



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

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Date: May 18, 2023

Darna 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.



Darna Dam Site Visit

Venue: Darna Dam, Igatpuri, Nashik.

Date: May 18, 2023

Class: BE

Number of Students: 60

No. of Teachers: 02

Mode of Transportation: Bus

Travelling Distance: 40 km (One Side)



Introduction

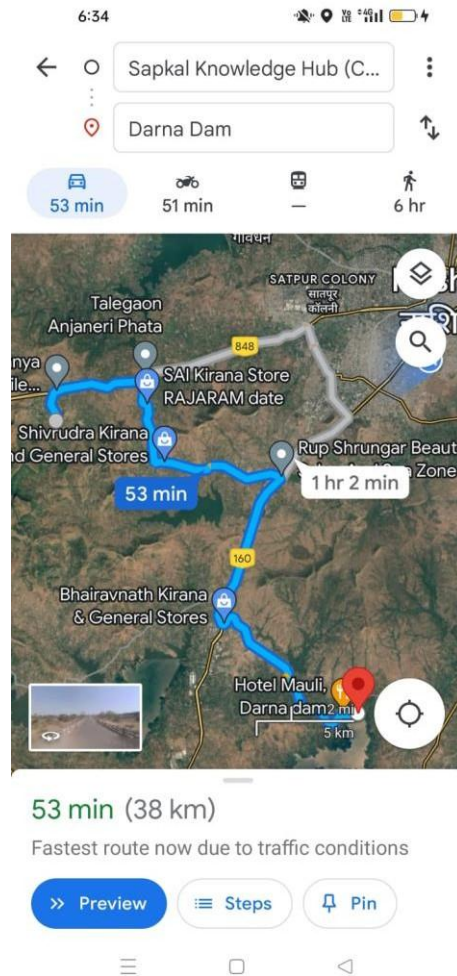
The Department of Civil Engineering of Late G. N. Sapkal College of Engineering, Nashik organized one day visit to Gravity Dam on 18th May 2023 for the last year student of Civil Engineering (BE) program.

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 Dam Site Visit

1. To gain insight and knowledge of Gravity dam.
2. To apply theoretical knowledge to practical situations.
3. To study the selection of dam site.
4. To study the different components of gravity dam.
5. To study the instrumentation of dam to safety of dam.
6. Understand the fundamentals of gravity dam.
7. Understand and design parameters of gravity dam.
8. Study plans, specifications for planning and design of gravity dam.
9. Involve in the planning and design of spillways on gravity dam.
10. Understand the various water levels and various storage of gravity dam.
11. While visiting the dam site the concerned engineers first gave guidance on safety.
12. To study the different forces acting on gravity dam.



History

Nashik has been identified as tribal region by the Maharashtra government. This place acts as the source for several important rivers in Maharashtra. Many dams have been built in Nashik district, because of the abundance of water sources. Godavari River (popularly known as Ganga of South India) originates at the holy city of Nashik. Apart from it there are many other rivers originating from Nashik, such as Girna, Darna, Aram, Mosam, Vaitarna, Kadwa and Manyad.

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.

Nashik district has successfully made many river-linking projects with the dams, which have provided ample supply for drinking, electricity and agriculture in the area. During the heavy

Darna Dam Site Visit

rain fall season, some of the dams starts overflowing, but these issues are managed by channelizing the excess water to other dams. You can find many dams in Nashik, the major ones being: Darna, Gangapur and Girna dams.

Darna dam in Nashik was built by the British in year of 1916. This dam has a catchment area of approximately 404 sq km. Darna dam is categorized as a gravity dam on Darna River near to Igatpuri in Nashik. The maximum height of this dam is 28 meters and the total length would be around 1635 meters. You can see 6 irrigation outlets on left bank of the river and 2 irrigation outlets on right bank. The gross storage capacity of Darna dam is 54,429.01 cu mi (226,870.00 km³). And this dam can contain a volume capacity of 452.5 cu mi or 1,886.1 km³. 50 automatic Reynolds type gates have been built in this dam for passing the 71250 cusecs of water. This masonry dam is located on the Nashik-Mumbai National Highway near to the Wadivarhe village just 15 kms away from city.

Location:

Darna dam is situated at 20 km from village Wadhivarhe on the Nashik –Mumbai highway. The co-ordinates of Darna was 19.7619781°N and 73.7371876°E.

Salient features of project:

- Name of the Dam:Darna Dam
- River:Darna
- Nearest city:Igatpuri
- District:Nashik
- State:Maharashtra
- Purpose of dam:Hydroelectric, Irrigation
- Year of Commencement:1907
- Year of Completion:1916
- Type of dam:Earthen Gravity and Masonry
- Length of dam:1633.4m
- Maximum height above foundation:28m
- Total volume content:1886.1
- Desing flood (cumec):2017.55
- Length of spillway:256
- Gest level of spillway:571.65m
- Spillway capacity: 3336 cumec
- Numbers of spillway gates: 56

Technical details of project:

Darna dam is a gravity dam on darna river near Igatpuri, Nashik district in the state of Maharashtra. The total capacity of Darna dam is 50340 cu m. with surface area of 34750 km². The height of dam above lowest foundation is 28 m. and the length is 1634 m. The volume content is 1886.1 km³ and gross storage capacity is 226870 km³. The Darna is having two spillways gates i.e. radial and vertical. The six of radial and vertical gates are 12.2 × 4.27 m and 3.05 × 3.12 m resp.



Need and practical significance of project

In Maharashtra, it is seen that the intensity of rainfall is not the same throughout the state. There is a heavy amount of rainfall in Western Maharashtra and vidharbha region. Water surveying as a boon to the mankind needs to preserved, stored and use wisely.

Hence, the western Maharashtra region has more number of dams because of sufficient water and topographical features. The need to construct the dam on river Darna was felt to avoid scarcity and draught in Nashik and Sinnar region of Maharashtra.

Detail description of project:

Darna dam, constructed on river darna is a gravity constructed by British Government in 1907 and 1912. The dam is also known as Lake Bill, as it was constructed by an Engineer named Bill.

The dam is having an ogee shape spillway with 50 automatic gates. The dam was first to have automatic gates in the world. These gates were also known as “Reynold’s gates”. Reynold was the one who discovered it. Now a days these gates are not functioning due to lack of maintenance facility, hence there are additional 6 radial gates are provided in year 1972 for discharge of water. The spillway is having capacity of 3336 cumec.

The new spillway for darna dam is provided at the junction of the dam and the dam wall. The darna dam is having minimum drawn down level of 554.27 m and gross and live storage capacity is 215.38 MCM and 202.42 MCM. The discharge passing through 50 automatic Reynold’s gates was 2017.55 cumec while that passing through 6 radial gates is 1318.4 cumec. There are 6 irrigation outlets on left bank and 2 irrigation outlets on right bank.

Special features of project:

Darna dam is the only dam in the world which having 50 automatic gates. These gates are also known as “Reynold’s gates”. The functioning of these gates is really unique.



There are walls below the spillway of dam having huge floats of cylindrical shape. These floats are mechanically attached to the pulleys which are provided at the edges of all gates. These gates are operated on the counter base concept. When the float level is down, the gate gets opened as soon as when the well level rises the floats are lifted up, which leads to closure of gates. In this way discharge of water is allowed to pass through in Reynolds gates.

Buttress are also provided on the downstream side of the dam which provides the additional strength and stability.



Various impact of project:

Due to construction of dam and hydropower generation project, a huge area of land has to go under submergence. This leads to rehabilitation and resettlement of people in large amount. This process may lead sometimes to delay of project and increase in cost which affects the project on a large scale. While construction of Darna dam 17 villages were affected which were rehabilitated and resettled to some other places.

Conclusion of the visit

1. Gained insight and knowledge of gravity dam.
2. Applied theoretical knowledge in practical situations.
3. Studied dam site selection.
4. Studied various components of gravity dam.
5. Studied dam devices for dam safety.
6. Understand the basic principles of gravity dam.
7. Understood and designed the parameters of gravity dam.
8. Study, planning and design features of gravity dam layout.
9. Involvement in planning and design of spillways on gravity dams.
10. Understand the different water levels and different storages in gravity dams.
11. While visiting the dam site concerned engineers first gave guidance on safety.
12. Studied the various forces acting on a gravity dam.

Darna Dam Site Visit

