



# Transportation Consortium of South Central States

## Key Points

**Project Number:**  
17GTNMS02

**Start Date:**  
05/08/2017

**End Date:**  
11/08/2018

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**Lead Institution:**  
New Mexico State University

**Funds Requested to UTC:**  
\$26,000

**Funding Source(s):**  
Tran-SET  
New Mexico State University

**Total Project Cost:**  
\$52,000

## In-situ Mechanical Characterization for Compacted Aggregates

### Brief Project Description

The evaluation of compacted unbound aggregate layers is perhaps the most common undertaking in transportation related projects. The assessment of compaction compliance in engineered fills, subgrades, subbases, and bases in roadways and railways is central to ensure longevity of ground transportation infrastructure. The technical objective of this project is to conduct a review of theoretical methods for the determination of strength and stiffness.

### Problem Statement

The state-of-the-art in mechanical characterization of soils continues to make significant progress, and the gap with the state-of-the-practice in transportation geotechnics continues to widen. Despite efforts by FHWA and AASHTO to bring practice into the new millennium, it remains almost a half century behind. New technologies continue to find resistance or serious challenges to adoption. The most exciting advances in real time mechanical response monitoring (intelligent compaction) has been almost entirely driven by the private industry. However, industry is much less interested in the development of quality control and quality assurance devices. Understanding the end-user priorities and engaging NMDOT in the development of rubrics for the evaluation of available methods will allow us to narrow down the universe of test methods to those with the highest chance of adoption.

### Objective

The principal goal of this project is to conduct a review of theoretical methods for the determination of strength and stiffness. The long-term objective of this project is to advance the state of the practice by developing a series of automated in-situ testing devices for the determination of strength and stiffness (with sufficient level of accuracy and practicality).

### Intended Implementation of Research

The research team will outline a pathway to automation for the highest ranked test method identified. By exploring the basic measurement requirements, the team will identify compatible electronics (sensors,



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controllers, data loggers, and communication systems), and create a blueprint for an automated prototype and prepare a proposal for its development. In the case of the most promising theories identified, the research team will formulate a needs assessment that outlines a series of steps needed for the translation from theory to application.

The findings of this project will be disseminated within the state at the Transportation Research Conference held every year in Las Cruces NM, at a regional level through the publically available reports, and nationally and internationally through peer reviewed journal publications.

## **Anticipated Impacts/Benefits of Implementation**

The development of field-friendly mechanical characterization methods for compacted unbound aggregates is very well aligned with the Center's mission of supporting research, technology transfer, and emerging technologies that can solve transportation challenges in the region. The exploration of untapped potential from unexplored theoretical advances that could be applied to the characterization of unbound aggregates aligns with the Center's vision of translating research into implementation. This study tackles one of the most common preventable causes of premature failure in pavement structures.

## **Weblinks:**

- [Tran-SET's website \(http://transet.lsu.edu/completed-research/\)](http://transet.lsu.edu/completed-research/)
- [TRB's Research in Progress \(RIP\) database \(https://rip.trb.org/view/1467363\)](https://rip.trb.org/view/1467363)