Kalyani Charitable Trust's

Late G. N. Sapkal College of Engineering

Kalyani Hills, Anjaneri, Trimbakeshwar Road,
Nashik – 422 213

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Department of Civil Engineering

List of Field Visit (A. Y. 2023-24)

Academic Year	Class	Details of Organization Visited	Date	Ref. File No. of Institute level Criteria file (Original Report)
2023-24	TE	National Cement Pipe Company in Satpur, Nashik.	03/11/2023	
	ME	Nakshtra Techno Hub, Nashik.	25/11/2023	
	BE	Field visit to Darna Dam, Igatpuri.	12/03/2024	
	BE	Field visit to Left Bank Canal of Godavari River, Near NIT Polytechnic college, Nashik (Cross drainage work).	18/03/2024	

Prof. K. M. Deore
Field Visit Coordinator

Prof. K. A. Salunke
Head of Civil Department

Late G. N. Sapkal College of Engineering
Civil Engg Dept

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LATE G. N. SAPKAL COLLEGE OF ENGINEERING

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Date: March 18, 2024

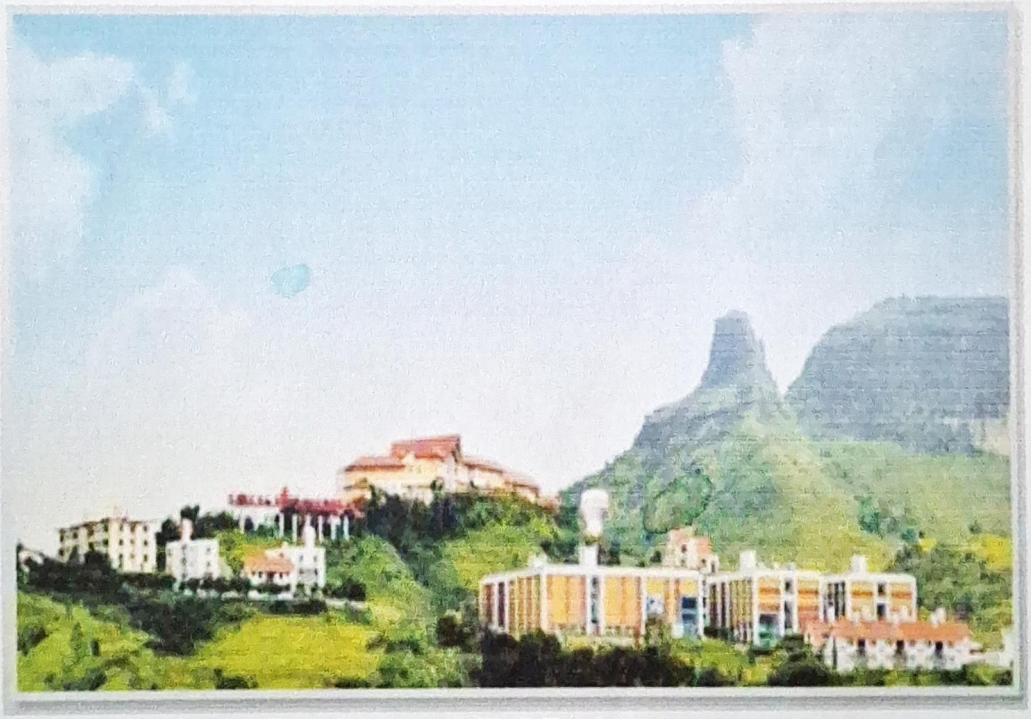
A

SITE VISIT REPORT

ON

CROSS DRAINAGE WORKS STRUCTURES

(BE-CIVIL)



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Acknowledgement

On behalf of the last year civil engineering students of Late G N Sapkal College of Engineering, Nashik, I would like to express our sincere gratitude to the Visit to Left Bank Canal of Godavari River Nashik for arranging a site visit for our class.

We would like to thank Respected Chairman of Sapkal Knowledge Hub Dr. Ravindra Sapkal Sir for giving us opportunity to do learn new things and providing necessary facilities. We are also thankful to Respected Principal of Late G N Sapkal College of Engineering Nashik Prof. Dr. Sahebrao Bagal Sir for giving us permission for the visit.

We would also like to thank Head of the Department of Civil Engineering Prof. Dr. K.A. Salunke and Prof. Nishigandha Nimse, Prof Anil Mankar and for co-ordinating to the site visit.

We believe that the site visit was a valuable learning experience for our students. It gave them a chance to see or learned the construction and importance of Cross drainage work structures. We are grateful to the left bank canal of Godavari river for providing us with this opportunity.

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Site Visit Details

Venue: Left Bank Canal of Godavari River, Near NIT Polytechnic, Nashik.

Date: March 18, 2024

Class: BE

Number of Students: 50

No. of Teachers: 02

Mode of Transportation: Own Vehicle

Figure 1 : Left bank canal of Godavari river Aqueduct structure

Introduction

The Department of Civil Engineering of Late G. N. Sapkal College of Engineering, Nashik organized one day visit to Cross Drainage Works on 18th April 2024 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. K. A. Salunke. Along with the staff members, students of BE. Prof. Nishigandha nimse have taken hard efforts and initiative for the visit.

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Objectives of the cross drainage work structure site visit

1. To learn how a CD works.
2. To understand the types of CD works.
3. To learn why CD work is needed.
4. To learn how CD work can be avoided.
5. To understand the types of pressures acts on CD work.
6. To apply theoretical knowledge to practical situations.
7. To study the selection site for CD work.
8. To study the different components of CD work.
9. Understand the fundamental of CD work.
10. Understand and design parameters of CD work.
11. Study plans, specifications for planning and design of CD work.

The alignment of a canal invariably meets a number of natural streams (drains) and other structures such as roads and railways, and may sometimes have to cross valleys. Cross-drainage works are the structures which make such crossings possible. They are generally very costly, and should be avoided if possible by changing the canal alignment and/or by diverting the drains.

Cross Drainage Works:

Cross drainage works is a structure constructed when there is a crossing of canal and natural drain, to prevent the drain water from mixing into canal water. This type of structure is costlier one and needs to be avoided as much as possible.

Cross drainage works can be avoided in two ways:

• By changing the alignment of canal water way.

• By mixing two or three streams into one and only one cross drainage work to be constructed,making the structure economical.

Types of Cross Drainage Works:

Following are the types of cross drainage works structures:

• Aqueduct

• Syphon Aqueduct

• Super passage

• Canal Syphon

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- Level Crossing
- Canal Inlets and Outlet

Aqueduct:

In an aqueduct, the canal bed level is above the drainage bed level. So the canal is to be constructed above the drainage. A canal trough is to be constructed in which canal water flows from upstream to downstream.

This canal trough is to be rested on number of piers. The drained water flows through these piers upstream to downstream. The canal water level is referred as full supply level (FSL) and drainage water level is referred as high flood level (HFL). The HFL is below the canal bed level.

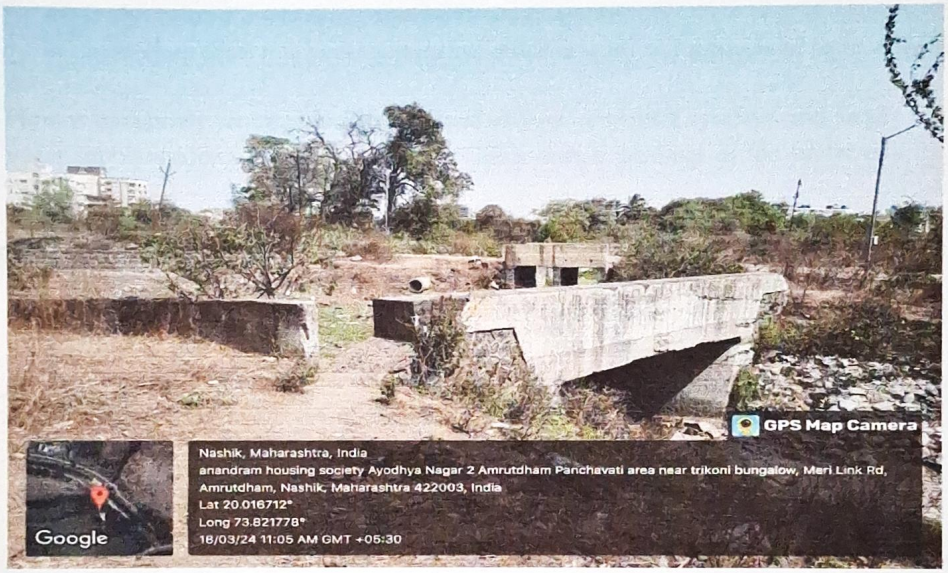

Figure 2:Aqueduct structure

Aqueduct is similar to a bridge, instead of roadway or railway, canal water is carried in the trough and below that the drainage water flows under gravity and possessing atmospheric pressure.

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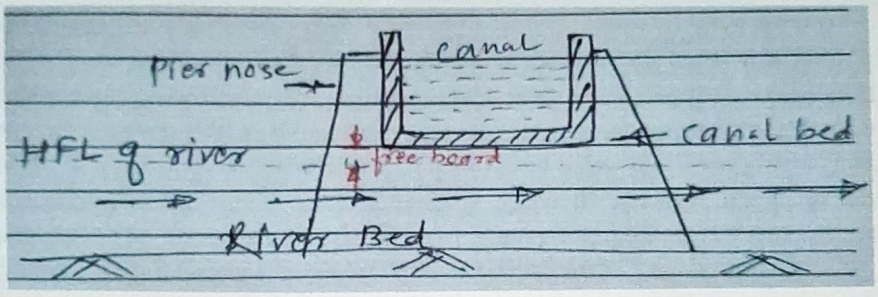

Figure 3:Aqueduct Structure

Functions/Necessity of an Aqueduct:

- Historically, agricultural societies have constructed aqueducts to irrigate crops.
- Another use for aqueducts is to supply large cities with drinking water.
- It also helps drought prone areas with water supply.
- In modern Civil Engineering projects, detailed study and analysis of Open-Channel

Flow is commonly required to support flood control, irrigation systems, and large water supply systems when an aqueduct rather than a pipeline is the preferred solution.

Syphon Aqueduct:

In a syphon aqueduct, canal water is carrier above the drainage but the high flood level (HFL) of drainage is above the canal trough. The drainage water flows under syphonic action and there is no presence of atmospheric pressure in the natural drain. The construction of the syphonaqueduct structure is such that, the flooring of drain is depressed downwards by constructing a vertical drop weir to discharge high flow drain water through the depressed concrete floor. Syphonic aqueducts are more often constructed and better preferred than simple Aqueduct, though costlier.

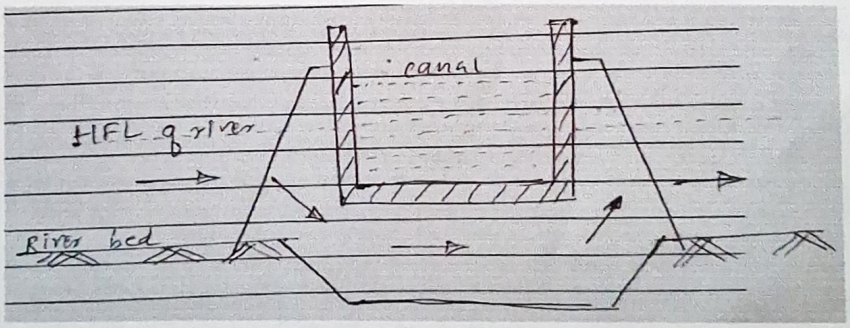

Figure 4:Syphone aqueduct

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Super Passage:

Super passage structure carries drainage above canal as the canal bed level is below drainage bed level. The drainage trough is to be constructed at road level and drainage water flows through this from upstream to downstream and the canal water flows through the piers which are constructed below this drainage trough as supports. The full supply level of canal is below the drainage trough in this structure. The water in canal flows under gravity and possess the atmospheric pressure. This is simply a reverse of Aqueduct structure.

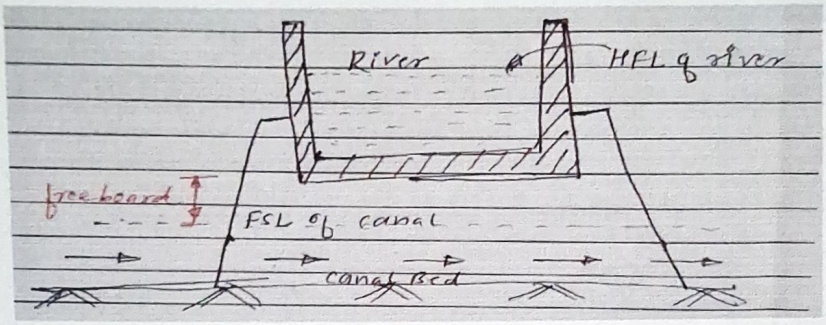

Figure 5: Super passage structure

Functions/Necessity of Super Passage:

- The discharge of drain is small in comparison with the canal discharge.
- Sufficient clearance is available between the F.S.L. of canal and the drain bed.
- In this type of structure, the canal is not open for inspection.
- If the slit is deposited in the barrels of the structure, it is difficult to clear it off.

Canal Syphon:

In a canal syphon, drainage is carried over canal similar to a super passage but the full supply level of canal is above than the drainage trough.so the canal water flows under syphonic action and there is no presence of atmospheric pressure in canal.

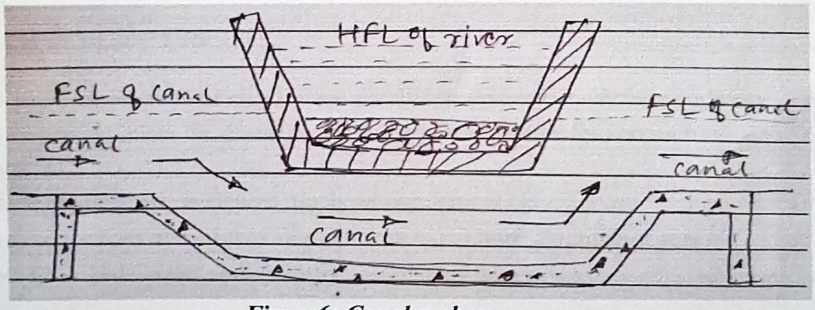

Figure6: Canal syphon

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When compared, super passage is more often preferred than canal Syphon because in a canal Syphon, big disadvantage is that the canal water is under drainage trough so any defective minerals or sediment deposited cannot be removed with ease like in the case of a Syphon Aqueduct. Flooring of canal is depressed and ramp like structure is provided at upstream and downstream to form syphonic action. This structure is a reverse of Syphon aqueduct.

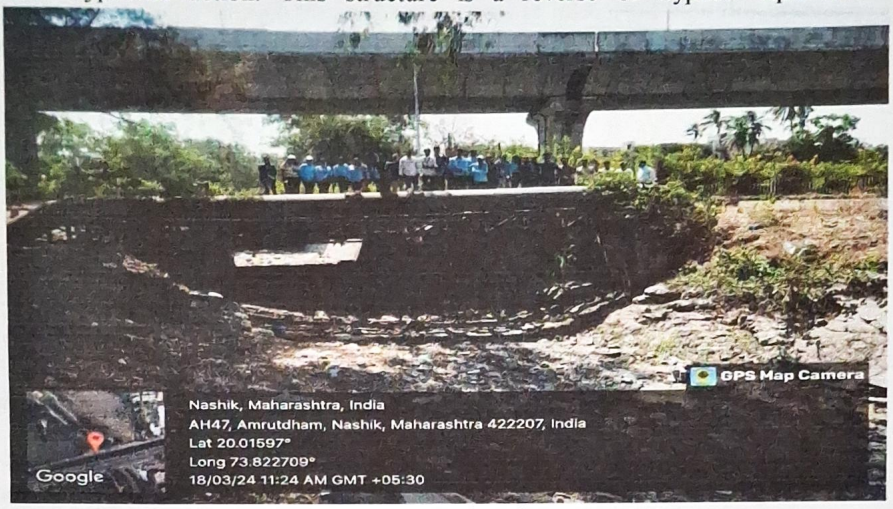

Figure7: Canal syphon

Level Crossing:

When the bed level of canal is equal to the drainage bed level, then level crossing is to be constructed. This consists of following steps:

1. Construction of weir to stop drainage water behind it
2. Construction of canal regulator across a canal
3. Construction of head regulator across a Drainage

Functioning of a Level Crossing:

- In peak supply time of canal water parallel to drainage, both the regulators are opened toclear the drainage water from that of canal for certain time interval.
- Once the drainage is cleared, the head regulator is closed down.
- Anyhow, cross regulator is always in open condition throughout year to supply canalwater continuously.

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Canal Inlets and Outlets:

Canal Inlets:

In a canal inlet structure, the drainage water to be admitted into canal is very less. The drainageis taken through the banks of a canal at inlet. And then this drainage mixed with canal travels certain length of the canal, after which an outlet is provided to create suction pressure and suckall the drainage solids, disposing it to the watershed area nearby.

Functions/Necessity of an Inlet:

- There are many disadvantages in use of canal inlet structure, because the drainage may pollute canal water and also the bank erosion may take place causing the canal structure deteriorate so that maintenance costs are high. Hence this type of structure is rarely constructed.

Canal Outlets:

A canal outlet is a structure built at the head of the tertiary unit to deliver water from the canal tothe field watercourses.

Functions/Necessity of an Outlet:

- Water is taken from the field watercourses for irrigating individual fields.
- In many large irrigation systems, the system management is responsible for delivering water up-to the canal outlet and it is usually the responsibility of the farmers beyond this point.
- As water is to be delivered through a network of canals and related structures to these outlets, delivery of the right amount of water in right time is a difficult job.
- The outlets also have to function properly for delivering the designed amount of water.

Types of Outlets:

There are several types of outlets used in different countries. Only a few of them are describedhere. These outlets are referred to as modules in India and Pakistan and are classified as follows:

1. Non-modular modules – In these structures, the discharge depends on the

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difference of headbetween the distributary and the watercourse. The discharge of these outlets is variable.

2. Semi-modules or flexible modules – In these structures, the discharge depends only on theupstream water level and independent of the water level in the watercourse.

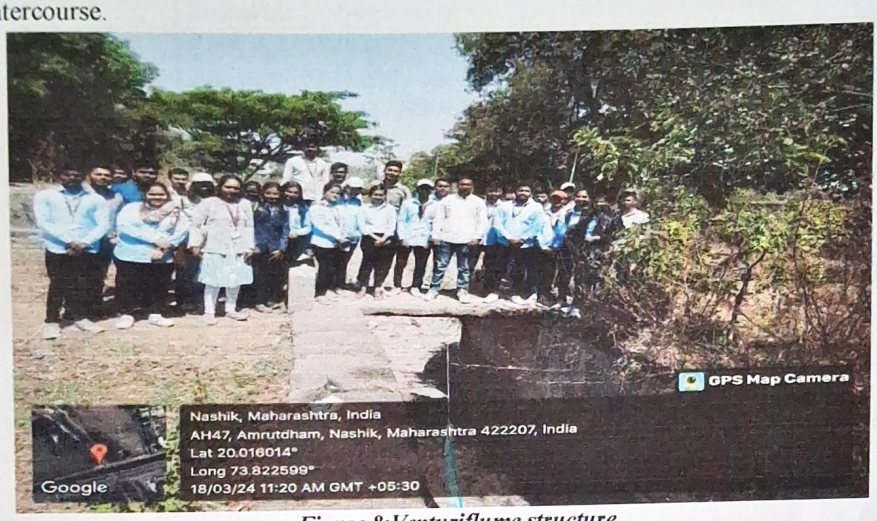

Figure 8:Venturiflume structure

3. Rigid modules – These are structures in which the discharge is constant and fixed within limits, irrespective of the fluctuations of the water levels of either the distributary or of the watercourse or both.

Conclusion of the visit

1. Students learnt how a CD works.
2. Students understood the types of CD works.
3. Students learnt why CD work is needed.
4. Students learnt how CD work can be avoided.
5. Students understood the types of pressures acts on CD work.
6. Students learnt to apply theoretical knowledge to practical situations.
7. Students studied the selection site for CD work.
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List of Staff Members for visit:

Sr. No.	Name of the Staff
1	**Prof. N.R.Nimse** **Assistant Professor** Dept. of Civil Engineering **Contact No.:** 7020561524 **Email id:** Nishigandha.nimse@sapkalknowledgehub.org
2	**Prof. A.U.Mankar** **Assistant Professor** Dept. of Civil Engineering **Contact No.:** 9421293530 **Email id:** Anilmankar@sapkalknowledgehub.org

Prof. N.R.Nimse	Prof. Dr. K. A. Salunke	Prof. Dr. S. B. Bagal
Visit Coordinator	**HoD (Civil)**	**Principal, LGNSCOE**

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