Guest Editorial

Since the last decade, the Government of India (GOI) has attached the highest priority to the development and expansion of physical infrastructure like communications, water, power, housing in both rural and urban sectors and transportation including rural and urban roads; national highways; railways; ports etc. Christened the Pradhan Mantri Gram Sadak Yojana, a Whopping Rs. 600.00 billion scheme was launched in December 2000 with the aim of providing road connectivity to all rural areas with a habitation of over 500 persons by the year 2007, a scheme in which 0.165 million rural habitations are expected to be benefited. The GOI has also undertaken another equally challenging program of construction of eight lane expressways connecting Srinagar in the north to Kanyakumari in south and Guwahati in the east to Mumbai in the west.

Creation of similar infrastructure like roads, housing, industry and as such any construction activity at high altitudes and in the hill areas of northern and north-eastern parts of the country poses an extremely difficult task, precisely because it involves the problem of creation of adequate space before any development is brought about. All these hill areas are tectonically and seismically very active. Experience gained over a period of last thirty years suggests that an additional investment of about 40 per cent of the total cost of construction is needed in hilly regions for proper development of sites, which are safe from the point of view of slope stability.

An important wing of transportation is the Railways and the country is proud of the famous Konkan Coastal Railway which was constructed in record time for transporting mineral resources between Mangalore and Mumbai ports. This konkan railway passes through many tunnel stretches and excavation of these tunnels, related construction technology and the design of their support systems require design parameters which are extremely difficult to estimate. All these projects pose very challenging problems related to rock mechanics and rock engineering. This is also true of another on going challenging rail line project, which connects Jammu with Srinagar in Kashmir via Udhampur. In case of both these projects, landslide hazard poses a major challenge in providing the uninterrupted traffic flow. The project bears importance especially for the army and the security services because transportation of equipments, machinery and manpower would then be much easier and less time consuming.

Realising the importance of landslides and the resulting hazards, Bureau of Indian Standards (BIS), New Delhi has constituted a special Hill Area Development Engineering committee for drafting of codes of practices in such difficult terrains. The code for Landslide Hazard Zonation Mapping (LHZM)- Macro-zonation has already been published and similar codes for micro-zonation and meso-zonation are in the drafting stage.

Out of the various means of producing electricity including atomic, thermal, gas based, hydro-power etc., hydro-power generation is probably the cleanest way of producing electricity. National Hydro-Power Corporation (NHPC), an agency involved in planning, design and construction of such plants, has alone got an outlay of Rs. 314.66 billion for the tenth plan period in order to realize the capacity utilization of 5,310 MW of power to the national grid. These hydro-power projects involve construction of a variety of structures including dams, water conducting tunnels, wide network of underground tunnels for access, transportation etc., large size underground power house caverns and de-silting chambers etc. apart from many

other appurtenant structures. Himalayas are tectonically very active, Himalayan geology quite fragile due to jointed nature of rock masses and the topography of the terrain so difficult. Analysis and design of such underground structures, which requires a combined application of the knowledge of geology, geophysics, hydro-geology, rock mechanics and rock engineering, is therefore a very difficult and a challenging task, especially due to: i) occurrence of geological faults, shear zones, thrust zones etc. ii) large in-situ stresses and iii) large tunnel convergence due to occurrence of squeezing ground conditions at many locations. The saturation of the rock masses consequent upon filling-up of the reservoir and the time-dependent behavior of rock masses further complicate the methods of prediction of realistic support pressures.

It is said that more thoroughly investigated tunnels are usually completed on schedule with fewer cost over-runs and therefore it is advisable to allocate a substantial funding from the overall project cost for geological, geophysical and geotechnical investigations during not only the planning and construction stages but also in the post-construction stage of any hydro-power project. In fact, a systematic instrumentation and monitoring program for monitoring the behavior of the ground and the supporting systems during all these three phases of construction must form an integral part of any hydro-power project, for which also it is advisable to allocate adequate funds. Such a program yields a vast quantum of data, which is extremely useful from the point of view of long-term stability of underground structures. All these aspects also assume importance for large underground tunnel networks, which are being planned in many metropolitan cities for creating mass rapid transit systems.

Finally, the Underground Space Technology (UST) has a major role in the present day context of nuclear warfare and in creation of infrastructure not only for civil but also for the defense services. This involves construction of underground nuclear shelters for civilian population in strategically vulnerable cities, large blast proof underground bunkers, storage facilities for warplanes; rockets; missiles and other explosives etc. IIT Roorkee and CMRI Regional Centre, Roorkee have made sufficient strides in this direction. Design and construction of these facilities also require thorough knowledge of rock mechanics and rock engineering and the country is really proud of organizations like DRDO, BRO, GREF and host of other such organizations for developing engineering skills required in the creation of such an infrastructure in the most difficult terrains.

Academicians, research workers, consultants and engineers working in the field are all welcome to contribute to the Journal of Rock mechanics and Tunneling Technology (JRMTT) by sending their technical articles or research papers. This is a medium for dissemination of all their knowledge gained either through research or through field experience, which can prove to be of immense use to the whole international community in future research, planning, design and construction. I, on behalf of the Editorial Board of JRMTT, congratulate and salute all those engineers who work in extremely difficult terrains and hostile conditions and explore an invaluable knowledge and therefore invite such people to write papers / articles and thereby enrich the Journal of Rock Mechanics and Tunneling Technology.

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