

Engineering Properties of Self-Cementing Fly Ash Subgrade Mixtures

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ABSTRACT

Soil treated with self-cementing fly ash is increasingly being used in Iowa to stabilize pavement subgrades, but without a complete understanding of the short and long-term behavior. To develop a broader understanding of the engineering properties, mixtures of five different soil types, ranging from ML to CH, and eight different fly ash sources were evaluated. Results show that soil compaction characteristics, compressive strength, wet/dry durability, freeze/thaw durability, hydration characteristics, rate of strength gain and plasticity characteristics are all significantly affected by the addition of self-cementing fly ash. Specimens for strength and durability testing were produced using the Iowa State University 2 x 2 apparatus, standard Proctor mold, and California Bearing Ratio (CBR) test methods. To simulate harsh Iowa field conditions, several specimens were subjected to hot/cold and wet/dry curing environments prior to testing. Some specimens were cured for up to 2.5 years. The morphology of soil fly ash mixtures and the soil clay mineralogy were also studied using x-ray diffraction (XRD) and scanning electron microscopy (SEM) techniques. Based on the results of this research, overall performance ratings and design and construction recommendations are provided for a typical range of pavement subgrade soils stabilized with self-cementing fly ash. (197 words)