

STABILITY ANALYSIS AND REINFORCEMENT OF THE EXISTING KARST CAVE PASSING THROUGH YUJINGSHAN TUNNEL

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High-speed Railway tunneling in karst terrain presents a huge challenge to the engineer including the identification, stability analysis and reinforcement of the karst cavities. The Cheng-Gui high-speed railway tunnel had to pass through the largest karst cave discovered in tunnel construction. To guaranteeing the tunnel construction safety, a series of corresponding prevention and control measures are put forward. To begin with, geological drilling, electromagnetic method and surface electrical resistivity tomography are adopted to detect and delineate the underground karst zone. Based on the detection results, this paper has put forward strategies to make the pre-support of karst cave and the main technical of those strategies include: the side-walls or in the crown was applied with shotcret (C40 steel fiber concrete); use expanding-shell pre-stressed hollow anchor rod and pre-stressed cable reinforcement; fix steel-mesh-bolting; the shotcrete sealing was applied. Moreover, if instabilities would develop in the side-walls, it should be sufficient to stabilize the cavities, to do dental cleaning of the broken rocks, and fill the voids with shotcrete or pumped lean concrete. At last, systematic grouting treatment around the excavated section, and was excavated with the layer-step method.

The solutions presented here may provide guidance for the design and construction of high-speed railway tunnels to be implemented affected by karst processes. The technical validation of the proposed solutions was demonstrated by the successful completion of the Yujingshan tunnel.

