



# USE OF CEMENT KILN DUST FOR SUBGRADE STABILIZATION

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## Introduction

Poor subgrade soil conditions can result in inadequate pavement support and reduce pavement life. Soils may be improved through the addition of chemical or cementitious additives. These chemical additives range from waste products to manufactured materials and include lime, Class C fly ash, Portland cement, cement kiln dust from pre-calciner and long kiln processes, and proprietary chemical stabilizers. These additives can be used with a variety of soils to help improve their native engineering properties. The effectiveness of these additives depends on the soil treated and the amount of additive used.

## Project Objective

This report contains a summary of the performance of a wide range of soils treated with pre-calciner cement kiln dust (CKD), and is intended to be viewed as a companion report to the previously published Kansas Department of Transportation report, *Performance of Soil Stabilization Agents*. CKD has been used as a soil additive to improve the texture, increase strength and reduce swell characteristics.

## Project Description

CKD was combined with a total eight different soils with classifications of CH, CL, ML, SM, and SP. Durability testing procedures included freeze-thaw, wet-dry, and leach testing. Atterberg limits and strength tests were also conducted before and after selected durability tests. Changes in pH were monitored during leaching. Relative values of soil stiffness were also tracked over a 28-day curing period using the soil stiffness gauge.

## Project Results

Treatment with cement kiln dust was found to be an effective option for improvement of soil properties, based on the testing conducted as a part of this research. Strength and stiffness were improved and plasticity and swell potential were substantially reduced. Durability of CKD treated samples in wet-dry testing was comparable to that of soil samples treated with the other additives, while performance was not as good in freeze thaw testing. CKD treated samples performed very well in leaching tests and in many cases showed additional reductions in plasticity and some strength gains after leaching. It is recommended based on the results of this research that cement kiln dust be considered a viable option for the stabilization of subgrade soils. As with all additives, it is recommended that a mix design be conducted prior to selection to confirm the CKD selected and the amount specified will provide satisfactory performance.

## Report Information

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