

A Preliminary Study of Economic Dimension of Underground Rock Caverns for Water Storage at Singapore

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Abstract : Due to scarce land resources in Singapore, it is imperative to increase water storage capacities to meet the increasing demand of water to secure a sustainable development, which can be achieved in the underground by rock caverns. In this paper, a preliminary study on the effects of cavern span, height and radius on the cavern stability is presented to provide a guidance on the cavern construction in the context of Singapore. It is found that the radius of caverns should be around half of the span width (i.e., $B/R=2$) to reduce vertical displacement at the crown of cavern. The smaller the rock cover, the smaller displacement. The minimum rock thickness should be at least the same as the cavern span to eliminate excessive yielded element. Finally, rock support system is introduced to maintain the profile of caverns.

Keywords : cavern dimension, numerical modelling, sustainable development, underground rock cavern

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