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Geotechnical Investigation of Foundation of Tukaram Gatha Mandir at Dehu

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ABSTRACT:

A method for calculating the safety of on rock foundations is discussed in the context of strength and total structural load. Because there are so many distinct load combinations and concurrent influences from so many diverse equipment and installations, large structure foundation designs are complex and time-consuming. Reliable foundations are essential for large structures since these engineering products are essential to the local economies. Due to the importance of the investment and the high costs, all buildings, independent of the soil conditions, are placed into the third geotechnical category. The foundations of this building must exceed safety requirements for the structure and ensure proper communication between machinery and neighbouring objects. To ensure that the equipment is functioning effectively, it is essential to adhere to strict standards for both the total, vertical displacement of the foundation as well as the differential settlements between various foundation locations. In order to analyse foundational strength analysis, rock properties like compressive strength are experimentally estimated together with complete structural load calculations.

Keywords: Hardness & Compressive Strength, Rock Mass Stability, weathering terminology.

Introduction:

The "International Society for Rock Mechanics" (ISFRM) hosted the first Conference on Rock Mechanics in Lisbon in 1966. The term "rock mechanics" was initially defined in 1964 by the Committee on "Rock Mechanics of Geological Society" (RMOGS) of America, and in 1966 by the Committee on Rock Mechanics of the National Academy of Sciences. Rock mechanics is the name of the theoretical and practical study of rock behaviour. That branch of mechanics is concerned with the responses of rocks to their environment. These techniques can be used for excavation on both the surface and below the ground. Planning and designing a mine involves many different factors, including the selection of mining methods, the appropriate design of the support system, and the guidelines for drilling and blasting.

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The Tukaram Gatha Mandir in Maharashtra is a well-known temple. This is situated at Dehu near the bank of the Indrayani River. Rich Temple Committee members donated all the supplies for this project through various devotional funds. Gatha Mandir has a total area of 7 acres and 30 guntas. 2 Acres with a Large Yard On the third floor of the main Gatha temple is a stunning 35000 square foot divya. The main temple is 125 feet tall and has five spires. It features five octagons with mythological themes. The temple includes nine shikharas, 33 kalas, four shikharas, four squares between the octagons, and four spires that are 85 feet tall. the octagonal centre A stunning panchadhatu grand heavenly idol of Sri Tukobaraya appropriate for the temple. The interior wall of the octagonal temple is covered with a grand engraving of 4145 Abhangs and 108 Names of Sri Tukobaraya on fine marble. The upper octagon wall features an attractive immortality vision of four endearing deities and four different Jagadguru Sri Tukobaraya incarnations across the four yugas. Interesting coloured Poopi carvings in the inside of the Bansi Pahadpur stone carvings temple.

Literature Survey

So-ngo In 2004, Clifford Teme and Patrick Omorodion Youdeowei At the time of the investigations (18th28th November 2002), steel sheet piles were suggested and used as foundation systems for the shore protection works, with the length of the sheet piles equal to H + Df + h, where H is the depth to the bottom of the river bed at low-low water, Df is the depth of embedment of the pile into the bearing medium, and h is the height of the sheet pile above

the river bank cliff (free-board). Wales of the steel-type with vertical separations of roughly 1.50 metres were utilised as reinforcement for the sheet piles that were inserted. To prevent the positioned sheet piles from failing due to flexural and/or buckling failures, steel tie-backs were used.

The most crucial component of any structure is its foundation, according to Abhishek Arya, Dr. N.K. Ameta in 2017. It bears the weight of the entire structure, hence it is crucial to properly design the building's foundation. The two main design considerations are the bearing capacity of the subsurface soil and footing settling. For a very long time, a lot of effort has been done to determine the soil's bearing capacity and the footing's settlement. In this essay, the previous research on topics is reviewed.

2005 saw J. Li and E. Villaescusa, For complete rock and rock masses, new correlations between critical strain and compressive strength and critical strain and modulus have been found. The work is based on a substantial body of laboratory rock testing data, data on the classification of rock masses, and expertise with numerical modelling in underground mining operations in Western Australia. The two methods lend credence to the idea that a rock mass's critical strain is lower than an intact rock's critical strain. In addition, a novel relationship based on critical strain has been devised to predict the compressive strength of the rock mass. Critical strain estimates for rock mass strength are consistent with predictions made by applying the available empirical techniques.

(2015) Mingqing You Tensile strength of the rock is required when estimating in-situ stress during hydraulic borehole fracturing. Even though they may accurately reflect the relationship between the strength of rock and confining pressure, certain strength criteria with three parameters lead to tensile strengths with large variations. The criterion with tension cut-off is appropriate to all rocks, but the exponential criterion yields reasonable magnitudes of tensile strengths for granites while overestimating those for other cocks. When the maximum horizontal principal stress is two times greater than the mince one during hydraulic borehole fracturing, the breakdown pressure will be lower than the shut-in pressure. This is not the peak value in the first cycle, but rather the point at which the slope of the pressure-time curve starts to decline.

Methodology:

Pre-survey:

The methodology used to create the current project work is based on the collection and reading of research papers, reports, reference books, and textbooks. First, we obtained approval from the president of the Tukaram Gatha Mandir using a letter from our college. After receiving the President's authorization, information regarding the building was obtained. the historical and architectural details they provided. Following that, pictures of the building's grounds were taken. The constructional perspective point has some drawbacks, which were noted..

FIELD INVESTIGATION:

Following the preliminary site inspection and ongoing communication between our batch and the company, we began the field investigation. In order to determine the valley and pier foundation, we conducted a surface survey and a river basin study at the site. We learned several aspects for foundation analysis within the same visit. Following our conversation with the corporation, we asked for the real core analysis, which was collected from various chainages and RLs to determine the depth of new rock along the proposed building's alignment. In this manner, the site inspection and field inquiry were supervised by our guide Dr. P. D. Sable. Under the direction, each core was categorised according to its location, core boxes, sequencing of core logs in boxes, choice of core box, washing for accurate interpretation, and measurement with lithological features in accordance with various lab standards. The core log in the core box is sequenced.

Methods For Analysis

Rock mass classification systems place different emphases on the various parameters, and it is recommended that at least two methods be used at any site during the project. Methods are:- • Rock Quality Designation. • Rock Mass Rating. • Rock Structure Rating. • Rock Tunneling Quality Index

ROCK QUALITY DESIGNATION (RQD):

Rock-quality designation (RQD), calculated as a percentage of the drill core in lengths of 10 cm or more, is a crude indicator of the degree of jointing or fractures in a rock mass. Low-quality rock has an RQD of less than 50%, whereas high-quality rock has one of over 75%. There are various meanings for "rock quality designation" (RQD). D. U. Deere created the term that is used the most in 1964. It is the percentage of solid core pieces recovered from boreholes that are longer than 100 mm, as measured along the core's centerline. If a piece of core is not solid and rigid, even if it is 100 mm long, it should not be counted.

Rock mass rating:

The Rock Mass Rating (RMR) method, also known as the Geomechanics Classification, was described in detail by Bieniawski in 1976. The reader should be aware that Bieniawski has significantly changed the ratings given to many characteristics, as this method has been improved over time as more case records have been analysed. The discussion that follows is based on the classification as it was published in 1989 (Bieniawski, 1989). The topic of

determining the strength of rock masses is covered in both this version and the version from 1976. The rock mass sits on the cusp of the "Fair rock" and "Good rock" classifications, according to the RMR value of 59. It is advisable to use the support recommended for fair rock during the first stages of design and construction. It should be able to gradually lower the support needs to those suggested for a good rock mass if the construction is going well, there are no stability issues, and the support is operating extremely well. Additionally, it is advised to try the less expensive and extensive support specified for good rock if the excavation needs to be stable for a little period of time. But if the surrounding rock mass is anticipated to undergo significant change.

ROCK STRUCTURE RATING:

Developed by Wickham, Tiedemann, and Skinner, the Rock Structure Rating (RSR) is a quantitative tool for describing the quality of a rock mass and adequate ground support, particularly for steel-rib support. Any tunnel section's RSR value is calculated by adding the weighted numerical values assigned to each parameter. A highly helpful way for choosing steel rib support for rock tunnels is the RSR concept. As with any empirical approach, the notion should not be employed outside the bounds of the adequate and trustworthy data used to establish it. The RSR idea is not advised for the selection of rock bolts and concrete support because of this.

ROCK TUNNELLING QUALITY INDEX:

Barton, Lien, and Lunde created the Q-system to categorise rock masses. The so-called Q-value, which serves as the basis for design and support suggestions for subterranean excavations, expresses the quality of the rock mass.

Objective:

1. To understand the foundation rock and it's engineering geological properties
2. To understand the strength of overall building structure.
3. To study the load bearing capacity of the foundation rock based on various rock mechanical properties.

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List all the material used from various sources for making this project proposal

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