ABSTRACT

The topic of the RC slabs is currently being actively pursued in the field of structural stability, efficiency and design. In the present works, following some earlier attempts and researches, the behaviour of floor slab is studied mainly with regard to possible reduction in the material weight and increase of flexural strength that enhances the serviceability. The conventional method of design of the slab as unit strip, has to a greater extent lead to the over utilization of the construction of materials (steel and concrete). A number of studies in recent years have attempted to understanding the appropriate section suitable for reducing dead weight while enhancing performances in terms of bending, deflection and shear strength. In this project, the performance and results of two simply supported slabs, one designed conventionally as solid section, the other redesigned as series of closely arranged RC I-section units forming box slabs were investigated for weight, steel content, bending, and deflection, by appropriate experimental method (three-point loading). Using a mix proportion of 1:1.5:3, the slabs construction and design concepts were done in accordance to BS 8110 for flexural strength, and deflection. Tests carried after 28ays of curing using Universal Testing Machine according to CECS1 3:89 test methods. The performances of the slabs were studied and the differences compared through weights, amount of reinforcements, deflection, flexural strength and cost to be considered as viable means of construction. According to test methods used for the two slabs, deflection, flexural strength in the bended sections of box slab are calculated, analyzed and compared with that of conventional RC solid slab through stress-strain and load-deflection curves. At failure, the solid slab collapsed diagonal cracks at 45o , the angle reducing with high concentration at the mid-span. In case of box slab, there was unusual formation of curvilinear cracks on the sides of the slab and vertical cracks at the support points under applied loads. The results indicate that the design of box slab reduces the weight of slab and cost use by 24.9% and 23.2% relative to similar solid slab. It was also observed that there is a great improvement in the deflection by about 23.5% relative to hollow box slabs with two voids. This improved strength was due to the mode of design of the box slab with incorporation of I-section beams (300mm wide) on the longitudinal that takes more flexure than 1m strip of slab. The result depicts a positive performance of slab design technique as hollow box with improved weight reduction, flexural strength and serviceability and would therefore be preferred to solid section as floor slab.