

# Improvement of aggregate packing model of Interlocking Concrete Block Pavement (ICBP) mixture using Fly Ash

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## Abstract

Use of concrete paver blocks is becoming increasingly popular. They are used for paving approaches, paths and parking areas, including their application in pre-engineered buildings and pavements. Interlocking Concrete Block Pavement (ICBP) has been extensively used in a number of countries for quite some time as a specialized problem-solving technique, to provide pavements in areas where conventional types of construction are less durable due to many operational and environmental constraints.

This research is conducted in order to improve aggregate packing model of ICBP by using Fly ash. In Sri Lanka, Lak Vijaya Coal Power Station at Norocholai, Puttalam generates large amount of fly ash per day as a by-product. It was considered a waste & an environmental hazard, thus its use was limited. Within this research, this waste & hazardous fly ash is used as a filler material in paving block mixture to optimize the packing of aggregate. These fly ash samples & control samples were tested for compressive strength, water absorption and Scanning Electron Microscope Analysis. Experimental results showed that 23 and 21 percent of cement can be replaced by Fly Ash in Grade 15 & 20 mixtures respectively. Fly ash has reduced the cement needed for ICBP mixtures. Optimization of packing of aggregate is the process of determining the most suitable aggregate particle size and distribution, to minimize the voids content of an aggregate mix. An optimized aggregate mix will have a lesser amount of voids which need to be filled with cement paste. Further, fly ash has improved the workability of the mixture due to the special nature of the particle. The use of fly ash in concrete paver blocks has reduced the cement content, and heat of hydration, leading to better economy and durability.

It will also help safeguard the environment from the adverse effects of CO<sub>2</sub> emissions from the cement industry, and provide a solution for the disposal issue of fly ash produced by thermal power plants.

**Keywords:** Fly Ash, Interlocking Concrete Block Pavement, packing of aggregate, Optimization, Compressive Strength, Scanning Electron Microscope.

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