

ALTERNATIVE MATERIALS FOR ROAD CONSTRUCTION

The Government of India has launched a massive road construction programme and as a result India is passing through a great construction boom in the road industry. Several thousand kilometers of roads are being or to be constructed in the next five to ten years across the country in the form of either National Highways Development Programme (NHDP) or in the form of rural roads (Pradhan Mantri Gramin Sadak Yojna). This requires huge quantities of road construction materials. The most difficult challenge for development of road network is to execute projects in harmony with the concept of sustainable development. The road industry is therefore looking forward for alternative materials and construction technology, which are environment friendly, energy efficient and cost effective for the construction and maintenance of roads.

The Conventional road construction technology is primarily dependent on aggregates extracted from rocks. The extraction of aggregates from natural outcrop of rocks results into loss of forest lands, noise, dust, vibrations due to blasting, pollution hazards leading to environmental degradation. Such environmental impacts are causing concern in many parts of the country. It is a well-known fact that the naturally occurring materials are fast depleting because of their over-exploitation to meet the huge demand for construction of infrastructure projects. To cope with the huge demand of these materials at present and in the future, sufficient reserves have to be ensured and as these reserves are non-replenishable. Unless we fulfil this task now, the existing reserves of natural resources of materials will ultimately disappear for which the next generation will not pardon us. Besides,

the amount of energy consumed for blasting the hills for quarrying operations, crushing the rocks, transportation of this material to plants, mixing, laying etc is doing unspeakable damage to the environment.

India has diverse geographical regions with different terrains, climate, rainfall and traffic pattern. Different types of construction materials and soils are also available throughout the country. In order to mitigate the problems associated with the use of rock aggregates, locally available materials and soils are to be harnessed for use of road construction. These materials or soils may not exactly match with the specifications as we are currently adopting for construction of roads. This may be turned as non-standard or non-traditional materials. The World Roads Association (PIARC) has defined non-standard and non-material as;

“any material not wholly in accordance with the specification in use in a country or region for normal road materials but which can be used successfully either in special conditions, made possible because of climatic characteristics or recent progress in road techniques or after having been subject to a particular treatment”

Emphasis is therefore to be given for use of such materials which are easily accessible and available in sufficient quantity and can be used for road construction either directly or with treatments. In this connection locally occurring materials like soil, gravel, moorum, laterite, sand, and emerging materials like mine waste, industrial slag, Municipal waste, Waste Plastic, jute geo-textile, soil-enzymes, etc. can be effectively used singly or in combination with other materials as an

alternative to conventional materials, with significant economy after studying their physical and engineering properties for their suitability in road construction. There may be situations where the existing pavements have to be dismantled. In such cases, the dismantled materials can be considered for re-use by recycling, duly supplemented with fresh materials compatible with dismantled materials.

Due to diverse conditions within the country, uniform methods of design and construction cannot be followed without consideration of the use of locally available materials. Therefore, there is also a need to review the present methods of design and construction practices using locally available materials. In the past, as well as in the present researches have been conducted for the successful use of locally available materials. However these research findings are to be dovetailed with the specifications and design practices. There is also an urgent need to step up R&D efforts to enhance the use of locally available materials and create a database on their performance and cost effectiveness for adoption in road construction in a big way. Appropriate guidelines are lacking for those who wish to use alternative materials. More important is the mind-set of the prospective users of these materials. If they are not interested or have no incentives to use these materials, no matter how much information is published, it will remain unread.

In order to allow the industry to take early advantages of the latest developments in the field of highway design and construction, IRC has evolved a mechanism

wherein any entrepreneur, developer, promoter, etc can seek accreditation from IRC for any new know-how, technology, material, equipment, etc for use in the field. The proposal is examined by an Expert Committee constituted for the purpose and an Accreditation Certificate is issued which can be used for marketing the technology and incorporation in the works. Upon receipt of successful field reports, these new ventures will thereafter be appropriately incorporated in the relevant Codes/Standards of IRC. So far, 46 new materials/techniques have been accredited for use on trial basis on various road projects for a period of two years. However, these alternate technologies are not being practiced in the field to a great extent. Their use has been limited so far. It is necessary for the benefit of sustainable development the alternate materials accredited so far are used in the road construction.

The use of locally available low-standard/alternate material is a vital aspect for appropriate design concept. It is necessary however to engender confidence in the use of materials that would normally have been classified unacceptable or, at best, marginal. An assessment framework for alternate materials need to be developed that seeks to provide a transparent and technically sound basis for making rational decisions on the use or non-use of non-standard materials. Further development is required in terms of linking the assessment procedure to an accessible knowledge base and in ensuring its effective practical utilisation.



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