UTC Project Information	
Project Title	Impact of Severe Drought on the Compacted Expansive Clays (Subgrade) in Northern Louisiana
University	Louisiana Tech University
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Agency ID or Contract Number	DTRT13-G-UTC36 SPTC14.1-76
Start and End Dates	August 1, 2014 – July 31, 2016
Brief Description of Research Project	**PROBLEM**: In northwestern Louisiana, most of the subsurface soils (down to a depth of 20 feet) are mainly stiff red, gray and brown fat clay known as expansive soil. Its large volume change could trigger large, deep cracks in dry weather. The high shrink-swell property can cause serious damage to foundations and highways. The issue has not been well addressed in Louisiana. **PROPOSED SOLUTION**: The purpose of this study is to develop a clear understanding of the fundamental volume change behaviors of compacted expansive clays in Louisiana, with a focus on severe drought conditions. Geotechnical index properties will be determined for preliminary soil assessment. Soil water characteristics curve (SWCC) will be plotted to understand the water retention capacity of the clay. Similarly, the shrinkage path and the swelling potential will be determined to study soil volume changes during shrinking and swelling, respectively. In the laboratory test, the swell–consolidation test will be conducted to determine the swelling pressure and to predict heave or settlement. Among these commonly used empirical equations, one or two ground heave/settlement prediction equations will be recommended for pavement design use in Louisiana. The mechanism of longitudinal crack developed at the pavement surface caused by expansive soils will be investigated. Finite Element Method will be utilized to establish a model to analyze the longitudinal crack mechanism by taking into account the volume change of subgrade, interaction between pavement structure and soil. In the model, pavement, shoulder, edge-drain, base, subbase, subgrade and natural embankment will be modeled in different constitutive descriptions. Additionally, cement, lime or/and fly ash

	treated expansive clays in northern Louisiana will be evaluated through swelling and shrinkage tests. Improvement in subgrade shrinkage and cracking will be studied based upon key factors such as stabilized (cement, lime or fly ash) content, material type, density, pre-treatment moisture content, molding moisture content, curing time and compaction method. The research will advance in-depth understanding of the volume change properties of the expansive clays.
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	
Impacts/Benefits of Implementation (actual, not anticipated)	
Web Links • Reports • Project website	