvant Solanki, Prof. Kinjal mistry, Prof. Khyati Mistry, Prof. Krupa Naik, Prof. Maulik Kakadiya, Prof. Bansari Mor, Prof. Ayush Ransingh, Prof. Amit Jain

Civil Engineering Department organised a visit to Sardar Sarovar Dam and Statue of Unity on 12th February, 2019, for the students of Diploma, B Tech and M. Tech (Structural Engineering). The visit was organized with the prior permission and guidance of Respected Director Dr. Rajkumar.V.Patil and Head of Civil Engineering Department, Dr. Manoj Gundalia.



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SARDAR SAROVAR PROJECT

Mankind has been in search of methods to make use of natural resources since its inception. Sardar Sarovar Project is one of the very few projects across the globe that have played a significant role in bettering the quality of life for millions. Considering water resources development, SSP is a mile stone in Indian history with its dimensions and unique features. In true sense, it is the Engineering Marvel which takes care of long term water, energy and food security and thereby sustainable development of Gujarat State. SSP is an inter-state project, which has participation from the States of Gujarat, Madhya Pradesh, Maharashtra and Rajasthan. The project comprises of 30 Major Dams, 135 Medium Dams and about 3,000 Minor Dams along the 1,312 km length.

SARDAR SAROVAR DAM

Sardar Sarovar Dam is a concrete gravity dam across river Narmada, 1210 meters (3970 feet) in length and with a maximum height of 163 meters above the deepest foundation level. It is constructed up to the crest level of spillway i.e. 121.92 m. This dam has a spillway discharging capacity of 87,000 m³/s. For chute spillway, 7 Radial gates each having size 60' x 60' and for service spillway, 23 Radial gates of size 60' x 55' are to be provided to negotiate the design flood. The River Bed Power House with an installed capacity of 1200 MW is an underground power house stationed on the right bank of the river located about 165 meters downstream of the dam. It has six number of Francis type reversible turbine generators each of 200 MW installed capacity. The turbines are supplied by M/S Sumitomo Corporation, Japan and M/S BHEL.

After visiting the dam, the students got a chance to interact with Executive Engineer, Mr. Ashok V. Gajjar and he had a good time discussing the features of Sardar Sarovar Project which reinforced the classroom knowledge of students. We had very good support and cooperation from all concerned instructors who explained each and every section very interestingly and deeply.



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SALIENT FEATURES OF SARDAR SAROVAR PROJECT

I. LOCATION	
State	Gujarat
District	Narmada
Taluka	Rajpipla (Nandod)
River	Narmada
II. HYDROLOGY	
Watershed area of the river above dam site.	88000 sq. km. (33970 sq.mile)
Mean annual rainfall	1 120mm (44.10 inch.)
<u>Annual run-off at dam site</u>	
at 50% dependability	4.10 Mha m (33.20 MAF)
at 75% dependability	3.36 Mha m (27.22 MAF)
at 90% dependability	2.44 Mha m (19.77 MAF)
Designed flood (1 in 1000 years)	87000 Cumecs (30.7 lakh cusecs)
III. RESERVOIR	
Full Reservoir Level (<u>FRL</u>)	138.68 m (455 ft)
Maximum Water Level (<u>MWL</u>)	140.21 m (460 ft)
Minimum Draw Down Level (<u>MDDL</u>)	110.64 m (363 ft)
Nonnal tail Water Level (NTWL)	25.91 m (85 ft)
Gross Storage Capacity	0.95 Million ha m (7.70 MAF)
Dead Storage Capacity	0.37 Million ham 2.97 MAF
Live Storage Capacity	0.58 Million ha m



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	(4.73 MAF)	
Annual evaporation	0.06 Million ha m	
	(0.5 MAF)	
Submergence at FRL 138.68m(455 ft)	37533 ha	
<u>No. of villages affected</u>	Full	Partial
Madhya Pradesh	1	192
Maharashtra	-	33
Gujarat	3	19
Total	4	244

No. of families affected	
Madhya Pradesh	33104
Maharashtra	3698
Gujarat	4728
Total	41440
IV. DAM	
Type	Concrete Gravity
Length	1210.02 m
Maximum height	163.00 m
Top of dam	EL 146.50 m
Crest	EL 121.92 m
Spillways	
Service spillway	23 bays
	60 ft (18.30 m) each
Auxiliary spillway	7 bays
	60 ft (18.30 m) each
Crest gates	
Type	Radial



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Size	18.30 mx 16.76 m (23 Nos.)
	18.30 mx 18.30 m (7 Nos)
Constructiun siuices at EL. i8.0m	2.10 m x 2.74 m (10 Nos)
	Closed in Feb 94
River sluices at EL. 53.00m	2.5m x 3.6 m (4 Nos.)
V. POWER INSTALLATION (CHPH)	
General	
Location	Right bank
No. of units	5
Rated capacity of each unit	50 MW
Installed capacity	250MW
Type of turbines	Kaplan (Conventional)
Type of Power House	Surface
Turbine	
Rated speed	136.4 RPM
Dia. of runner	4.7 m
Max. head race level	138.20 m
Min. head race level	110.18 m
Max. tail water level	95.10 m
Min. tail water level	92.07 m
Output at 46.13 m head (Max.)	56.4 MW
Output at 36 m head (Design)	51.265 MW
Output at 18.12m head (Min.)	18.575 MW
Discharge at 46.13 m head (Max.)	135.5 Cumecs
Discharge at 36 m head (Design)	157.6 Cumecs
Discharge at 18.12 m head (Min.)	118.5 Cumecs



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Generator		
	Generator rated output	50.556 MVA (50MW)
	Max. cant. output	61.111 MVA (55 MW)
	Line voltage	11.0 ± 5% KV
	Power Factor	0.9 (lag)
	Frequency	50(±3%) Hz
VI. POWER INSTALLATION (RBPH)		
General		
	Location	Right Bank
	No. of units	6
	Rated capacity of each unit	200 MW
	Installed capacity	1200 MW
	Type of turbines	Francis (Reversible)
	Type of Power House	Underground
Turbine		
	Rated speed	136.36 RPM
	Dia of runner	5.7 m
	Max. head race level	138.68 m (FRL)
	Min. head race level	110.64 m (MDDL)
	Max. tail water level	25.91 m
	Mill. tail water level	20.80 m
Turbine Mode		
	Output at 116.6 m head (Max.)	224.4 MW
	Output at 100 head (Design)	204 MW
	Output at 75 m head (Min.)	138 MW
	Discharge at 116.6 m head (Max.)	212.3 Cumecs
	Discharge at 100 m head (Design)	227.5 Cumecs
	Discharge at 75 m head (Min.)	219.1 Cumecs
Pumping Mode		
	Input at 114 m head (Max.)	204.5 MW



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	Input at 100 m head (Design)	209.2 MW
	Input at 81 m head (Min.)	207.5 MW
	Discharge at 114 m head (Max.)	168.4 Cumecs
	Discharge at 100 m head (Design)	197.5 Cumecs
	Discharge at 81 m head (Min.)	233.4 Cumecs
Generator		
	Generator rated output	222.22 MVA
	Line voltage	13.8 \pm 10% KV
	Power Factor (Generating Mode)	0.9 (lag)
	Power Factor (Motoring Mode)	0.95 (lead)
	Frequency	50 (\pm 3% Hz)

VII. CANAL SYSTEM		
	FSL at head regulator of main Canal	91.45 m (300ft)
	Type of Canal	Lined contour canal
	Length	458 Km upto Rajasthan border and 74 Km in Rajasthan
	Base width in head reach	73.1 m
	FSD in head reach	7.6 m
	Discharge capacity in head reach	1132.68 cumecs (40000 cusecs)
	Gross Command Area (GCA)	34.286 lakh ha
	Cuturable Command Area (CCA)	21.190 lakh ha
	Annual Irrigation	17.92 lakh ha

VIII. Cost (Rs. Crore)

Price Level I				
		1986-87*	1996-97**	2000-01***
Unit -1	(Dam & Appurtenant works)	1019.45	4473.75	6036.78^
Unit-II	Main Canal	1588.54	4410.00	5216.35



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Unit-III	Hydro Power Works	979.95	2184.75	2728.07
Group-IV	Branches & Dist. System	2818.10	11850.00	14578.17
	Total Cost of the Project	6406.04	22918.50	28613.37

STATUE OF UNITY

At 182 meters from the road entry and 208.5 meters from the river entry, the SoU is the tallest statue in the world; taller than the 153 m tall Spring Temple Buddha in China and almost twice as tall as the world famous Statue of Liberty in New York.

The statue is conceived as a naturalistic depiction of Sardar Patel in characteristic garb in a walking pose. The monument is constructed on a river island named Sadhu Bet, 3.2 km (2.0 mi) away from and facing the Narmada Dam downstream. The statue and its surroundings occupy more than 2 hectares (4.9 acres) land and are surrounded by a 12 km (7.5 mi) long artificial lake formed by the Garudeshwar weir downstream on the Narmada River. It has a unique, slender width to height ratio, far more exacting than existing technical norms, that calls for special engineering considerations. The structure has two vertical cores, each housing a high-speed passenger elevator. The vertical cores support the steel frames to which about 6500 bronze panels are clad. A viewing gallery at the 135 m level, at the chest, can accommodate up to 200 visitors at one go and affords a breath-taking view of the dam and its environs. Students were also enjoyed Light and Sound show at evening.

DESIGN FEATURES OF STATUE OF UNITY

Location	Kevadiya colony, Narmada district, Gujarat, India
Designer	Ram V. Sutar
Beginning date	31 October 2013
Completion date	October 2018
Opening date	31 October 2018; 3 months ago
Height	182 m
Total height of the structure from its base	240 m (790 ft)
Base height	58 m (190 ft)



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Concrete	210,000 cu.m. of cement concrete
Reinforced steel	18,500 tonnes
Structural Steel	6,500 tonnes
Bronze	1,700 tonnes
Bronze cladding	1,850 tonnes of bronze cladding made up of some 565 macro & 6,000 micro panels
Made by (under PPP model)	L & T ₹29.89 billion (US\$420 million)



PHOTO GALLERY



Statue of Unity

Pictures of Sardar Sarovar Dam



Executive Engineer Mr. Ashok Gajjar addressing



Students listening to Executive Engineer



Felicitating Mr. Ashok Gajjar (Ex. Engineer) with Memento



Night View of Statue of Unity