

<b>UTC Project Information</b>	
Project Title	MPC-596 – Measurement of Turbulent Flow Characteristics and Bed Shear Stress in Laboratory Soil Erosion Tests
University	South Dakota State University
Principal Investigator	Francis Ting, Ph.D., P.E.
PI Contact Information	Professor Department of Civil and Environmental Engineering South Dakota State University Phone: (605) 688-5997 Email: francis.ting@sdstate.edu ORCID: 0000-0001-8524-7691
Funding Source(s) and Amounts Provided (by each agency or organization)	USDOT, Research and Innovative Technology Administration \$74,007  South Dakota State University \$77,887
Total Project Cost	\$151,894
Agency ID or Contract Number	69A3551747108
Start and End Dates	April 11, 2019 to July 31, 2022
Brief Description of Research Project	The objective of this research project is to measure the characteristics of turbulent flow over an eroding soil sample in an erosion function apparatus (EFA) type facility. A gravel bed will be installed in an open-channel flume to produce fully developed turbulent flow over a rough bed. The developed flow will pass over an extruded thin walled tube soil sample housed in a floor recess. Three components of water particle velocities in a three-dimensional (3D) flow volume over the eroding sample will be measured by using a volumetric three-component velocimetry (V3V) system. The measured data will be used to determine the spatial distributions of mean velocity, turbulent kinetic energy and Reynolds stress to quantify the effects of surface roughness and height of soil protrusion on the local flow characteristics, induced bed shear stress and soil erosion rates. The outcome of this study will be an improved laboratory setup for measuring soil erodibility. A demonstration project will be performed by testing thin walled tube samples collected from a new bridge over waterway in South Dakota. The measured erosion-rate-versus-shear stress curves will be used with the SRICOS method to predict scour history over the project life of the bridge. A future extension of this project will use the improved EFA facility to develop a soil erodibility chart for South Dakota soils. This information will be useful for assessing the susceptibility of soil erosion and scour in many highway projects.

Describe Implementation of Research Outcomes (or why not implemented)	
Place Any Photos Here	
Impacts/Benefits of Implementation (actual, not anticipated)	
Web Links <ul style="list-style-type: none"><li>• Reports</li><li>• Project Website</li></ul>	