

Use of Coconut Shell as a Replacement of Normal Aggregates in Rigid Pavements

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Abstract : India ranks among third in the production of coconut besides Philippines and Indonesia. About 92% of the total production in the country is contributed from four southern states especially, Kerala (45.22%), Tamil Nadu (26.56%), Karnataka (10.85%), and Andhra Pradesh (8.93%). Other states, such as Goa, Maharashtra, Odisha, West Bengal, and those in the northeast (Tripura and Assam) account for the remaining 8.44%. The use of coconut shell as coarse aggregate in concrete has never been a usual practice in the industry, particularly in areas where light weight concrete is required for non-load bearing walls, non-structural floors, and strip footings. The high cost of conventional building materials is a major factor affecting construction delivery in India. In India, where abundant agricultural and industrial wastes are discharged, these wastes can be used as potential material or replacement material in the construction industry. This will have double the advantages viz., reduction in the cost of construction material and also as a means of disposal of wastes. Therefore, an attempt has been made in this study to utilize the coconut shell (CS) as coarse aggregate in rigid pavement. The present study was initiated with the characterization of materials by the basic material testing. The casted moulds are cured and tests are conducted for hardened concrete. The procedure is continued with determination of fck (Characteristic strength), E (Modulus of Elasticity) and μ (Poisson Value) by the test results obtained. For the analytical studies, rigid pavement was modeled by the KEN PAVE software, finite element software developed specially for road pavements and simultaneously design of rigid pavement was carried out with Indian standards. Results show that physical properties of CSAC (Coconut Shell Aggregate Concrete) with 10% replacement gives better results. The flexural strength of CSAC is found to increase by 4.25% as compared to control concrete. About 13 % reduction in pavement thickness is observed using optimum coconut shell.

Keywords : coconut shell, rigid pavement, modulus of elasticity, poisson ratio

Conference Title : ICCEBM 2017 : International Conference on Civil Engineering and Building Materials

Conference Location : Boston, United States

Conference Dates : April 24-25, 2017