Florida Department of Transportation

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605 Suwannee Street
Tallahassee, FL 32399-0450

JIM BOXOLD
SECRETARY

January 8, 2016

Khoa Nguyen
Director, Office of Technical Services
Federal Highway Administration
3500 Financial Plaza, Suite 400
Tallahassee, Florida 32312

Re: State Specifications Office
Section **457**
Proposed Specification: **SP4570000 Integral Pile and Column Jackets.**

Dear Mr. Nguyen:

We are submitting, for your approval, two copies of the above referenced Special Provision.

The changes are proposed by Ivan Lassa of the State Materials Office to include columns in the application of this repair method, update references to approved APL items and other minor technical and editorial changes. This change also includes language for consistency with the State Construction Office e-Construction initiative.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via email to daniel.scheer@dot.state.fl.us.

If you have any questions relating to this specification change, please call me at 414-4130.

Sincerely,

Signature on file

Daniel Scheer, P.E.
State Specifications Engineer

DS/ot
Attachment
cc: Florida Transportation Builders' Assoc.
State Construction Engineer

**INTEGRAL PILE AND COLUMN JACKETS.**
**(REV ~~11-6~~*1224-15**1-7-16*)**

The following new Section is added after Section 455:

## SECTION 457
## INTEGRAL PILE *AND COLUMN* JACKETS

**457-1 Description.**

Furnish, fabricate and install an integral pile *and column* jacket in accordance with the Contract Documents.

**457-2 Materials.**

**457-2.1 Stay-In-Place Forms:** Use forms composed of a durable, inert, corrosion resistant material with an interlocking joint along one or two sides that permits the form to be assembled and sealed in place around the pile *or column*. Fabricate the forms from ~~fiber~~glass *or carbon fibers* and polyester *or vinylester* resins~~,~~. *Provide ~~the~~ jackets with* ~~having~~ a minimum thickness of 1/8 inch~~es~~ with a minimum thickness at the corners of 3/16 inch~~es~~ *and dimensions as shown in the Contract Documents*. Ensure the form is capable of maintaining its original shape without additional support or damage when placed around a pile. Ensure the inside face of the form has no bond inhibiting agents in contact with the filler material. Provide the forms with bonded or bolted-on, non-metallic*, adjustable* standoffs to maintain the forms in the required positions. Sandblast or score the inside surface of the forms with an abrasive material to provide a rough surface texture *and ensure bond with the filler material*. Equip the forms with a compressible sealing strip at the bottom which will effectively seal the annular space between the pile *or column* and the form. Use non-metallic hardware for pumping ports when these are provided. Fabricate the ~~pile~~ jacket form in a workmanlike manner and have it inspected and approved by the Engineer prior to placement ~~on piles~~. Remove from the project any ~~pile~~ jacket form that has been rejected.

The forms shall meet the following physical property requirements of Table 1:

| Table 1: Physical Requirements of Stay-In-Place Forms | |
|---|---|
| Water Absorption (ASTM D 570) | 1% maximum |
| Ultimate Tensile Strength (ASTM D 638)* | 9,000 psi minimum |
| Flexural Strength (ASTM D 790)* | 16,000 psi minimum |
| Modulus of Elasticity (ASTM D 790) | 700,000 psi minimum |
| IZOD Impact (ASTM D 256) | 15 lb/inch minimum (unnotched specimen) |
| Barcol Hardness (ASTM D 2583) | 45 minimum |
| Color: Similar to Federal Color Standard No. 595, Table VII, Shade No. 36622. The color must be integral in the form gel coat. | |
| * On original specimens whose flat surfaces are not machined to disturb the fiberglass. | |

**457-2.2 Anode Material**: Use expanded mesh anodes pre-installed inside the form by the manufacturer when cathodic protection integral pile~~/~~ *or column* jackets are specified. Use anode type and configuration shown in the Contract Documents. If galvanic anodes are used, place the *a*nodes in direct contact with the inside face of the form.

**457-2.3 Fillers:** Use portland cement grout fillers for non-structural jackets and concrete fillers for structural jackets unless otherwise specified in the Contract Documents.

**457-2.3.1 Portland Cement Grout:** Use a mix design of portland cement, fine aggregate, water and an admixture containing a minimum of 940 pounds of cementitious material per cubic yard. Up to 30%, by weight of cement, may be replaced by fly ash for standard pile jackets. Do not use fly ash, slag, or silica fume for cathodic protection jackets *unless specifi~~cally indicated~~ed in the Contract Documents*.

Use silica sand fine aggregate meeting the requirements of Section 902.

Use portland cement meeting the requirements of Section 921.

Use admixtures meeting the requirements of Section 924, ASHTO M194, Types A and D.

Use air-entraining admixtures meeting the requirements of Section 924 and containing no chlorides or other salts corrosive to metals.

Use fly ash meeting the requirements of Section 929, ASTM C618, Type F, except that loss on ignition shall not exceed 4%.

Provide a grout filler mix with a minimum compressive strength of 5,000 psi at 28 days and a slump of 7 inches to 9 inches. Submit the design mix to the Engineer for approval by the Department before placing any grout filler.

**457-2.3.2 Class IV Concrete:** Use Class IV Concrete meeting the requirements of Section 346 with an adjusted slump of 7 inches to 9 inches. Reduced size coarse aggregate may be used as approved by the Engineer. Do not use fly ash, slag, or silica fume for cathodic protection jackets.

Submit the design mix to the Engineer for approval by the Department before placing any concrete filler.

**457-2.3.3 Special:** When ~~required~~*specified*, furnish special fillers in accordance with the Contract Documents. ~~Provide~~ *Submit* test results and documentation that demonstrate the material meets the requirements for the project. Use materials meeting the requirements of 930-7 when cementitious pre-bagged fillers are specified.

**457-2.3.4 Chlorides**: Total amount of chlorides for jacket fillers shall not exceed 0.4 pounds per cubic yard of filler *after placement*. Total amount of chloride will be tested at a random basis as directed by the Engineer.

**457-2.4 Water:** Use water that meets the requirements of Section 923 for all filler mixing. Use potable water for cleaning, rinsing, or any other application that requires direct contact with the piles.

**457-2.5 Reinforcing Steel:** Use reinforcing steel meeting the requirements of Section 415 for all structural jackets.

**457-2.6 Materials Certification and Testing.**

**457-2.6.1 Certification:** For materials other than those for portland cement grout and Class IV concrete, ~~provide~~ *submit* a certificate to the Engineer certifying that the materials furnished meet all the requirements of this Section and conform in all respects to the materials tested. Attach ~~copies of~~ current test reports to the certificate.

~~Provide~~ *Submit* certified test results of the chemical composition of the anode and ~~provide~~ *submit a* manufacturer certification stating that the dimensions and physical characteristics of the anode meet the requirements of the Contract Documents when cathodic protection jackets are specified.

**457-2.6.2 Testing:** No test report for tests made more than two years prior to shipment will be accepted for the form material.

Test materials for portland cement grout and Class IV concrete as required in Section 346 for approved design mixes. Perform sampling and testing using Quality Control technicians meeting the requirements of Section 105.

Test properties of materials for other cement based fillers allowed under 457-2.3.3 same as required for the Department approved design mixes. Test the materials at a frequency of one set of tests per load of the mixer. For each set of tests, cast three 4 inch by 8 inch cylinders for compressive strength testing at the required test date. The Engineer may adjust the frequency of testing based on consistency of the mixes. Conduct a field verification mix prior to commencing the jacket installation. Cure samples of cement based materials in accordance with ASTM C31.

Hardened concrete or grout will be accepted on the basis of strength test results as defined in this Section. Test the laboratory cured samples for compressive strength at 28 days in a laboratory meeting and maintaining at all times the qualification requirements listed in 105-6.

**457-3 Construction.**

**457-3.1 Shop Drawings:** Submit shop drawings and obtain approval prior to field installation. ~~Provide~~ *Submit* shop drawings showing locations of standoff spacers, method of fastening jacket form to piling, method of sealing the form after ~~installation~~*assembly*, and method for bracing during placement of filler. Include details of access holes, fiberglass caps, *method of securing anode from movement,* and methods for placing the filler and cutting and sealing the pumping ports.

**457-3.2 Surface Preparation**: Remove all cracked or delaminated concrete and excavate to a depth of 3/4 inch~~es~~ to 1 inch behind the exposed reinforcement. Limit the size of chipping hammers to 20 pounds unless otherwise approved by the Engineer. Thoroughly clean all pile*/column* surfaces that the jackets will cover. Remove all oil, grease, dirt, broken concrete, marine growth and any other deleterious material that ~~would~~ *could* prevent proper bonding. Sandblast all exposed reinforcing steel to SSPC-SP10, near white, per the Society of Protective Coatings, to remove all rust and scale before installing the pile jacket. Water blast or mechanically clean reinforcing steel exposed under water by methods and with equipment approved by the Engineer. Clean existing concrete surfaces by sandblasting, wet blasting, wire brushing, water laser, or other methods approved by the Engineer which will yield an equivalent result. Do not place the form until the surface preparation has been approved by the Engineer.

**457-3.3 Cathodic Protection:** Provide connection to the reinforcement for cathodic protection integral pile jackets inside the jacket limits unless otherwise specified in the Contract Documents. Use connection methods and materials in accordance with the Contract Documents.

**457-3.4 Form Placement:** Place the fiberglass form in position around the pile; secure and seal the interlocking joints, and seal the bottom of the form against the pile surface with the compressible seal and an *APL* ~~*approved*~~*listed* epoxy mastic suitable for underwater application. Adjust stand-offs as necessary to prevent misalignment and install temporary hard backing to prevent deformation *of the jacket*. Place a temporary plastic wrap around the form prior to placement of the hardbacking to protect the gel coat.

**457-3.5 Filler Placement**: Wet to saturation the surface of the ~~pile~~ *existing concrete* immediately prior to placing the filler. Place the filler in one continuous pour at no more than 72 hours after surface preparation. Fill the annulus between the pile~~/~~ *or column* and ~~pile~~ jacket

form following the jacket manufacturer's instructions and the Contract Documents. Do not drop filler material into forms higher than five feet or into forms containing water. Prevent contamination of the filler during placement and provide internal or external vibration to ensure proper consolidation.

Cure filler for a minimum of 96 hours before removing any external bracing. Remove any filler or other extraneous material from the exterior surface of the form and clean the form without damaging the fiberglass or gel coat resin. Cut pumping ports flush with the surface of the jacket and seal opening with *an APL ~~approved~~listed* epoxy.

**457-4 Method of Measurement.**

The quantities to be paid for under this Section will be the total feet of integral pile*~~/~~ or column* jacket furnished, installed, completed and accepted. Measure length from bottom of the form to top of the form.

**457-5 Basis of Payment.**

Price and payment will be full compensation for all work specified in this Section. No separate payment will be made for reinforcing steel or filler material. Include payment for anode material*, ~~and~~* anode connection accessories*, testing, and activation* in the price per foot for cathodic protection integral pile jackets. *Remove and replace jackets with misalignment exceeding 3/4 inch or CP jackets with the anode electrically shorted to the reinforcement at no ~~extra~~additional cost to the Department.*

Payment will be made under:

| | | |
|---|---|---|
| Item No. | 457-1- | Standard Integral Pile Jacket - per foot. |
| Item No. | 457-2- | Cathodic Protection Integral Pile Jacket – per foot |

**INTEGRAL PILE AND COLUMN JACKETS.**
**(REV 1-7-16)**

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