

Request for Research Funding for FY 2019-2020

Requesting Office	Geotechnical	Priority	3 of 4
Proposed Title	Field Investigation of Downdrag on Concrete Piles in Sandy Soil		
Justification	This project was requested by two District Geotechnical Engineers (DGEs) with the concurrence of every district in the state based on discussions at the statewide geotechnical meeting held in 2018. Design considerations for downdrag sometimes greatly limit the remaining capacity of piles to support normal pile loads. Currently there is disagreement among practitioners, both within the state and at the national level, regarding whether the phenomenon manifests itself according to theory, or whether its effects are altered by the densification that occurs around displacement piles.		
Impact	It is expected that the research will provide the required information to allow the Department to reduce the estimated downdrag loading in design. This will allow the Department to safely increase the factored design load for piles in loose sand profiles and stop the current practice to mitigate the estimated downdrag loading of adding extra piles or expensive bitumen coating. Since these subsurface conditions are prevalent in Florida, the results of this research will affect a significant number of projects throughout the state.		
Affected Offices	Design & Construction		
Existing Work	Existing work consists of model studies, laboratory tests intended to represent displacement piles, and full-scale measurements of steel H-piles in clays and clayey sands. However, none of these studies adequately replicate the near field densification effects of driving an 18-inch, 24-inch or 30-inch square concrete pile into loose to medium dense sands frequently encountered in Central and South Florida.		
Keywords Used In Existing Work Search (Cannot leave blank)	Downdrag, sand, negative skin friction, drag load		
Related Contracts (Give contract numbers)			
Funding Request	\$250,000.00	Anticipated Duration	24 months (depending on construction schedule)
Project Manager	Larry Jones	Contracting Method	Direct contract with University of South Florida (Dr. Gray Mullins)
Urgency	2	Resolution is needed to quantify the downdrag loading for the specific condition of driving a prestressed concrete pile into loose to medium dense sands, which is a frequently encountered condition in Central and South Florida. Data is needed to support an engineered solution since there is no consistent guidance both within the state and at the national level. Requests from each of the districts to address this matter have been submitted to the central office to address this matter and to develop a consistent statewide policy.	
Implementability	1	Results will be implemented into the next Soils & Foundations Handbook edition following completion of the project. Findings of this research will be presented in annual Geotechnical Research in Progress (GRIP) meetings to district geotechnical staff and consultants.	

Project Benefits (Succinct, complete explanation)

It is expected that the research will allow the Department to safely reduce the estimated downdrag loading considered during design of the bridge foundations. This will allow us to increase the factored design load for piles in loose sand profiles and stop the current practice to mitigate the estimated downdrag loading of adding extra piles or expensive bitumen coating. Since these subsurface conditions are prevalent in Florida, the results of this research will affect a significant number of projects throughout the state.

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 checked="" type="checkbox"/> Materials Enhancement		The research is expected to document the value of near field densification effects of driving an 18-inch or 24-inch square concrete pile into loose to medium dense sand profiles. This will more accurately estimate the soil properties that can incorporated into the foundation design.
<input checked="" type="checkbox"/> Materials Savings		The research is expected to reduce the magnitude of downdrag theoretically required during design, thereby reducing the number of piles, or bitumen coating required for end bents in loose sand profiles.
<input checked="" type="checkbox"/> Time Savings		The research is expected to reduce the magnitude of downdrag theoretically required during design, thereby reducing the time to install piles, or bitumen coating required for end bents in loose sand profiles.
<input type="checkbox"/> Lives Saved/Injuries Prevented		
<input type="checkbox"/> Other (Explain)		

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