Title: Use of Sacrificial Embankments to Prevent Bridge Collapse Due to Scour Under Extreme Events

The leading cause of highway bridge failure in the United States is bridge scour. High flow events in streams lead to foundational bridge scour by enhancing erosion and scour processes. These bridges are at a critical risk of collapsing during extreme flooding events, and are a major risk to human life and economic sustainability. Currently, agencies and designers have limited resources to predict the increasing severity of flooding that has occurred over the last five decades. Retrofitting the thousands of undersized and scour critical bridges throughout the country to the current standards is prohibitively expensive, and current countermeasures inadequately address the core problems related to scour.

Recent research efforts on scour are geared towards modeling and pattern analysis for designing standards for newly built or planned bridges. Very limited research is focused on the design or retrofit standards for the tens of thousands of bridges already built, yet still vulnerable to scour. This research focused on the design and implementation of a simple and effective retrofit for bridges already built using an embankment system that acts as a “fuse” during high flow events. This embankment design increases the streams cross sectional area during high flow events, thereby decreasing the energy and scour potential. This research can provide a more inexpensive, safer, and quicker retrofit for vulnerable bridges compared to current methods.