



KALYANI CHARITABLE TRUST'S
LATE G. N. SAPKAL COLLEGE OF ENGINEERING

Kalyani Hills, Anjaneri-Vadholi, Trimbakeshwar Road, Dist: Nashik – 422 212 (India)
Tel: +91 – 2594 – 220168/71, Fax : +91 – 2594 – 220174
Website: www.sapkalknowledgehub.org E-mail: gns_engineering@sapkalknowledgehub.com



Date: May 18, 2023

Gangapur Dam Visit Report

BE-Civil

A VISIT REPORT ON DAMS AND HYDRAULIC STRUCTURES

Department of Civil Engineering

Late G. N. Sapkal College of Engineering, Nashik.



D. B. Patil International Airport Site Visit Report

Venue: Gangapur Dam, Gangapur, Nashik.

Date: May 18, 2023

Class: BE

Number of Students: 60

No. of Teachers: 02

Mode of Transportation: Bus

Travelling Distance: 30 km (One Side)



Introduction

The Department of Civil Engineering of Late G. N. Sapkal College of Engineering, Nashik organized one day visit to Earthen Dam on 18th May 2023 for the last year student of Civil Engineering (BE) program.

The visit was organized with the prior permission and guidance of Respected Principal Prof. Dr. S. B. Bagal and HOD of Civil Department Prof. Dr. C. K. Sridhar. Along with the staff members, students of BE. Prof. Kiran Deore have taken hard efforts and initiative for the visit.

Faculty member Prof. Kiran Deore and Dr. D. P. Joshi sir of our college accompanied the 60 student of BE civil program for dam visit.

Objectives of the Airport Site Visit

1. To gain insight and knowledge of Earthen dam •
2. To apply theoretical knowledge to practical situations.
3. To study the selection of dam site.
4. To study the different components of earthen dam.
5. To study the instrumentation of dam to safety of dam.
6. Understand the fundamental of earthen dam.
7. Understand and design parameters of zoned earthen dam.
8. Study plans, specifications for planning and design of earthen dam.
9. Involve in the planning and design of spillways on earthen dam.
10. Understand the various water levels and various storage of earthen dam.
11. While visiting the dam site the concerned engineers first gave guidance on safety.
12. To know the information about India's first earthen dam.

History

At the end of 19th century there was a serious draught condition in Nasik and nearby villages. To overcome the situation British government at that time appointed committee under the guidance and leadership of 'Engr. Bill'. Survey was carried out and a dam was proposed on Darna River in Igatpuri. It serves the purpose of irrigation and drinking water supply to nearby towns.

After completion and opening of Darna Dam (a.k.a. Bill Lake) it was found that Nasik was not benefitted by that dam. So another committee was appointed under the guidance of 'Executive Engr. Evershed. Upstream side of Godavari River was surveyed and in 1942 dam was recommended near Gangawadi village. Proposal was sanctioned in 1948. This dam is constructed in two phases, the first phase was completed in 1960 and the 2nd phase i.e. final completion of project was done in 1965. This is the first dam in state which is constructed on basis of "Terzaghis" soil mechanics principle.

Due to deposition of silt, storage capacity of Gangapur Dam is reduced also due to increase in residential zone (civilization) in command area of Nasik, Right Bank canal is closed since 2006 and the land has been given to Nasik Municipal Corporation for laying pipeline for drinking water from Ciangapur Dam. In order to overcome the storage loss, Kashyapi Dam has been constructed on the upstream.



Salient features of project:

- River : Godavari
- Village : Gangawadi
- Latitude : 22°38'
- Longitude : 73°19'
- Toposheet : 4811/12
- Catchment area : 357.40 hect
- Submergence area : 2231 hectors
- Dam type : Major dam
- Construction type : Rolled filled earthen dam

D. B. Patil International Airport Site Visit Report

- TBL (Top Bind Level) : 614.52m
- FSL(Full Supply Level) : 612.05m
- Spillway crest level : 606.41m
- Seal of right bank outlet : 599.09
- Seal level of left bank outlet : 589.94m
- Lowest RBL : 573.78m
- Deepest foundation RL : 571.65m
- Top width of dam : 9.15m
- Maximum height of dam from river bed level : 36.58m
- Maximum height of dam from deepest foundation level : 43.29m
- Gates : Tenter
- Numbers of gates : 9
- Size of gates : 30ft × 20ft
- Length of spillway : 101.83m
- Design spillway discharge : 2294 cumecs
- Length of emergency spillway : 325m
- Length of earthen dam 3475.6m
- Total length of dam : 3902.43m
- Gross storage : 7600mcft
- Live storage : 7200mcft
- Dead storage : 400mcft
- Maximum design discharge from outlet of NLBC : 415 cusec
- Outlet details of NLBC : open well type
- Size of two outlets : 6ft 3inch × 8ft
- Tunnel type : Horseshoe type double barrel
- Length of NLBC : 62.40 km

ठळक वैशिष्ट्ये		
१. प्रकल्पाचे नाव	: गंगापूर धरण प्रकल्प	
२. धरणाचे नाव	: गंगापूर धरण	
३. नदीचे नाव	: गोदावरी (गोदावरी आणि त्याच्या उपनद्या करणपी यांच्या संगमावर)	
४. गावाचे नाव	: गंगापडी, तालुका नाशिक, जिल्हा नाशिक	
५. पाणलोट क्षेत्र	: ३५७.४० चौ. कि.मी.	
६. बुडीत क्षेत्र	: २२३१ हेक्टर	
७. खर्गीकरण आणि प्रकार	: मुख्य, भरलेल्या मातीचे धरण	
८. पूर्णसंख्य पातळी	: ६९२.३५ मी.	
९. नदी पात्रातून धरणाची उंची	: ३६.५७ मी.	
१०. धरणाची लांबी	: ३८९९ मी.	
११. डाव्या विमोचकाचा तळाचा तलांक	: ५८९.९४ मी.	
१२. उजव्या विमोचकाचा तळाचा तलांक	: ५९९.०९ मी.	
१३. डाव्या कालव्याची लांबी (विस्तारीकरणानंतर)	: ६४ कि.मी.	
१४. उजव्या कालव्याची लांबी	: ३० कि.मी.	
१५. वहन क्षमता	: ८.९२ घन मीटर/सेकंद	
१६. सांडव्याचा प्रकार	: (ओगी आकाराचे द्वारांसह)	
१७. वक्राकार दरवाजांची संख्या	: ९ नंबर (९.९५ मी. x ६.९० मी.)	
१८. पाणी साठा	प्रकल्पीय	सन २००२ गाळ सर्वेक्षणानुसार
१. धरणाची एकूण क्षमता	२९५.८८ दलघमी (७६०० दलघफु)	१५९.८४ दलघमी (५६५४ दलघफु)
२. जिवंत पाणीसाठा	२०३.८८ दलघमी (७२०० दलघफु)	१५९.४२ दलघमी (५६३० दलघफु)
३. मृत पाणीसाठा	१२.०० दलघमी (४०० दलघफु)	०.४२ दलघमी (२४ दलघफु)
४. कॅरी ओव्हर	५.६६ दलघमी (२०० दलघफु)	
१९. पूर विसर्ग इंग्लिश प्रमाणे	: २२९४ घन मीटर/सेकंद	
२०. संकल्पित	: २२९४ घन मीटर/सेकंद	
२१. बांधकाम सुरु करण्याचे वर्ष	: १९४७	
२२. पूर्ण करण्याचे वर्ष	: १९५४ - पहिला टप्पा / १९६५ - दुसरा टप्पा	
२३. प्रकल्पाची किंमत	: ५०० लाख	

Special feature of dam

Emergency spillway: On malfunction of main spillway water is diverted to emergency spillway. It is constructed weak to wash away to save spillway and dam body. This is the only dam in India having emergency spillway. Length of spillway is 325m. This spillway is not used until date.

Selection of type of dam

Type of dam was selected considering the following points-

1. For construction of dam considering length to be 3811 m, concrete was not economical.
2. Scarcity of stones led to drop selection of stone masonry dam.
3. Narrow valley was unavailable and due to soft foundation gravity dam was rejected because foundation may not have sustained its heavy loads.
4. Soft foundation and availability of abundant soil, earthen type of dam was selected.
5. Water tight basin was available and labour cost was less at the time of construction

Hence earthen dam were choose

Need and practical significance of project

Before the independence of India, there is British govt. which ruled the India. In the period of 1892, there is drought in Nashik district. Hence, British gov. decided to built one dam on Godavari river. One committee was established under Mr. Bill for survey of area for deciding suitable site for dam. In 1958-60, Mr. Evereshed was an executed engg. form another committee for construction of dam. In next period, the population of nashik increases satpur industry estate established in 1960, ambad industry and also NTPS also forms in nashik region. Hence there is lot of need of water.

For construction of Gangapur dam, Mr. M.J.Deodar was engineer, Mr. Shind was junior engg, and Mr. Dhanak was deputy engg. Mr. Shind written a book on Gangapur Dam. Trambakeshwar which is starting of Godavari river, the annual average rainfall is 2500-3000 mm. And on gangapur dam site annual average rainfall is 565 mm..

The annual average rainfall in the near areas of site was in trimbakeshwar it is 2250 mm, in waghera village it is 2300 mm and in gangapur at dam site it is 1750 mm The gangapur dam project was initiated in 1947. In first stage it is designed and constructed as ungated type i.e. overflow type. This first stage construction were comleted in 1957. After that, the gates are provided in the period of 1960-1962.



Technical details of project

1) Emergency spillway:

It is first and only one dam in the world which has emergency spillway. The emergency spillway is called as breaching section. Emergency spillway is in continuation with main spillway. When main spillway fails to operate or when floods will be move towards emergency spillway and the whole spillway will be washed out. The main difference between emergency spillway and service spillway is that service spillway has E.D.D. but emergency spillway does not have E.D.D. Emergency spillway encroaching the F.B.

2) Gates – Tenter – radial:

The gates which are provided on Gangapur dam are radial gates which are also called as tenter gates. Radial gates are curved in shape which effectively resists the water pressure by arch action. The ends of arms are attached to turner girder. The hydrostatic pressure is transferred from arch of gate to concrete pier. The gates are rest on seal beam of crest of gate and crest is covered with skin plate.



3) Intake well:

On left side of main spillway the intake well is provided. The intake well is on under submergence. When water level is below the crest level, the intake well is used for removing the water from dam. For removing water by using intake well chain pulley, winch and hoist system is provided in it. NLBC (Nashik left Bank canal) is originated from this intake well which ends at Nandur – madhmeshwar. The length of NLBC is 64 km. The gates of intake well are calibrated with scales.

Detailed description of project:

Gangapur dam is constructed on Godavari River in Gangawadi village of Nashik. It is first and one and only one dam in the world which has emergency spillway. The first phase capacity of dam is 5500 mcft. It is under major irrigation project because culturable common area is 16500 hectares.

Major irrigation project: CCA > 100 km²

Medium irrigation project: 100 km² > CCA > 20 km²

Minor irrigation project: 20 km² > CCA

Tenter gates are provided on spillway. There are 9 gates are provided. The gates are operated as per gate operation schedule. The gates are operated as per criteria given by –

IAHR – International Association of Hydraulic Research

MJD – Monitor Joint Discharge

On the upstream side of Gangapur dam, there are two dams. The Gangapur dam takes water from two rivers i.e. Godavari and Kashyapi. On Godavari river, Gautami- Godavari dam is constructed which has capacity of 1868 mcft and on Kashyapi river Kashyapi dam is constructed which has capacity of 1827 mcft.

The Gangapur dam takes water from secondary discharge from catchment area and from outflow of Kashyapi dam.

The Kashyapi dam feeds the Gangapur dam hence it is called as feeder dam. It has water tight basin i.e. on all sides of reservoir there is hill and rocky area. On the downstream side of Gangapur dam about 15 km distance city Nashik is situated. At junction or joints water seals and water keys are used for avoiding leakage.

Conclusion of the visit

1. The agenda of this field trip is to get a maximum information about the construction methods of airport and their major type and parts like runways taxiways control tower
2. By doing this field trip successfully we get known and close to the problem appearing while doing constructing the airport
3. Also we get an information and knowledge about the material and transport use for construction of airport
4. What kind of safety needed and also what precautions we need to take while constructing is known to us by this field trip
5. Overall this trip gives us the major information of airport construction aspects. And also gives an opportunity to see the construction and civil projects by different eyes.