ORIGINATION FORM

THE INFORMATION BELOW IS TO BE PROVIDED BE THE ORIGINATOR

☒ Modification Specification: SP 4570000
Section/File Number

☐ New Section: _____
Section Number

Subject:	Integral Pile Jackets
Origination Date:	October 16, 2007
Originator:	Tom Malerk
Office/Phone:	State Materials Office (352) 625-6620
Email Address:	tom.malerk@dot.state.fl.us
Userid:	RT820TM
Problem Statement:	Section 457 allows pile jackets to be used as a corrosion prevention measure for piles in general. However, since 1995, these jackets have been replaced by cathodic protection jackets when installed on piles in marine environments. New pay items have been issued for cathodic protection jackets. Consequently, the specification needs to be changed to include these pay items and to differentiate between standard and cathodic protection integral pile jackets.
Information Source:	Ivan Lasa, State Materials Office. Research Report 0510803, "Condition Assessment of Jackets Upon Pilings in Florida Bridges"
Background Data:	This specification is outdated and includes materials no longer recommended for use on piles in marine environment. It is also necessary to make changes to the method of acceptance of pile jackets with cementitious filler to concur with the new FDOT concrete acceptance program.
Recommended Usage Note:	Include details for cathodic protection in Plans or Technical Special Provisions when used for cathodic protection pile jackets.
Estimated Fiscal Impact, if Implemented:	Minimal fiscal impact is expected since the new requirements have already been specified in technical special provisions for some time for pile jackets.

Florida Department of Transportation

CHARLIE CRIST
GOVERNOR

605 Suwannee Street
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STEPHANIE KOPELOUSOS
SECRETARY

M E M O R A N D U M

DATE: February 14, 2008

TO: Specification Review Distribution List

FROM: Duane F. Brautigam, P.E., State Specifications Engineer

SUBJECT: Proposed Specifications Change: 4570000 – Integral Pile Jackets

In accordance with Specification Development Procedures, we are sending you a copy of a proposed new specification change for Integral Pile Jackets.

This change was proposed by Tom Malerk of the State Materials Office and is a complete re-write.

Please share this proposal with others within your responsibility. Review comments are due within four weeks and should be sent to Mail Station 75 or to my attention via e-mail at SP965DB or duane.brautigam@dot.state.fl.us. Comments received after March 13, 2008 may not be considered. Your input is encouraged.

DFB/sh

Attachment

COMMENTS: _____

_____

_____

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_____

_____

Submitted by: _____ Phone #: _____

INTEGRAL PILE JACKETS.
(REV ~~9-12-94~~*~~1-23-08~~1-28-08**~~) (7-00)~~**

PAGE 563. The following new Section is added after Section 455:

SECTION 457
INTEGRAL PILE JACKETS

457-1 Description.

Furnish, fabricate and install a permanent outer form made from durable, inert, corrosion resistant materials and fill the annular space between the pile and the permanent form with portland cement grout, concrete, ~~epoxy compounds or combinations of these~~*or other specified* materials as indicated in the plans. Use integral pile jackets composed of compatible materials as described above, and install around a pile as indicated on the plans to furnish a durable, corrosion resistant pile protection system. *Use only cathodic protection (CP) integral pile jackets for corrosion protection of piles in marine environments.*

457-2 Materials.

457-2.1 Forms: Use forms composed of a durable, inert, corrosion resistant material with an interlocking joint along one *or two* side*s* that permits the form to be assembled and sealed in place around the pile. Fabricate the forms from fiberglass and polyester resins, having a minimum thickness of 1/8 inch unless otherwise shown on the plans. The form dimensions shown in the plans are minimum dimensions permitted. ~~Upon opening to place around a pile, ensure~~*Ensure* that the form is capable of ~~returning to~~*maintaining* its original shape without assistance or damage *when placed around the piles*. Ensure that the inside face of the jacket *form* has no bond inhibiting agents in contact with the cementitious or ~~epoxy grouts~~*other specified filler material*. Provide the forms with bonded *or bolted*-on, non-corrosive standoffs, which will maintain the forms in the required positions. Sandblast or score the inside surface of the forms with an abrasive material to provide a texture equal to a sandblasted surface. Equip the forms with a compressible sealing strip at the bottom which will effectively seal the annular space between the pile and *the* form. *Use non-metallic hardware for pumping ports when these are provided.*

Meet the following physical property requirements:

(a) Water Absorption (ASTM D 570)	1% maximum
(b) Ultimate Tensile Strength (ASTM D 638)*	9,000 psi minimum
(c) Flexural Strength (ASTM D ~~5224~~*790*)*	16,000 psi minimum
(d) ~~Flexural~~ Modulus of Elasticity (ASTM D 790)	700,000 psi minimum
(e) IZOD Impact (ASTM D 256)	15 lb/inch minimum (unnotched *specimen*)
(f) Barcol Hardness (ASTM D 2583)	45 minimum
(g) Color: Similar to Federal Color Standard No. 595, Table VIII, Shade No. 36622. The color must be integral in the form material.	
** On original specimens whose flat surfaces are not machined to disturb the fiberglass.*	

~~**457-2.2 Epoxy Grout Filler:** Use epoxy grout filler composed of a mixed epoxy binder and sand as follows:~~

~~(a) Binder: Use a two component binder material (any mix ratio allowing measurement and mixing on the job) meeting the following requirements:~~

~~(1) Ensure that it is moisture insensitive for application above and below water.~~

~~(2) Ensure that it adheres to wet concrete, steel, and the fiberglass jacket.~~

~~(b) Sand: Use kiln dried Silica sand meeting these gradation requirements:~~

~~Standard Sand~~		~~Alternate Sand~~	
~~Sieve Size~~	~~Passing~~	~~Sieve Size~~	~~Passing~~
~~No. 4~~	~~100%~~	~~No. 4~~	~~100%~~
~~No. 16~~	~~90-100%~~	~~No. 10~~	~~90-100%~~
~~No. 30~~	~~30-50%~~	~~No. 20~~	~~0-5%~~
~~No. 50~~	~~0-10%~~	~~No. 40~~	~~0%~~
~~No. 100~~	~~0-5%~~		

~~(c) Mixing: Machine mix the binder in strict accordance with the manufacturer's instructions.~~

~~(1) Combine one part binder with a maximum of three parts of sand filler.~~

~~(2) When mixed in the ratio of one part binder to one part sand by weight, the minimum compressive strength of 2 inch cubes of this mix at seven days (curing at 66 to 74ºF) shall be 6,500 psi when tested according to 926-3.2(b).~~

~~(3) Mix no more filler than can be incorporated into the form assembly in 20 minutes. Discard any excess on hand after this time.~~

457-2.2 Anode Material for Cathodic Protection Pile Jackets*: Use expanded mesh anodes pre-installed by the manufacturer for all cathodic protection pile jackets. Use anode type and configuration shown in the Plans. Place galvanic anodes in direct contact with the inside face of the jacket.*

Provide certified test results of the chemical composition of the anode and manufacturer certification stating that the dimensions and physical characteristics of the anode meet the requirements of the ~~Plans and Technical Special Provisions~~Contract Documents for the cathodic protection installation.

457-2.3 Portland Cement Grout Filler: Use a mixture of portland cement, fine aggregate, water and an approved admixture containing a minimum of 940 pounds of cementitious material per cubic yard. ~~of which up~~*Up* to 30%, by weight *of cement*, may be replaced by an approved fly ash *for standard pile jackets*. *Do not use fly ash, slag, or microsilica for cathodic protection jackets.*

Use Silica Sand fine aggregate meeting the requirements of Section 902.

Use Portland cement meeting the requirement*s* of Section 921.

Use admixtures meeting the requirements of AASHTO M 194, Types A and D.

Use air-entraining admixtures meeting the requirements of 924-2.1 and containing no chlorides or other salts corrosive to metals.

Use fly ash meeting the requirements of ASTM C 618, Type F, except that loss on ignition shall not exceed 4%.

Use a grout filler mix with a minimum compressive strength of 5,000 psi at 28 days and a slump of 7 to 9 inches. Before mixing any grout, submit the design mix for approval. Incorporate only Department approved mixes into the work.

457-2.4 Class ~~III~~ *IV* Concrete Filler: Use Class ~~III~~ *IV* Concrete ~~(Seal)~~ in accordance with Section 346 *and a slump of 7 to 9 inches*. *Reduced size coarse aggregate may be used as approved by the ~~District Materials~~ Engineer. Do not use fly ash, slag, or microsilica for cathodic protection jackets.*

Submit the design mix for approval before mixing any concrete. Incorporate only Department approved mixes into the work.

457-2.5 Special Filler: When required, furnish special fillers in accordance with the Contract Documents. *Provide test results and documentation that demonstrate that the material meets the requirements for the project. Use materials meeting the requirements of 930-7 when cementitious pre-bagged fillers are specified.*

457-2.6 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.*

~~**457-2.6 Shop Drawings:** Prepare shop drawings showing locations of standoff spacers, method of fastening jacket form to piling, sealing the form after installation and bracing during placement of materials in the annular space between the form and the pile and submit for approval before any field installations. Include details of the access holes, fiberglass caps and construction methods for filling the annular void and capping the holes in the shop drawings for approval~~.

457-3 ~~**457-2.7**~~ **Certification and Material Tests.**

For materials to be used, other than materials for portland cement grout and Class ~~III~~ *IV* Concrete, furnish a certificate to the Engineer attesting that the materials meet all the requirements contained herein and conform in all respects to the materials subjected to the tests required. Attach copies of current test reports to the certificate. No test report for tests made more than one year prior to shipment will be accepted for the form material~~. and no test reports for tests made more than six months prior to shipment will be accepted for epoxy grout filler~~.

Materials for portland cement grout and Class ~~III~~ *IV* Concrete shall be tested and accepted as required in the ~~*Standard S*~~specifications ~~*for Road and Bridge Construction*~~*Contract Documents for approved design mixes. Sampling and testing will be performed by Quality Control technicians meeting the requirements of Section 105.*

Materials for other cement based fillers allowed under ~~Section~~ 457-2.5 shall be tested equivalent to the testing required for the FDOT 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 C-31.

Hardened concrete or grout will be accepted on the basis of strength test results as defined in this specification. 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 ~~Section 6-6~~105-6.

457-~~4~~3 Construction Methods.

457-4.1 Surface Preparation*: Remove all cracked or delaminated concrete and excavate to a depth of ~~¾~~3/4 to 1 inch behind the exposed reinforcement.* Thoroughly clean all pile surfaces the integral pile jackets will cover of oil, grease, dirt, broken concrete*, marine growth* and any

other deleterious material that would prevent proper bonding. ~~Remove all cracked and unsound concrete from the pile and sandblast~~ *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. Clean existing concrete surfaces by sandblasting, wetblasting, wire brushing, water laser, or other approved methods which will yield an equivalent result. Do not place the jackets until the pile cleaning has been approved. *Provide connection to the reinforcement for cathodic protection pile jackets inside the jacket limits unless otherwise specified in the Plans and Specifications for the project.*

Fabricate the pile jacket form in a workmanlike manner and have it inspected and approved prior to placement on piles. Remove any pile jacket form not approved from the project. ~~Spread open the pile jacket form by disengaging the interlocking joint along the side; then place~~*Place the fiberglass form* in position around the pile; secure *and seal* the interlocking joint*(s),* and seal the bottom of the jacket form against the pile surface with *the compressible seal and* an approved epoxy adhesive. *Adjust stand-offs as necessary to prevent misalignment.*

***457-4.2 Filler Material Placement**: Place the filler material in one continuous pour at no more than 72 hours after clean-up.* Fill the annulus between the pile and pile jacket form meeting the material Manufacturer's instructions and the Contract Documents. *Wet to saturation the surface of the pile immediately prior to placing the filler material. Do not drop filler material into forms higher than six feet or into forms containing water. Provide internal or external vibration to ensure proper consolidation.*

Remove external bracing and banding materials after completing the work *but no earlier than 96 hours after placing the filler.* ~~and clean~~*Clean* the exterior surfaces of the forms of any filler material or other extraneous material deposited on the forms *without damaging the fiberglass or gel coat resin.*

***457-4.3 Shop Drawings:** Prepare shop drawings showing locations of standoff spacers, method of fastening jacket form to piling, sealing the form after installation and bracing during placement of material in the annular space between the form and the pile and submit for approval before any field installation. Include details of the access holes, fiberglass caps and construction methods for filling the annular void and capping the pumping ports in the shop drawings for approval.*

457-4 *5* Method of Measurement.

The quantities to be paid for under this Section will be the total feet of *Standard or Cathodic Protection* Integral Pile Jacket -of the filler and size specified *in the contract documents*; furnished, installed, completed and accepted. *Measure length from bottom of the form to top of the form.*

457-~~5~~ *6* Basis of Payment.

The Contract unit price for Integral Pile Jacket measured as provided above will be full compensation for all work specified herein.

Payment will be made under:

Item No. 457-70-	Integral Pile Jackets - per foot.
Item No. 457-71-	*Cathodic Protection Integral Pile Jackets – per foot.*

Implementation of these changes, if and when approved, will begin with the January, 2008 letting.