

## **Ten Commandments for Using RMR and Q**

RMR and Q Systems are becoming increasingly popular in India as elsewhere in the world. They have sustained the test of time for nearly four decades now. However, it is very important to ensure their proper application so that positive results can be derived. Given below are guidelines advocated by Barton and Bieniawski (2008) authors of the two most widely used of rock mass classification systems.

1. Ensure that the classification parameters are quantified ( measured and not just described) from standard tests, for each geologically designated structural region, employing bore holes, exploration adits and surface mapping, plus seismic refraction for interpolation between the inevitably limited numbers of bore holes.
2. Follow the established procedures for classifying the rock mass by RMR and Q and determining their typical ranges and the average values.
3. Use both the systems and then check with the published correlations of Bieniawski and Barton.
4. Estimate support and rock reinforcement requirements. The Q System supplies permanent support only if B and S(fr) are of good quality,
5. Estimate standup time and rock mass modulus for preliminary modeling purposes. A stress dependent modulus is needed if the depth is significant. Perform numerical modeling in appropriate cases (large spans, special conditions) and check if sufficient information is available.
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7. If sufficient information is not available, recognizing the iterative design processes, request further geological exploration and parameter testing, e.g. stress measurements, if necessary.
8. Consider the construction process, and in case of TBM feasibility studies, estimate the rates of advance, using the  $Q_{TBM}$  and RME methods.
9. Ensure that all rock mass characterization information is included in the geotechnical baseline Report, which discusses design procedures, assumptions and specifications.

10. Perform RMR and Q mapping as the excavation proceeds so that comparisons can be made of expected and encountered conditions, leading to design verifications and changes.

Our comment: The above guidelines are a sure recipe for successful project implementation.

Reference: Barton, N. and Bieniawski, Z.T. (2008). RMR and Q setting Records. *Tunnels and Tunneling* February 2008 pp 26-29.