2018 FDOT-FRP Industry 2nd Winter Workshop

February 9, 2018

Orlando, FL

Part 1-Reports

Part 1 - Reports

a. FDOT FRP-RC implementation status *(Steve Nolan)*

b. FDOT Materials Office update on durability focused research projects

c. Update on AASHTO LRFD Guide Specification for GFRP-RC

d. Canadian Standards Association update

e. ACMA FRP-RMC update

f. Action Item Status from last year

FDOT FRP-RC implementation status

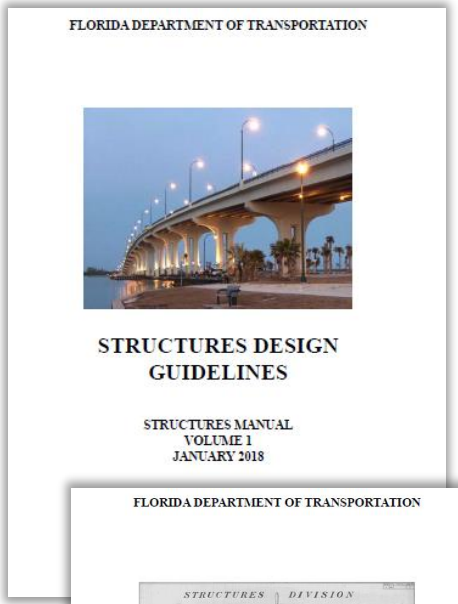
Steve Nolan (FDOT-SDO) steven.nolan@dot.state.fl.us

FDOT FRP-RC implementation status

1. Design Guidance
2. Construction & Materials Specs
3. Developmental & Standard Plans
4. Designer Tools
5. Construction Projects
6. New Applications
7. Other Research Projects

FDOT FRP-RC implementation status

1. Design Guidance:
   - *i.* ***SDG*** *– Added C-R Sheet Pile usage criteria*
   - *ii.* ***FRPG*** *– No significant changes*
   - *iii.* ***IDDS/SPI*** *– No significant changes*



http://www.fdot.gov/structures/StructuresManual/CurrentRelease/StructuresManual.shtm

http://www.fdot.gov/design/standardplans/current/

FDOT FRP-RC implementation status

1. Design Guidance
2. Construction & Materials Specs
   i. Division II - Structures:

      400, 407, 410, 415, & 450

   ii. Division III - Materials:

      932-3 & 933

- Changed strength from stress to strength;

- Now allow non-ISO certified labs for qualification and verification testing (SMO approved).

932-3.4.1 Sampling: The Engineer will select a minimum of six straight bars with minimum lengths of 7 feet each and a minimum of five bent bars from each shipment, representing a random production LOTs, per ~~diameter~~ bar size of FRP reinforcing for testing in accordance with Table 3-4. Testing shall be conducted, at the Contractor's expense, by a Department approved ~~ISO 17025 accredited~~ independent laboratory.

FDOT FRP-RC implementation status

1. Design Guidance
2. Construction & Materials Specs
3. Developmental & Standard Plans
   i. D6011c – Gravity Wall (GFRP-RC)
   ii. D22420 – 32” F-Shape Traffic Railing (GFRP-RC)
   iii. D22900 – Approach Slab (GFRP-RC)
   iv. D296 – Three-sided culvert (GFRP-RC) *(considering development)*
   v. D20700 – Precast Bent Cap *(in development)*

FDOT FRP-RC implementation status

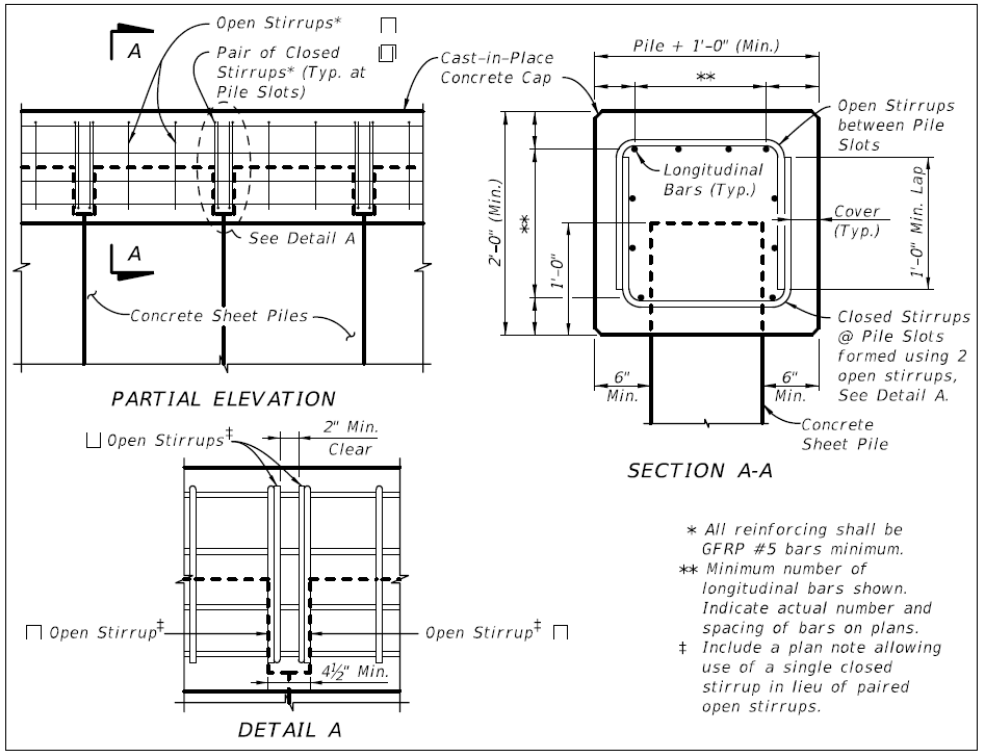
1. Design Guidance
2. Construction & Materials Specs
3. Developmental & Standard Plans
4. Designer Tools:
   i. *FDOT Prestressed Beam Program - v5.2beta*
   ii. *Mathcad* GFRP-RC Design Worksheets *– Flat Slab, Drainage Structures, Noisewall Panels)*
   iii. ***Design Aids*** in Instructions (***IDDS***, ***SPI***)…

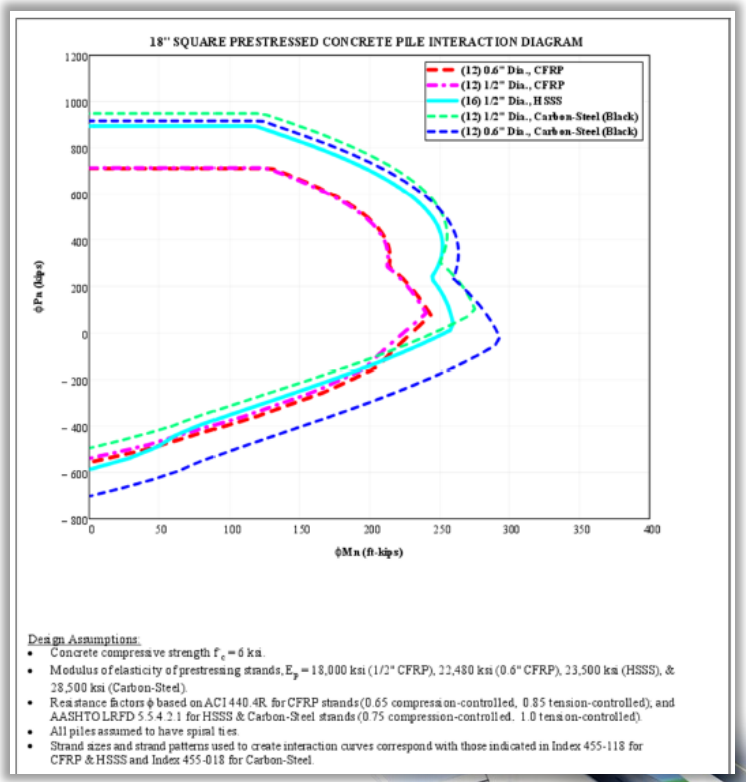
FDOT FRP-RC implementation status

4. Designer Tools:

iii. ***Design Aids*** in Instructions (***IDDS***, ***SPI***)

Figure 1 Typical Cap Details



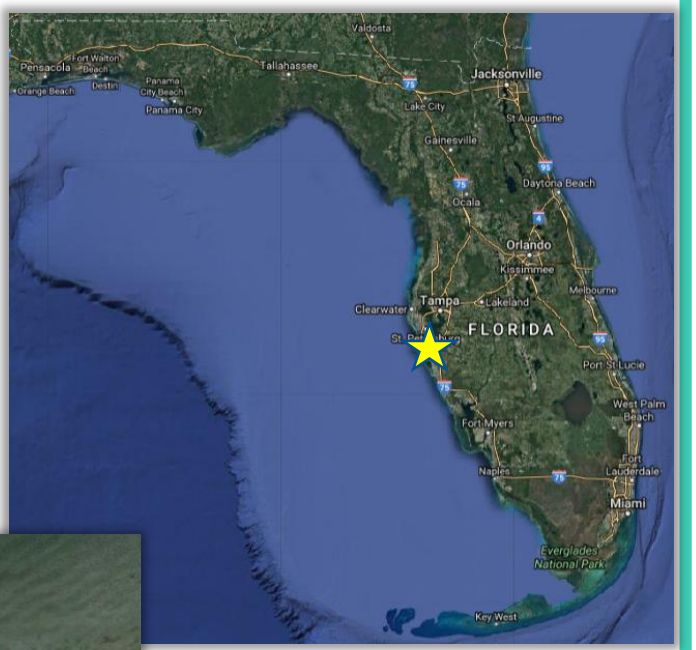


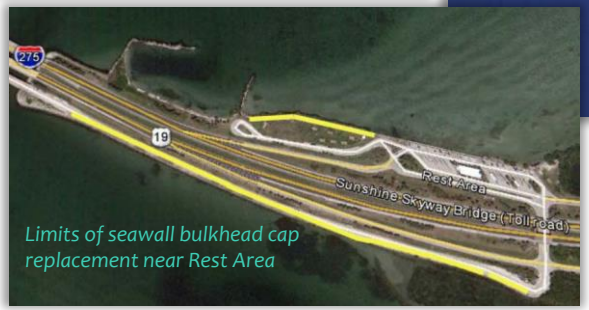
FDOT FRP-RC implementation status

5. Design & Active Construction Projects:
   i. Skyway Rest Area Rehab & Seawall (D1 - *2017*)
   ii. Cedar Key: C-Street (D2 - *2018*)
   iii. St Joe Bay Inlet (D3 - *2019*)
   iv. Pensacola Beach Ped. Tunnels (D3 – *2018 PD&E)*
   v. A1A Flagler Beach Revetment (D5 – *2018)*
   vi. Barracuda Blvd (D5 – *2020 production)*
   vii. Bakers Haulover Cut (D6 - *2016*)
   viii. Halls River Bridge (D7 - *2016*)
   ix. 40th Ave NE Bridge (City of St. Pete - *2019 production*)

FDOT FRP-RC implementation status

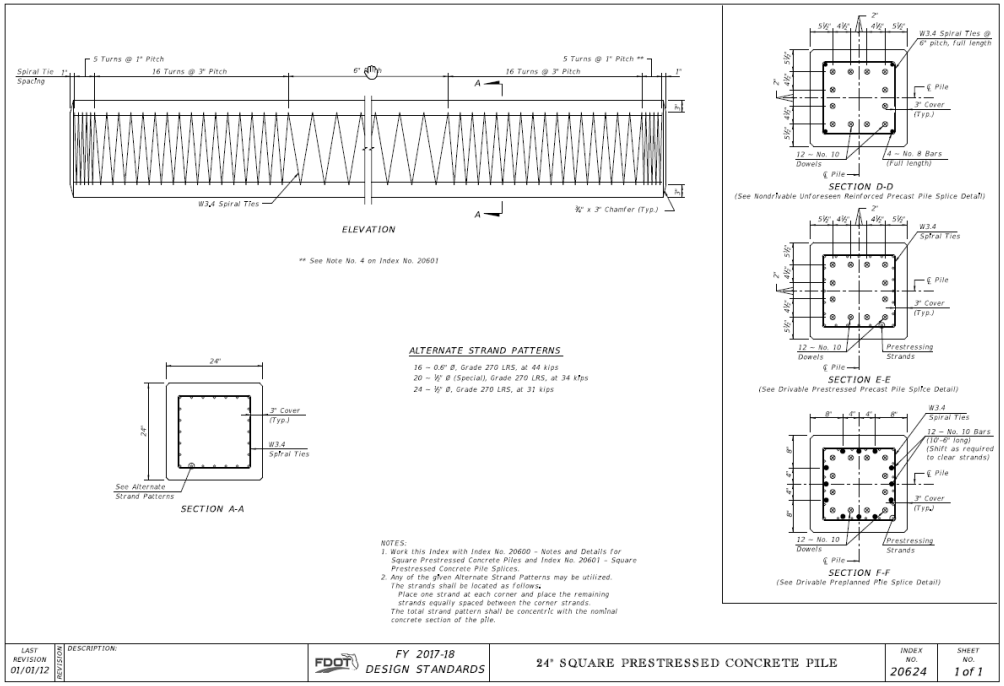
D1 Project: Skyway South Rest Area Seawall Rehab.

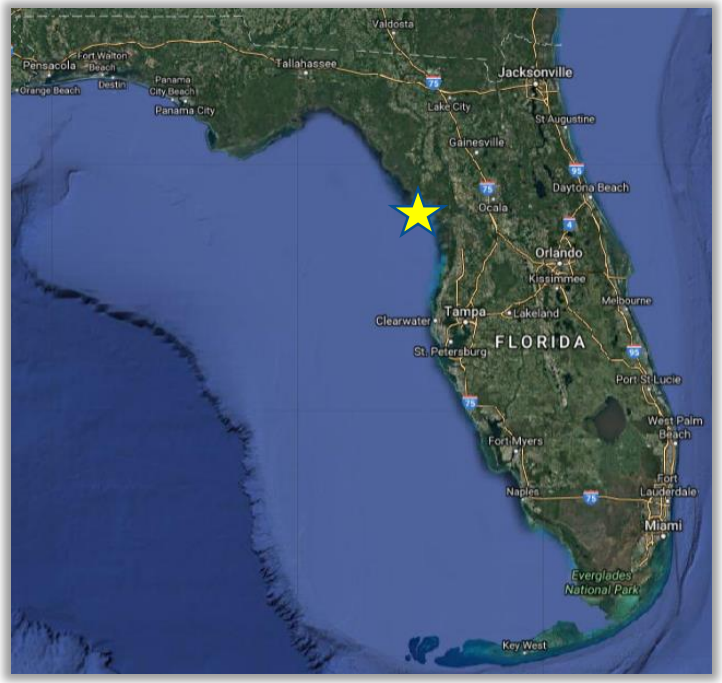




FDOT FRP-RC implementation status

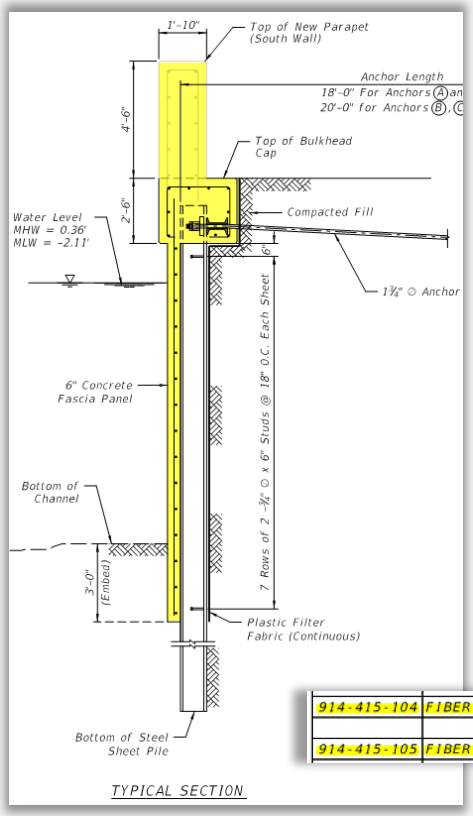
D2 Project: C-Street Bridge Replacement

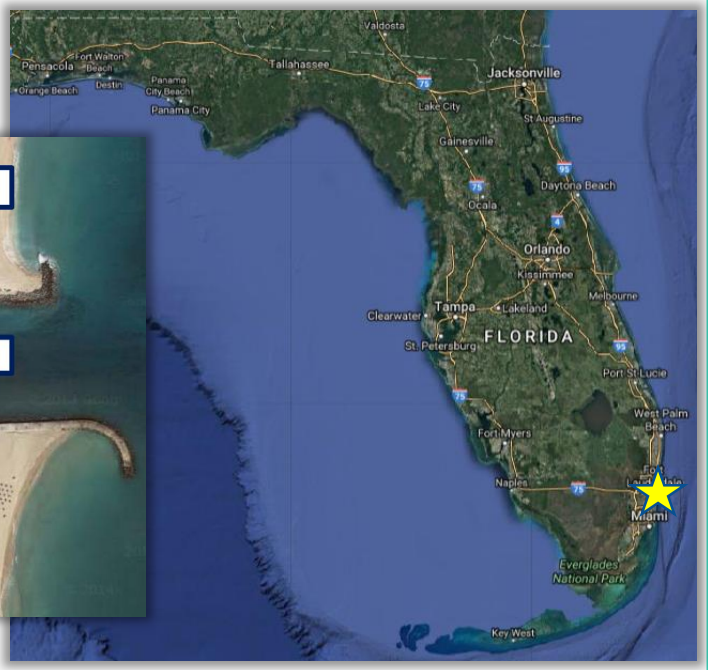




FDOT FRP-RC implementation status

D6 Project: Bakers Haulover Cut Bridge Rehab. – Bulkhead Replacement

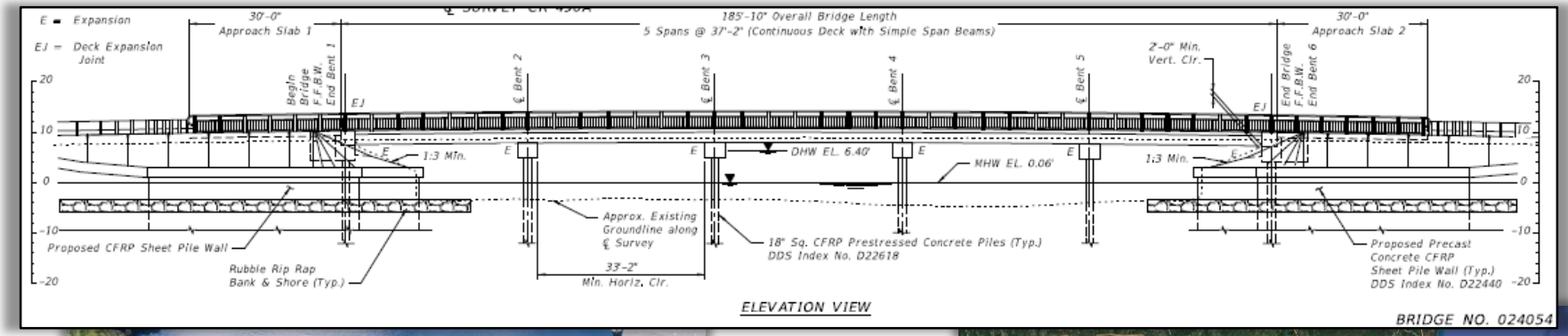




914-415-104	FIBER REINFORCED POLYMER BAR #4	BULKHEAD CAP, PARAPET & FASCIA PANEL	LF	12,199.32
914-415-105	FIBER REINFORCED POLYMER BAR #5	BULKHEAD CAP, PARAPET & FASCIA PANEL	LF	7,071.14

FDOT FRP-RC implementation status

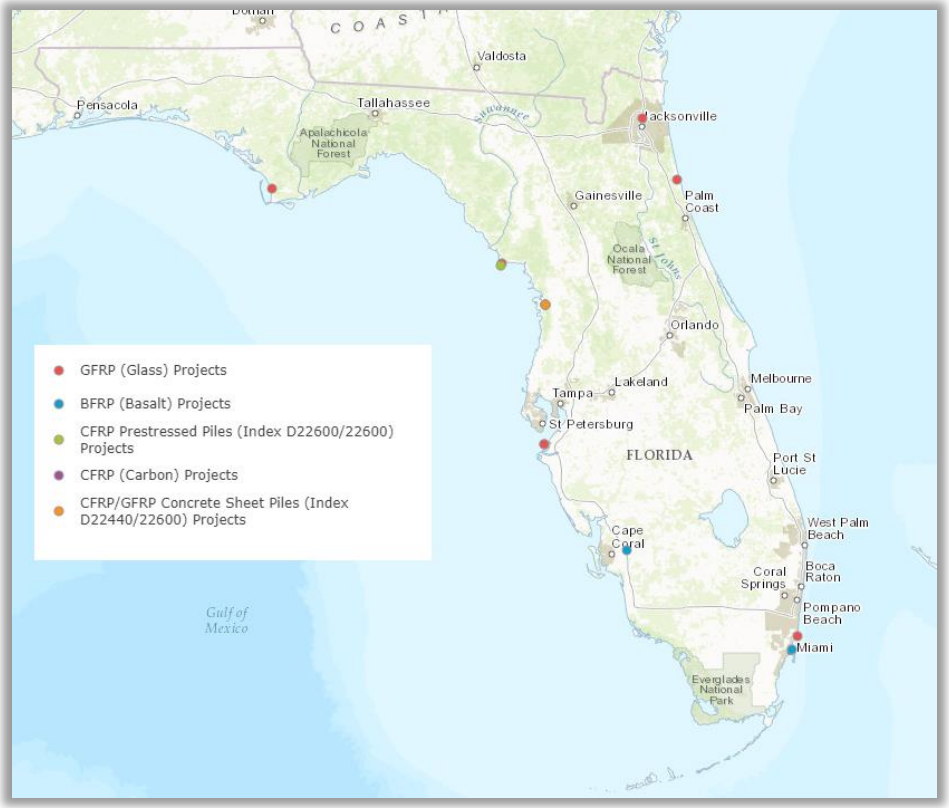
D7 Project: Halls River Bridge Replacement



FDOT FRP-RC implementation status

FRP Projects GIS-Mapping Tool:

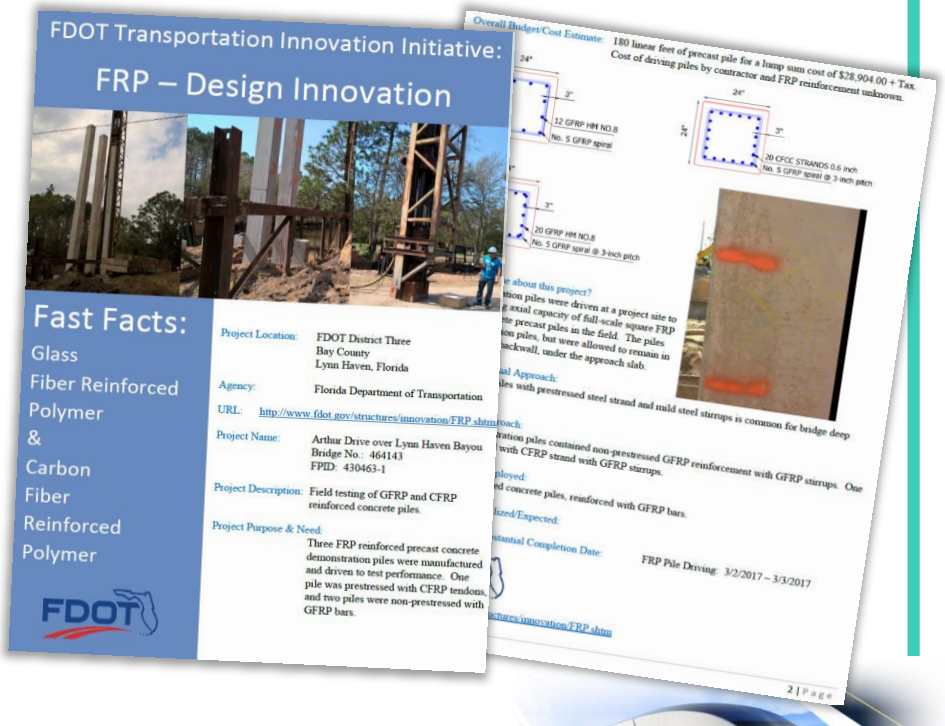
- Active and Completed FRP-RC projects;
- Includes FRP-Fender Systems,
- May add bridge beam repair/strengthening projects in future (20+ year history of wet-layup repairs)



FDOT FRP-RC implementation status

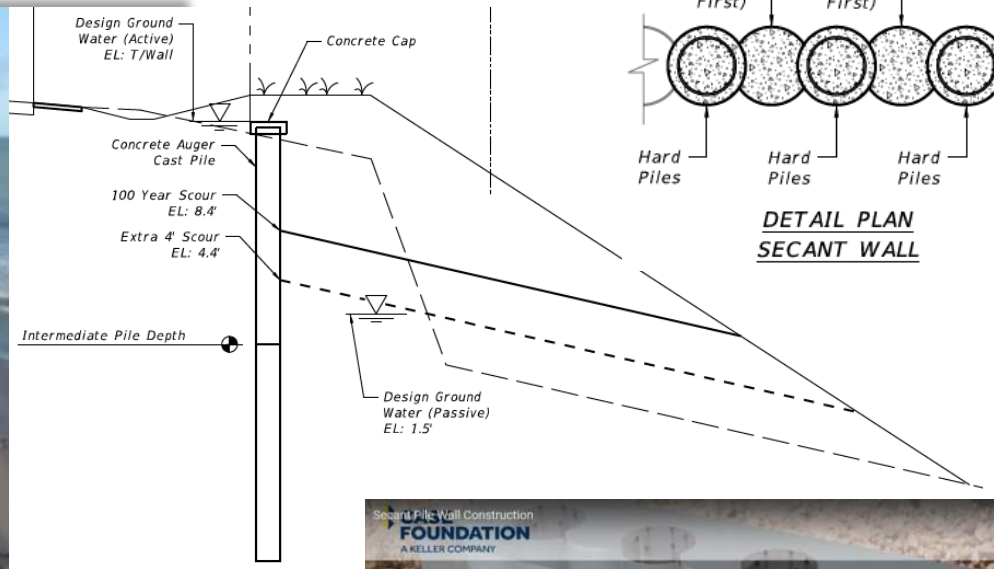
Fast-Facts Sheets:

- EOR's requested to complete for each new project



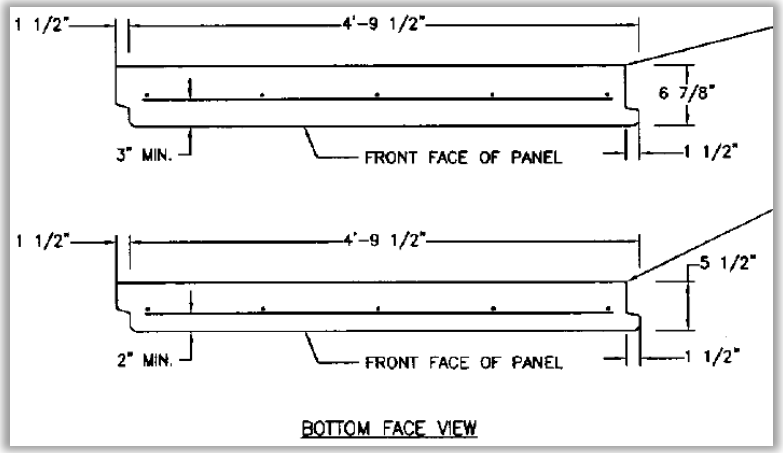
FDOT FRP-RC implementation status

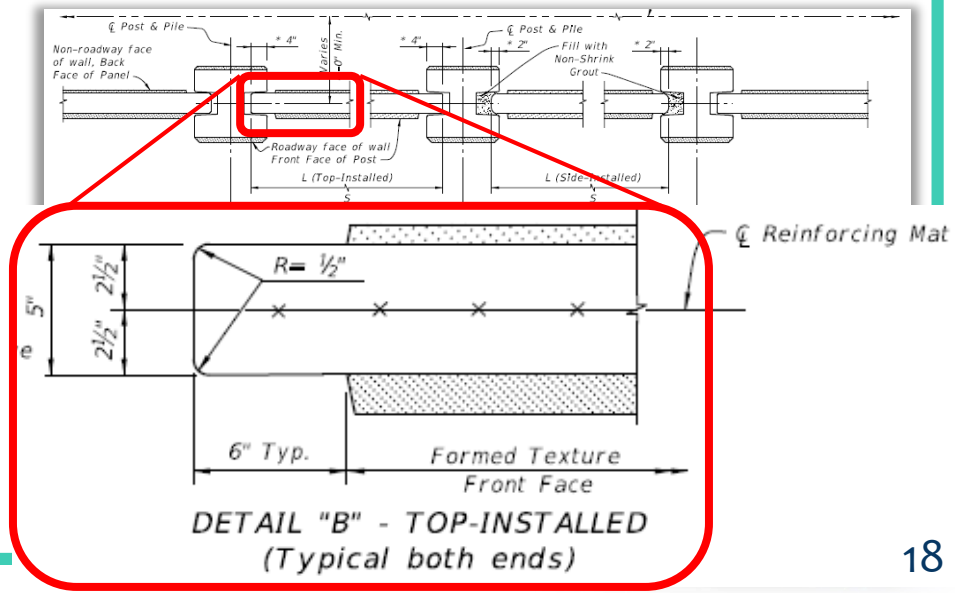
6. New Applications
   i. A1A Secant Seawall option (D5 – 2018)



FDOT FRP-RC implementation status

6. New Applications
   - i. A1A Secant Seawall (D5 – 2018)
   - ii. Precast MSE Wall Panels
     - Allows using 5½" thick panel in place of 7" panel
   - iii. Precast Noisewall Panels
     - Allow 4" thick panel in place of 5" panel





FDOT FRP-RC implementation status

6. New Applications
   i. A1A Secant Seawall (D5 – 2018)
   ii. Precast MSE Wall Panels
      - Allows using 5½" thick panel in place of 7" panel

FDOT MSE RETAINING WALL CLASSIFICATION TABLE													
Applicable FDOT Wall Type *	Durability Requirements (Carbon-Steel Reinforcing)			Durability Requirements (FRP Reinforcing)			Soil Reinforcement Type	Other Allowable FDOT Wall Types					
	Concrete Cover (in.)	Concrete Class for Panels	Pozzolan Additions **	Concrete Cover (in.)	Concrete Class for Panels	Pozzolan Additions? **		2A	2B	2C	2D	2E	2F
Type 2A	2	II	No	1.5	II	No	Metal		✔	✔	✔	✔	✔
Type 2B	2	IV	No	1.5	IV	No	Metal			✔	✔	✔	✔
Type 2C	3	IV	No	1.5	IV	No	Metal				✔	✔	✔
Type 2D	3	IV	Yes	2	IV	No	Metal					✔	✔
Type 2E	3	IV	No	2	IV	No	Plastic						✔
Type 2F	3	IV	Yes	2	IV	No	Plastic						

* See Data Table in Contract Plans.

** Silica fume, metakaolin or ultrafine fly ash.

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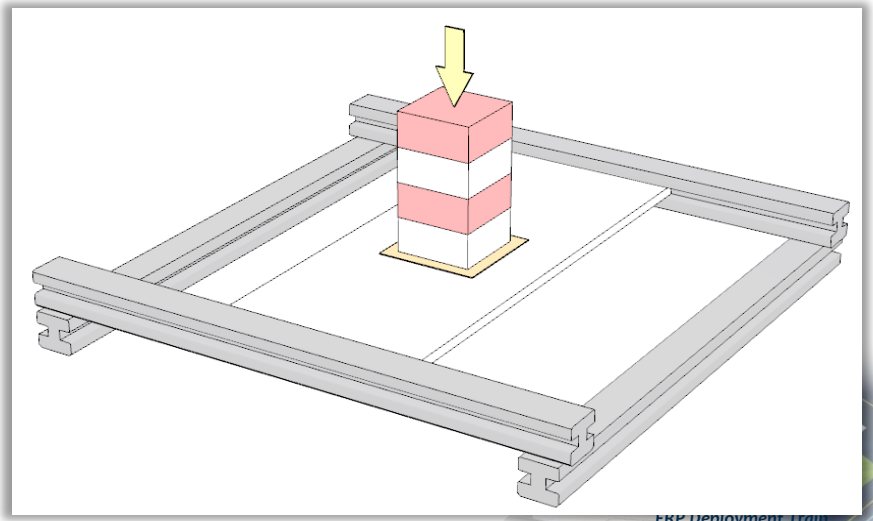
STIC 2018 Proposal *(pending)*
– Basalt-FRP Rebar Standardization

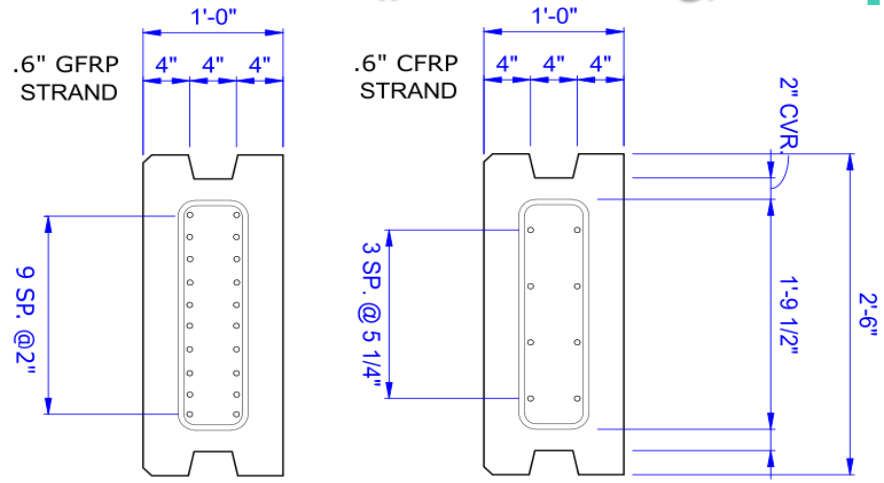
"Develop standard (guide) **design specification,** and standard **material** and **construction specifications** for basalt fiber-reinforced polymer (BFRP) bars for the internal reinforcement of structural concrete…"



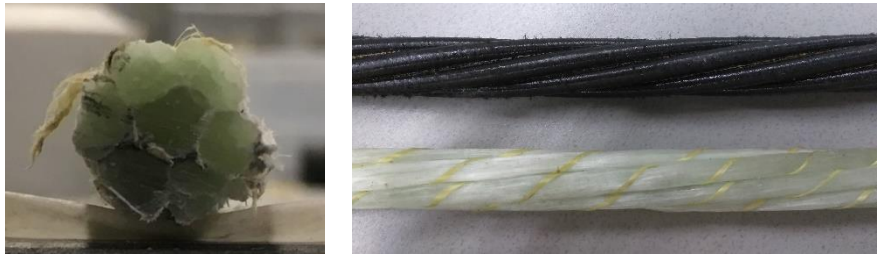
FDOT FRP-RC implementation status

NCHRP IDEA Project – *MILDGLASS (prestressing)*

(a) & (b) CFRP strand failed during tensioning;
(c) cracking following strands release.



(a) GFRP-PC sheet pile concept (b) CFRP-PC sheet pile design for Halls River Bridge



(a) GFRP strand prototype cross section;
(b) compared to a CFRP alternative.

(a) & (b) Tensioning apparatus for CFRP; versus
(c) standard steel HSCS chucks, for GFRP.

Questions