

Construction of Diversion Tunnel of Koteshwar HEP through Weak and Complex Geological Setup – A Case Study.

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Abstract

A 400 MW Koteshwar Hydro Electric Project (Koteshwar HEP) is an integral part of Tehri power complex comprising 1000 MW Tehri Hydro Power Project (Tehri HPP) and 1000 MW Tehri Pumped Storage Scheme (Tehri PSP) to develop hydroelectric potential of river Bhagirathi. The project envisages of 97.5 m high gravity dam across river Bhagirathi located at about 20 km downstream of Tehri Dam; a surface powerhouse with installed capacity of 4 x 100 MW on the right abutment at a distance of 125 m downstream of the dam axis and a 591 m long diversion tunnel of 8 m diameter passing through left abutment to divert non-monsoon discharge (design discharge of 670 cumecs) during construction period.

Slope wash material of ± 30.00 M thickness with RBM at base represents the slope morphometry above the alignment of Diversion Tunnel in Inlet area. A huge succession of slates/phyllite with occasional bands of fine sandstone or siltstone constitutes the typical bedrocks of the area. This sequence has been classified as Chandpur Formation of Jaunsar Group. The bedrocks on the diversion tunnel area have very consistent bedding dips in $75^{\circ}/350^{\circ}$ with other defects oriented in $40^{\circ}/85^{\circ}$, $55^{\circ}/90^{\circ}$ and $70^{\circ}/250^{\circ}$ directions. The rockmass condition deteriorated drastically, once Shear seams of varying thickness were encountered during construction of the Tunnel, at different chainage. Besides the different set of discontinuities and shear seams, a complex folding pattern in this rockmass is also reported. Flexures are formed by a few parallel overturned synclines and anticlines. Diversion tunnel stayed constructed in above said Geological Setup by providing different engineering solutions.