Kansas Department of Transportation

TECHNICAL SUMMARY

Characterizing Soil Erosion Potential Using Electrical Resistivity Imaging

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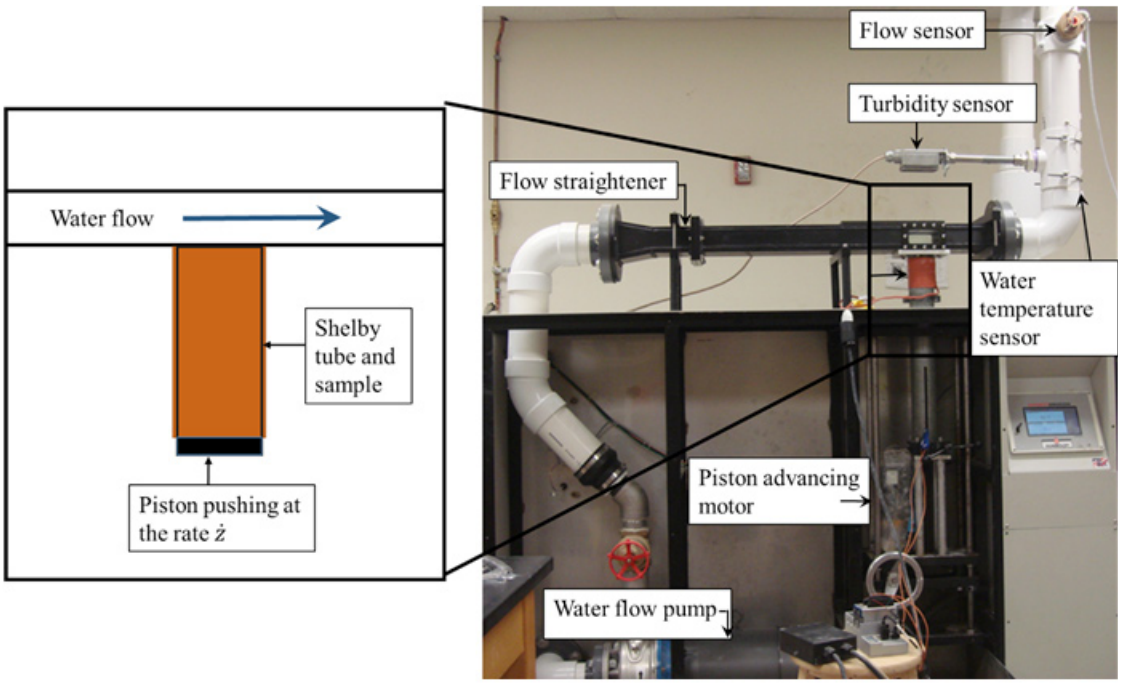
Introduction

The erosion rate, or erodibility, of soil depends on many soil characteristics including: plasticity, water content, grain size, percent clay, compaction, and shear strength. Many of these characteristics also influence soil in situ bulk electrical resistivity (ER) measurements. The objective of this study was to characterize soil erosion potential by correlating the in situ ER of soil with erodibility measured in an Erosion Function Apparatus (EFA) at Kansas State University.



Erosion Function Apparatus at Kansas State University

Project Description

ER surveys were conducted at 15 bridge sites. Five soil samples were also collected at each site with a drill rig from the surface to 10 ft (3 m) using thin-walled Shelby tubes. The samples were tested in the EFA and classified according to the Unified Soil Classification System. Analysis showed that the rapid in situ data obtained from an ER field survey can be used to categorize the level of soil erodibility. As such, ER surveys may be used to characterize the soils at future bridge sites or prioritize existing bridges for additional testing to measure the scour potential. Moreover, ER surveys may be used to determine which existing bridges should be closed or closely monitored for scour potential during a flood event.

Project Results

Preliminary analytical models to predict soil critical shear stress using ER and other soil parameters were constructed. The selected preliminary model and ER prediction of soil erodibility were validated using one site.

Project Information

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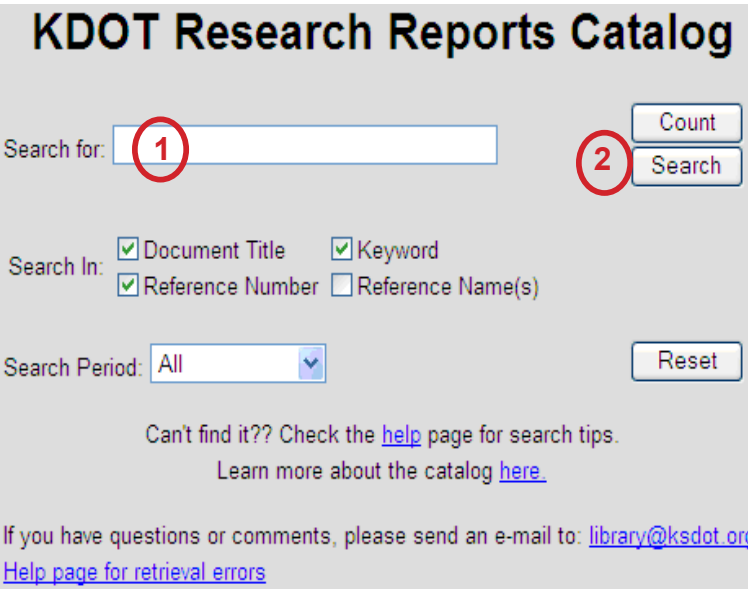

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