

2018 FTBA Construction Conference

February 8 & 9, 2018

Orlando, FL



Halls River Bridge Update

Antonio Nanni, U. Miami, nanni@miami.edu

Structures Session 2: 3:30 PM-5:00 PM, Thursday 2/8/2018



1. GFRP Rebar Cage Fabrication Case Study (15 min)

- Mikhail Vorobiev, Owens Corning & Contractor (TBA).

2. Bakers Hallover Cut Bulkhead Rehabilitation (15 min)

- Jake Perez, Bolton, Perez & Assoc. JPerez@BPAMiami.com

3. Skyway Rest Area Rehabilitation (15 min)

- Andra Diggs, FDOT D1, Andra.Diggs@dot.state.fl.us

4. Halls River Bridge Update (15 min)

- Antonio Nanni, University of Miami, nanni@miami.edu
- Steve Nolan, FDOT-SDO, steven.nolan@dot.state.fl.us

5. CFCC Recent Projects and PT developments. (15 min)

- Jen Tankel, TokyoRope USA, jen.tankel@tokyoropeusa.com

6. Guide Specifications for GFRP Reinforcing (15 min)

- Antonio Nanni, University of Miami nanni@miami.edu
- Brahim Benmokrane, University of Sherbrooke, Brahim.Benmokrane@USherbrooke.ca



FRP for New Construction

Outline

Halls River Bridge

- Replacement project - Overview
- Bridge elements directly related to SEACON
 - Bulkhead caps and test blocks
 - Retaining walls
 - Traffic railings
- Update on bridge construction
 - Images from April 2017 to January 2018
 - Short video

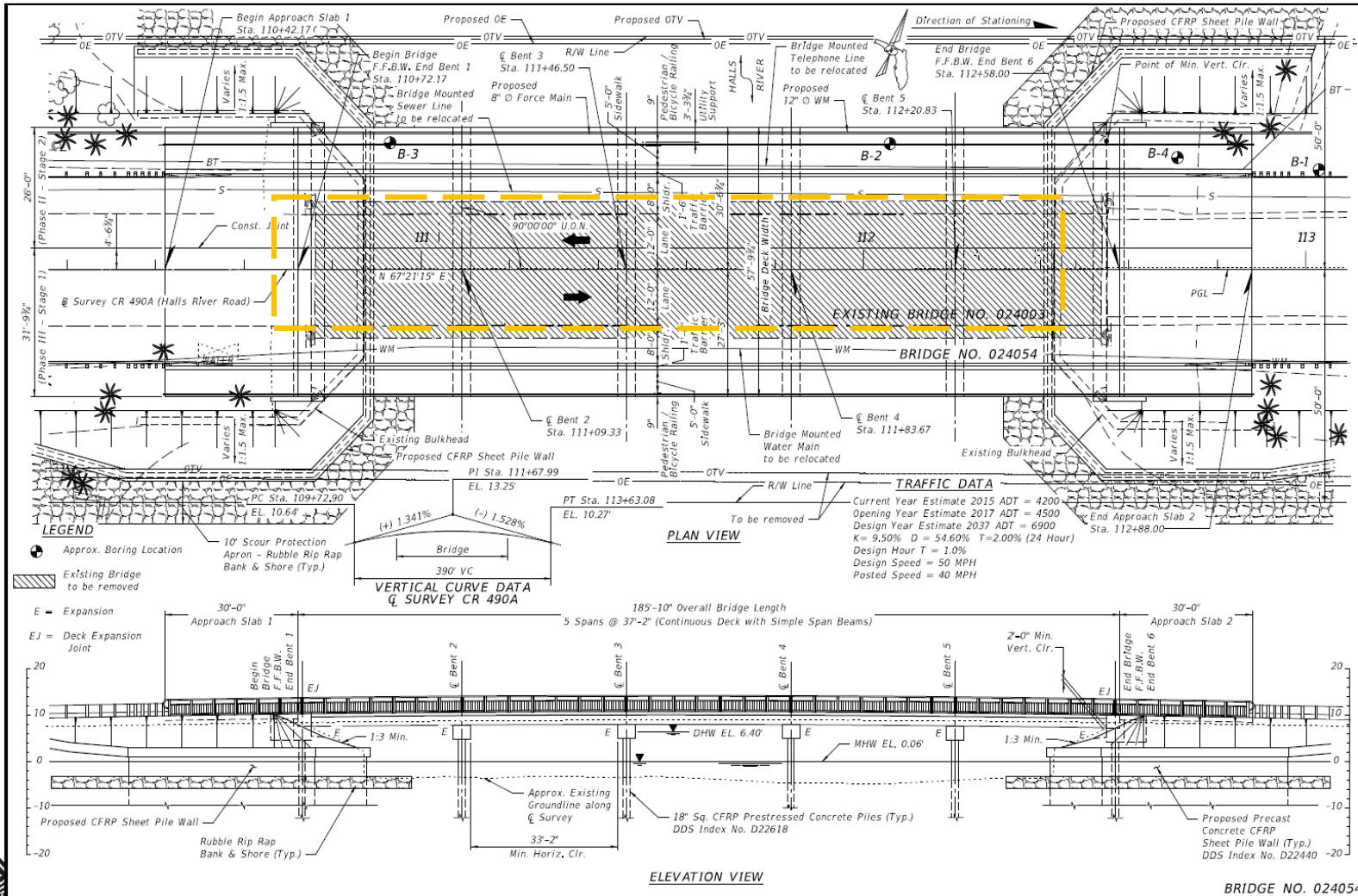
Credits: EOR - FDOT District 7; GC - Astaldi; Owner – Citrus County



Project Overview – Halls River Bridge Replacement



Infravation
An Infrastructure Innovation Programme

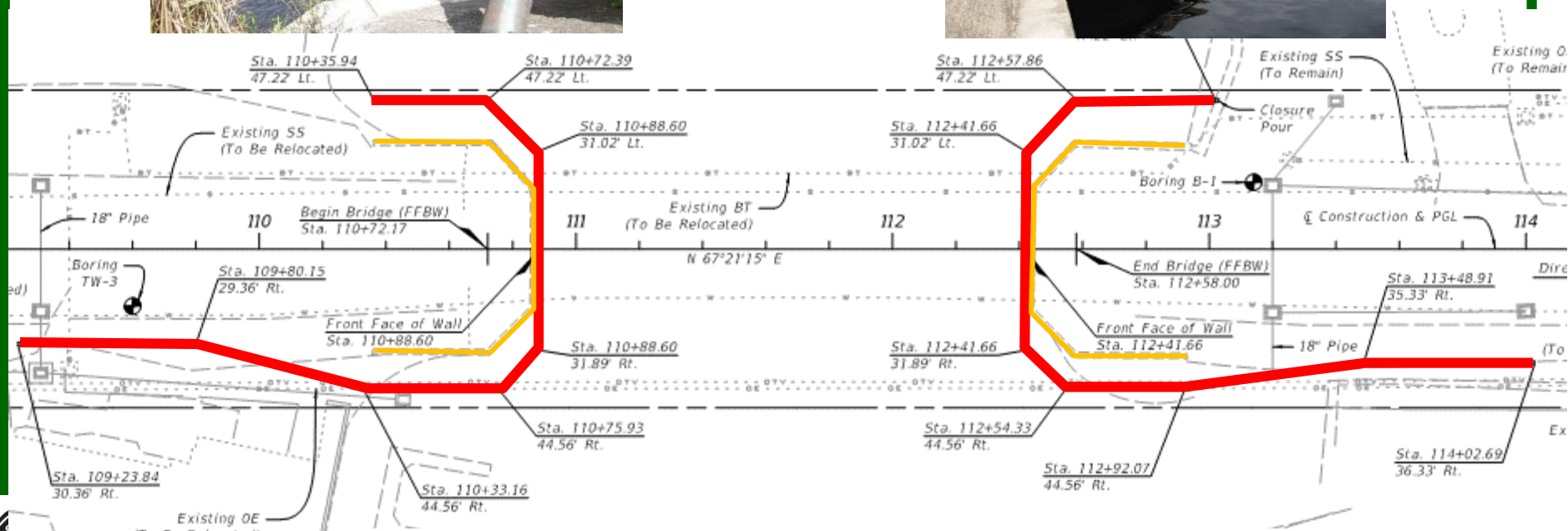


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Existing (orange) and New Layout



Project Overview – Halls River Bridge Replacement



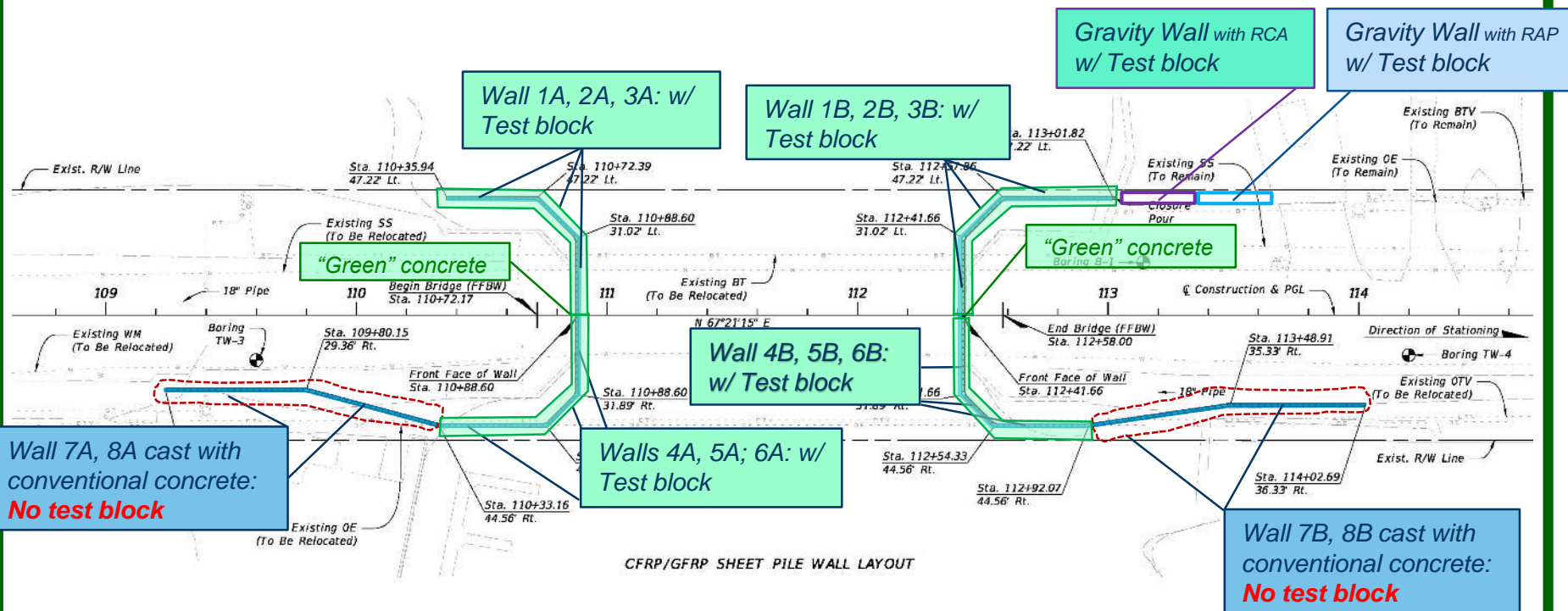
Existing (orange) and New Bulkhead (red) Layout



FRP for N...

Bulkhead Cap for Sheet Pile Walls

“Green” concrete uses seawater for mixing



Total wall cap length: 575 LF

Total test block length: 395 LF

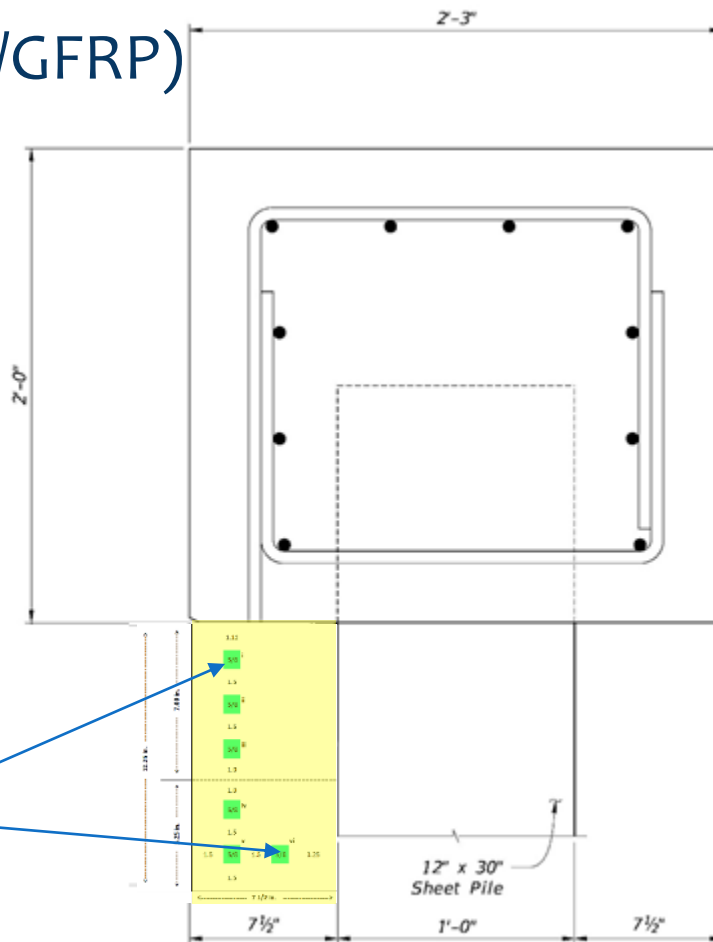
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Bulkhead cap test blocks

(with BFRP/CFRP/GFRP)

Bulkhead cap and test block are to be cast monolithically with same concrete mix



Six FRP bars for lab testing

Legend: Test block to be removed at different ages

SECTION A-A



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Gravity Walls (with GFRP & RAP or RCA)

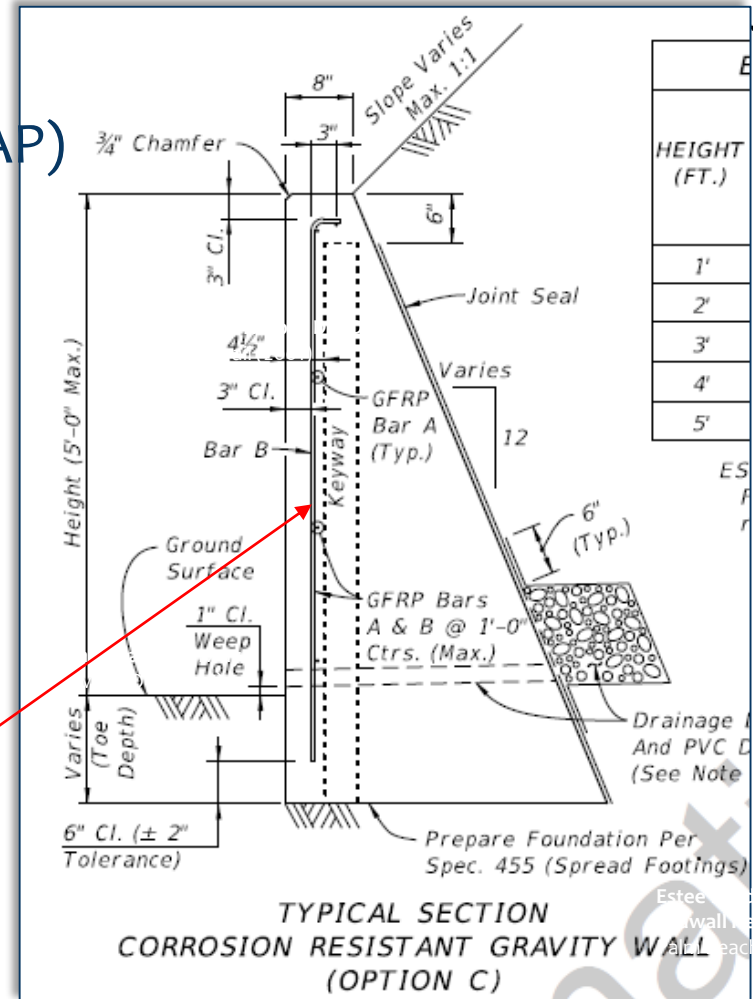
Mix Design Criteria:

FDOT Material Specifications **-347** (RAP)

Dev347 (RCA – project specific)

Challenges:

- i. Consistent aggregate gradation envelope for alternate source substitution
- ii. Relevant performance based specifications



GFRP bar

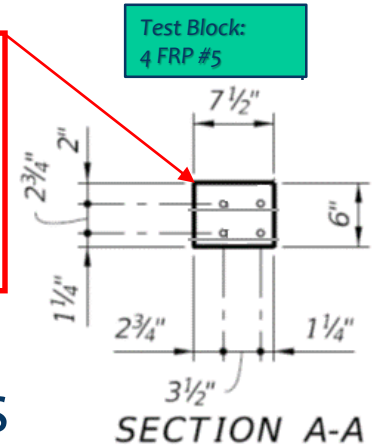
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SEACON Test Matrix

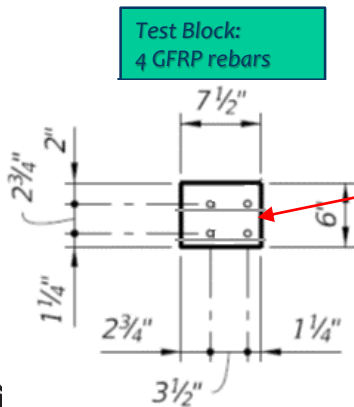
- RCA & RAP Gravity Walls

24 test blocks of each RCA and RAP concrete mixes
4 GFRP #5 rebar (half cast with conventional RCA and RAP mixes & half with green RCA and green RAP mixes)



- White Cement & Slag Blend Traffic Parapets

12 test blocks of each WHITE CEMENT and SLAG BLEND concrete mixes
Test blocks with 4 GFRP rebar



(All blocks cast separately not attached to walls or parapets)

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Work progress: 4/04/2017



View of formwork and temporary sheet-pile installation on East side



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Work progress: 4/12/2017



Excavation at East side for permanent CFRP-PC sheet-pile wall



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Work progress: 4/12/2017



Six-man crew completes bent cap cage in 4.5 hours



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Work progress: 4/13/2017

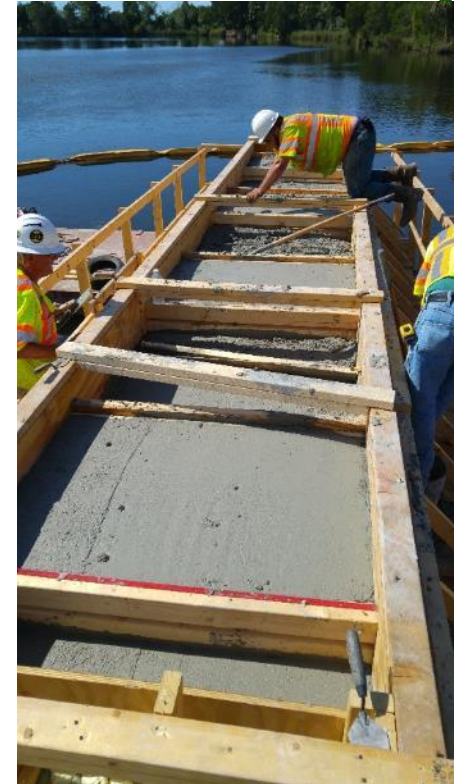
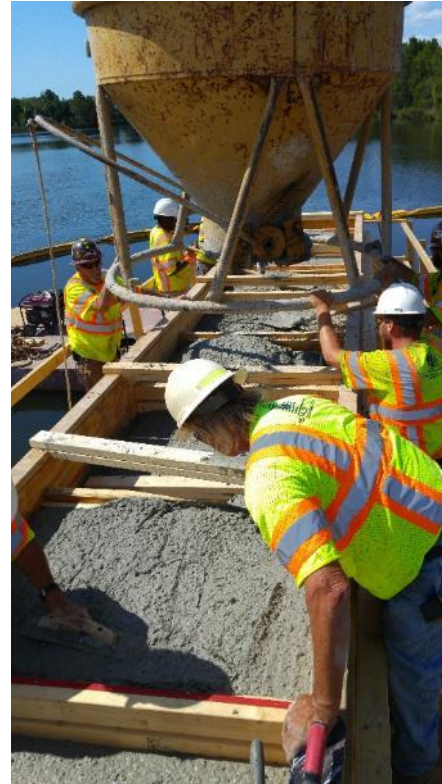


Placement of GFRP reinforcement cage at bent caps #4 and #5



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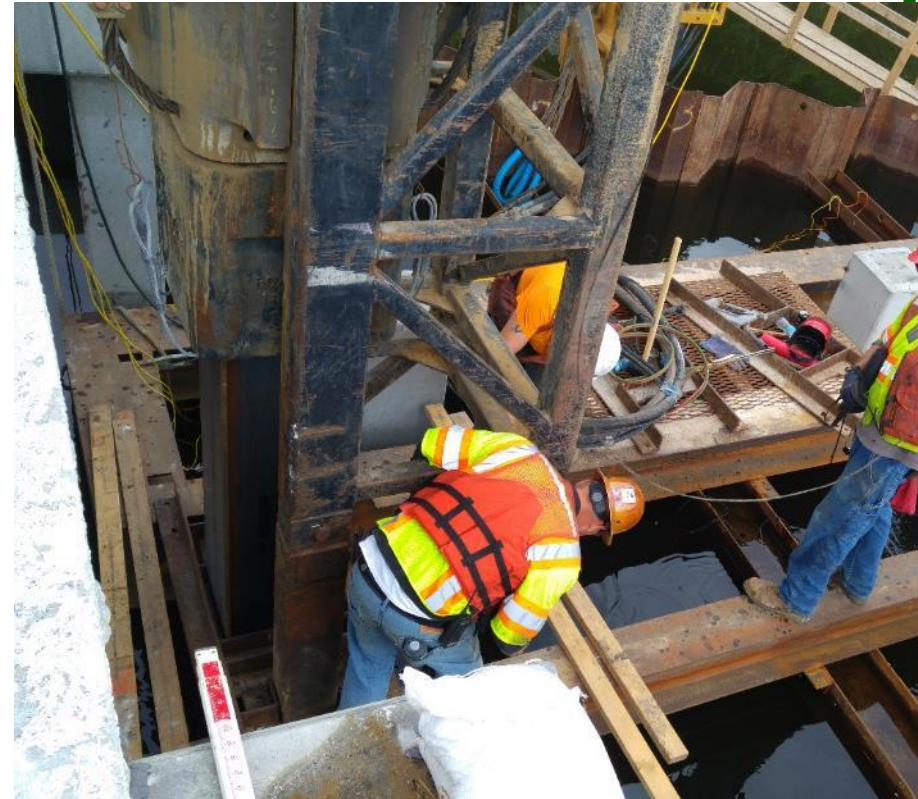
Work progress: 4/18/2017



Concrete placement at bent caps #4 and #5



Work progress: 4/25/2017

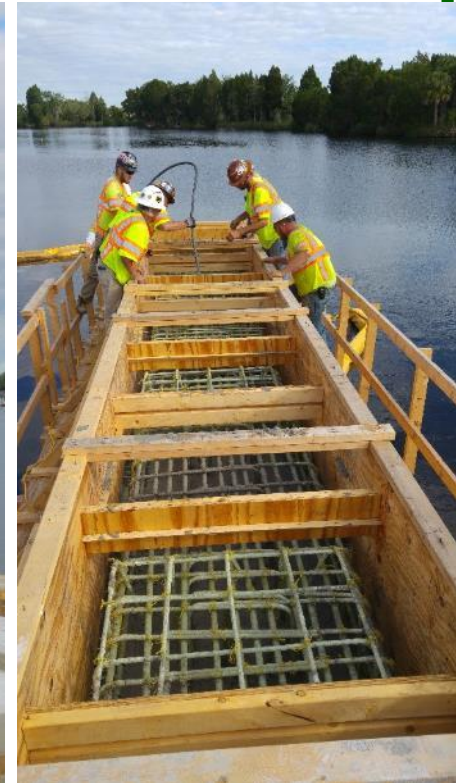


Exploratory steel H-shape driven 150 feet at pier #2
(determine splice length of permanent piles at pier #2)



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Work progress: 4/26/2017



Demolding completed at bent caps #4 and #5.
Concrete placement at bent cap #3



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Work progress: 5/16/2017



Combined action of excavator and auger drill to attain
25-foot tip elevation of sheet piles

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Work progress: 5/30/2017



Hybrid Composite Beams with GFRP laminate shell set in span 4

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Work progress: 6/13/2017



Extra temporary sheet piles driven to sustain and protect excavation of East CFRP seawall



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Work progress: 6/21/2017



32 in. depth holes drilled on existing CFRP piles in bent 2
for splicing. Temporary jig set-up



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Work progress: 6/27/2017



Epoxying SS dowels at pile splice male-female joint



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Work progress: 6/28/2017

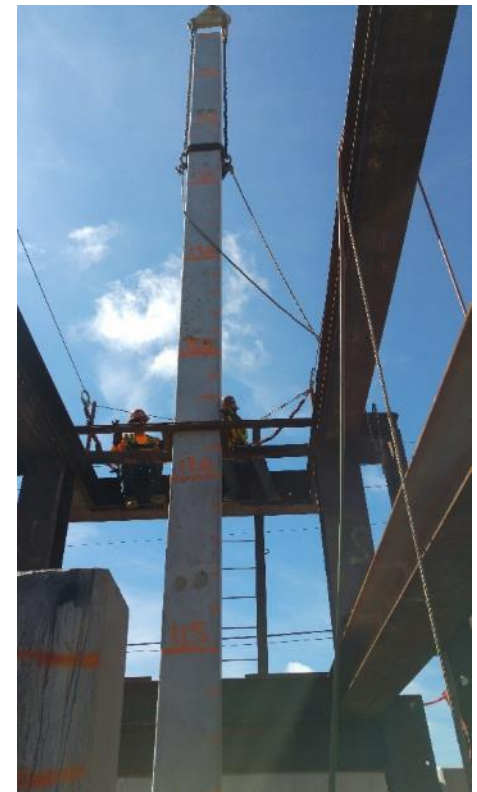


First set of 42-ft. pile splices driven in bent 2

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Work progress: 6/29/2017



Second set of 42-ft. pile splices added over first set.
7 gallons of epoxy needed per pile

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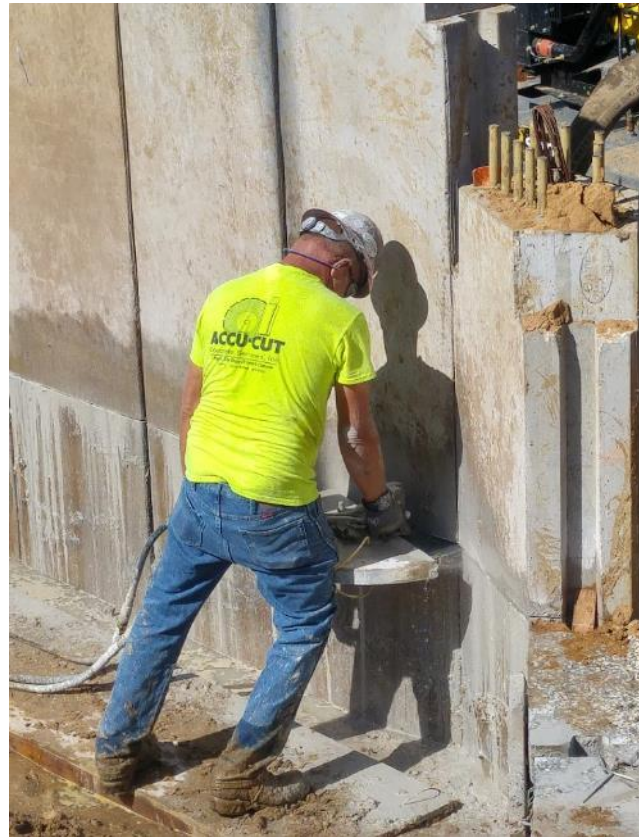
Work progress: 9/05/2017



Installation of steel beam alignment system. Trenching with specialized excavator-mounted hydraulic rock cutters to install sheet piles



Work progress: 11/13/2017



CFRP-PC sheet piles cut off at new design elevation
(-15 ft wall 1A, 2A)

Work progress: 12/19/2017



5-man crew in 12 hours (split in 2-day work) installed reinforcement for bulkhead cap (wall 1A, 2A, 3A)



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Work progress: 12/21/2017



Concrete consolidation aided by rubber-tipped vibrator. Approximately 16.5 cubic yard (3 trucks) of green concrete poured for 3 sections of wall.

After forms were filled, top surface smoothly finished

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Work progress: 01/17/2017



New sheet pile design with tieback made of SS rod inserted in 4-in. perforated pipe and deadman. Sheet piles cut offs reused as deadmen anchors.

Deadmen caps are reinforced with GFRP



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Play short video.....and many **thanks** for your attention!



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