

USE OF APPROPRIATE TECHNOLOGY IN DEVELOPMENT OF ROADS

The choice of the appropriate construction method for a work is governed by several factors such as terrain, climate, available resources, technical feasibility for the nature of operations and relative economy. Once a road project has been prepared, the prime objective of the Site Engineer will be to complete the construction to meet the stipulated requirements at the minimum cost and within the time schedule. Fulfilment of this objective will involve the choice of the appropriate construction technology which is economically viable and technically suitable for the type of work and for which the necessary resources are readily available or can be made available in time.

In the interest of better planning of works at site and economical execution of highway projects, the choice of appropriate construction methods and technologies under different situations is required for optimizing the cost, improving the efficiency and productivity. Some of these methods and technologies have been mentioned hereunder.

Use of Manual Method for Concrete Roads

Design requirement for construction of concrete roads for NHs, are different from that required, for concrete road at toll booths, low volume roads in villages, other district roads, at roundabouts and at-grade junctions in cities. For low volume village roads the requirement is a well-drained riding surface of width 3.75 to 5.5 m. For other district roads width of road is 5.5 m to 7.0 m. For road at junctions the requirement is width of road and adequate camber and the pavement has to withstand stresses due to axle load of vehicles etc. For such roads there is a need to use manual methods of construction. In manual methods, the mixing of concrete is in a small mixer located at site and don't require plasticizers and cement set retarders, no machinery for laying of concrete. The cost of 1m³ of PQC is low due to absence of machinery component. Roughness value of surface is not a criteria for acceptance of work. For execution of all such works the essential requirement is thickness of concrete road. The thickness can be achieved by manual methods of laying. Keeping in view what is expected of furnished road work it will be appropriate to use manual method of construction.

Use of Arch Bridges

For construction of bridges, if height of embankment is sufficient to accommodate arch bridges then there is a need to adopt such structures from aesthetic considerations. The load in arch structure is transferred to mother earth by development of compressive stresses in arch structure. Arch bridges are more durable and require low maintenance. The construction of arch bridges can be by using bricks, cement, steel, sand and aggregates. Know how for construction of arches is available in the country since long. There is a need to develop standard drawings for arch bridges for various

spans both for precast concrete and cast in situ arches. With availability of standard drawings and specifications the consultants will be encouraged to recommend arch bridges in DPR's.

Use of Local Soil and Marginal Stone Aggregates

For construction of roads, the stone metal and chips meeting the specification is used in the works. In case, the material does not meet the specification then it is not possible to use such materials. Stabilizers are now available which may be used to improve the strength of local soil and aggregates. Such soil stabilizers are accredited by IRC for use in pilot projects. To make use of locally available materials, MoRT&H had carried out a countrywide study under research scheme R1 in 1980s. There is an urgent need to update this important study. There is also a need to develop specifications for the stabilized soil and unconventional materials in pavement layers.

Modern Computer based Asset Management

Traditional system of repair by departmental road gangs at project level was workable when length of road and volume of traffic was low. Now with the increase in the length of roads, number of bridges and speed of traffic in network, a need has arisen to use survey vehicles for condition assessment of roads and to prepare road inventory. The data is stored in computers. With the availability of actual road condition and traffic input, it is possible to prepare realistic repair proposals and to rationally prioritize roads for taking up repairs under annual budget and other programmes. In this system there is a transparency at all stages of work. The repair estimate is prepared by qualified consultants using computer software. Modern Computer based Asset management needs to be developed in various states and at national level .

Thus, for any construction work, a broad spectrum of methods is available with the labor-intensive and equipment-intensive methods falling at either extremes and the intermediate methods falling in-between. In the choice of the most appropriate method(s) for road construction projects, economic viability among the technically feasible methods emerges as the most important parameter. An objective exercise for evaluating this parameter will require realistic productivity norms of the various methods under different site conditions so as to find out most appropriate method/technology. In this regard the existing relevant IRC Guidelines IRC:SP:24 "Guidelines on the Choice and Planning of Appropriate Technology in Road Construction" is presently under revision. Any suggestion and feedback on the same is welcome.



(Sanjay Kumar Nirmal)
Secretary General

SUSTAINABLE DEVELOPMENT

Communication network and more particularly road infra-structure is pre-requisite for economic and social development of the Nation and therefore its development assumes the highest priority. However, at the same time, it is also important to ensure sustainable development including protection of environment and maintaining ecological balance. Development of Road Infrastructure is one of the major important activity for ensuring communication among societies, districts, economic and industrial hubs. However, very often, when aligning Road network we come across number of ecologically sensitive area, wild life sanctuaries and other important places of archaeological and cultural importance and other sensitive areas which also need to be protected. While aligning the highway in the first instance, alignment through these areas has to be avoided and if unavoidable all necessary clearances from the concerned authorities may be obtained before finalising the alignment. This is of utmost importance to ensure timely completion of projects, reduction in time & cost overruns and reaping social and economic benefits besides revenue generation by tolling.

During recent reviews it is observed that number of projects are stuck up because of alignment of the highway passing through such ecologically sensitive area where proper attention for seeking environmental clearances from the concerned authority of Ministry of Environment & Forests was not paid and requisite land acquisition not done. These projects attracted intervention from National Green Tribunal and subsequently in the Courts and the projects are still to take off. This is happening in case of highways passing through protected forests and eco-sensitive zones. Number of projects have been sanctioned and awarded without seeking clearance from the forest authorities/CRZ clearance and now the projects are getting delayed. Further the forest authorities has refused to allow widening/further development of the road passing through the forest area except for its strengthening through bituminous layers. This is affecting the project completion besides attracting avoidable cost over-run due to change of scope. Looking to these past experiences, it is more important to seek such clearances before sanction of the projects and in any case before award of work. Such an eco-system is not sustainable which is draining our scarce resources and need urgent correction by putting adequate attention in planning and preconstruction activities.

Ministry of Environment & Forest has brought out handbook of guidelines for effective and transparent implementation of the provisions of Forest (conservation) Act, 1980 which is applicable w.e.f. 8th March, 2019. These may invariably be complied which are available on website www.parivesh.nic.in. Further, MoEF has also brought out guidelines for development of stretches passing through the wild life sanctuaries for mitigating the adverse effect which are available at the website of the MoEF and may scrupulously be followed.

It is also important to bring out the cost benefit analysis of aligning the highway through sensitive area vs. avoiding these areas, bringing out socio-economic advantage against the minor adverse impact on the environment. After all, development has to continue to sustain the economic and social development of the Country. Only emphasising on one aspect would not be desirable as it will lead to economic imbalances leading to socio political issues.



(I.K. Pandey)