ORIGINATION FORM
Proposed Revisions to the Specifications
(Please provide all information - incomplete forms will be returned)

Date: 5/1/23

Office: Materials

Originator: Thomas Frank

Specification Section: 450

Telephone: 352-955-6683

Article/Subarticle: 450-3.1, 450-3.2, 450-4.2.1, 4

email: thomas.frank@dot.state.fl.us

Associated Section(s) Revisions:

Will the proposed revision require changes to the following Publications:

Publication	Yes	No	Office Staff Contacted	Date
Standard Plans Index	○	◉	Rick Jenkins/Joshua Turley	6/30/23
Traffic Engineering Manual	○	◉	Mariano Amicarelli	6/30/23
FDOT Design Manual	○	◉	DeWayne Carver	6/30/23
Construction Project Administration Manual	○	◉	Patrick Overton	6/30/23
Basis of Estimate/Pay Items	○	◉	Ryan Gray	6/30/23
Structures Design Guidelines	○	◉	Ben Goldsberry	6/30/23
Approved Product List	○	◉	Karen Byram	6/30/23
Materials Manual	○	◉	Susan Musselman/Brad Pearson	6/30/23
Maintenance Specs	○	◉	Deanna Hutchison	6/30/23

Will this revision necessitate any of the following:

Design Bulletin ☐ **Construction (DCE Memo)** ☐ **Estimates Bulletin** ☐ **Materials Bulletin** ☐

Have all references to internal and external publications in this Section been verified for accuracy? YES

Synopsis: Summarize the changes:

450-4.2.1: Updated reinforcing steel sampling frequency for consistency with Materials Manual. 450-7.1: Included CFRP strand with respect to max exposure temperature, and clarified max temperature of CFRP coupler assembly exposure (120F). 450-8.2.6: Adjusted concrete blocks for strand positioning to be of the same concrete class; same mix design when a highly reactive pozzolan is used. 450-11.1: Referenced the existing prestressed QC

Justification: Why does the existing language need to be changed?

450-4.2.1: To update reinforcing steel sampling frequency for consistency with Materials Manual. 450-7.1: To include CFRP strand with respect to max exposure temperature, and clarify max temperature of CFRP coupler assembly exposure (120F). 450-8.2.6: To adjust concrete blocks for strand positioning to be of the same concrete class; same mix design when a highly reactive pozzolan is used. 450-11.1: To reference the existing prestressed QC personnel requirements in Section 105-8.8.2 for personnel performing detensioning

Do the changes affect either of the following types of specifications (Hover over type to go to site.):

Special Provisions ☐ **Developmental Specifications** ☐

List Specifications Affected: (ex. SP3270301, Dev330TL, Dev334TL etc.)

Contact the State Specifications Office for assistance completing this form.

Daniel Strickland 850-414-4130 Daniel.Strickland@dot.state.fl.us, Darla Hunsicker 850-414-4114 Darla.Hunsicker@dot.state.fl.us,
Jennifer Burnsed 850-414-4101 Jennifer.Burnsed@dot.state.fl.us, MaryElizabeth Parker 850-414-4155 MaryElizabeth.Parker@dot.state.fl.us

1. Are changes in line with promoting and making meaningful progress on improving safety, enhancing mobility, inspiring innovation, and fostering talent; explain how?

Yes; these changes improve safety of various processes by keeping limits and thresh holds current and inspire innovation of industry by encouraging new training.

2. What financial impact does the change have; project costs, pay item structure, or consultant fees?

None.

3. What impacts does the change have on production or construction schedules?

None.

4. How does this change improve efficiency or quality?

Changes improve efficiency by categorizing defects more accurately and ensuring the appropriate repair methods will be used.

5. Which FDOT offices does the change impact?

State and District Materials Offices.

6. What is the impact to districts with this change?

Clarifies precast prestressed concrete producer requirements.

7. Does the change shift risk and to who?

No.

8. Provide summary and resolution of any outstanding comments from the districts or industry.

Comments and Responses are available on the Track the Status of Revisions hyperlink located on the Specifications landing page: https://www.fdot.gov/programmanagement/Specs.shtm

9. What is the communication plan?

Through the established specification revision process (e.g., Internal and Industry Review)

10. What is the schedule for implementation?

The Standard Specifications eBook and Workbook are effective July 1st every year.

PRECAST PRESTRESSED CONCRETE CONSTRUCTION.
(REV 5-1-23)

SUBARTICLE 450-3.1 is deleted and the following substituted:

450-3 Materials.

450-3.1 General: Meet the following requirements:

Concrete	Section 346
Steel Strands*	Section 933
Carbon Fiber Reinforcing Polymer (CFRP) Strands*	Section 933
Steel Prestressing Bars	Section 933
Steel Accessories	Section 933
Steel Spirals	Section 931
Reinforcing Steel and Metal Welded Wire Reinforcement	Sections 415 and 931
FRP Reinforcing	Sections 415 and 932
FRP Spirals**	Section 932
Embedded Ducts	Section 960
Membrane Curing compounds***	Section 925
Epoxy Resin Compounds	Section 926
Burlap	Section 925
Curing Blanket	400-16
Penetrant sealer***	Section 413
Methacrylate	Section 413
Epoxy Injection of Cracks	Section 411

* Do not use strands from more than one source in any individual prestressed element, with the exception of the partially tensioned strands (dormant strands).

** The FRP spirals cannot be used in combination with steel prestressing strand.

*** Use membrane curing compounds and sealers that are compatible with coating or other materials that are applied to concrete surface.

Use inserts in accordance with the recommendations of the manufacturers and within their certified capacities and application qualifications. Do not use aluminum inserts.

Use draped strand devices of sufficient rigidity having adequate support to retain the position of the strand unchanged under the induced load. Do not allow the devices to induce friction to the strand~~tendon~~s such that the required jacking force and elongation cannot be attained.

SUBARTICLE 450-3.2 is deleted and the following substituted:

450-3.2 Strand Chucks and Splice Chucks: For pretensioning, use strand chucks that are capable of anchoring the strands without slippage after seating and ensure against strand failure within the grips at loads less than 95% of ultimate tensile strength of the prestressing strand.

Submit manufacturer's certification that splice chucks used to transmit the prestressing force from one prestressing ~~tendon~~ strand to another are capable to hold at least 95% of the ultimate tensile strength of the prestressing strand.

Do not use wedges that become worn, cracked, deformed, or that allow dead end seating in excess of 3/8 inch. Use components from the same manufacturer to make up chucks and to provide proper wedge fit.

Use chucks as complete units. Clean, inspect, and lubricate the chucks between each use. Use wedges and housing that are compatible and made for the specific type and size of prestressing strand used. Ensure proper fit and proper seating of wedges on the strands.

The Engineer will allow one splice per strand subject to the following:

1. Splices are located outside the concrete products (except for precast piling where up to two splices are permitted to be used in each pile, so long as they are not located in the same vertical cross section, perpendicular to longitudinal axis of the pile).

2. Strands which are being spliced have the "lay" or "twist" in the same direction.

SUBARTICLE 450-4.2.1 is deleted and the following substituted:

450-4.2.1 General: Identify all reinforcing steel, welded wire reinforcement and prestressing strand for pretensioning by LOTs. A LOT of reinforcing steel or welded wire is a shipment of material from the same manufacturer and heat. A LOT of prestressing steel is a shipment of material of the same size, production grade and heat from the same manufacturer. A LOT of FRP reinforcing bars or prestressing strands is a shipment of material of the same size, fiber lot and resin batch from the same manufacturer.

Acceptance of reinforcing bars, welded wire reinforcement and prestressing steel for pretensioning is based on manufacturer's certification and the Department's verification tests. The sampling for verification testing will be performed by the Department at each plant, on at least ~~two~~ one LOT~~s~~ every six months~~per year~~. Additional samples may be taken at the manufacturing source of reinforcing bars, welded wire reinforcement and prestressing strands.

When products contain the material that has failed to meet the requirements of 450-3, reject the unused material of the failed LOT. The Engineer may require an engineering analysis of the products which contain the failed material, in accordance with Section 6.

SUBARTICLE 450-7.1 is deleted and the following substituted:

450-7 Protection and Placement of Prestressing Strand.

450-7.1 Protection of Prestressing Strand: Maintain and store prestressing steel above the ground surface on platforms, skids, or other supports, to prevent contamination from below, and protect them from mechanical injury. Do not use any packaging or wrapping material that retains moisture at the bottom of the reel. Clean contaminated prestressing strand before use or otherwise reject it. Handle prestressing strand carefully to prevent nicks or kinks. Do not expose ~~steel~~ prestressing strand to temperatures greater than 165ºF at any time prior to concrete placement. Do not expose C~~R~~FRP prestressing strand coupler assemblies to temperatures greater

than 120°F at any time. Do not use arc welding equipment, including welding electrode lines, within 2 feet of prestressing strand. Do not perform welding on forms that have been set in place after the prestressing strand is placed in the bed. Reject prestressing strand that has sustained any physical damage at any time.

SUBARTICLE 450-8.2.4 is deleted and the following substituted:

450-8.2.4 Draped Strand Tensioning: Tension draped strands by either partial tensioning and subsequent strains or by final tensioning in draped position.

Partial stressing and subsequent strains applies when the strands are tensioned through a combination of applied jack loads and strand uplift. To verify the final force, place a load cell between the tensioning anchorage and anchor chucks at the dead end on at least two draped strands. Other methods as approved by the Engineer may be used to verify the final force in the dead end. Apply an initial force of 5% to 25% of the final force to eliminate slack in the system. After application of the initial force, establish reference marks for measuring elongation. Apply a pre-calculated jacking force and measure elongations on a minimum of four strands. The average measured elongation must agree within 5% of the theoretical elongation for strand force measured by jack load, or the factors contributing to the difference must be identified and corrected before proceeding. Allow the load indicated by the jacking system to control the tensioning for the pre-calculated load. Obtain the required final force by lifting or depressing the strand simultaneously at all pickup or hold down points or in an approved sequence as shown on the shop drawings. On each different bed setup, after lifting or depressing the strands to their final position, check the final force at the dead end of at least two strands on the bed. If the load is below the required tensioning force by more than 5%, adjust it to the final load.

When the final stressing is performed in the draped position, apply the tensioning load in two increments with the strand~~tendon~~s being held in their draped positions. To verify the final force, place a load cell between the tensioning anchorage and anchor chucks at the dead end on at least two draped strands. Other methods as approved by the Engineer may be used to verify the final force in the dead end. Bring each strand to an initial tension of 5% to 25% of the final load before the application of the required final load. After application of the initial load, establish reference marks for measuring elongation. Then tension the strands to final load and measure the elongation. Allow the load indicated by the jacking system to control the tensioning for the initial and final loads. The measured elongation must agree within 5% of the theoretical elongation for the strand force measured by jack load, or the factors contributing to the difference must be identified and corrected before proceeding. When the jacking is performed at one end of the bed, check the applied load on two draped strands at the other end of the bed. If the load on the end opposite the jacking end is below the required value by more than 5%, adjust the load to the required final load.

SUBARTICLE 450-8.2.6 is deleted and the following substituted:

450-8.2.6 Position of Prestressing Strand: Position prestressing strand as shown in the Plans within the tolerances allowed in 450-2.3. Fix the required vertical and horizontal position of each prestressing strand at the ends of each product and at intervals within each

product not exceeding 30 feet. Use the method of fixing the prestressing strand shown in the Producer QC Plan. When blocks are to be used for supporting prestressing strand, use those cast from concrete of the same ~~mix design~~concrete class or higher as used in the prestressed product. When the product's mix design requires a highly reactive pozzolan, use blocks cast from concrete of the same mix design. Stagger the location of blocks with an offset of 12 inches or greater and do not stack them.

SUBARTICLE 450-11.1 is deleted and the following substituted:

450-11 Detensioning.

450-11.1 General: The required concrete strength at which the prestressing force may be transferred to the concrete in a product will be a minimum of 4,000 psi, unless specified otherwise in the Plans. Verify the release strength by compressive strength cylinder tests or other approved means, no later than 24 hours after casting and every 24 hours thereafter until release strength is developed.

In lieu of every 24 hour testing, estimate the strength development of concrete using the maturity method in accordance with ASTM C1074, the pulse velocity method in accordance with ASTM C597, or any other nondestructive test method acceptable to the Engineer, until the time of the detensioning.

Before detensioning, verify the concrete release strength by testing the compressive strength test cylinders. Make a minimum of two compressive strength release test cylinders daily for each individual mix or for each LOT, or fraction thereof, of a given concrete mix design where the daily consumption exceeds this volume or when non-continuous batching or dissimilar curing is used. The release strength test, representing the LOT, is the average compressive strength of two test cylinders, cured under conditions similar to the product or match-cured test specimens, which are match cured until the time of release.

For products cured using accelerated curing, release the prestressing force immediately after terminating the accelerated curing process. After the detensioning operation is completed, continue to 72 hour curing period using one of the methods listed in 450-10.6. For products cured using methods other than accelerated curing, release the prestressing force within a detensioning time limit, not to exceed five calendar days after the verification of release strength by compressive strength cylinder test or other approved strength gain monitoring system.

For all products in a casting line, use the same test method for determining their release strengths. Ensure the detensioning time limit is included in the Producer QC Plan. Cure concrete cylinders used for detensioning strength tests in the same manner and location as the prestressed concrete products they represent.

For I-Beams, when side forms are loosened upon setting of concrete or removed before the 72 hour curing period is complete, the top flange dormant strands may be released after the concrete reaches a compressive strength of 2,000 psi.

Production personnel will p~~P~~erform detensioning operations under the supervision of ~~personnel possessing a certificate of completion of PCI Quality Control Personnel Certification Level II, and Section 450 Specification examination~~a QC Inspector/Technician in accordance with Section 105 for prestressed plant quality control personnel, or certified personnel may perform detensioning operations directly.

SUBARTICLE 450-12.3.1.2 is deleted and the following substituted:

450-12.3.1.2 Spall: A spall is a depression resulting when a fragment is detached from a larger mass by impact, action of weather, by pressure or by expansion within the larger mass.

A cosmetic spall is a circular or oval depression not greater than 1.0 inch in depth nor greater than 3.0 square inches in area, and must be repaired in accordance with 450-13.2.

With the exception of spalls in the bearing areas and edges of the top flange, a minor spall is defined as a spall not larger than 2.0 square feet and no deeper than one inch plus the sum of the concrete cover and the diameter of the bar in the first layer of reinforcing. Repair minor spalls in accordance with 450-13.4.

Repair cosmetic and minor spalls as described above, except for spalls with visually exposed reinforcing steel, prestressing strand, inserts, or weldment surfaces, which require repair in accordance with 450-13.5.

Spalls located at the edges of the top flange are considered minor spalls as follows:

1. A spall on one edge of the top flange, without a coincident spall on the other edge of the top flange, is considered a minor spall if the total longitudinal length of the defect does not exceed 10 feet and any lateral dimensions of the spall measured perpendicular to the longitudinal axis of the beam are not greater than 25% of the width of the top flange.

2. Coincident spalls on opposite edges of the top flange are considered minor spalls if the total length of the defects within both spalls does not exceed 10 feet and any lateral dimensions of the spalls at a given location measured perpendicular to the longitudinal axis of the beam are not greater than 25% of the width of the top flange.

Spalls are considered major when they are located in the extended bearing area of the beams as defined in 450-12.3.5, or if any depression exceeds the dimensions that are described for minor spalls.

SUBARTICLE 450-12.3.1.3 is deleted and the following substituted:

450-12.3.1.3 Chip: A chip is the local breaking of the corners or edges of the concrete with the resulting void containing angular surfaces. Repair chips in accordance with 450-12.3.1.2.

~~Cosmetic chips are chips where the sum of the two lateral dimensions perpendicular to the length does not exceed 2.0 inches. Regardless of length, it is not necessary to repair cosmetic chips except for visually exposed reinforcing steel, prestressing strand, insert, or weldments surfaces, which may require repair in accordance with 450-13.5.~~

~~Minor chips are chips where the sum of the two lateral dimensions perpendicular to the length exceeds 2.0 inches, but does not exceed 4.0 inches, and with a length of no more than 12.0 inches. Repair minor chips in accordance with 450-13.5.~~

~~Major chips are any chips larger than minor chips. Major chips require engineering evaluation and disposition in accordance with 450-12.~~

Cosmetic chips are chips where the sum of the two lateral dimensions perpendicular to the length does not exceed 2.0 inches. Regardless of length, it is not necessary to repair cosmetic chips except for visually exposed reinforcing steel, prestressing strand, insert, or weldments surfaces, which may require repair in accordance with 450-13.5.

Minor chips are chips where the sum of the two lateral dimensions perpendicular to the length exceeds 2.0 inches, but does not exceed 4.0 inches, and with a length of no more than 12.0 inches. Repair minor chips in accordance with 450-13.5.

Major chips are any chips larger than minor chips. Major chips require engineering evaluation and disposition in accordance with 450-12.

SUBARTICLE 450-13.1 is deleted and the following substituted:

450-13 Repair Methods and Materials.

450-13.1 General: Before beginning the repairs of bug holes, spalls, chips, surface porosity, and honeycomb, remove all laitance, loose material, form oil, curing compound and any other deleterious matter from the repair area. Repair cosmetic or minor deficiencies by methods specified herein. Submit alternative repair methods as needed.

For each project, maintain the record of deficiencies and their repair methods. Ensure the record includes information about product description, unit serial number, date cast, defect description including dimensions, repair method and materials, defect discovery date, and signature of producer's QC Manager indicating concurrence with the information.

Use materials for concrete repair that will meet or exceed the strength requirement of the concrete class used. Cure repaired surfaces for the full 72 hour curing time or for the curing time as recommended by the manufacturer of the repair material. Ensure the repaired surfaces have a surface texture, finish and color which matches the appearance of the unaffected surrounding area of the product.

450-13.1.1 Product Acceptance on the Project: Use only materials listed on the Approved Product List (APL),in accordance with the following Sections:

Epoxy Compounds (Type F) …….. Section 926
Materials for Concrete Repair……. Section 930
Non-shrink Grout…… Section 934

SUBARTICLE 450-13.6 is deleted and the following substituted:

450-13.6 Removal and Restoration of Unsound Concrete: Carefully cut the area of unsound concrete to be repaired back perpendicular to (or slightly undercut from) the surface and to the depth of sound concrete or to a minimum depth of 1 inch, whichever is deeper. When reinforcement is exposed, remove the concrete from around the items to provide a 1-inch clearance all around. When less than one-half the reinforcement diameter is exposed, a positive connection utilizing anchor screws may be proposed in lieu of 1-inch clearance all around. Do not damage the reinforcement. Coat the prepared surface with an approved epoxy bonding compound applied in accordance with the manufacturer's recommendations. Fill the area to be repaired with an approved non-shrink grout, concrete repair material, or epoxy mortar. Mix, apply, and cure in accordance with the manufacturer's recommendations. Firmly consolidate the

material in the area to be repaired. Restore surfaces and edges to the original dimensions and shape of the product.