

## Development of Models to Estimate the Subgrade and Sub-base Layers' Resilient Modulus from In-Situ Devices Test Results for Construction Control

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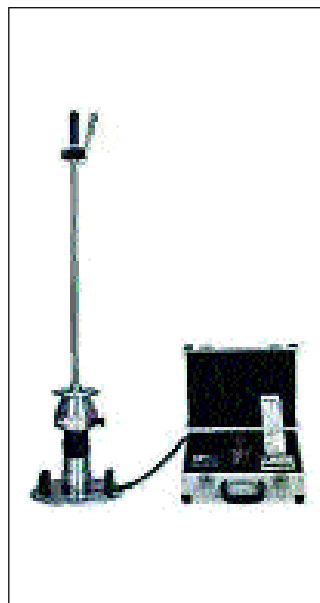
### Problem

Currently, in accordance with LADOTD standard specifications, construction quality control and quality assurance (QC/QA) of pavement base courses and embankments in Louisiana is performed using in-place moisture/density tests. It is assumed that base courses and embankments will perform satisfactorily in the field throughout expected design life as long as adequate field density is achieved.

It should be noted, however, that design parameters for base course and embankment materials are not based on

moisture/density values. The current AASHTO pavement design guide uses resilient modulus as the primary support characteristic of paving materials. Resilient modulus is an indicator of material strength or stiffness.

In order to produce durable base courses and embankments in the field, construction QC/QA procedures should be based on criteria that closely correlate field measurements to the values of resilient modulus used in pavement design.



Above: Geogauge

Left: Light falling weight deflectometer



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## Objective

The primary objective of this study is to develop models to estimate the resilient modulus of base course and embankment soils from in-situ tests using devices such as the geogauge, dynamic cone penetrometer (DCP), and light falling weight deflectometer (LFD). A secondary objective is to examine the effects of various parameters (soil type, loading level, moisture content, density, thickness, environmental conditions) on the resilient characteristics of the investigated soils.

## Description

The scope of this study includes conducting repeated load triaxial tests to determine the resilient modulus of materials similar to those used in the ongoing LTRC study titled "Assessment of In-Situ Test Technology for Construction Control of Base Courses and Embankments" (AITT). The AITT study is assessing the use of non-destructive in-situ tests (DCP, LFD, and geogauge) to evaluate the strength/stiffness properties of crushed stone base course, soil-cement base course, and embankment soils. The combination of material types and test parameters for the AITT study will be utilized in this study.

Soil property measurements using the in-situ test devices will be obtained from the AITT study. Statistical analyses will be performed to correlate the

in-situ device measurements with the resilient characteristics of the investigated soils. Multiple regression models will be developed for estimating the resilient modulus based on different in-situ test results.

## Implementation Potential

It is anticipated that this study will provide a relatively simple, cost-effective, and repeatable approach to accurately estimate the resilient modulus of soils for use in design and/or construction QC/QA.

The knowledge and experience gained from this project will facilitate LADOTD's implementation of the AASHTO pavement design guide.



*Repeated load triaxial test*