

EXCAVATION AND SUPPORT FOR WEAK ROCK MASS ENCOUNTERED DURING CONSTRUCTION IN A LARGE UNDERGROUND CAVERN

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Abstract

The excavations and providing support for large underground caverns in a weak rock mass offers many challenges, during its construction. Errors in judgments of the complicated geotechnical conditions can lead to design inadequacies increasing the risk of very costly failures.

The large underground cavern project is being constructed for the storage of crude oil (storage capacity 2.55 million metric tons) in Padur near Udupi Karnataka. Padur underground storage consists of parallel storage unit1, unit 2, unit 3, & unit4. , The unit 1 consists of two parallel caverns as Cavern PUA 11 and Cavern PUA 12. The Geometry of cavern PUA 11 is 656.0m length, variable height 28.93m to 31.39m, and 20.0m width. The geometry of Cavern PUA12 is 656.0m length, variable height 22.0m to 28.81m, and 20.0m width. The fractured basic dyke rock accompanied with intermittent shears seams and dripping water conditions resulted in weak conditions encountered in cavern gallery of Unit 1. The Excavation process has been done in pilot and side-slashes separately during the construction of top heading for the weak rock mass and keeping the view of support implementation in weak rock mass zone.

The support system are consists of Rock bolt, Steel fiber reinforcement shotcrete (SFRS) and grouting. The dimension of rock bolt is 6.0m long,

25mm dia and spacing is 1.5m center to center. Applied SFRS thickness is 150mm. The study presents an example of proper engineering approach commonly applied in the fields of Civil and Mining engineering works, towards developing and application of support systems to address weak rock mass conditions in large underground caverns.