

ENGINEERING GEOLOGICAL OPTIMIZATION OF TUNNEL ALIGNMENT.

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A water conduction tunnel generally has the entrance and outlet as fixed points, and the adopted alignment is a straight line, since that will be the shortest way and is presumed to be more economical. Notwithstanding, the tunnel may cross adverse conditions along the line; the required supports might be intense, causing great delay in construction time and considerable increase of costs. However, if the local geology is sufficiently investigated in the design phase, adverse conditions may often be avoided by an alternate alignment, to escape from such adverse conditions, which may be slightly longer but more economical. In such a way, a straight line is not always the best alignment for a conduction tunnel. This paper mentions, as examples, three instances in which curved or S shaped stretches of tunnels were adopted, avoiding unfavorable geological conditions. The assessed geomechanical conditions along the non-linear alignment showed to be more convenient as compared to the original straight line. Two of the cases refer to water conduction tunnels. One of them is the a ca. 9m diameter water coolant tunnel of the Angra dos Reis NPP in Brazil in gnaisses, and the other is the Jachacuesta tunnel of the Pasto Grande Project in Peru, where high pressure water bearing unconsolidated moraines were avoided. The third case consider an underpass for the Bolivia-Brazil gas pipeline, driven in basalt flows, consisting of a 760m long horizontal tunnel and a 370m deep shaft.