STRUCTURES DESIGN OFFICE

District 4

Earman River Bridge Replacement

Earman River Bridge Replacement

- Project Overview
- Design Considerations
- Material Selection
- Project Key Features
- Construction Pictures
- Q & A

Earman River Bridge Replacement

Project Overview

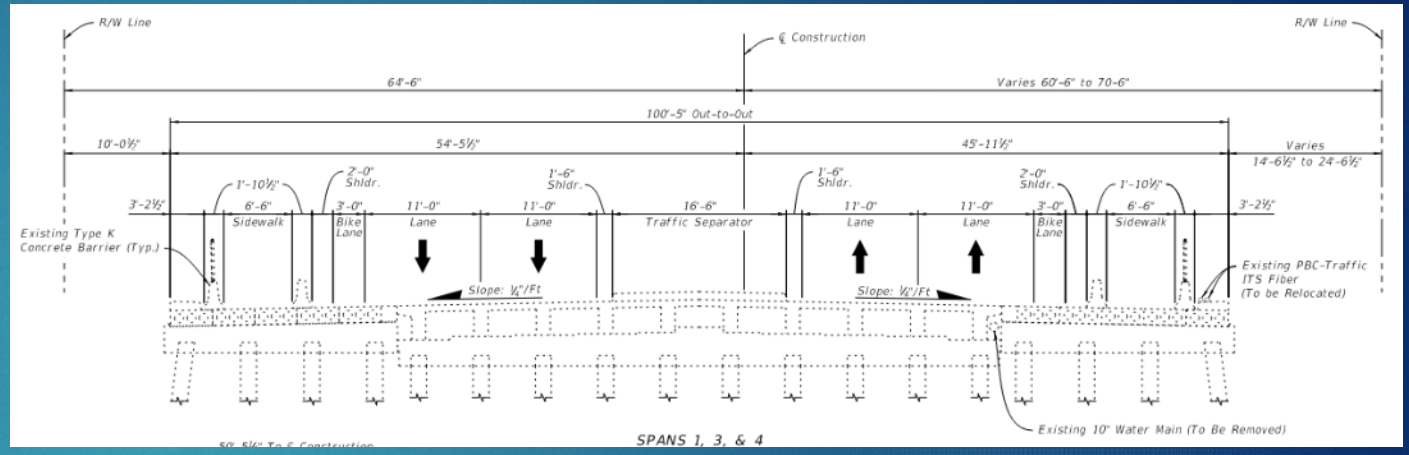
- SR-5 (US-1) Over the Earman River Canal, Palm Beach County
- Failure of the exterior slab unit in Span 2 of the existing Bridge
- Existing bridge was classified structurally deficient
- In-house structures design

Partial Bridge Collapse October 2018

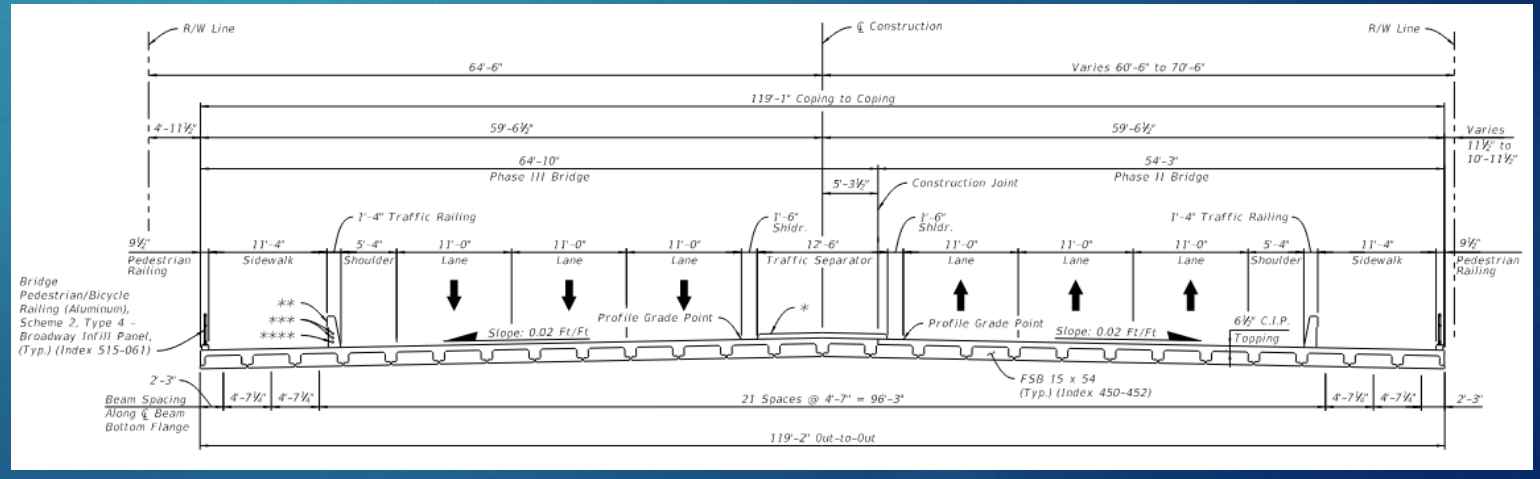
Earman River Bridge Replacement

Project Overview

- Earman River Bridge replacement is the first full bridge replacement in District IV to use Florida Slabs Units (FSBs) with CFRP strands and GFRP mild reinforcement.
- It is the widest FSB bridge to date.
- The C.I.P. topping and pile bent caps will utilize GFRP bars with reduced concrete cover.



Existing Bridge Typical Section



Proposed Bridge Typical Section

Earman River Bridge Replacement

Design Considerations

- Extremely aggressive environment due to chlorides for both the superstructure and substructure components
- Roadway vertical profile to minimize negative impact to neighboring properties
- Bridge alternative to comply with the 100-year design wave crest elevation
- Use of FRP/Stainless steel reinforcement to mitigate corrosion concerns
- Design for vessel collision is not required, bridge is not over a navigable waterway

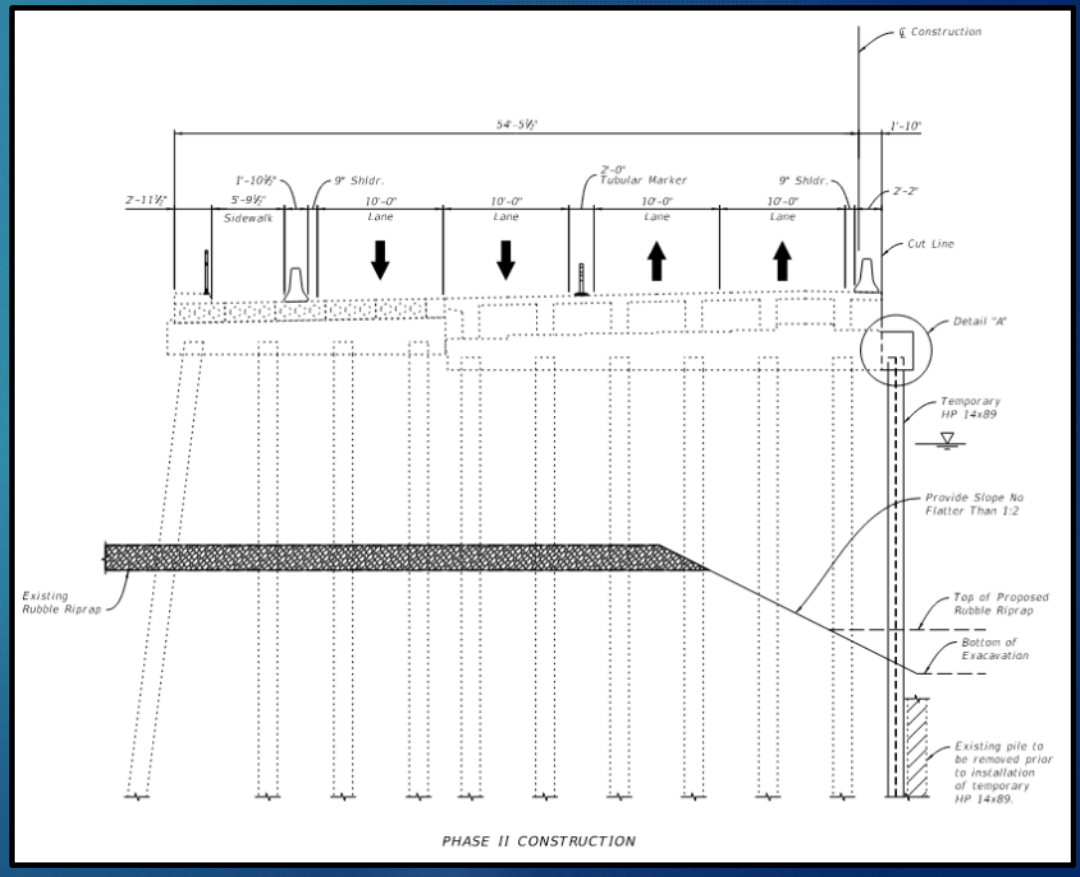
Table 3.5.1-1 Concrete Pile Size and Material Requirements

Pile Location	Minimum Square Pile Size (inches)		Minimum Cylinder Pile Diameter (inches)	Material Properties for All Pile Sizes[1]		
	Vehicular Bridges	Pedestrian Bridges & Fishing Piers		Strand Type	Spiral Type	Reinforcing Bar Type
On land or in water in environments that are Extremely Aggressive due to chlorides[2]	24[3]	18	54	Carbon steel Spec 933	Carbon steel Spec 931	Carbon steel Spec 931
	18	14	54	CFRP Spec 933	CFRP Spec 932	FRP Spec 932
				Stainless steel Spec 933	Stainless steel Spec 931	Stainless steel Spec 931
On land or in water in all other environments	18	14	54	Carbon steel Spec 933	Carbon steel Spec 931	Carbon steel Spec 931

Earman River Bridge Replacement

Design Considerations

Provide temporary bent support due to construction phasing and South Florida Water Management requirement of about 8-ft canal dredging

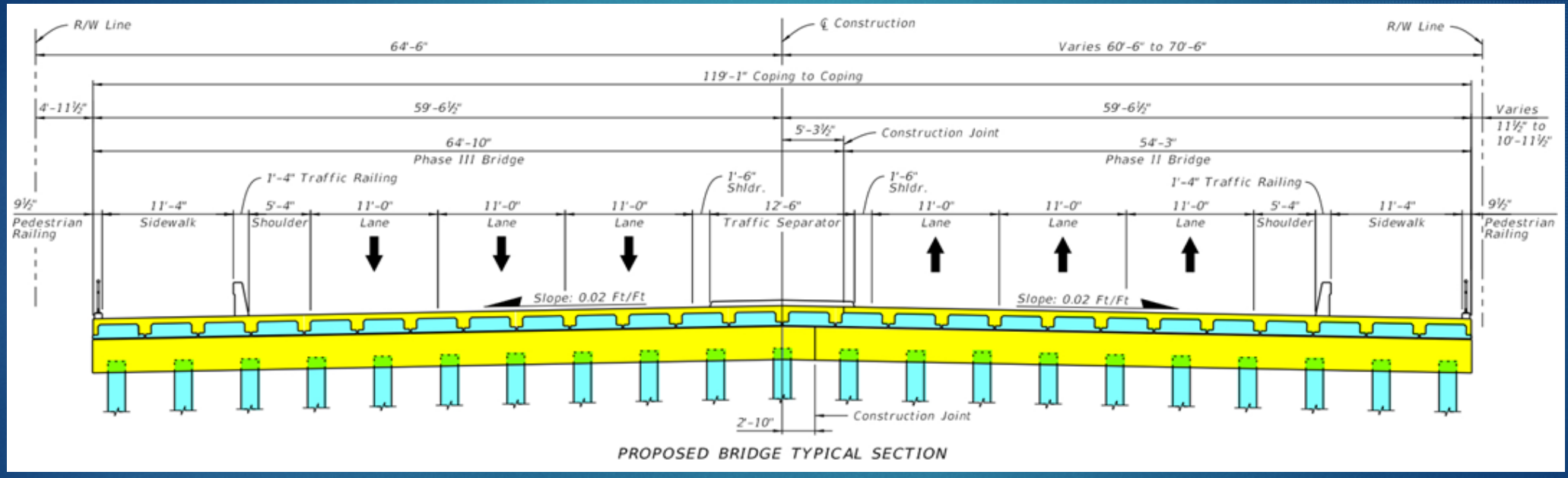


Earman River Bridge Replacement

Material Selection

- The Contractor was provided the option in the plans to use CFRP or Stainless Steel for the prestressed piles and the FSB

- Contractor's Choice for Construction:
- CFRP/GFRP for the FSB's
- CFRP for the Piles



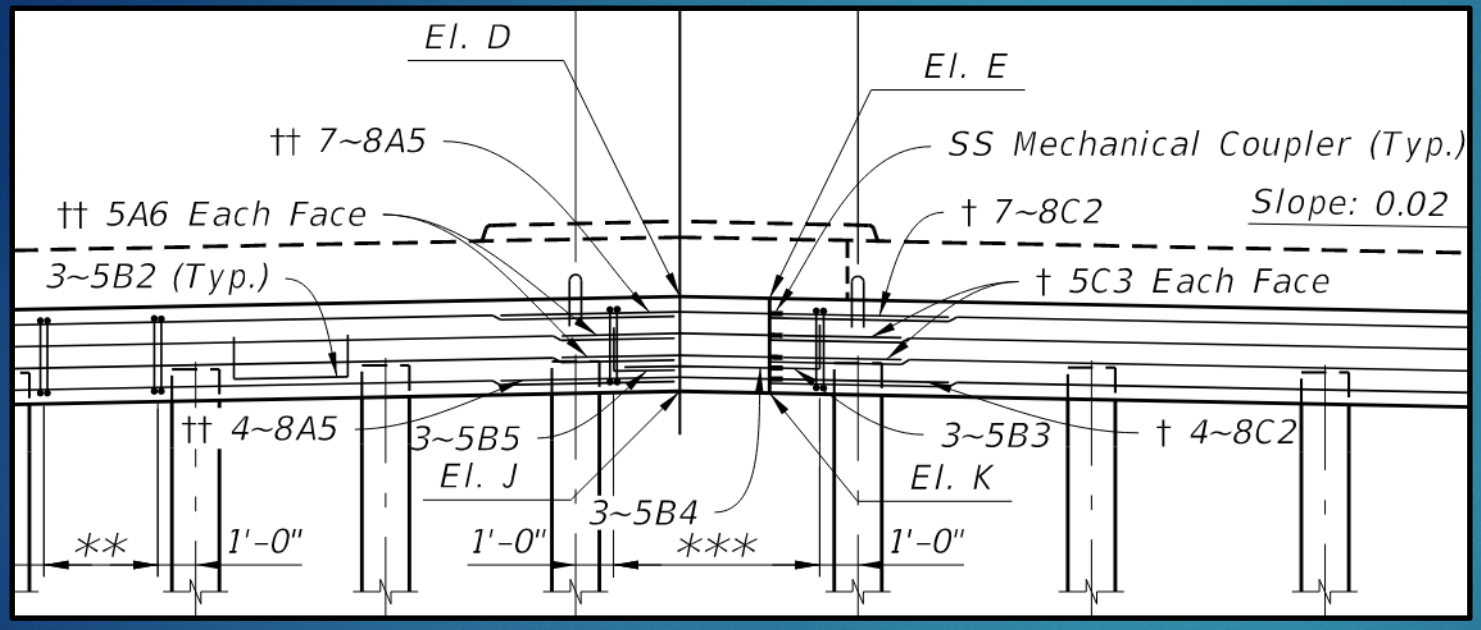
- GFRP-RC
- CFRP or Stainless Steel

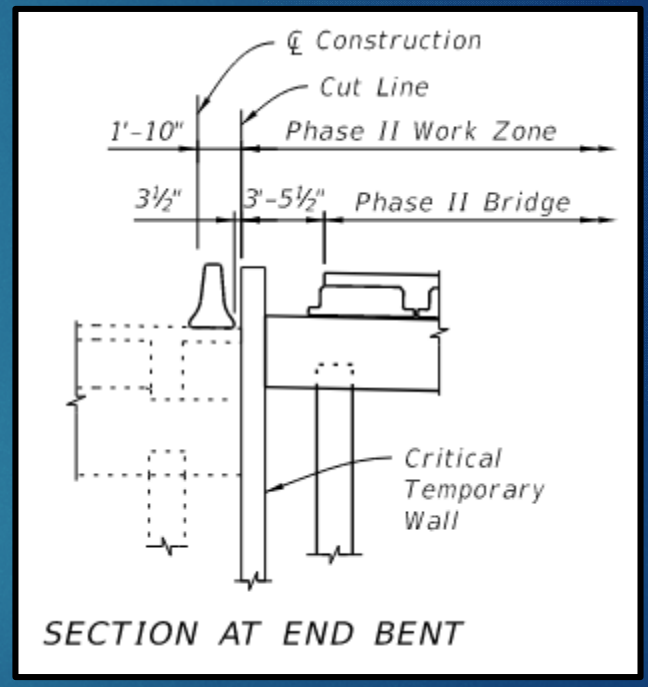
Benefits:
Longer service life of the bridge without major maintenance

Earman River Bridge Replacement

Project Key Features

- Construction Joint Detail

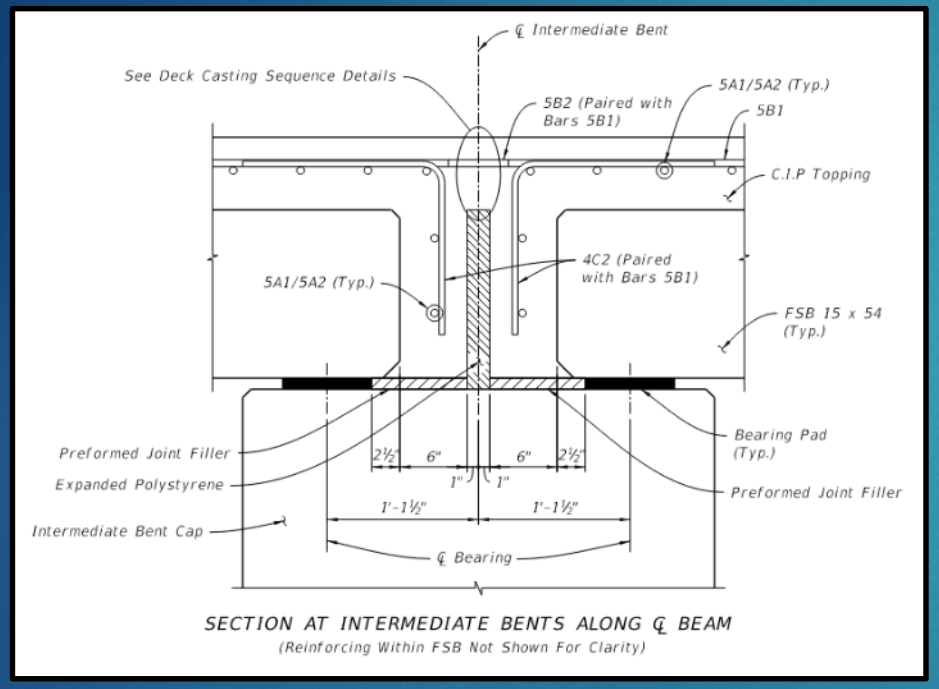




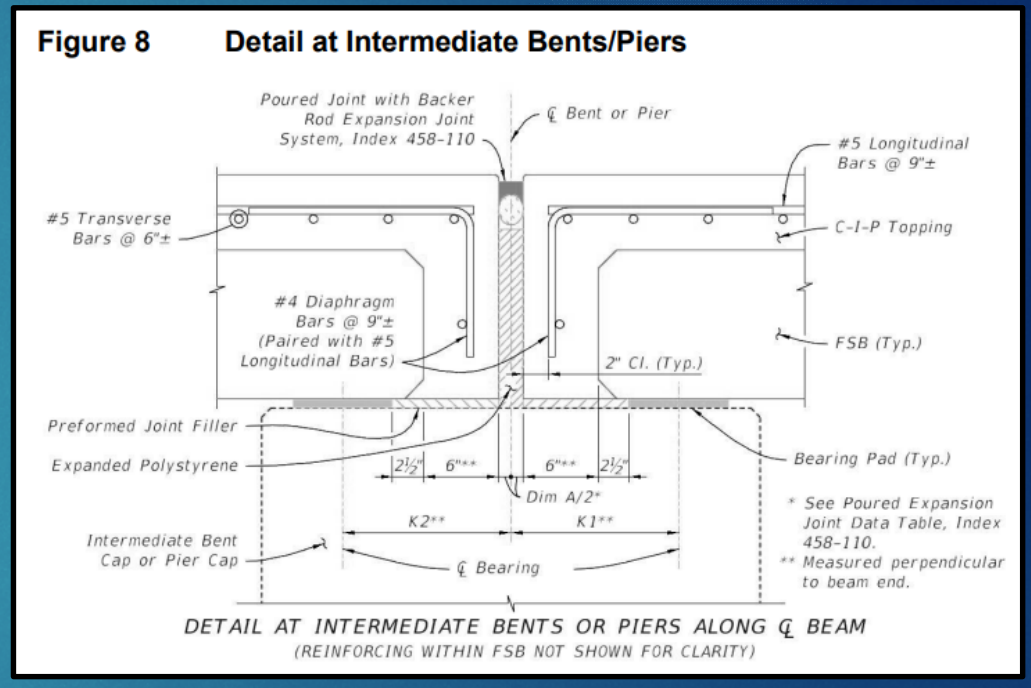
Earman River Bridge Replacement

Project Key Features

- New link-slab connection eliminates the typical bent detail with an expansion joint



Provided Detail in the Plans



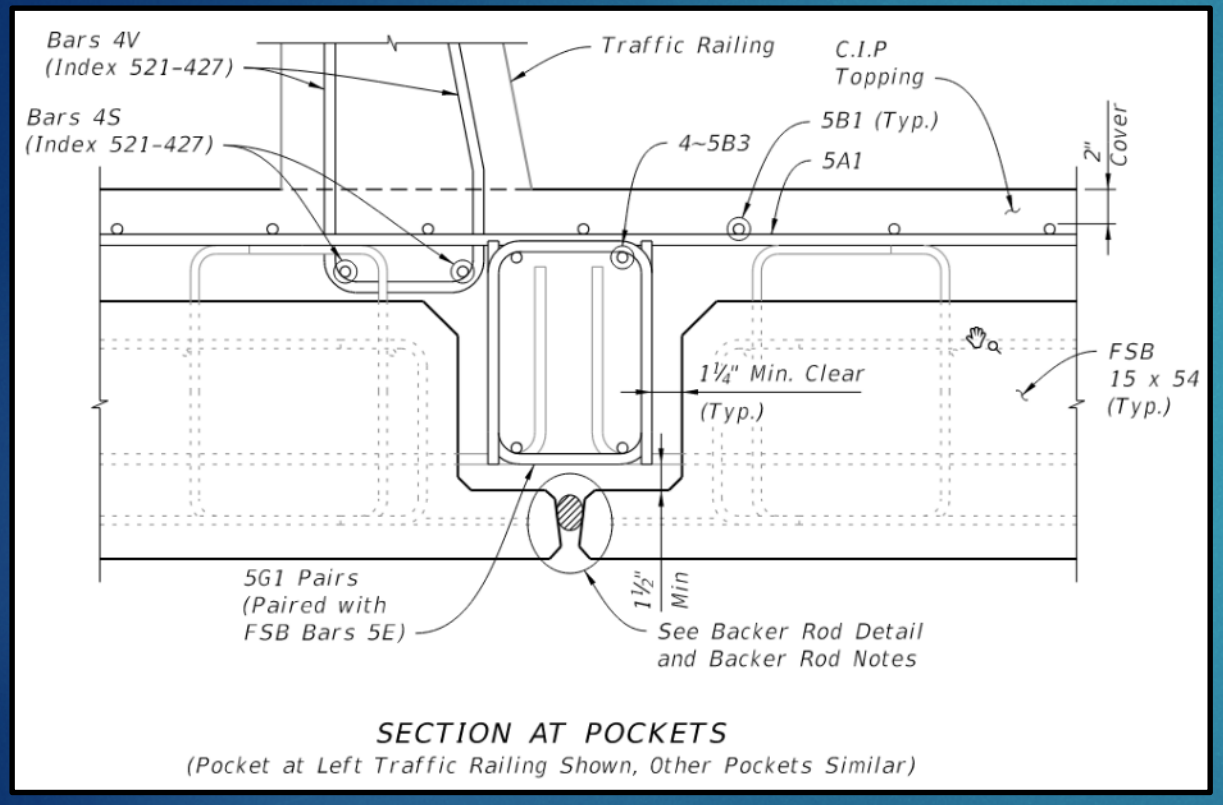
Instructions for Standard Plans Index 450-450

Benefits:
Improves maintenance

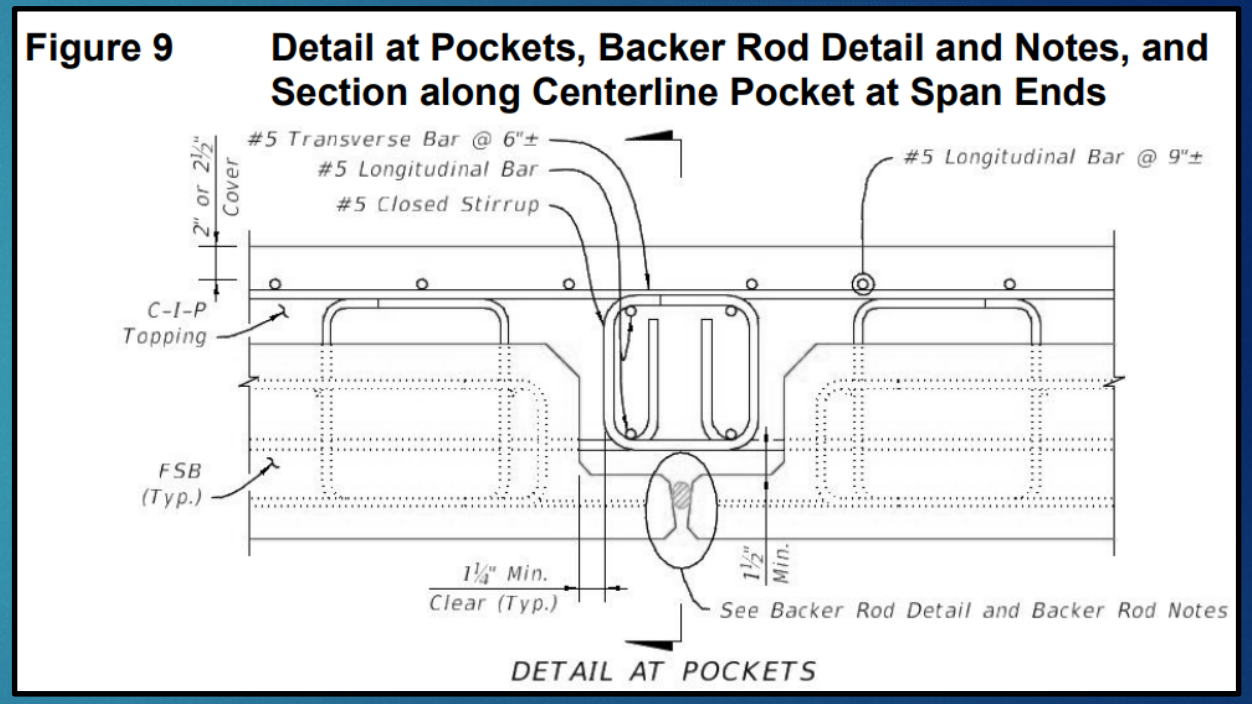
Earman River Bridge Replacement

Project Key Features

- FSB Transverse Connection with GFRP



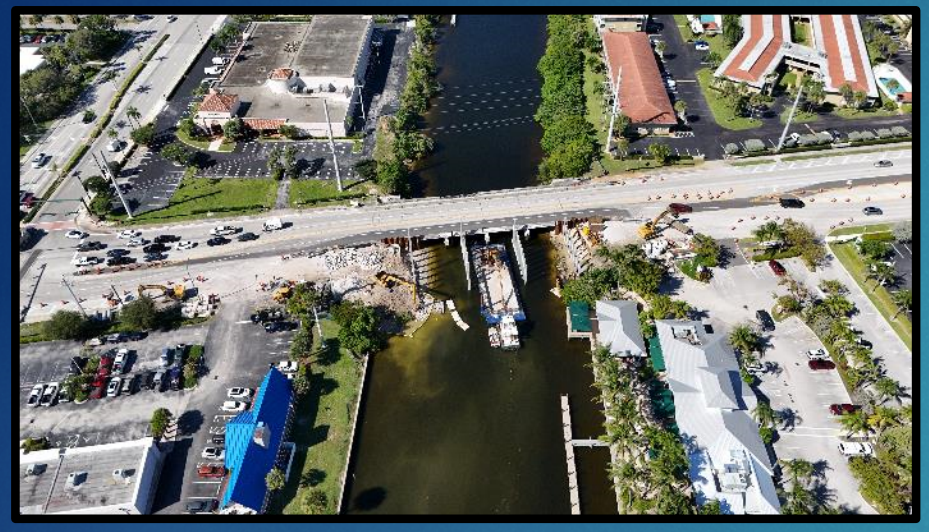
Provided Detail in the Plans



Instructions for Standard Plans
Index 450-450

Earman River Bridge Replacement

Construction Process



Phase 1A
Construction

Earman River Bridge Replacement

Construction Process

Phase 1A
Construction

Earman River Bridge Replacement

Q & A