FDOT Transportation Innovation Initiative:

FRP – Design Innovation

Fast Facts:

Glass Fiber Reinforced Polymer & Basalt Reinforcing Mesh

Project Location:	FDOT District Two St. Johns County St. Augustine, Florida
Agency:	Florida Department of Transportation
URL:	http://www.fdot.gov/structures/innovation/FRP.shtm
Project Name:	SR-312 Over Matanzas River Bridge No. 780089 FPID: 428229-1
Project Description:	Bridge Substructure Rehabilitation
Project Purpose & Need:	Bridge Inspection Reports identified concrete deterioration in the substructure. Work activities included removal of existing multi-column pier jackets and installation of new jackets on the multi-column pier. New jackets were installed at the specific multi-column piers. Pier Footing Jackets with Impressed Current Cathodic Protection (ICCP) were installed. Ribbon anodes were installed between the piles on the pier footing. GFRP dowels and Basalt Reinforcing Mesh were used in select locations.

What was unique about this project?

Pier 15, Pier 19, Pier 20, Pier 21, Pier 22, Pier 23, Pier 26, Pier 29, Pier 30, and Pier 31 were rehabbed as follows:

Columns: No. 4 L-shape GFRP dowel bars with epoxy were embedded into the columns to attach the 150mm x 150mm x 4mm Basalt Reinforcing Mesh to protect the Titanium Anode Mesh.

Struts: No. 4 L-shape GFRP dowel bars with epoxy were embedded into the strut to attach the No. 4 GFRP bars in longitudinal and No. 3 GFRP bars in transverse direction to protect the Titanium Anode Mesh. Dowel spacing was 6-in and GFRP bars were spaced at 1-ft in both direction alongside of strut.

Footing: This is among the first projects to implement Ribbon Anodes.

Shotcrete: Pneumatically applied concrete was used in the Column and Strut to form the Jacket. However, due to problems with concrete quality issues, the shotcrete was removed from a few piers and was applied again. This provided an opportunity to explore removal of concrete from the Basalt Mesh and GFRP bars.

Below is the list of innovations unique to this project:

- Use of GFRP in conjunction with Shotcrete
- GFRP bar use in the marine environment
- Use of Basalt Mesh in conjunction with GFRP
- Use of Ribbon Anode in Footings

Overall Budget/Cost Estimate: $2.4 Million Construction Contract

http://www.fdot.gov/structures/innovation/FRP.shtm

Describe Traditional Approach: Traditional approach includes installation of traditional Grade 60 rebar in conjunction with cast-in-place concrete.

Describe New Approach: Utilization of GFRP rebar and Basalt Reinforcing Mesh in lieu of traditional Grade 60 rebar in variety of settings including in conjunction with Shotcrete; in the marine environment; and with traditional pour in place construction method and opportunity to explore the removal of concrete from basalt bars.

Top Innovations Employed: Utilization of GFRP rebar and Basalt Reinforcing Mesh within the splash zone/marine environment

Primary Benefits Realized/Expected: Lifted the restrictions on use of GFRP and Basalt within the splash zone/marine environment. Gave the opportunity to explore the use of Basalt. The restriction was in place due to reaction of GFRP resin with chlorides.

Project Start Date/Substantial Completion Date:		01/06/2014 – 6/12/2015
Affiliations:	PE Consultant:	Stantec Consulting Services Inc.
	Construction Contractor:	Orion Marine Construction, Inc.
	Construction Engineering Inspection:	JEA Construction Engineering Services
	Material Testing:	Ellis & Associates, Inc.
Project Contact:	Engineer of Record:	Mohit D. Soni, P.E. Stantec Consulting Services Inc. Mohit.Soni@stantec.com
	FDOT Project Manager:	Jeff Bailey FDOT District Two Jeff.Bailey@dot.state.fl.us
	FDOT State Materials Office:	Chase C. Knght, Ph.D. FDOT State Materials Office Chase.Knight@dot.state.fl.us
		Matthew Duncan FDOT State Materials Office Matthew.Duncan@dot.state.fl.us

http://www.fdot.gov/structures/innovation/FRP.shtm