SOIL CHARACTERIZATION AND P-Y CURVE DEVELOPMENT FOR LOESS

Report Number: K-TRAN-KU-05-3

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RESEARCH

Introduction

Lateral loads on drilled shafts are often the controlling factor in their design. These lateral loads are transferred to the surrounding soil or rock, and estimation of the capacity of the shaft to resist lateral loads is a critical part of the design. The lateral load-deformation relationship of a drilled shaft and its supporting soil is commonly modeled using the p-y curve method. P-Y curves vary with soil type, deposition characteristics and depth, but general curves have been developed to represent common soils. Unfortunately, no p-y curves have been developed to represent the behavior of loess, cemented silt that is common throughout much of Kansas. This lack of available p-y relationships has meant that less applicable curves, normally those for sandy soils, must be used.

Project Objective

The purpose of this research was to define the significant engineering properties of Kansas' loessal soils through a literature review, laboratory tests, and in situ tests and to determine the soil-structure response by performing full scale lateral load tests on six drilled shafts.

Project Description

Laboratory testing included saturated and unsaturated triaxial, direct shear, consolidation and collapse testing. Field tests included SPT, CPT, vane shear, and pressuremeter testing. Two pairs of shafts with diameters of 30 and 42 inches were tested under static loading. A third pair of 30 inch shafts was tested under repeated loading. Shaft deflections were measured using inclinometer soundings and correlated with the CPT cone tip resistance (qc).

Project Results

A hyperbolic model was developed to correlate ultimate soil resistance (Puo) to the CPT cone tip resistance (qc) for both static and repeated loading at any given depth and was used to develop a family of p-y curves unique to loess. This model may be entered into the commercially available software package LPILE for design of laterally loaded drilled shafts constructed in loess.

Report Information

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