C-24: Development of cementitious materials using residual (lateritic) soils

S K Muthuratne, N B M Ranatunge, V T L Bogahawatte
(Building Materials Division, National Building Research Organisation, Colombo 5)

Samples of residual (lateritic) soils from 4 locations in Kaduwela area representing different weathering grades were collected from outcrops and open pits. An investigation was carried out with these samples to examine their pozzolanic reactivity in order to evaluate their use as alternative cementitious materials by blending with ordinary Portland cement.

Comminution (grinding), fractionation by sedimentation and heat treatment were used in the analysis. The analysis was carried out by two methods. The successive stages involved are summarised below.

Method I

Soil → Sieving → Firing → Grinding → Sieving
(700°C)

Method II

Soils → Sieving → Grinding → Firing → Sieving
(700°C)

Method I was found to be more effective than Method II in terms of pozzolanic reactivity. It was found that 50mm mortar cubes prepared in compliance with ASTM-C 109-86 and cast from materials processed as per Method I had a compressive strength of 22 N/mm^2 and 29 N/mm^2 at 7 days and 28 days respectively for different types of clayey materials examined. Control mortar cubes cast from ordinary Portland cement had equivalent strengths of 16 N/mm^2 and 24N/mm^2 at the same ages.

In order to economize the grinding process, the fine clay (<2μm) fraction was separated by using a sedimentation technique. Calcium chloride in concentrations ranging from 0.2 g/l to 0.45 g/l was used as the flocculent and different drying methods were employed to separate the sediments.