

Load and Resistance Factor Design Calibration to Determin a Resistance Factor for the Modification of the Kansas Department of Transportation-Engineering News Record Formula

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### Introduction

The Kansas Department of Transportation (KDOT) has, in recent years, used a variation of the Engineering News Record (ENR) formula to determine the capacity of piles in the field. It was a concern that the KDOT-ENR formula was under-predicting actual pile capacity.

## **Project Objective**

KDOT has used the Pile Driving Analyzer (PDA) in the field since 1986 for at least 246 pile-driving operations. It was consistently noted that the PDA- and CAPWAP-predicted capacity was significantly greater than KDOT-ENR-predicted capacity. Therefore, the objective of this analysis was to compare available KDOT-ENR data to

PDA and CAPWAP data in order to arrive at a revised version of the KDOT-ENR formula.

If the current KDOT-ENR formula consistently under-predicts pile capacity in the field, piles are being driven to a capacity that is overly conservative. By applying a calibrated factor to the existing formula, piles will be credited with reaching the design resistance at shallower depths, resulting in savings on materials and labor.

#### **Project Description**

For this study actual ENR resistance estimates were compared with estimates obtained using a pile driving analyzer (PDA) system. The PDA values were taken as the true capacity. There were 175 end-of-drive data points and 189 restrike data points available for statistical analysis.

#### **Project Results**

A set of correction (resistance) factors to be used with the ENR formula was developed, with individual factors based on given probabilities of pile failure (capacity being exceeded).

#### **Report Information**

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