

**DEVELOPMENT OF LIGHT WEIGHT CEMENT
BLOCKS WITH BOTTOM ASH FROM COAL FIRED
THERMAL POWER PLANTS**

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AUTHOR'S DECLARATION

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Abstract

In the Nuraicholai coal fired thermal power plant, 7500 MT of coal per day is burnt producing 750 MT and 75 MT of two main waste products fly ash and bottom ash respectively. Fly ash is used in cement manufacture, but bottom ash is presently regarded as a waste material. However, there is a possibility to convert bottom ash to a value added material. This thesis presents findings pertaining to the feasibility of using bottom ash as a replacement of sand in producing light weight cement blocks. Chemical analysis carried out using Atomic Absorption Spectroscopy on Nuraicholai power plant bottom ash waste showed that the harmful elements present such as As, Pb, Cr, Cd, Cu, Ni and Se were within internationally specified toxicity limits for soil. It was found that bottom ash at oven dry condition had a loose bulk density of 600 kg/m³, which is about 40% that of river sand which has a nominal loose bulk density of about 1450 kg/m³. Important physical and mechanical properties such as compressive strength, water absorption, density, accelerated erosion resistance and drying shrinkage & wetting expansion were tested for blocks produced by partly or fully replacing fine aggregate with bottom ash. Heat conductivity of blocks produced with bottom ash was found to be less than the good quality conventional cement blocks available in Sri Lanka. Comparatively, performance of the bottom ash blocks was very good and comparable with conventional cement blocks produced with river sand and quarry dust. Further, trials were carried out with river sand, crushed rock sand and coarse aggregate in order to find out optimum mix proportions and to investigate the feasibility of medium scale production of bottom ash blocks using a conventional type of block making machine. The optimum mixes which give strength, density and water absorption of desirable amount were found with Cement, Quarry dust, Bottom ash and 5-10 mm crushed rock aggregates.



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Keywords: Bottom ash, fine aggregate, crushed rock aggregate, light weight cement blocks

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