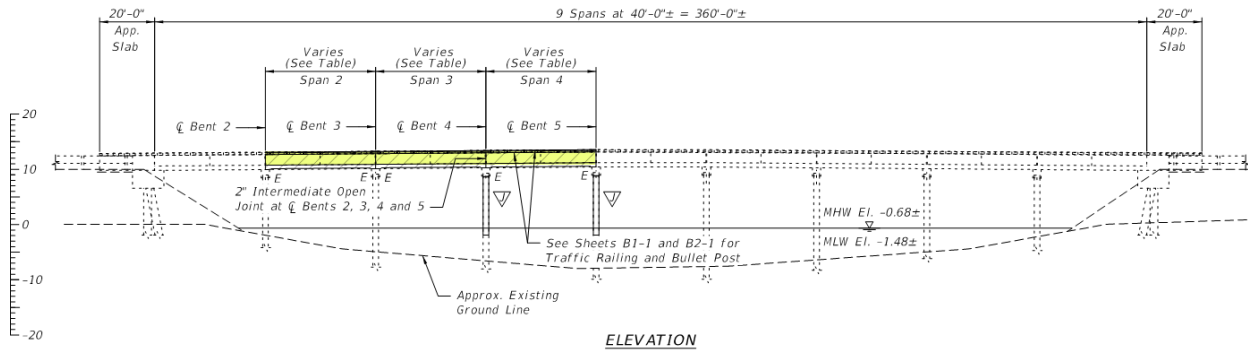


FDOT Transportation Innovation Initiative: FRP – Design Innovation



Fast
Facts:
Carbon &
Glass
Fiber
Reinforced
Polymer



Project Location: Key West, Florida

Agency: Florida Department of Transportation

URL: <http://www.fdot.gov/structures/innovation/FRP.shtm>

Project Name: US 1 over Cow Key Channel
Bridge Nos. 900086 & 900125
FPID: 441740-1-52-01

Project Description: Bridge rehabilitation and span replacement of the Northbound and Southbound Bridges over Cow Key Channel.

Project Purpose & Need: Bridge rehabilitation includes three span replacements with CFRP prestressing and GFRP reinforcing. The bridges are parallel, 360' long, each with nine (9) spans designed in 1976 and 1983, respectively. Bridge spans 2, 3 & 4 to be replaced, are 40' simply-supported spans with expansion joints at each bent location. The existing superstructure is composed of hollow prestressed "Sonovoid" slab units with a reinforced 5" thick concrete topping.

Overall Budget/Cost Estimate: \$ 5,700,000.

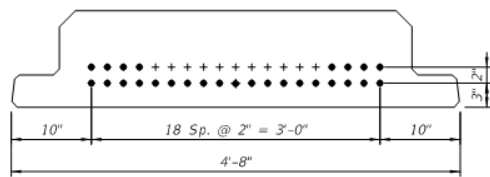
What was unique about this project? First FDOT vehicular bridge to use CFRP pretension slab-beams.

Describe Traditional Approach: Superstructures located in the splash-zone require concrete using ternary blends of cement with silica fume, metakaoline, ultrafine flyash or calcium nitrate additives. Also, tensile stresses under service load are limited to zero, and waterproofing sealants may be required.

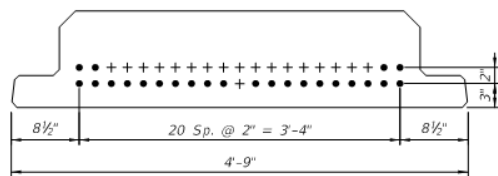
Describe New Approach: Florida Slab Beams (FSB12x55) with modified end haunches to maintain the existing superstructure depth at supports. Use of CFRP prestressing strands and GFRP reinforcing in FSBs to eliminate degradation due to steel corrosion with no reduction in AASHTO LRFD allowable tensile stresses.

Top Innovations Employed: a) 0.6-inch diameter CFRP strands (approx. 61,000 LF + 10,000 LF Strands N) for prestressing 63~FSB (12"x55", 12"x56" and 12"x57") x39' units.
b) GFRP shear stirrups and transverse reinforcement in FSBs (approx. 80,000 LF)

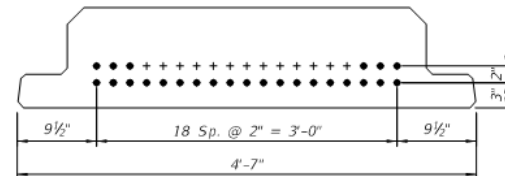
Primary Benefits Realized/Expected: FRP reinforcement eliminates the need for additional concrete cover, concrete additives, and waterproofing sealants for corrosion protection. Lightweight reinforcement allows for significantly lower labor and equipment costs because of the handling. Other benefits include longer service life and low maintenance costs for the owner.



TYPE ① 27 STRANDS



TYPE ② 24 STRANDS



TYPE ① 25 STRANDS

FIBER-REINFORCED POLYMER REINFORCING:

1. FSB precast panels shall be reinforced using Glass-Fiber Reinforced Polymer (GFRP) and shall be prestressed using Carbon-Fiber Reinforced Polymer (CFRP).
2. All FRP reinforcing shall be per Specification Section 932 and 933.
3. FRP reinforcing detail dimensions are out-to-out of bars.
4. For standard bar bending detail for FRP, see FDOT Developmental Design Index D21310.

ITEM NUMBER	ITEM DESCRIPTION	UNIT	44174015201	44174015201 BR# 900086	44174015201 BR# 900125	QUANTITY TOTAL
0110-3-	REMOVAL OF EXISTING STRUCTURES/BRIDGES 44174015201 900086	(LS)		1.000		1.000
0450-8-13	PRESTRESSED BEAM: FLORIDA SLAB BEAM, BEAM DEPTH 12", WIDTH 55-57"	LF		1046.000	1395.000	2441.000

Project Start/Completion Dates: Jan 2020 – TBA

Affiliations: PE Consultant: Bolton Perez & Associates
Construction Contractor: TBA
Construction Engineering Inspection: TBA

Project Contacts: Engineer of Record: Luis M. Vargas, P.E.
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