Halls River Bridge Project

Will Potter
Project Overview
Plan and Elevation
Design

- Hybrid Composite Beams (HCB)
- GFRP-Reinforced Concrete
- CFRP-Pretensioned Piling
Hybrid Composite Beams
GFRP Reinforced Concrete

- Deck
- Bent Cap
- Back and Wing Walls
- Diaphragms
- Traffic Railing
CFRP-Pretensioned Piling and Sheet Piling

ELEVATION

ALTERNATE STRAND PATTERNS
12 - 0.6" CFPM 1-Strand, at 34 ips
12 - 0.6" CFPM Single-Strand, at 34 ips

NOTES:
1. Work this Index with Index 453-001 - Typical Details and Notes for Square CFRP & SS Prestressed Concrete Pile and Index 459-007 - FRP Prestressed Concrete Pile
2. Any of the Strand Patterns may be utilized. The strands shall be located at intervals

SECTION A-A

SECTION F-F

CFRP PRESTRESSED PILE DETAILS

18" SQUARE CFRP & SS PRESTRESSED CONCRETE PILE

INDEX 453-118
GFRP/CFRP Manuals and References
Construction
HCB Fabrication/Installation

- Shell Fabrication – Augusta, Maine
- SCC Casting – Gretna, FL
- Bridge – Homosassa Springs, FL

Design
- HCB Design Guide
- ACI 440
- Developed MathCAD
- Technical Special Provision (TSP)
Hybrid Composite Beams

- New Process for All
- Laminate Strength
- QA/QC Plan
- Damage During Installation
CFRP Piling
CFRP Piling
Unexpected Conditions
CFRP Piling - Cracking
CFRP Sheet Piling
CFRP Sheet Piling
Soil Conditions cont’d
GFRP-RC – Bent Caps
Near Completion
Lessons Learned

- QC Requirements and Specifications
  - Ensure Clarity Early
  - Verification of Material Lots at Different Project Locations
- Standard Material (Are We Ready?)
Lessons Learned

Material Lead Times and Testing Requirements
- Unforeseen Issues

Subsurface Difficulties (CFRP Quantities/Pile Splicing)

Phased Construction
- GFRP Reinforcement Exposure
- Pre/Post-Installed Anchors and Blockouts

Construction Defects/Repairs
- Additional Consideration in Bar Tying Methods
- Bent Cap (Phased Joint)
- Deck (Phased Joint)
- Pile Cracking/Damage
- Damaged HCB
- Sheet Pile Wall Bulkhead Repairs
Summary

• Experimental Project with Innovative Materials – First in Florida
  • Superstructure: Hybrid Composite Beams; GFRP Bars: Deck, Barriers & Approach Slabs
  • Substructure: CFRP Pre-stressed Piles; Bent Caps: GFRP Bars
  • Sheet Pile Walls: CFRP Sheet Piles; Wall Cap: GFRP Bars

• Contractor Bid Cost - $6.1 Million (Structures = $3.7 Million)
  • Bridge Cost = $221 / sq. ft. (???)
    • (Conventional Construction = $166 / sq. ft.)
Questions

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