

**Request for Research Funding for FY 2019-2020**

<b>Requesting Office</b>	SDO (Geotechnical)	<b>Priority</b>	2 of 4
<b>Proposed Title</b>	Performance Testing of GRS Test Piers Constructed with Florida Aggregates – Axial Load Deformation Relationships		
<b>Justification</b>	GRS-IBS Abutments are currently designed based on tests performed using aggregates or road base from Northern States at the FHWA’s Turner-Fairbank Highway Research Center or in Defiance County OH. The load deformation characteristics of Florida limestone is known to differ from the characteristics of the tested materials. In order to investigate expanded use of GRS-IBS and increasing the allowable loading, tests using local materials are needed.		
<b>Impact</b>	<p>The results of this study will increase designer confidence in estimating the internal deformations due to superstructure loads. The lack of having these test results is a stumbling block for designers to utilize this cost saving foundation type.</p> <p>The study will also investigate the effect use of stronger geotextile components and the potential for increasing the normal service load limits for GRS-IBS abutments. This will allow us to safely expand the use of cost saving GRS Abutments to longer, heavier spans. In order to save costs and control conditions, the testing will be performed at the FDOT Marcus H. Ansley Structures Research Center.</p>		
<b>Affected Offices</b>	Structures Design, Structures Research Center, Materials, Construction		
<b>Existing Work</b>	<p>FHWA-RD-01-118 Performance Test for Geosynthetic Reinforced Soil Including the Effects of Preloading (2001)</p> <p>FHWA-HRT-11-026 Geosynthetic Reinforced Soil Integrated Bridge System Interim Implementation Guide (2011)</p> <p>FHWA-HRT-11-027 Geosynthetic Reinforced Soil Integrated Bridge System Synthesis Report (2011)</p> <p>FHWA-HRT-13-066 Geosynthetic Reinforced Soil Performance Testing – Axial Load Deformation Relationships (2013)</p> <p>Adams, M. T., Ooi, P. S., and Nicks, J. E., "Mini-Pier Testing To Estimate Performance of Full-Scale Geosynthetic Reinforced Soil Bridge Abutments," <i>Geotechnical Testing Journal</i>, Vol. 37, No. 5, 2014, pp. 884-894, <a href="https://doi.org/10.1520/GTJ20140007">https://doi.org/10.1520/GTJ20140007</a>. ISSN 0149-6115</p>		
<b>Keywords Used In Existing Work Search (Cannot leave blank)</b>	GRS Test Pier, GRS Load Test		
<b>Related Contracts (Give contract numbers)</b>	None		
<b>Funding Request</b>	\$300,000	<b>Anticipated Duration</b>	24 months
<b>Project Manager</b>	Larry Jones	<b>Contracting Method</b>	Direct contract with University of Florida (Dr. Scott Wasman)
<b>Urgency</b>	2	Part of this research will provide measured load vs. deformation data for Florida specific materials, because Structural Engineers have indicated they are hesitant to design GRS abutments for many bridges until this data is available.	
<b>Implementability</b>	1	The results of this research will be directly implementable even before the project is 100% complete.	

**Project Benefits:**

The project will provide measured load vs. deflection data for the design of GRS bridge abutments. The project will also verify that the FHWA design methods for heavily loaded GRS bridge abutments are safe. This will allow FDOT to use GRS bridge abutments for longer and heavier

bridges than those conservatively recommend by FHWA. GRS abutments, when used, are much less expensive, faster to construct and deformation tolerant than conventional abutments. This project will expand the use of these cost and time saving abutments.

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	N/A	GRS exhibits the behavior of a composite material rather than a reinforced material.
✓ Materials Savings	N/A	The deformation tolerance of GRS reduces the need for over excavation of unsuitable subsoil.
✓ Time Savings	Approx. 2 months per bridge	On the Orange Avenue bridge replacement project, both abutments were ready for girder placement in less time than it would have taken to drive test piles and determine pile lengths and driving criteria for most bridges of similar size.
○ Lives Saved/Injuries Prevented		
○ Other (Explain)		

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