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Assessment of supporting system of Hulu Terengganu hydroelectric surge chamber cavern in Malaysia

ONIMISI A JIMOH, SHEHU SHAIB ABDULAZEEZ, MOCHAMAD TRISUGIWO
& HAREYANI ZABIDI*

School of Materials and Mineral Resources Engineering, Engineering Campus, Universiti Sains Malaysia,
Engineering Campus, 14300 Nibong Tebal, Pulau Pinang, Malaysia

*Corresponding author email address: srhareyani.zabidi@usm.my

Abstract: When rocks are excavated, the in-situ stress is disturbed and thereby causing a state of instability due to the deformation caused by the creation of space in the in-situ rocks. This research assessed the supporting system used in a surge chamber cavern excavated for Hulu Terengganu hydroelectricity project in the northwest of Peninsular Malaysia. The results obtained were compared with the installed supports. Geological mapping of the excavated region was carried out to outline the discontinuity parameters of the rock. The rock mass quality (Q), the rock mass rating (RMR), the geological strength index (GSI) and the uniaxial compressive strength were evaluated using standard methods and procedures. The strength and rock mass properties were further used to classify the rock and establish the required standard supports for the surge

chamber cavern. The wall height is approximately 40m. It requires systematic bolting with 7 to 11m length of rock bolt at a maximum wall spacing of 1.5m. The required reinforce shotcrete falls within a thickness of 50-90 mm. The currently installed shotcrete is within the minimum of 50mm thickness and has a spacing of 3.0m along the wall which is too large for reliable safety. The cavity of the crown is critical and to consider unforeseen geological weaknesses in rock mass, maximum safety must be ensured by increasing the current thickness of the shotcrete and reducing the spacing to a maximum of 1.5m as evaluated using the rock mass properties.

Keyword: Rock mass rating, geological strength index, deformation, shotcrete, cavern