



Project Number

BDV31-977-108

Project Managers

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Geo-Statistical Deep Foundation Design Software

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Current Situation

Deep foundations can consume substantial portions of overall design and construction costs for Florida bridges. This is because soils are highly variable, with measured soil properties varying both horizontally and vertically across most construction sites. Uncertainty is also introduced when measured soil properties are correlated to soil resistance, a key parameter needed for the design of piles or shafts used in foundations.

Quantifying these two distinct sources of uncertainty – spatial variability and method error – can lead to more efficient geotechnical investigations, more appropriate foundation designs, and more cost-effective use of materials for the various foundation systems the bridge will require.

Research Objectives

University of Florida researchers modified previously developed software for the computation of pile or drilled shaft axial resistance to accept the results of geotechnical investigation of a specific site, performing both spatial variability analysis and method error estimation.

Project Activities

The research team developed software called GeoStat in a previous Florida Department of Transportation research project (BDK75-977-23). In that project, they demonstrated the viability of geostatistical techniques for quantifying soil spatial variability of strength characteristics (e.g., rock unconfined compression, unit weight, etc.). In addition, the project also developed procedures for estimating method error.

In this project, the researchers developed the prototype version of GeoStat into a deployable package for use by practicing engineers. This required a number of steps to adapt the software, validate its results, and produce reference materials for users. These steps were accomplished through a series of tasks. First, the operational tasks included establishing input and output formats. Then, Geostat's use of another important piece of foundation design software, FB-Deep, had to be automated. Quality assurance testing was then built in to validate the results. Second, to create a user-oriented software package, an installation package was added, including licensing. Finally, user documentation was created, including a user software manual and technical manual.

Project Benefits

The software developed in this project will assist engineers in creating better and more economical foundations on highly variable soils like the ones found in Florida.

For more information, please see www.fdot.gov/research/.



Florida bridges, both large and small, must be built on foundations that take into account Florida's highly variable soils.