Request for Research Funding for FY 2019-2020			
Requesting Office	SMO	**Priority**	1 of 11
Proposed Title	Identification of the mechanisms that produce hydrogen embrittlement on post-tensioning members and the effects of galvanic coupling on bridge tendons		
Justification	Following the identification of hydrogen embrittlement on bridge tendons by the University of South Florida in 2018, the State Materials Office and State Structures Design Office agree that it is necessary to identify the possible consequences of having galvanic couplings between the post-tensioning steel and the galvanized ducts in deviators and bulk heads on regards to the evolution of hydrogen on the high strength steel used for post-tensioning. Hydrogen produced by high strength steel reduce the tensile strength of the steel producing an unanticipated effect not considered in the design that could place the safe use of the bridges on high risk of failure.		
Impact	Because of the large number of post-tensioned bridges in Florida designed with this condition, it is necessary to understand this degradation mechanism to implement the proper corrective actions to avoid possible critical failures.		
Affected Offices	State Materials Office- Structures Group and State Structures Design Office		
Existing Work	It is well known that high currents could introduce hydrogen embrittlement on high strength steel. However, this has not been associated to post-tensioning bridge designs.		
Keywords Used In Existing Work Search **(Cannot leave blank)**	corrosion, hydrogen embrittlement, galvanic coupling, post-tensioning, tendons		
Related Contracts (Give contract numbers)	None		
Funding Request	$200,000	**Anticipated Duration**	2 years
Project Manager	Matthew Duncan	**Contracting Method**	Direct contract with University of South Florida
Urgency	1	Several structures have exhibited multiple tendon failures with at least 1 of them having been identified as a failure due to hydrogen embrittlement.	
Implementability	2	Multiple phases are not anticipated. Findings from research will better equip the State Materials, Structures Design, and Maintenance office personnel in addressing corrosion concerns of a structure design that is continuing to be used.	

Project Benefits (Succinct, complete explanation)

Ensure Department personnel are prepared to evaluate corrosion issues when they occur due to these types of corrosion mechanism and to provide a safe infrastructure.
May also provide information to implement preventative efforts.

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		
o Materials Savings	$1M/tendon that needs replacing	This is the average cost the Department has been paying for tendon replacement
o Time Savings	varies	Due to design variances and number of tendons that need to be replaced, a specific or quantifiable amount of time is unavailable
o Lives Saved/Injuries Prevented		
o Other (Explain)		

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