Stabilization of Sulfate-Bearing Soils Using Class F Fly Ash and Calcium Chloride

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Conventionally, lime, cements and in some cases Class C fly ash have been used in roadway construction to stabilize bases, sub-grades and soils. In Texas, Class C ash was found to produce unfavorable results, especially in soils containing soluble sulfates. Class F ash tends to be more forgiving in sulfate-bearing soils, but suffers from a much slower rate of cementing action. More recently, a combined fly ash/calcium chloride stabilization has been investigated to enhance the pozzolanic strength development provided by the ash with the dust control characteristics of the calcium chloride. The calcium chloride also tends to provide earlier workable strengths in Class F ashes while achieving a significant extension in service life.

An ongoing investigation at Texas A&M University was initiated due to pavement failures encountered on US-67 in Dallas-Fort Worth (1999) and US-82 in Paris, Texas (2002). This study focused on reducing the extensive sulfate-induced swelling and heaving which conventional stabilizers, including Class C ash had caused. These distress phenomena can occur within 24 hours of stabilization and can create volume changes as high as 250 percent. This paper shows the positive impact of using a Class F fly ash/calcium chloride treatment for both enhanced strength development and reduced swelling and heaving in such sulfate-bearing soils.

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