Research Project Descriptions

UTC Project Information	
Project Title	Development of Numerical Simulation Tool for Continuously Reinforced Concrete Pavements
University	The University of Texas at El Paso
Principal Investigator	PI: Cesar Carrasco Co-PI: Soheil Nazarian Co-PI:
PI Contact Information	[Cesar Carrasco, ccarras@utep.edu]
Funding Source(s) and Amounts Provided (by each agency or organization)	$90,000 for 2 years– SPTC $231,629 – SPO funds from research project TXDOT 0-6658 and In kind from CRSI, Commercial Metals and Cement Council
Total Project Cost	$321,629
Agency ID or Contract Number	DTRT13-G-UTC36 OU Subaward #SPTC 14.1-94
Start and End Dates	1/1/2016 – 12/31/2017

Brief Description of Research Project	**PROBLEM**: A continuously-reinforced concrete pavement (CRCP) is a type of rigid pavement with continuous longitudinal steel reinforcement and no transverse expansion or construction joints except at bridges or pavement ends. CRCPs, like any type of pavement, are designed to withstand the level of traffic loads to which they will be subjected under specific environmental conditions. Other design features that impact the CRCP response include slab thickness and mechanical properties, longitudinal reinforcement, and foundation properties. The accurate modeling of these features is of primary importance in a mechanistic-empirical pavement design procedure. The Finite element method (FEM) is one of the most comprehensive tools for modeling the responses of rigid pavements (in general) and CRCP (in particular). However, its use has been limited because of the complexity of implementation by pavement engineers. Researchers from The University of Texas at El Paso developed NYSLAB in MATLAB to comprehensively analyze jointed concrete pavements' (JCPs) responses for different geometric configurations, foundation models, temperature gradient profiles and traffic loads. This tool has the capability to analyze pavements under nonlinear thermal profiles across the thickness of the slab and capture the frictional tractions between slab and foundation. All complications related to appropriate discretization and modeling are handled internally by the software. **PROPOSED SOLUTION**: This research project aims to expand the capacity of the existing source code of NYSLAB by upgrading its FEM models to predict the stresses and strains in CRCP. Unlike JCPs, CRCPs use reinforcing steel rather than contraction joints for crack control. Therefore, the addition of a new FEM model will also be required to determine the complex interaction of reinforcement steel and concrete as well as slab-foundation interaction due to friction and temperature changes.
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	Will be provided under http://ctis.utep.edu/research/