Innovations in Development of Yadagiri Gutta Temple in Telangana State, India

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Abstract. The Paper presents some of the challenges encountered in the Development of the ancient Yadagiri Gutta Temple, located on a hillock, in Yadadri - Bhuvanagiri District of Telangana State, India. A major hurdle was the dismantling of the entire Temple and associated buildings (other than two very sacred structures), without causing inconvenience to the daily flow of pilgrims. The second challenge was to increase the area of the Temple from the existing half acre on top of the hillock. This involved the construction of a Retaining Wall of length 500 m and height 30 m, along the periphery of the hillock. The backfill created an additional space of 4 acres for additional structures and facilities. The construction of seven - storied Main Gateway of height 22 m, weighing 12000 t, placed on fractured boulders was completed successfully. The Temple is expected to have a longevity of 1,000 years. It was built of black granite stone. The compactness of the rock was ascertained through ultra-sonic pulse testing Following the Heritage norms, in place of conventional cement, lime mortar, prepared with ingredients of ink nut (haritakayi), jaggery and jute. The cost of the development was about Rs.1,000 crores. Work commenced in 2015. The Temple was inaugurated in in March 2022.

Keywords: Geotechnical Engineering · Heritagestructures · Retaining Wall Granitemasonry · Lime mortar

1 Introduction

Government of Telangana has proposed to develop the ancient Yadagiri Gutta Temple of Lord Lakshmi Naarsimha Swamy, situated on a Hillock in Yadadri - Bhuvanagiri District. For this purpose, most of the old Temple was dismantled to give way to new structures and facilities. The Paper presents the challenges that were encountered in the renovation and development during the period 2015–2022. The innovative solutions are described herein.

Yadagiri Gutta is a Hillock at an elevation of about + 500.00 m above MSL, comprising loose boulders of fairly large size and sheet rock.The rock s essentially Granite, an igneous grey stone. The Hillock has relatively steep slopes, and boulders are strewn on top of the Hillock.

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2 Dismantling of the Existing Temple

It was decided to dismantle the entire Temple and the structures in the premises, such as Shops, Rooms for Pilgrims, and facilities such as Ticket Counter,

Prasadam (Sacred Food) Counter. The only exception was not to touch the *Garbha Gudi* (the Holiest Place), where the Lord manifested inside the cave.

Also, the statue of Anjaneya Swamy near the entrance was not to be disturbed (Fig. 1). The Aerial View after dismantling is shown in Fig. 2

A major constraint was not to inconvenience the Pilgrims in any manner. The Temple was kept open all through the dismantling operations. A 'Balayalam' was improvised to facilitate the worship of the Lord.

It was noted that during the excavation of foundations near Anjaneya Swamy Statue, the bottom rock exhibited a minor opening, due to stress relief. This was immediately taken care of by chemical treatment and rock stitching (Fig. 3).

Fig. 1. Dismantling the Temple

Fig. 2. Bird's Eye View after Full Dismantling of the Temple premises

(a) : The Statue protected (b) : Stitching to close the rock opening

Fig. 3. (a): The Statue protected. (b): Stitching to close the rock opening

3 Retaining Wall

The area of the earlier Temple was half acre, which was not adequate to accommodate the new structures and facilities. It was proposed to construct a Retaining Wall all around the base of the Hillock, and to fill back with well –compacted gravel, to create new space of four acres (Fig. 4).

The length of the Retaining Wall was 500 m, of height 30 m (Fig. 5).This was an important component in the development of the Temple. (47) Bore holes were drilled along the periphery of the Hillock, carried to depth of 5 to 15 m, to reach hard rock. Weathered / Disintegrated Rock and boulders were encountered in most of the Bore Holes. The foundations were designed for Safe Bearing Capacity of 60 t per sq. m.

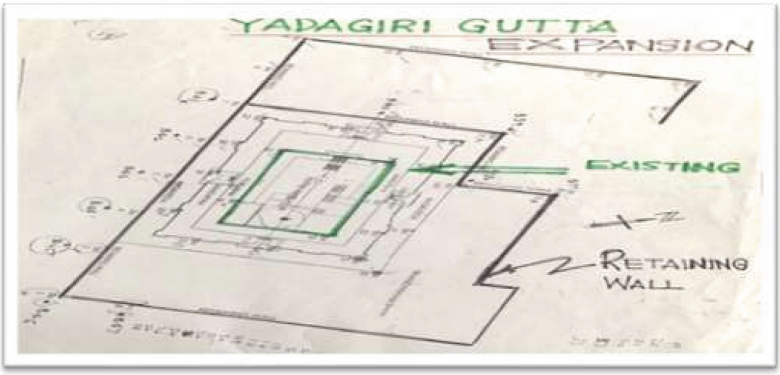

Fig. 4. Plan showing the Existing Temple and the proposed Retaining Wall

Fig. 5. Progress of Construction of Retaining Wall

Fig. 6. Foundation Area for the Main Gateway

4 Main Gateway

The main Gateway is a seven- storied sculptured structure of height 22 m, weighing about 12,000 t. During excavation, the foundation material was found to be unreliable, comprising irregular boulders with large openings (Fig. 6). The required Safe Bearing Capacity was 80 t per sq. m. Considerable anchoring, stitching and grouting were used to obtain a strong mass for the foundation.

5 Materials of Construction

The Temple is expected to have a longevity of 1000 years. As advised by the Sculptors, the rock for the large number of sculptures and pillars was brought from Prakasam District in the State of Andhra Pradesh. About 90,000 cu m of rock was transported

to the Temple. Locally, the rock is called 'Krishna Sila', (the geological name is Basic Charnockite) , being black in colour and possessing very compact structure. Ultrasonic Pulse velocities were measured up to 5000 m per sec, to ascertain the soundness of the rock.

Further, for placement of sculptures, the sculptors did not want cement; a unique mixture of lime, jaggery, fibre and a vegetable seed *Haritaki* (Indian hog plum) was used. According to the traditional building concepts, this combination of indigenous materials gives a very long life to the construction joints [1].

Among other features, the Man Hall was designed for a span of 33 m to accommodate a large number of pilgrims. The new *Gopuram* (Ornamental, Monumental Tower) over the Lord's Abode, was raised as a frustum of pyramid, over the existing Tower) [2].

6 Closure

Foundation stone was laid in the year 2015. After renovation, the Temple was declared open on 28th March, 2022 (Fig. 7). The total cost of Renovation and Development was about Rs. 1,000 crores. A Temple City is under construction in an area of 850 acres. What was once an ancient Cave Temple of the Lord Lakshmi Narasimha Swamy, has now been restored to be one of the biggest Temples in the country, carved in unique stone. The Temple is expected to be a major fillip to the religious, cultural and tourist development in the State of Telangana.

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Fig. 7. Renovated and Developed Yadadri Temple

References

1. Ranjan Gopal , A.S. Rao. Basic and Applied Soil Mechanics. New Age International Publishers.2020
2. Wu F, Wu J, Bao H, Bai Z, Qiao L, Zhang F, Li B, Si F, Yu L, Guan S, Sha P. Rapid intelligent evaluation method and technology for determining engineering rock mass quality. Rock Mechanics Bulletin. 2023 Feb 11:100038