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Environment friendly concrete made from Portland cement and aggregate replacement materials

This research work investigated the properties of concrete block made from Portland cement and aggregate replacement materials. Portland cement (PC) was replaced by fly ash (FA) at 10%, 20%, 30% and sand was replaced by bottom ash (BA) at 10% by weight. Water was used at 7% by weight of total solid mass. Binder : Sand : Stone dust ratio of 1 : 5 : 6, 1 : 4 : 5 and 1 : 3.5 : 4.5 were used. Compressive strength were tested after curing in air for 28 days. The microstructure and phase characterizations of the specimens were analyzed using a scanning electron microscope and X-Ray Diffraction respectively.
The results showed that compressive strength of 1 : 5 : 6 ratio was lower than others. Concrete block replaced by fly ash had lower compressive strength when amount of fly ash increased. Concrete block had lower compressive strength when replaced sand by bottom ash. As a result, the mixes with FA as PC replacement and BA as sand replacement at the ratio of 1 : 5 : 6 did not meet the requirement of Thai industrial standard. However, concrete block with PC replaced by fly ash 10%, 20% and sand replaced by bottom ash 10% of 1 : 3.5 : 4.5 ratio was higher than 1 : 5 : 6 ratio and this ratio meet the requirement of Thai industrial standard.

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