Request for Research Funding for FY 2023-2024			
Project Number (Research Center Use Only): SMO-25-05			
Requesting Office	SMO	**Priority**	5 of 15
Proposed Title	Optimized mix design of pavement concrete for long-term performance		
Justification	Pavement concrete is usually designed based on compressive strength or flexural strength. Concrete pavements in Florida with similar concrete strength and slab thickness have shown to have widely variable performance. Some concrete pavements have been in service for over fifty years and are still in excellent condition, while other concrete pavements using concrete with adequate strength have failed prematurely. Past research on concrete pavement performance has shown that concrete with a low coefficient of thermal expansion, low elastic modulus, and low drying shrinkage will have lower thermal and load-induced stresses and will have better performance. In addition to consideration of strength, all these relevant properties of concrete need to be incorporated into the mix design. The main objective of this research is to develop a procedure for optimized mix design for pavement concrete. A database of pavement concrete will be established. This database will contain mix design information, relevant properties of concrete, and field performance of pavement concrete used in Florida. This database can be used to provide concrete mix designs which will give good performance. Artificial Intelligence (AI) technique will be used to do concrete mix designs using this database.		
Impact	This research would recommend a procedure for optimized mix design for pavement concrete for long-term performance.		
Affected Offices	Materials and Design Offices		
Existing Work	The factors affecting the performance of pavement concrete have been known through research findings in the past. However, no coordinated effort has been made to develop a database of pavement concrete and to develop a procedure for optimum mix design.		
Keywords Used In Existing Work Search **(Cannot leave blank)**	Pavement Concrete, Optimum Concrete Mix Design, Coefficient of Thermal Expansion, Elastic Modulus, Drying Shrinkage, Database		
Related Contracts (Give contract numbers)	NA		
Funding Request	$240,000	**Anticipated Duration**	24 months
Project Manager	Ohhoon Kwon	**Contracting Method**	Direct to UF (Dr. Tia and Dr. Wong)
Equipment	Estimated equipment cost (or N/A)	N/A	
Urgency	Score 1-5 1= highest, most immediate need	2	
Implementability	Score 1-5 1= greatest likelihood of and proximity to implementing results	2	

Project Benefits (Succinct, complete explanation)

The success of this research would result in an improved procedure for the optimized design of pavement concrete for long-term performance.

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**
o Materials Enhancement	Extension of pavement service life	The outcome of this research will be an improved concrete mix design which will provide better performing concrete.
o Materials Savings	Extension of pavement service life	The outcome of this research will be longer-lasting pavements, which will result in material savings.
o Time Savings	Time Savings for developing new mix design	The data-driven mix design reduces a significant amount of time in developing new concrete mix designs with high certainty of long-term performance.
o Lives Saved/Injuries Prevented	N/A	
o Other (Explain)	N/A	

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