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Role of Geologists During Tunnel Construction and Face Mapping to Decide the Required Tunnel Support

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Abstract: ***The stability of underground structures is an important aspect during design, construction and execution Phase. Depending on the geotechnical conditions and influencing factors, different failure modes during execution mode can be expected, and depending on the potential failure modes, boundary conditions and specific construction measures to ensure stability have to be chosen. The most important is developing a realistic estimate of the expected ground conditions and their potential behaviour/failure modes as a result of the excavation. The variability of the geological conditions including local ground structure, ground parameters, stress and ground water conditions requires that a consistent and specific procedure is used. The other is to design an economic and safe excavation and support method for the determined ground behaviours. The discussion of role of geologists during design stage is beyond the scope of the present study. The main objective of this study is to present the role of geologists during the construction stage.***
Keywords: Geologist, Stress, Behaviour, RMR, Q Value, RQD, Rock Mass

I. INTRODUCTION

After blasting in tunnels, Geologist is the first person to determine actual ground type (GT), assessment of the behaviour in the excavation area, determination of excavation and support (following the design given by Design Consultant), check of the system behaviour and geotechnical safety management.

For determination of Ground type and its behaviour, detailed face logging on the scale of 1:100 is used to be done and different engineering geological parameters, such as, weathering/alteration, structure, colour, grain size, rock type, groundwater influence, details of discontinuities (number of joint sets, orientation, persistence, spacing, aperture/thickness, infilling, waviness and unevenness), etc. are to be collected.

The data collected since then would be utilized for rock mass classification, which is an empirical approach for determining support requirements. Few schemes for rock mass classification would be used here; those are Rock Mass Rating (RMR) and Geological Strength Index (GSI). These involve degree of fracturing in the rock mass as the main input parameter. For calculation of RMR, six parameters would be taken, i.e., Uniaxial compressive strength of the rock, Rock Quality Designation (RQD), groundwater conditions, spacing, conditions and orientation of discontinuities. Then GSI is used to be calculated, i.e., RMR'-5. In case of calculation of Q, the in-situ stresses and random joints are taken into consideration. For determination of Q-value, the following equation would be used: Q= (RQD/Jn) X (Jr/Ja) X (Jw/SRF); where, RQD=Rock Quality Designation; Jn=Joint set number; Jr=Joint roughness number; Ja=Joint alteration number; Jw=Joint water reduction factor; SRF=Stress reduction factor.GSI is in use to properly demarcate the geo-mechanical properties of the rock mass, starting from intact rock, taking into consideration the discontinuity network and the relative geotechnical characteristics.

The structural geological data (dip amounts and directions of joints and bedding planes/foliation planes, etc.) collected has to be plotted by using spherical projections (stereo net). The stereo net plot of these data would also be used to identify the wedges and the stability of the face. The Unwedge Software would be used for identifying and analyzing the character and behaviour of the wedges that would develop due to conjugate joints. If required the same software would also be used to determine the rock-bolting pattern to protect the slide prone wedges.

II. CONCLUSION

Geologists have a pivotal role in investigating ground conditions and assessing the key design parameters in design modelling, monitoring and in observing the changing ground conditions during construction. Geologists are also involved in decision-making processes for altering support types based on feedback from performance monitoring.

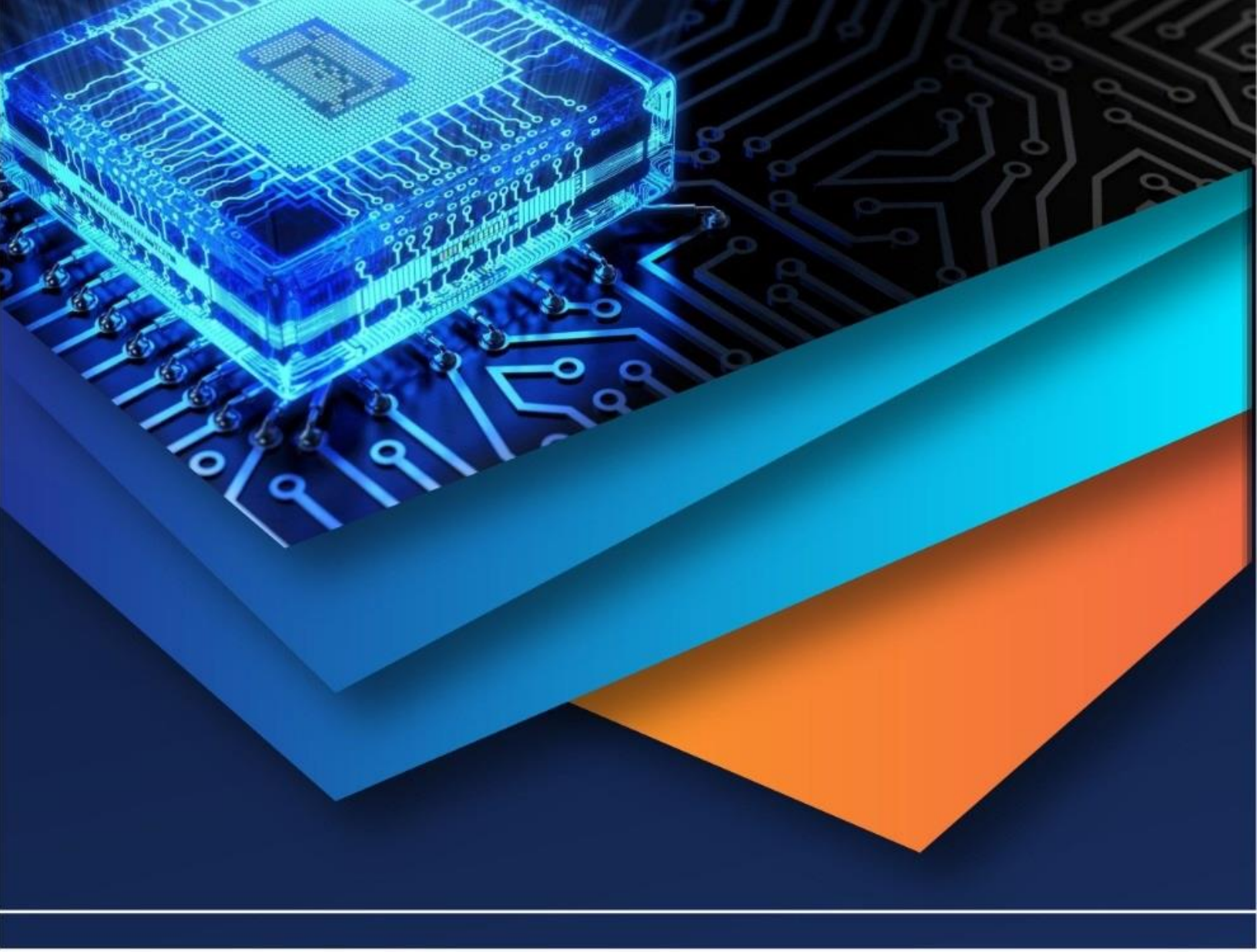
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REFERENCES

[1] Wadia D.N. (1975)., Geology of India., Tata McGraw-Hill Publishing Co., New Delhi, 4th edition. (Tenth reprint).
[2] "The Himalayas startling discoveries", *India Today* (an English Magazine), March 15, New Delhi, India 1993, pp. 90-101.
[3] Dube, A. K. (1979). "Geomechanical evaluation of tunnel stability under failing rock conditions in a Himalayan tunnel", Ph. D. thesis, Dept. of Civil Eng., University of Roorkee, India.
[4] Deepak Parkash Gupta IJRDT Volume-16, Issue (Sep-21)Case Study of Bali Landslide, along National Highway-44, Jammu & Kashmir; India.
[5] Vinay Kumar Pandey, Geological & Geotechnical Challenges in road widening, national highway 44: Jammu-Udhampur-Banihal-Qazigund, J&K, India.

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