FDOT Transportation Innovation Initiative:

FRP-RC/PC – Design Innovation

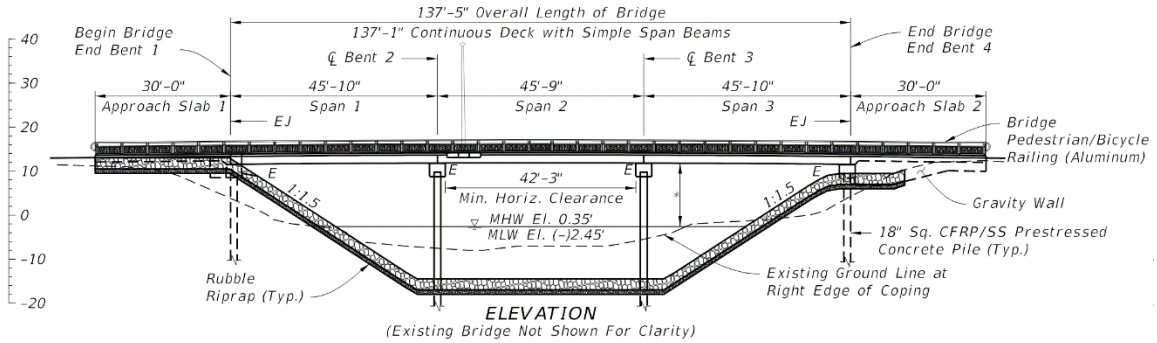

Existing Bridge (2022)

Fast Facts:

Glass
Fiber Reinforced
Polymer Bars
&
Carbon Fiber
Reinforced
Polymer/HSSS
Strands

Project Location:	FDOT District Four Palm Beach County North Palm Beach, Florida
Agency/Owner:	Florida Department of Transportation
URL:	http://www.fdot.gov/structures/innovation/FRP.shtm
Project Name:	SR 5 (US 1) over Earman River Bridge No. 930564 FPID: 442891-1 (T4615)
Project Description:	Bridge replacement with 3-span FSB superstructure and pile bents.
Project Purpose & Need:	Following the failure of the exterior slab unit in Span 2 *(see image below)* and subsequent inspection, the structure was classified as structurally deficient and identified for replacement. Corrosion and complete section loss of the transverse post-tensioning led to the failure. The proposed typical section maintains 3 lanes in each direction with a large 11'-4" sidewalk on each side.


Existing Bridge (2022)



What was unique about this project? First full bridge replacement in District IV to use FSBs (3,477 LF) with CFRP/HSSS strands and Basalt/Glass FRP/SS auxiliary reinforcement. The typical FSB intermediate bent detail with an expansion joint is modified to eliminate the joint (link-slab). Basalt/Glass FRP reinforcement is used in the bent caps and C.I.P topping (148,000 LF).

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: In lieu of carbon-steel prestressing strands and mild reinforcing, the FSBs will utilize CFRP or HSSS prestressing strands and Basalt/Glass FRP or SS reinforcing. The C.I.P. topping and pile bent caps will utilize Basalt/Glass FRP bars with reduced concrete cover. Highly reactive pozzolans are still used with HSSS prestressing strands.

Top Innovations Employed:	Utilization of CFRP/HSSS prestressing strands and Basalt/Glass FRP bars within the splash zone/marine environment.
Primary Benefits Realized/Expected:	Longer service life of the bridge without major maintenance.
Project Start/Completion Date:	Oct. 2023 – Oct. 2025 (Bid Solicitation Notice T4615)
Construction Estimate:	$12,000,000

Affiliations:	PE Consultant (Roadway):	American Consulting Professionals, LLC
	Construction Contractor:	TBA
	Construction Engineering Inspection:	Pinnacle Consulting Enterprises, Inc.
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