

# The Effects of Supplementary Cementitious Materials on Alkali-Silica Reaction

Report Number: FHWA-KS-15-06 • Publication Date: July 2015

**William H. Parcels, Jr., P.E.**  
**Rodney A. Montney, P.E.**

*Kansas Department of Transportation*  
*Bureau of Research*

## Introduction

The Kansas Department of Transportation (KDOT) has controlled alkali-silica reaction (ASR) for more than 70 years through the use of selected aggregates. Sand and gravel sources had to be tested using Kansas Test Method KTMR-23 (1999), *Wetting and Drying Test of Sand and Sand-Gravel Aggregate for Concrete*. Those aggregate sources that did not pass the Wetting and Drying Test had to be used with a “sweetener.” The sweetener had to make up a minimum of 30% (by weight) of the aggregate in the concrete. The most common sweeteners used have been limestone, calcite cemented sandstone, and a coarse gravel that passed the Wetting and Drying Test. Granite from Arkansas has recently been added as a sweetener in the Kansas City market.

## Project Description

KDOT had traditionally banned Class C fly ash from concrete mixes due to their possible contribution to the ASR problem. Class C fly ash that could not meet the expansion requirements for Effectiveness in Controlling Alkali-Silica Reaction in Table 3 of ASTM C618 (2005), *Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete*, was not allowed to be used in concrete mixes for KDOT projects.

In 2007, KDOT specifications were changed to allow supplementary cementitious materials (SCMs) in portland cement concrete. KDOT began accepting ASTM C1567 (2004), *Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)*, test results for concrete mixes containing SCMs. In 2009, the requirements of Table 3 of ASTM C618 were changed from 100% of the control mix to 120% of the control mix for Class C fly ash used in all concrete.

---

## Project Results

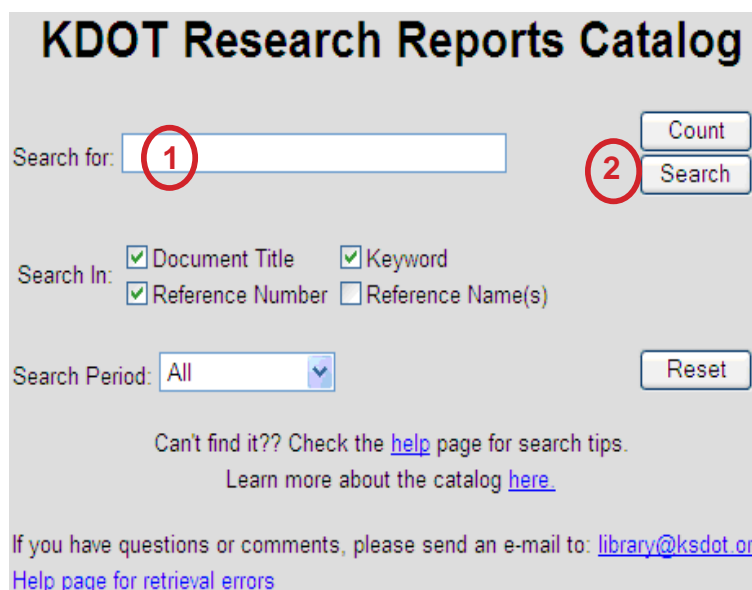
Test sections that utilized selected mixes from this study were placed during the summer of 2008 in Wyandotte County, Kansas. The construction report for this project is available, and regularly scheduled surveys are being performed (Distlehorst, 2013).

KDOT is currently evaluating threshold combinations of aggregates and SCMs to determine which combinations will require ASTM C1567 testing and which combinations can be approved without testing. This research is being conducted at the request of Kansas contractors due to the expense of the ASTM C1567 testing.

## Project Information

For information on this report, please contact Rodney A. Montney; Bureau of Research, Kansas Department of Transportation; 2300 SW Van Buren, Topeka, KS 66611; (785) 291-3841 phone; [rodney@ksdot.org](mailto:rodney@ksdot.org).

---



**KDOT Research Reports Catalog**

Search for:  Count Search

Search In: ☒ Document Title ☒ Keyword  
☒ Reference Number ☐ Reference Name(s)

Search Period: All Reset

Can't find it?? Check the [help](#) page for search tips.  
Learn more about the catalog [here](#).

If you have questions or comments, please send an e-mail to: [library@ksdot.org](mailto:library@ksdot.org)  
[Help page for retrieval errors](#)

## Directions for Downloading the Full Report

To download the full report, visit <http://kdotapp.ksdot.org/kdotlib/kdotlib2.aspx> and do the following:

1. Enter FHWA-KS-15-06 in the search box.
2. Click the Search button to the right of the search box.
3. You may have to scroll to find the specific report.
4. To download the report, click on the title of the report to open the PDF file and save it to your hard drive.

If you have any questions, please email us at [library@ksdot.org](mailto:library@ksdot.org).

---

KDOT RESEARCH