

O 80. EFFECTS OF FLY ASH AND SUPER PLASTICIZER ON STRENGTH OF SOIL-CEMENT MIXING MATERIALS

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ABSTRACT: In this study, the effects of fly ash and super plasticizer, improver materials by adding into the grout, on soil-cement mixing columns called as deep mixing columns (DMC) were investigated. Fly ash is a waste product emerging from burning in the thermal power plant. By evaluating waste materials in this way, environmental pollution will be reduced directly and cement usage and carbon emissions caused by cement production will be reduced indirectly. By using super plasticizer into the grout, more strength structural element will be manufactured as decreasing water/binder ratio of grout. In order to achieve these goals, an experimental program was developed using statistical and experimental design methods. It is desired to determine the optimum grout quantity and consistency required to maximize the strength of the column manufactured with DMM in silty soils. For this purpose, the amounts of fly ash (0-40%), cement (3-11%), super plasticizer additive (0.5-2%) and water/binder percentage (0.5-1.25%) were chosen as variable to form grouting material. Experimental studies have been carried out using Taguchi method, which is a powerful optimization technique, using 5-parameter and 4-level L16 design table. Permeability test specimens were prepared in PVC tubes with diameter of 5 cm and length of 10 cm for each design for different curing times of 7 and 28 days. As a result of the experiments, the unified compression strength (q_u) of the soil-binder mixture were found for each design. As a result of the statistical analysis, the optimum values of grouting materials to obtain maximum strength of DMC was found with 7% cement, 10% fly ash, 1.5% super plasticizer additive and 0.75% water/binder ratio for 7 days cure time. For 28 days of curing time, optimum parameters were obtained with 7% cement, 25% fly ash, 1.5% super plasticizer additive and 1% water / binder. These results show that cement requirement may be reduced at %25 for soil stabilization works especially in DMM.

Keywords: cement, deep mixing method, environmental pollution, fly ash, super plasticizer, Taguchi method, silty soil