Research Project

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C a p s u l e

Technology Transfer Program

LTRC

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Use of Reinforced Soil Foundation (RSF) to Support Shallow Foundation

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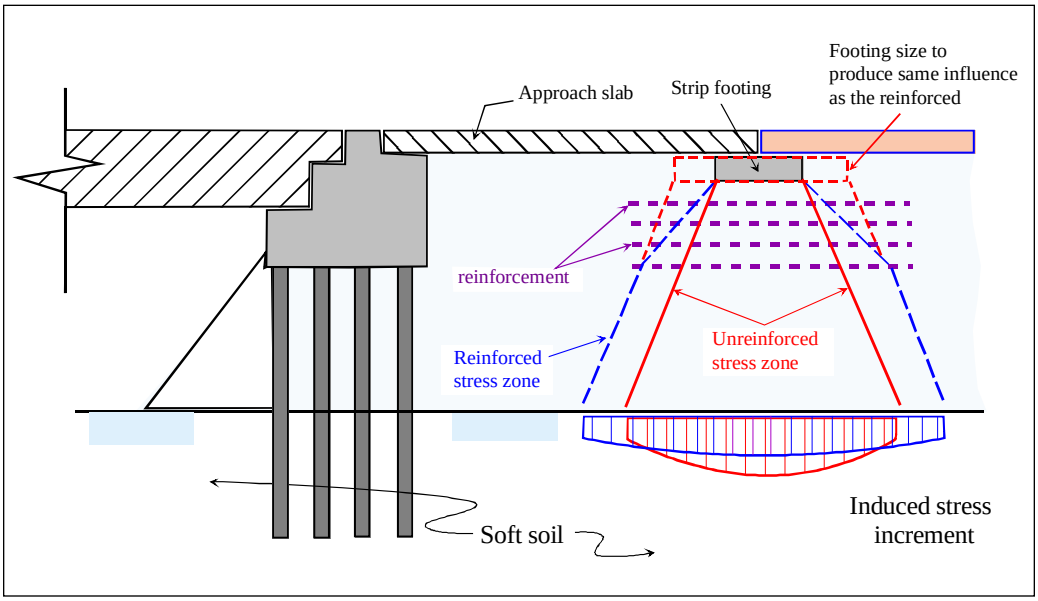
Problem

Excessive differential settlement of concrete approach slabs is one of the major highway maintenance problems facing state transportation departments. The Louisiana Department of Transportation and Development (LADOTD) initiated an effort with the support of the Louisiana Quality Initiative (LQI) to address problems caused by the preponderance of weak soil formations and high ground water levels present in this state.

One task of the LQI proposal is to consider increasing the rigidity of approach slabs by using thicker slabs.

Due to support conditions, applied loads will be concentrated at the ends of a rigid slab rather than uniformly distributed over the length of the slab. Accordingly, a shallow foundation is needed at the end of the approach slab farther from the bridge.

The bearing capacity of a shallow foundation may be improved by using geosynthetic reinforcement of the underlying soil. Using a strip footing with a reinforced soil foundation (RSF) will improve the bearing capacity of a shallow foundation and redistribute loads into a wider area within the



Schematic representation of reinforced soil foundation

embankment soil, potentially reducing differential settlement and the frequency of required maintenance activities.

Objective

The main objective of this study is to evaluate the potential for reinforced soil foundations to improve bearing capacity and reduce settlement of shallow footings. This objective will be accomplished by conducting tests on instrumented reinforced soil foundation sections to examine the influence of specific variable parameters, such as footing dimensions, soil type, and reinforcement material.

Description

In this study, the bearing capacity and settlement of shallow footings with reinforced soil foundations will be investigated by conducting two series of tests: reduced-scale (indoor) testing at the LTRC Geosynthetic Engineering Research Laboratory and large-scale (outdoor) testing at the DOTD Pavement Research Facility.

Static loading will be performed using precast concrete panels as dead weight for the outdoor tests, and a reaction frame with jacking load for the indoor tests. Measured settlement and reinforcement strain will be reported for each loading. Load-settlement curves and bearing capacity ratios will be analyzed to determine optimal placement of reinforcement. A finite element model will be developed, calibrated, and validated for prediction of RSF behavior.

Implementation Potential

This research will lead to the development of RSF design guidelines. The influence of specific variable parameters on RSF behavior will be described and compared.