Innovative Approach to Cost Reduction in Construction

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This paper describes an effort made by the author to analyse scientifically a slab where precious concrete had been replaced with burnt earthen tiles. Due to its light weight substantial savings could be achieved in structures, foundations etc. Cost reduction in this case has been achieved without dilution of quality.

Keywords: Construction; Cost reduction; Innovation

INTRODUCTION

Planning in developing country like India, is meaningless unless it is possible through technological studies and research, to reduce the existing levels of cost and to optimise the use of resources. It is estimated that nearly 50% of the total plan outlays are spent on construction, out of which nearly one-half goes for construction of buildings and allied services. Savings, if any achieved, would, therefore, help to ease the pressure of the total investment in the economy. Cost reduction can be achieved in a variety of ways such as avoiding wastage, adopting appropriate technology, evolving innovative designs, achieving efficient construction management, effective programming of works and efficient monitoring.

Influenced by the Laurie Baker technique a 123.1 m² (1325 ft²) building (named supervisor site office) has been constructed at Calcutta Electric Supply Corporation Ltd’s newly constructed Thermal Power Station, at Budge Budge (2 x 250 MW). The building is made by using conventional method, but certain innovative measures have been adopted on the RCC roof which has been constructed with earthen tiled RCC filler slab, resulting in substantial saving of cost. The technique has been described in this paper.

THE METHOD

The technique is suitable for any type of slab, either intermediate or the roof slab, and may span in either direction (one-way slab or two-way slab). It consists of two layers of earthen Raniganj tiles of size 430 mm x 260 mm (17" x 11") each, placed 480 mm (19") centre-to-centre in one direction and 330 mm (13") centre-to-centre in the other direction which forms the main span. Reinforcement is placed in the gap of 50 mm (2") between two double-layer tiles in a grid pattern (Fig 1) and the deck concrete is placed over the units (Fig 2). The finished slab has a pleasant grid pattern in the soffit. This is very similar to the age-old method of reinforced brick concrete of early thirties. The main advantage of providing twin tile over brick concrete is that it is lighter than brick resulting in substantial savings in superstructure and foundation cost.

STRUCTURAL DESIGN

The slab may be analysed in form of grid slabs. Since it is a time consuming method of analysis, the grid slabs may be analysed as per code IS:456-1978. The dead load of the slab has to be taken as 2000 kg/m³, instead of the conventional one like 2400 kg/m³. The reinforcements span is 330 mm (13") centre-to-centre in main span and 483 mm (19") centre-to-centre in the other direction. Since the centre-to-centre distance is fixed the diameter of the reinforcing bars can be worked out accordingly.

One important thing to be noted is that this slab can be accommodated in any span and in any type, either one-way or two-way. In the supervisors’ office the maximum size of a room is 4.39 m × 6.1 m (14.4' × 20') which had been built easily using the same technique. When calculated for conventional method the slab thickness is approximately 125 mm (5") thick, but using this method the value is only approximately 110 mm (4.5") for solid portion alone, whereas in