Request for Research Funding for FY 2021-2022			
Requesting Office	Geotechnical	**Priority**	3 of 5
Proposed Title	Estimating Grout Volume of Auger Cast Piles		
Justification	Thermal Integrity Testing is a critical test for auger cast piles on bridge foundations. Estimating the actual volume of grout placed is a necessary task to obtain the as-built pile diameter, and reinforcement cover of these foundations. However, determining this volume is not an easy task and we have observed some problems obtaining it. Even though there is continuous monitoring of volume pumped throughout the installation there is not an accurate way to determine how much of this volume will end up being part of the as-built pile. The installation requires an initial priming of the grout delivery lines and pumping an initial head of volume, with a minimum overgrout (volume delivered / theoretical volume) of 115% or 120% throughout the full length of the pile. These factors combined with the volume the auger occupies which typically displaces a significant amount of grout volume which will not be part of the pile (waste) and is currently not measured accurately.		
Impact	A beneficial impact from this research is expected since it will improve the interpretation of thermal integrity testing estimates of pile diameter and reinforcement cover. This will allow practitioners to evaluate thermal integrity testing for auger cast piles in a more reliable and consistent manner, and will benefit the department, contractors and consultants.		
Affected Offices	This project will affect the Structures Design Office, State Materials Office and the Office of Construction.		
Existing Work	The subject problem was identified originally on the FDOT implementation research "Thermal Integrity Profiling for Augered cast-in-place Piles-Implementation Plan" (2017). The last sentence of this report recognized that "..determining the grout volume was a weak link in the quality assurance program…". We are not aware of any publication addressing this issue specifically. Only recently (2019) has the Department started the use of thermal testing on auger cast piles, and the problem has become evident. FHWA and DFI guidelines do not address this issue as the use of thermal testing in auger cast piles is relatively new, particularly the need to determine the grout volume placed in the ground.		
Keywords Used In Existing Work Search **(Cannot leave blank)**	Auger Cast Pile, Grout volume, Thermal Integrity Profiling		
Related Contracts (Give contract numbers)	None		
Funding Request	$150,000	**Anticipated Duration**	18 months
Project Manager	Proposed technical manager to oversee research: Juan Castellanos and Rodrigo Herrera	**Contracting Method**	Direct contract with USF, Dr. Mullins
Urgency	3	We would like to have results on this relatively soon as the acceptance of auger cast piles for bridges relies significantly on the thermal integrity testing method.	
Implementability	1	Project results could be implemented within 6 months after the completion of the project.	

Project Benefits (Succinct, complete explanation)

1. Improve the quality and reliability of the thermal integrity results.
2. Establish a uniform method to determine the grout volume.
3. Minimize disputes and claims with contractors and their consultants regarding the accuracy of TIP.

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
○ Materials Enhancement	NA	Will improve the quality of the thermal integrity testing for auger cast piles. Will improve the quality of our inspection of foundations.
○ Materials Savings		
○ Time Savings	NA	Will reduce action time during construction that typically arises when there are disagreements regarding the interpretation of the integrity testing and the questionability of pile integrity.
○ Lives Saved/Injuries Prevented		
○ Other (Explain)	NA	Having a standard methodology for testing and interpretation will help reduce claims for delays and extra cost that could happen if there are disagreements regarding the quality of certain piles and the contractor argues his interpretation is the correct one.

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