Kansas Department of Transportation

TECHNICAL SUMMARY

Electrical Resistivity Measurement of Mechanically Stabilized Earth Wall Backfill

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Introduction

In Kansas, mechanically stabilized earth (MSE) retaining walls are typically backfilled with coarse aggregate. Current backfill material testing procedures used by the Kansas Department of Transportation (KDOT) utilize on-site observations for construction quality assurance and the American Association of State Highway and Transportation Officials (AASHTO) Standard T 288-12 (2012), "Standard Method of Test for Determining Minimum Laboratory Soil Resistivity." T 288 is designed to test a soil sample's electrical resistivity, which correlates to its corrosive potential. The test, based on material passing through a No. 10 sieve, is considered inappropriate for coarse aggregates and potentially leads to over-conservative designs. Additionally, T 288 is run on a sample from the aggregate source, but test results may not capture variability of the aggregate used in construction. Electrical resistivity imaging (ERI) provides a two-dimensional (2D) profile of the bulk resistivity of backfill material, thereby reducing uncertainty regarding backfill uniformity as compared to traditional sampling.

Experimental Setup

Project Description

The objective of this study was to characterize bulk resistivity of in-place MSE wall backfill aggregate using ERI. ERI was used on six walls: five MSE walls and one gravity retaining wall that contained no reinforcement. The ERI field method produced a 2D profile that depicted electrical resistivity uniformity for bulk analysis. A post-processing algorithm was developed to calculate the bulk electrical resistivity of the backfill and reduce the qualitative interpretation of the ERI results.

Project Results

These results indicate that the laboratory analysis of T 288 underestimates the bulk electrical resistivity of in situ backfill material. Recommendations of the study were that ERI surveys and calculated mean electrical resistivity be utilized as construction quality assurance in order to reduce uncertainty of current selection practices.

Project Information

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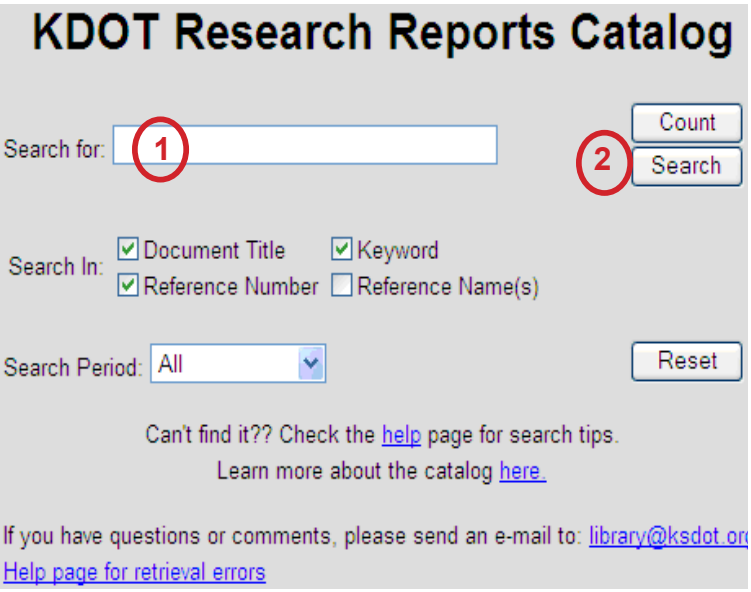

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