

Request for Research Funding for FY 2024-2025			
Project Number (Research Center Use Only): STR-25-03			
Requesting Office	CO Structures Design	Priority	3 of 4
Proposed Title	Post-installed post-tensioning anchorages in concrete for bridge strengthening		
Justification	<p>Complex bridges pose unique challenges in terms of initial design and life cycle maintenance. Commonly, these bridges are found at interchanges linking interstate highways or arterial thoroughfares in highly urbanized areas. As such, replacement of these structures can be extremely challenging. Thus, in many cases, retrofitting or strengthening these structures can be an economical and logistical alternative to bridge replacement. Recent alternative technical concepts (ATC) proposed by designers and/or contractors have included some innovative post-tensioning (PT) solutions that require that PT elements, such as bars, be anchored in concrete footings or other substructure elements. This requires that anchorages be post-installed and would not resemble traditional PT anchorage systems. Instead, they would likely resemble an undercut anchorage system. An illustration of this is shown in Figure 1, below.</p> <div data-bbox="414 850 1461 1173" data-label="Image"> </div> <p style="text-align: center;">Figure 1. Post-installed PT anchorage system</p> <p>The objective of this project is to develop preliminary details for the anchorage system shown above and conduct proof of concept testing with a focus on the ultimate limit state of the system. The solution needs to be rational and constructible; therefore the investigator will engage a design consultant as an advisor to the project team. Variables investigated will include filler material, edge distance and pile cap reinforcement, with only one anchorage shape tested.</p> <p>This research can be considered to enhance <u>safety</u> because it entails development of details which can be used to increase capacity of existing structures, therefore also enhancing <u>resiliency</u> of the existing transportation infrastructure. Developing <u>technological</u> advancements that allow the strengthening of existing structures will reduce the impact on the traveling public, thereby enhancing <u>community</u> connectivity.</p>		
Impact	<p>Post-installed post-tensioning anchorages have been proposed in recent alternative technical concepts, which means there is an industry need for their use. Without this research and the resulting knowledge, the potential performance of post-installed post-tensioning anchorages is unknown and FDOT should not allow usage of these details. That means retrofit projects are more</p>		

	costly than they otherwise would be or replacement is required, which negatively impacts the traveling public.		
Affected Offices/ Districts	Central Office Structures Design Office, Central Office Maintenance Office, Central Office Construction Office		
Existing Work			
Keywords Used In Existing Work Search (Cannot leave blank)	Post-installed post-tensioning anchorages		
Related Contracts (Give contract numbers)			
Funding Request	\$225,000	Anticipated Duration	18 months
Project Manager	Olga Iatsko	Contracting Method	Direct to USF
Equipment	N/A		
Urgency	3	This project scored third in a rating of 15 research ideas by FDOT's Central and District Structures Design Offices.	
Implementability	3	The scope of this initial project would include anchorage hole details, undercutting methods, grouting materials and placement methods, and investigation of the ultimate load capacity of the system. This research would likely require a follow-up study focused on the long-term effects of sustained loads.	
Project Benefits (Succinct, complete explanation) This project aims to broaden the suite of solutions for retrofit / strengthening of complex bridges. Vetted solutions provide more confidence to the State and the engineer of record. Furthermore, and most importantly, vetted solutions enhance bridge safety and the safety of the traveling public.			
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		This research will determine appropriate details for installing post-tensioning anchorages into existing structures, which will enhance the service life of existing bridge structures.	

○ Financial Impact		Cost savings could be realized by strengthening instead of replacing bridge structures. Evidence of this is provided by recent alternative technical concept submittals.
○ Time Savings		
○ Lives Saved/Injuries Prevented		Reduced construction impacts are associated with improved safety for the traveling public.
○ Other (Explain)		

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