FDOT Transportation Innovation Initiative:

FRP – Design Innovation

Fast Facts:

Glass Fiber Reinforced Polymer
&
Carbon Fiber Reinforced Polymer
&
Hybrid Composite Beam

Project Location:	FDOT District Seven Citrus County Homosassa Spring, Florida
Agency:	Florida Department of Transportation
URL:	http://www.fdot.gov/structures/innovation/FRP.shtm
Project Name:	CR-490A Halls River Road over Halls River Bridge No. 024054 FPID: 430021-1-52-01
Project Description:	Bridge Replacement
Project Purpose & Need:	The existing bridge was functionally obsolete and listed on the Citrus County Bridge Replacement Program. The purpose of this project is to increase capacity and improve safety of the existing transportation facility.
Overall Budget/Cost Estimate:	$6,015,645.00 (Construction Contract)

What was unique about this project?

This project is a demonstration project. Work activities included replacement of the bridge with Hybrid-Composite Beams (HCB) from HC Bridge Company; Prestressed precast concrete square piles and sheet pile walls reinforced with carbon fiber-reinforced polymer (CFRP) strands and stirrups; and Cast-in-place concrete bulkhead caps, pile caps, wing walls, back walls, deck, traffic barriers, approach slabs reinforced with glass fiber-reinforced polymer (GFRP) bars and stirrups. Removable test blocks, reinforced with varying types of FRP bars and strands, will cast with the bulkhead cap for monitoring long-term durability.

Describe Traditional Approach: Traditional approach includes addition of flyash, blast furnace slag, silica fume and other corrosion inhibitors into cement rich concrete mixes to protect carbon steel prestressing strands and reinforcing with limited long-term success, especially in the presence of concrete cracking.

Describe New Approach: HCB uses galvanized steel strands (as tension reinforcement) encased in polymer resin with Glass fiber-reinforced polymer beam shell and SCC concrete arch core. GFRP bars and stirrups used in the cast-in-place pile cap, bulkhead cap, deck, traffic railing, approach slab, back wall, wing wall, CFRP strands and spirals in piles, sheet pile walls, in lieu of traditional grade 60 steel rebar and steel strands.

Top Innovations Employed: Utilization of FRP bars and strands in marine environment.

Primary Benefits Realized/Expected: Longer service life of the bridge without major maintenance.

Project Start Date/Substantial Completion Date: 1/9/2017 – 2018

Affiliations:	PE Designer:	FDOT District Seven
	PE Consultant:	American Consulting Engineers of FL.
	Construction Contractor:	Astaldi Construction Corp.
	Construction Engineering Inspection:	FDOT/Brooksville Operation, JACOBS Engineering, and Cardno TBE.
Project Contact:	Engineer of Record:	Mamunur R. Siddiqui, P.E. FDOT District Seven mamunur.siddiqui@dot.state.fl.us
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