International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 10 Issue: 07 | July 2023 www.irjet.net p-ISSN: 2395-0072

A Case Study of Underwater Temple for 46 Years at Honnur, Belgaum

Roshan Ramesh Kavilakar[1], Vishal Vishwas Desai[2]

[1]Student, Department of Civil Engineering, Sant Gajanan Maharaj College of Engineering, Mahagaon, India
[2] Lecturer, Department of Civil Engineering, Sant Gajanan Maharaj Rural Polytechnic, Mahagaon, India

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Abstract - *This paper is the case study of an underwater Vitthal temple for 46 years at Honnur, Belgaum District Karnataka. the temple is in underwater due to construction of Hidkal dam in that particular area. In this paper the detailed study of underwater temple includes general details of temple, ancient temple construction technology and construction material used in temple.*

Key Words: **Underwater temple, Ancient construction technology, Rocks, Lime mortar rig, Stepped square slab.**

1.INTRODUCTION

Karnataka is a state with a rich cultural and heritage that is enriched with architectural Jewel's. India has 38 world heritage site that include 30 cultural, 7 natural and 1 mixed site. Karnataka has 2 UNESCO world heritage site that are popular destination and tourist attraction Hampi and pattadakal. Hampi boasts of the ruins from Vijaynagar empire and is an ancient village located in north Karnataka, the pattadakal was built 18th century by chalukya dynasty.

The Vitthal temple located at Honnur village, Belgaum district, Karnataka. This temple was built in 1928 by local governing authority. Total life of temple from 1928 to 2023 is about 95 years. Temple is located in the center of the Honnur village which located at the bank of ghatprabha river in Krishna River basin. After some decades the Karnataka governing body are decided to construct a reservoir (dam) across the ghatprabha river in that particular area due to this the number of villages are rehabilitated from reservoir ponding area but some temples were present as it is. In 1977 construction of reservoir (dam) are completed and the dam was named as Raja Lakhamagouda dam, also known as Hidkal dam. This name was given due to Raja Lakhamagouda Sar Desai was an Indian philanthropist, first Barrister-at-Law from Karnataka and a ruler of Vantamuri princely state in Belagavi district. He was the 16th ruler of Vantamuri princely state. He ascended the throne at the age of 13 years in 1877. The princely state had a Wada (traditional mansion) at Vantamuri which was built by Prabhu Basavantrao and it was submerged in 1978-79 when a dam was constructed at Hidkal dam.

Afterwards from 1977 huge amount of water are stored in reservoir due to this the Vitthal temple is present as it is location are submerged under water. In May 2023 due to delay in the monsoon and less rainfall intensity water level are dropped and the temple is reopened after from 46 years and it is very surprised that the temple is in good condition like just built in 2 days ago and other miscellaneous structure are collapsed and move away from location.

Fig -1: Partially submerged temple in summer, May 2022

Fig -2: Fully Resurfaced after 46 years in summer, Jun 2023

2. LOCATION DETAILS

The temple is 350m from honnur (newly rehabilitated) village, Belgaum district, Karnataka state. The temple is fro from 13 km from hattargi village Karnataka. The latitude and longitude of temple are 16° 9' 14"N and 74° 36' 28" E respectively.

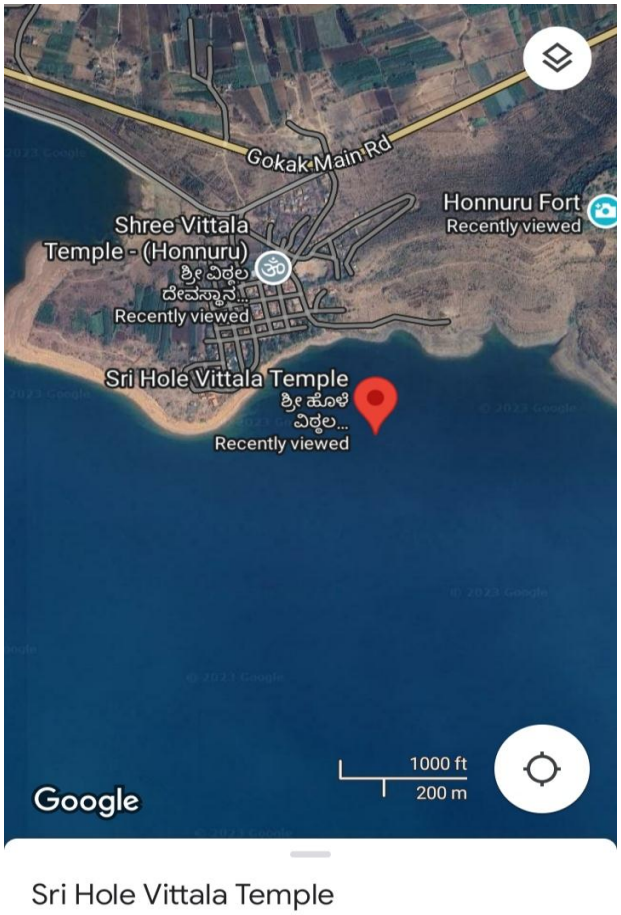

Fig -3: Google map location of Vitthal temple

3. AIM AND OBJECTIVE

3.1 To study the general details of Vitthal temple

3.2 To study the various ancient construction technology used in temple construction

3.3 To study and identity the construction materials used in the temple

3.4 To study the reason behind how temple is withstand in underwater for 46 years.

4. METHODOLOGY

4.1 Visual observation and identification

Visual observation includes instance crack, colour of material, Temple alignment, spalling, disintegration, staining and lack of uniformity, cleavage of rocks, rock grains

4.2 General details

It includes size of temple, type of structure, number of pillars, number and shape of arches, temple components, mortar rig mechanism by physical measurement

5. STRUCTURAL DETAILS

All temple components are constructed in stone masonry

5.1 Main Temple Details

Size of temple - Mandapa (Hall) 10 m x 8m x7m

Garba griha (shrine inside the shikhara)- 3m x 4 m x 7 m

Shikhara (tower) - 3 m x 4 m x 9 m, Number of steps 12

Number of stone pillars- 18 (Hexagonal basalt stone)

Number of stone beams - 11 (Rectangular sandstone)

Stone masonry plain slab size - 10m x 8m x 0.4m overall

Area of temple - 92 square meter

Plinth height - 0.25 m in stone masonry

Type of structure- Load Bearing structure

5.2 Temple side structure (for storage purpose)

5.2.1 Semi-circular arch (Roman type)

Number of arches - 20

Type of masonry - stone masonry

(Basalt and sandstone)

5.2.2 Stone masonry square stepped slab -

No of slab panel - 2

Size of slab- 3.5m x 3.5 m

Shape of stone used - triangular and rectangular

Fig -4: Front view of main temple

Fig -5: Back view of main temple shikhara

Fig -5: sandstone beam and slab of main temple

6. CONSTRUCTION TECHNOLOGY AND MATERIALS

6.1 Lime Mortar Rig Mechanism

Lime mortar rig is an arrangement or mechanism provided in which limestone are crush in fine powder form and after addition of River sand and water lime mortar are ready to use in masonry.

The mortar rig mechanism is constructed in South-East direction nearly 10m from main temple structure. After the details study it is observed that mortar rig is in damaged condition (Half diameter of rig is removed). This are constructed in shape Of Hollow circular. The external diameter is 5 m, and Lime stone crushing drain of size 0.2 m. (200 mm) width and depth 0. .3 m provided with side embankment of stone masonry nearly 0.2 m wall thickness

At the center of that hollow circle provided with 3m height vertical pole (post) and pair of bulls are moving around the pole during processing. The outer periphery of circle 1.2m diameter circular stone wheel are connected to pair of bulls along with horizontal shaft.

The pieces of lime stone are manually drop in the drain and pairs of bull rotated along, stone wheel. hence the lime stone are crushed and at this time water and River sand are mixed and through the outlet, lime mortar are taken to use for masonry

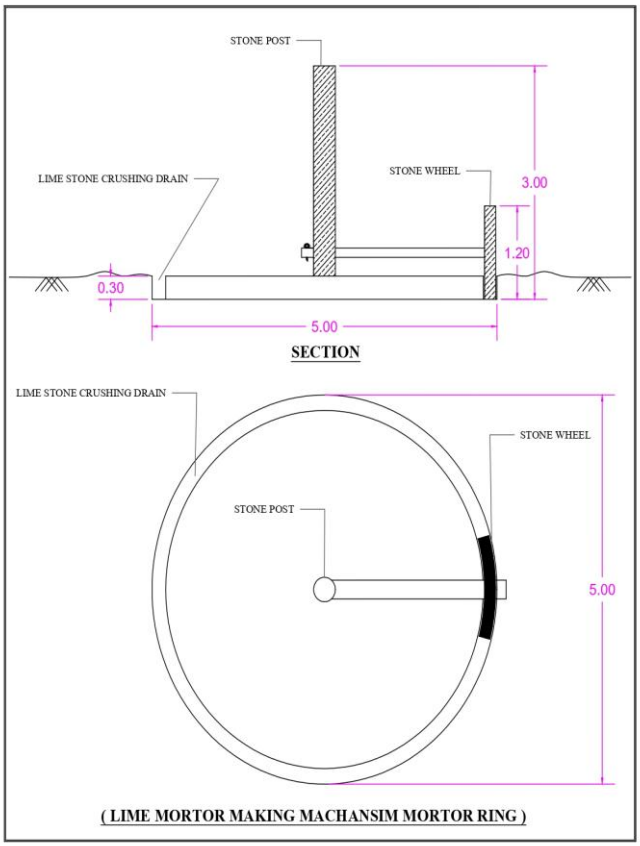

Fig -7: lime mortar rig plan and section by Satyam manjre

Fig -8: Existing lime mortar rig in temple site

Fig -9: stone wheel in lime mortar rig

6.2 Stone Masonry Square Stepped Slab

In temple area It is observed that span area about 2m x 2 m is covered with (Basalt & sandstone) masonry Arches and slab area more than 2m x 2 m or less than 3.5m X 3.5m special type of stone masonry that is square steeped slab are provided.

It has 400mm in total height of slab with each step are 100 mm thick along with square pattern. In this pattern sandstone are used. from the bottom of this slab, it is seen that each step of slab like the Triangular and rectangular in shape and the top of step is in square shape. divided in two parts.

Fig -9: sandstone masonry square stepped slab

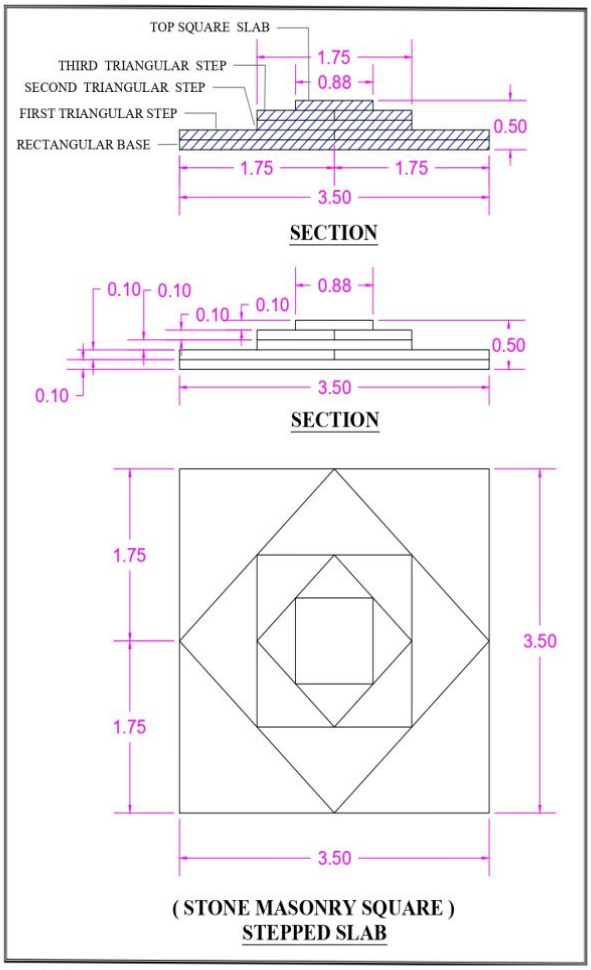

Fig -10: stepped slab plan and section by Satyam manjre

6.3 Construction Material

6.3.1 Basalt

After visual observation and Investigation with help of magnifying glass & measurement scale. it is seen that Basalt rock are used for main temple structure for wall and pillar. It is observed in temple site basalt rock are Dark in colour (Black), fire grained texture, rough stone, No vesicular texture, no cleavage. Basalt under the classification of Igneous rock, there is no any minor crack present in a stone masonry, No spalling & disintegration in stone masonry.

In stone masonry no any minor crack is seen and temple alignment very sharp and accurate.

Fig -11 : Basalt stone sample

Fig -12: Basalt stone used in main temple structure

6.3.2 Sandstone

After visual observation and Investigation, it is seen that sandstone are used as stone in main temple as slab panel and sandstone beams and also used in Arches, square steeped slabs in temple side structure

It is observed in field that sandstone is coarse to fine grained particle, presence of cemented sand grains, yellow and light white in colour, Dull luster, rough texture, it is classified under the classification of Sedimentary Rock.

Fig -13: Sandstone sample

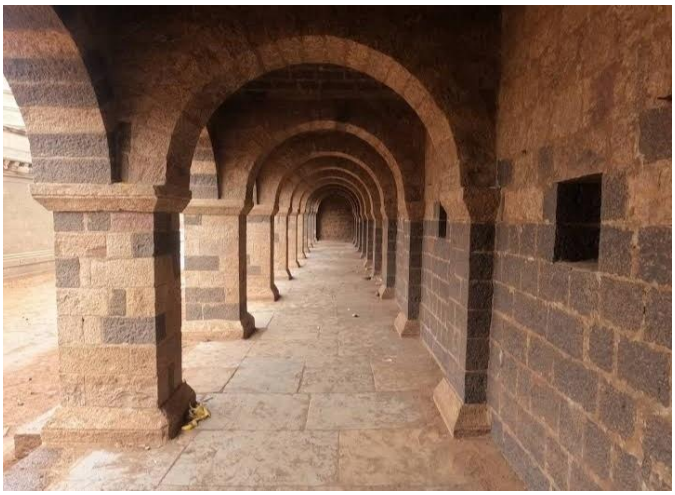

Fig -14: sandstone used in arches

7. CONCLUSION

All the below conclusion are made on the basis of visual observation & detailed study of temple

7.1 the temple and side structure are constructed in Basalt and sandstone rocks and Special type of lime mortar used

7.2 In temple ancient construction technology such as mortar rig (mechanism) And square steeped stone slab, stone masonry Arches are used is studied

7.3 The general details of temple such. size of temple, components of temple, type of arches used is studied

7.4 Basalt has greater durability, lifespan, strength (>100Mpa) and sandstone have good durability, Aesthetic, versatility, anti-skid and during observation it is observed that some components of masonry are joined by locking arrangement like hemandpanti architect also pure natural

form of limestone used hence temple is withstand in underwater in good condition.

8. ACKNOLOGMENT

Author[12] are like to express gratitude to Mr. Akshay Desai sir who gave the concept of ancient construction technology.

The Auther[1] grateful his uncle Ramchandra kavilakar who encouraging me in all of my pursuits and inspiring me to follow my dream and also author[2] is grateful to his father vishwas Desai for his constant encouragement

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10. BIOGRAPHIES

First Author:
Mr. Roshan Ramesh Kavilakar
B.E Civil Engineering,
Sant Gajanan Maharaj College of Engineering, Mahagaon

Second Author:
Mr. Vishal Vishwas Desai
Lecturer,
Sant Gajanan Maharaj Rural Polytechnic, Mahagaon