



Low Cost Concrete Road for Villages

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A bituminous road is damaged fast in high rainfall areas due to poor drainage conditions, while a gravel road becomes dusty, causing safety and health problems due to a cloud of dust raised by motorised traffic, which is increasing by leaps and bounds. Problems of dust and wet weather damage to roads can be easily overcome by constructing a thin flexible concrete road using innovative technology at a cost lower than that of a bituminous pavement for equal traffic. The surfacing layer of concrete can be as thin as 50mm for a low volume of traffic, to about 100mm for about 50 commercial vehicles per day. The paper describes construction of a road in the village Rakhalgaria, close to IIT Kharagpur, using the new technology.

The existing road had a formation width of 3.50m and the road crust consisted of murrum/laterite boulder of 100mm average thickness. The CBR of the subgrade was found to be 5 and the region has an average annual rainfall of 1500 mm. The daily traffic consisted of about 30 iron-rimmed bullock carts, 3 to 5 trucks carrying building material, 20 three wheelers, 30 motorcycles and 100 bicycles per day. The village has a primary school and fairs are held twice a year with plenty of commercial activities.

Formation width was widened to 5.5m and a carriageway width of 3.75m was adopted. A camber of 3.0% over the subbase was provided by compacting murrum over the existing murrum surface. An edge restraint of brick on end edge was provided on either side of the compacted



Fig 1 Murrum subbase with brick on end edge along the pavement edge

subbase(Fig 1). A form work of cells of plastic sheets is laid across the full width of the subbase so that a grid of square cells with sides 150mmX150mm and depth 100mm is formed (Fig.2). The formwork is kept under tension.



Fig 2 Formwork of plastic cell being spread

A cement concrete of nominal mix 1:1.5:3 by volume, with a water content of about 6% was filled into the plastic cells (Fig. 3). The concrete had zero slump. The 28 day strength was found to be 27MPa. The concrete was rolled with a plate



Fig.3 Placing of concrete in plastic cell

compactor (Fig.4) but a vibratory road roller can be used for faster construction. The concrete was cured for two weeks by using wet paddy straw, but light traffic such as motor cycles, bicycles, autorikshaw etc were permitted to ply after 24



Fig. 4 Compaction of zero slump concrete by a plate vibrator

hours. Fig.5 shows the road surface after removal of paddy straw.



Fig 5. A finished surface of the concrete road after removal of paddy straw used for wet curing

The pavement was evaluated by Falling Weight Deflectometer (Fig. 6) using a dynamic load of 45kN on

300mm diameter plate. The equivalent elastic modulus of the 100mm compacted flexible concrete was about 4500



Fig 6 Evaluation of pavement by FWD

MPa, three times the modulus of high strength bituminous concrete used in major highways. Its expected life is 15 to 20 years. The cost of 250m long pavement with a hard shoulder of laterite boulder was found to be Rs.4.00 lakhs and the cost per kilometer is estimated as Rs16.00 lakhs .The entire cost was born by IIT Kharagpur. If CBR of the soil is 5 and above, no subbase is necessary. The students and scholars of Civil Engineering Department of the Institute were involved for quality control. The construction is labour intensive and it is in consonance with the employment generation scheme of the Ministry of Rural Development.

Documenting Impact of PMGSY

Rural Roads connectivity promotes access to economic and social services to the rural masses. Rural Roads provide the best means of reducing poverty through sustainable development and social economic transformation of Rural India. It is evidenced that rural accessibility has a marked impact on agriculture, employment generation, industry, health, education and other areas.

NRRDA would like to systematically document the impact of connectivity being provided under PMGSY. Accordingly, we would welcome brief case-studies (preferably with digital photographs) depicting changes brought about by the programme in the socio-economic profile of the habitations benefitted. Articles, in MS Word (not exceeding 1200 words), may kindly be sent to:

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