

Long-Term Performance of a Highway Subgrade Stabilized with an Atmospheric Fluidized Bed Combustion Material

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Abstract

In 1986, 9.6 km of KY Route 11, near the town of Beattyville, Kentucky, was reconstructed. Except for one section measuring about 0.3 km of the reconstructed roadway, sections of soil subgrades of this roadway were stabilized with various chemical admixtures to improve bearing strengths. Two sections of the roadway were stabilized with cement, one section was stabilized with hydrated lime, and one section was stabilized with a byproduct, referred to as multicone kiln dust (MKD). The MKD material is a byproduct of the manufacturing of hydrated lime. In addition to those four chemically stabilized subgrades, two subgrade sections, measuring 1.74 km and 1.35 km, respectively, were treated with a residue byproduct from a process referred to as atmospheric fluidized bed combustion (AFBC). The AFBC experiment was an attempt to find new applications of byproducts generated in Kentucky. The procedure for determining the optimum amount of AFBC byproduct to mix with the KY 11 soils is briefly described. Problems that arose during and shortly after construction and procedures used to overcome the initial problems are discussed. This paper mainly focuses on the use of the AFBC material as a chemical admixture for soil subgrade stabilization and the long-term performance of the AFBC-treated subgrades. Although initial swelling of the AFBC subgrade and pavement occurred during construction, field and laboratory studies show that the rate of swelling has decreased after construction. In situ strengths of the AFBC subgrades after twelve years range from 10 to 54 while in situ CBR values of the untreated subgrade have decreased to values lower than 6 percent. Strengths of the AFBC subgrades are more than sufficient to maintain good pavement stability. Pavements constructed on the AFBC subgrades are in good condition after twelve years.