HILL ROADS – SAFETY CONCERNS

In the last few decades there has been a sharp rise in vehicular traffic accompanied by increasing incidences of road accidents and associated human injuries and fatalities. The roads in hilly areas, in general, are more accident prone due to inadequate sight distances, sharp curves, steep gradients and lack of visibility often aggravated by poor weather conditions. Further, difficult terrain conditions pose constraints in ensuring adherence to design and construction norms, as also safer operations. This calls for added vigilant application of safety principles during the planning, construction, operation and maintenance stages for prevention of accidents on hill roads.

While planning new road alignments on the hills, geologically unstable and fissured areas prone to landslide and erosion should be avoided. Due care has to be exercised in ensuring that the intervening road length connecting the obligatory points at different altitudes have gradients mostly within the ruling gradient limits. Adequate safety features like parapet/guide walls, safety barriers, drainage arrangements, appropriate signages, road markings, delineators etc. should be planned and provided.

During the construction stage, at the time of formation width widening, the rock cutting/ earth excavation without proper planning disturbs the natural inclination of the hill face thereby, creating conditions for large scale landslides, shooting boulders or rock fall. At places where the alignment passes through landslide prone areas, advance geological studies are required to be carried out and adequate protection works such as breast walls, retaining walls and toe walls have to be erected prior to starting the construction work. All visible cracks and fissures should be properly sealed. Wire crated check walls along the valley side should be provided with the formation cutting for retaining the excavated material so as to check the damage to the habitations in the valley. At the same time, the blasting operations should be minimum and well planned with controlled techniques. The accidents, may it be due to fall of boulders or blasting, cause loss of precious lives and property and hence to be avoided. Sufficient warning arrangement should exist at the site for the workers and public in such situations.

Landslides pose chronic problems causing damages to hill roads and loss of precious human lives and property. Landslides are frequent and annually recurring phenomenon in the hills. Most of the landslides occur due to exhaustive deforestation being undertaken for urbanization and plantation. In these areas, rainwater directly

penetrates into the soil and causes landslides. The identification of areas susceptible to landslides is necessary to support the infrastructure development plans in the hills in reducing the risks of potential damages to life and property. Timely mitigation measures should, therefore, be undertaken to either prevent or reduce occurrence of landslides. However, technological innovations in India in the area of landslide control have been very few and lot of work needs to be done in this area.

One of the major causes of failure of slopes and road formation in hills is poorly designed, constructed and inadequately maintained drainage system. Most landslides and damages to roads are associated with water either from rainfall or underground sources. Drainage system should, therefore, take care of cross-drainage, road surface drainage, sub-surface drainage and also erosion control. In hilly roads, the side drains should be large enough to effectively remove large discharges but, should not be deep enough for vehicles or pedestrians to stray into them. Gentle side slopes and shallow depths are preferred for safer traffic operations. Drains should also be easily maintainable by keeping wide flat bottom for easy cleaning and providing self cleansing velocities. Quick debris clearance of road side drains should be done to avoid flow of rainwater over the surface causing damage of surface and retaining walls by backfill penetration. The cracks and cavities developing along the hill slope particularly before and during rainy season need careful inspection and sealing well in time.

Hill roads are characterized by risk prone stretches like narrow widths, steep grades, sharp or blind curves and steep dangerous valleys. Parapets, guide walls properly white washed on both ends and white washed vertical strips on hill side at regular intervals serve as life saving guides as these afford a feeling of safety to the drivers and the pedestrians. Site-specific and appropriate safety measures like crash barriers, wire rope fencing etc. should be erected in high accident risk-prone road stretches for avoiding fatal accidents. An important element of traffic management is proper traffic signages, delineators and markings. The standard signs should be displayed in prescribed layout, convey a clear simple warning, command respect and attention of road users. The positioning of the signs must give drivers sufficient time to understand and respond to the information. Signs must be clean and well maintained. As fog is a problem in the hilly areas, use of luminous paints/strips may be used for signboards.

For enhancing road users' safety on hill roads, action needs to be initiated on priority for identification of accident black spots and taking remedial measures at such vulnerable, accident prone locations. This would also necessitate scientific investigations and analysis of accidents without relying merely on accident reports and data available with the local enforcement authorities.

(A.N. Dhodapkar)
Secretary General