

Request for Research Funding for FY 2020-2021

Requesting Office	State Materials Office	Priority - High	1 of 10
Proposed Title	NEXTGEN Concrete – The Tests of the Future		
Justification	<p>FDOT needs to minimize or eliminate cracking in new structural elements. We need to stop constructing our future maintenance headaches. As part of this goal, FDOT needs to do a better job assessing concrete mixes for specific structural applications. This assessment needs to adapt to the ever changing physical, chemical and market issues associated with concrete’s constituent ingredients. We need to apply a series of screening tests to our mixes that robustly assess their cracking potential in specific FDOT applications. Specifically, we need tests that: Measure a mixes shrinkage potential, Sulfate and Chloride durability and potential to generate excessive heat. These are the key materials related factors generating cracking in FDOT’s new structures. The tests should be simple enough for a high school graduate to run. The cost of the equipment should be low enough to support a wide deployment. The tests should avoid the use of hazardous materials. The tests should take no longer than 30 days to complete. We ultimately need to know what tests to run and what specification thresholds to use when screening a mix for a particular use on our projects.</p> <p>SMO Strategic Focus Area – G2, G3 and S2</p>		
Impact	Mix designs would be put through a more rigorous evaluation based on their intended use on our projects. We should be able to substantially reduce cracking in new structural elements.		
Affected Offices	<p>Construction – Hurtado, Westphal</p> <p>Structures Design – Robertson</p> <p>Specifications- Strickland</p> <p>State Materials Office – Ruelke, Upshaw, Musselman (MAC)</p>		
Existing Work	The first phase of this overall project will be reviewing the existing literature to see if there are existing tests that meet our needs. The PI will offer an expert opinion on why tests are or are not suitable.		
Keywords Used In Existing Work Search (Cannot leave blank)	<p>Concrete shrinkage</p> <p>Concrete Mix Approval</p>		
Related Contracts (Give contract numbers)			
Funding Request	<p>Project 1 \$50K</p> <p>Project 2 \$200-300K</p> <p>Project 3 \$200K</p>	Anticipated Duration	<p>Project 1- 6 Mo.</p> <p>Project 2 - 24 to 36 months</p> <p>Project 3 - 24 months</p>
Project Manager	Ruelke/Upshaw	Contracting Method	<p>Project 1- Direct UF Ferraro</p> <p>Project 2 - RFP</p> <p>Project 3 – If satisfied, Direct to PI of Project 2</p>
Urgency	1	We anticipate that some of the tests needed to meet our needs do not exist today. We need to identify those gaps (Project 1), Create the tests to fill them (Project 2), and then set the spec limits for approval for all the tests (Project 3).	

		This will take time complete. Until then, the SMO will be implementing prescriptive spec changes designed to reduce cracking. As an agency, we need to continue in the direction of robust performance based specifications.
Implementability	1	<p>Implementation will take the form of spec changes that use the new performance related tests to screen mix designs for their specific use. By the end of Project 3 we should know what tests to run and what thresholds to use for approval.</p> <p>Our Contractor industry partners will need to be kept informed in order to manage the fear of change and allow them to adapt their expectations to the new mix approval process and the field performance of the new mixes.</p>
<p>Project Benefits (Succinct, complete explanation)</p> <p>These projects will result in fewer cracks in new structural concrete elements. Each mix will be evaluated by a series of performance based tests designed to assess their potential to cause cracking in a specific element. Mixes with a high cracking risk will not be approved for use in specific elements (Bridge Decks, Drilled Shafts, Mass Concrete).</p>		
Project Benefits (Select all that apply and explain)	Quantifiable Benefits (units, dollars, etc...if applicable)	Methodology or Data Sources Used to Determine Quantifiable Benefits. If not applicable, please give justification of project benefits
<input type="radio"/> Materials Enhancement - YES		The new tests will allow us to do a better job picking the right mixes for the application.
<input type="radio"/> Materials Savings – YES		We will not be using as much crack sealant. Also, we will also not have to use expensive cathodic protection systems as often.
<input type="radio"/> Time Savings - YES		Maintenance will not have to be monitoring the effects of cracks on brand new structures.
<input type="radio"/> Lives Saved/Injuries Prevented		
<input type="radio"/> Other (Explain)		Public confidence maintained. Public will see fewer cracks in brand new bridge decks.

*Comments should explain and support urgency, financial benefit, and implementability scores