

FY2018 STIC Incentive Proposal

Development of Ultra-High Performance Concrete Mixture Proportions Produced with Local Materials for Prefabricated Bridge Element Concrete Connections

Description of Proposed Work: The NMDOT, in conjunction with New Mexico State University (NMSU), will develop a non-proprietary Ultra-High Performance Concrete (UHPC) mix design utilizing regionally available materials for use in UHPC bridge deck concrete connections for Prefabricated Bridge Elements and Systems (PBES).

End product/result: Previous research for the New Mexico Department of Transportation has shown the many benefits and advantages that ultra-high performance concrete (UHPC) offers to improved behavior and durability of infrastructure. This project will develop UHPC mixture proportions using materials local to New Mexico for bridge deck connection applications. UHPC mixtures produced with local materials have been shown to cost roughly 70% less than commercially available, proprietary products. Furthermore, using materials familiar to the local concrete industry expedites the implementation of the materials. While the focus of this project is bridge connections applications, it will also provide additional background information for the broader application of UHPC in new applications including decks, shear keys, approach slabs, and joints.

The mixture proportions will be optimized for ingredients, curing, and application. The mixture proportions will be optimized for:

- fiber content
- fiber type/size (steel, polypropylene, blends)
- workability
- admixtures
- curing

Amount of STIC Incentive Funding: \$40,000

Commitment of other funding: No other funding is being pursued. This project recognizes the vast amount of research and publications that have determined that UHPC for PBES connections is a durable and beneficial solution. This project is unique in that it will result in a UHPC for PBES connections mix design that is customized to utilize the natural resources that are readily available in New Mexico. NMSU has produced similar mix designs for use in bridge girders and for bridge deck overlays.

Budget Justification: The budget includes the cost of a student support (graduate and undergraduate), materials (e.g., fibers), small tools and instrumentation, and facility and administrative cost.

Project Schedule:

Task	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Admixtures	X	X	X	X								
Other Constituents		X	X	X	X	X						
Strength Gain			X	X	X	X	X	X	X	X		
Fiber Optimization	X	X	X	X	X	X	X	X	X			
Reporting / Documentation						X	X	X	X	X	X	X