

# Laboratory Investigation of the Use of Volcanic Ash in Concrete

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**TECHNICAL SUMMARY**

## **Introduction**

Supplementary cementitious materials (SCMs) are commonly used in KDOT concrete pavements and bridge decks to improve strength and permeability characteristics. The supplementary cementitious materials allowed under current KDOT specifications are all by-products of industrial processes. Volcanic ash is a natural product that has been used as a mineral admixture in concrete.

## **Project Description**

The purpose of this study was to evaluate Kansas sources of volcanic ash for use in concrete as an SCM. This report will discuss all three stages of the study: material testing of the volcanic ash, testing the cementitious properties of Kansas volcanic ash, and evaluating the effects of volcanic ash on the properties of concrete such as strength and permeability.

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## Project Results

Based on the results and the subsequent analysis, it has been determined that Kansas sources of volcanic ash are not suitable for use as SCMs in concrete. Testing indicated that Kansas volcanic ash has few cementitious properties and as a result, when added to concrete, it has several possible negative effects, including increased bleed, increased set time, negative effect on strength, permeability, and finishing. The few benefits that the use of volcanic ash may provide (controlling alkali–silica reaction [ASR] and reducing shrinkage, although more testing would be necessary to completely determine the validity and extent of those benefits) are not significant enough to overcome the detrimental effects of the volcanic ash.

## Project Information

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