Florida Department of Transportation

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GOVERNOR

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Tallahassee, FL 32399-0450

STEPHANIE KOPELOUSOS
SECRETARY

August 7, 2009

Monica Gourdine
Program Operations Engineer
Federal Highway Administration
545 John Knox Road, Suite 200
Tallahassee, Florida 32303

Re: Office of Design, Specifications
Section 455
Proposed Specification: 4550510A Structures Foundations - Pilings

Dear Ms. Gourdine:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

These changes were proposed by Larry Jones to change capacity determination of prestressed concrete pile bridge foundations (with test piles) from blow per foot to the Embedded Data Collector (EDC) results using damping values determined from dynamic load tests.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via Email to ST986RP or rudy.powell@dot.state.fl.us.

If you have any questions relating to this specification change, please call Rudy Powell, State Specifications Engineer at 414-4280.

Sincerely,

Rudy Powell, Jr., P.E.
State Specifications Engineer

RP/dt
Attachment
cc: Gregory Jones, Chief Civil Litigation
Florida Transportation Builders' Assoc.
State Construction Engineer

SP4550510A.*D01*
All bridge projects with square, prestressed concrete pile foundations, with test piles. *If other pile types are used, contact Central Office Specifications.*

STRUCTURES FOUNDATION - PILING
(REV *8*~~6~~ ~~*918*~~*6*~~*426*~~ ~~-~~09)

SUBARTICLE 455-5.10.1 (PAGE 534) is deleted and the following substituted:

455-5.10.1 General: Drive piles to provide the bearing capacities required for carrying the loads shown in the plans*. The Engineer will determine pile capacities* ~~*as determined by the Engineer*~~ *using the methods described herein*. For all types of bearing piles, consider the driving resistance as determined by the methods described herein sufficient for carrying the specified loads as the minimum bearing which is accepted for any type of piles. ~~Determine pile bearing using the method described herein or as shown in the plans.~~

The Engineer may accept a driven pile when the pile has achieved minimum penetration, ~~the blow count is generally increasing~~ and the minimum required bearing capacity obtained for *two consecutive12*~~24~~ inch~~es~~ *increments* of ~~consecutive~~ driving. At his discretion, the Engineer may also accept a driven pile when the minimum penetration is achieved and driving has reached practical refusal in firm material.

SUBARTICLE 455-5.10.2 (PAGE 534) is deleted and the following substituted:

455-5.10.2 *Bearing*~~Blow Count~~ Criteria: *The Engineer will determine the bearing resistance of the pile using the data received from Embedded Data Collector (EDC) equipment installed in each pile according to the methods described herein.*~~The Engineer will determine the number of blows required to provide the required bearing according to the methods described herein. Determine the pile bearing by computing the penetration per blow with less than 1/4 inch rebound averaged through 12 inches each of penetration. When it is considered necessary by the Engineer, determine the average penetration per blow by averaging the penetration per blow through the last 10 to 20 blows of the hammer.~~

SUBARTICLE 455-5.10.3 (PAGE 534) is deleted and the following substituted:

455-5.10.3 Practical Refusal: Practical refusal is defined as 20 blows per inch with the hammer operating at the highest setting *which can be used without exceeding the tension or compressive allowed stresses specified in 455-5.11.2*~~or setting determined by the Engineer~~ and less than 1/4 inch rebound per blow. Stop driving as soon as the Engineer determines that the pile has reached practical refusal. The Engineer will generally make this determination within 2 inches of driving. ~~However, the Engineer will in no case approve the continuation of driving at practical refusal for more than~~

~~12 inches.~~ When the required pile penetration cannot be achieved by driving without exceeding practical refusal, use other penetration aids such as jetting or Preformed Pile Holes.

SUBARTICLE 455-5.11.1 (PAGE 535) is deleted and the following substituted:

455-5.11.1 General: *Notify the Engineer two work days prior to placement of piles within the template and at least one work day prior to driving piles. Do not drive piles without the presence of the Engineer.*

The Engineer will determine pile capacity of the Test Piles based on the results of Dynamic Load Tests using externally mounted instruments. Allow the Engineer one work day after driving the dynamic load tested pile to ~~perform CAPWAP~~ analyze~~sis~~ the data and determine the damping value for the EDC equipment. After ~~analyzing the PDA data to~~ determining~~e~~ the appropriate damping value~~factor~~, the Engineer will determine the capacity of the production piles for each pier or bent based on EDC equipment using the Fixed Method of analysis.

If the EDC does not perform to the satisfaction of the Engineer due to actions of the Contractor, engage a Specialty Engineer to perform Dynamic Load Testing of the pile installation at no additional cost to the Department. Set Dynamic Load Test~~PDA~~ equipment to the damping value provided by the Engineer prior to driving the production pile. ~~Allow the Engineer one business day after driving the dynamic load test pile to perform CAPWAP analysis and determine the damping value for the EDC equipment.~~

If the Engineer requires ~~directs the Contractor to perform~~ an additional Dynamic Load test for comparison purposes on piles with a properly functioning EDC, the Contractor will be paid an additional Dynamic Load Test. If the Engineer directs the Contractor to engage a specialty engineer to perform Dynamic Load Tests on a pile with a properly functioning EDC, the Specialty Engineer will be paid for as Unforeseeable Work.

The Engineer may also require static load tests to confirm pile capacities. When the Contract Documents do not include pay items for Static Load Tests, they will be paid for as Unforeseeable Work.

~~Dynamic load test will be used to determine pile capacity for all structures or projects unless shown otherwise in the Contract Documents. When necessary, the Engineer may require static load tests to confirm pile capacities. When the Contract Documents do not include items for static load tests, the Engineer will consider all required static load testing Unforeseeable Work. When considered necessary by the Engineer, adjust the blow count criteria to match the resistance determined from static load tests.~~

SP4550510A.*D01*
All bridge projects with square, prestressed concrete pile foundations, with test piles. *If other pile types are used, contact Central Office Specifications.*

SUBARTICLE 455-5.12.1 (PAGES 537 - 538) is deleted and the following substituted:

455-5.12.1 Description: *Data collection from EDCs will be the responsibility of the Department, and will be in addition to the information collected in accordance with 455-5.13.*

Drive piles of the same cross-section and type as the permanent piles shown in the plans, in order to determine any or all of the following:

(a) the installation criteria for the piles.

(b) the nature of the soil.

(c) the lengths of permanent piles required for the work.

(d) the driving resistance characteristics of the various soil strata.

(e) the amount of work necessary to obtain minimum required pile penetration.

(f) the ability of the driving system to do the work.

(g) the need for point protection.

Because test piles are exploratory in nature, drive them harder (within the limits of practical refusal), deeper, and to a greater bearing resistance than required for the permanent piling. Except for test piles which are to be statically (or Statnamically) load tested, drive test piles their full length or to practical refusal. Build up test piles which have been driven their full length and have developed only minimal required bearing, and proceed with further driving.

As a minimum, unless otherwise directed by the Engineer, do not cease driving of test piles until obtaining the required bearing capacity continuously, where the *capacity is generally* ~~blow count is~~ increasing, for 10 feet unless reaching practical refusal first. For test piles which are to be statically (or Statnamically) load tested, ignore this minimum and drive these piles as anticipated for the production piles.

When test piles attain practical refusal prior to attaining minimum penetration, perform all work necessary to attain minimum penetration and the required bearing. Where practical, use water jets to break the pile loose for further driving. Where jetting is impractical, extract the pile and install a Preformed Pile Hole through which driving will continue. The Department will consider the work of extracting the pile to be Unforeseeable Work.

When driving test piles other than low displacement steel test piles, have preforming equipment available at the site and water jets as specified in 455-5.7 when jetting is allowed, ready for use, before the test pile driving begins.

The Engineer may elect to interrupt pile driving up to four times on each test pile, two times for up to two hours and two additional times during the next working day of initial driving to determine time effects during the driving of test piles at no additional cost to the Department.

If additional set-checks are determined necessary by the Engineer within two working days following the end of initial driving, each set-check will be paid as an additional set-check. If set-checks are determined necessary by the Engineer after two working days from the end of initial driving, each set-check will be paid for as Pile Redrive.

Install instruments on test piles when dynamic load tests are included in the plans or when directed by the Engineer.

SUBARTICLE 455-7.2 (PAGE 543) is deleted and the following substituted:

455-7.2 Manufacture: Fabricate piles in accordance with Section 450. *Supply and install EDCs in all square prestressed bridge foundation piles in accordance with Index 20602. Ensure the EDCs are installed by the manufacturer's approved personnel.*

SUBARTICLE 455-7.8 (PAGES 545 - 546) is deleted and the following substituted:

455-7.8 Pre-Planned Splices: Splices shall be made by the doweled splice method contained in the Standard Indexes or may be made using proprietary splices which are listed on the Department's QPL. Splice test piles in the same manner as the production piles. Include in the pile installation plan, the chosen method of splicing and the approximate locations of the splice. Generally, place the splice at approximately the midpoint between the estimated pile tip and the ground surface, considering scour if applicable. Stagger the splice location between adjacent piles by a minimum of 10 feet. Obtain the Engineer's approval prior to constructing any pile sections. Construct piles which are to be spliced using the doweled splice with preformed dowel holes in the bottom section and embedded dowels in the upper section.

When ~~the~~ electing to use dowel splices, assist the Engineer in performing a dynamic load test on each dowel spliced pile to verify the splicing integrity at the end of driving. Replace any damaged pile splices in accordance with 455-11.2.7. Provide the Engineer 48 hours advance notification prior to driving piles with epoxy-bonded dowel splices.

Ensure sections of mechanically spliced piles are restrained from rotating with respect to the other sections. Mechanical pile splices shall be capable of developing the following capacities in the pile section unless shown otherwise in the plans and capable of being installed without damage to the pile*, EDC,* or splice:

a) Compressive strength = (Pile Cross sectional area) x (28 day concrete strength)

b) Tensile Strength = (Pile Cross sectional area) x 900 psi

Pile Size (inches)	Bending Strength (kip-feet)
18	245
20	325
24	600
30	950
36	*1600*

ARTICLE 455-11 (PAGES 549 - 553) is expanded by the following:

455-11.15 Embedded Data Collectors: *The quantity to be paid for will be the number of EDCs as shown in the plans or authorized by the Engineer, actually installed in piles, completed and accepted in accordance with the Contract Documents. The price of EDC will include all costs related to the work as described herein.*

SUBARTICLE 455-12.15 (PAGES 555 - 556) is deleted and the following substituted:

455-12.15 Embedded Data Collectors: *Price and payment will be full compensation for all labor, equipment, and materials required to perform this work.*

ARTICLE 455-12 (PAGES 553-556) is expanded by the following:

455-12.1*6*~~5~~ Payment Items: Payment will be made under:

Item No. 455- 2-	Treated Timber Piling - per foot.
Item No. 455- 14-	Concrete Sheet Piling - per foot.
Item No. 455- 18-	Protection of Existing Structures - lump sum.
Item No. 455- 34-	Prestressed Concrete Piling - per foot.
Item No. 455- 35-	Steel Piling - per foot.
Item No. 455- 36-	Concrete Cylinder Piling - per foot.
Item No. 455- 37-	Fiberglass Structurally Reinforced Composite Piles- per foot.
Item No. 455-119-	Test Loads- each.
Item No. 455-120-	Point Protection - each.
Item No. 455-133-	Steel Sheet Piling - per square foot.
Item No. 455-143-	Test Piles (Prestressed Concrete) - per foot.
Item No. 455-144-	Test Piles (Steel) - per foot.

SP4550510A.*D01*
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Item No. 455-145-	Test Piles (Concrete Cylinder) - per foot.
Item No. 455-146-	*Embedded Data Collector (EDC) - each*

SP4550510A.D01
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STRUCTURES FOUNDATION - PILING
(REV 8-6-09)

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455-5.10.1 General: Drive piles to provide the bearing capacities required for carrying the loads shown in the plans. The Engineer will determine pile capacities using the methods described herein. For all types of bearing piles, consider the driving resistance as determined by the methods described herein sufficient for carrying the specified loads as the minimum bearing which is accepted for any type of piles.

The Engineer may accept a driven pile when the pile has achieved minimum penetration, and the minimum required bearing capacity obtained for two consecutive12 inch increments of driving. At his discretion, the Engineer may also accept a driven pile when the minimum penetration is achieved and driving has reached practical refusal in firm material.

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455-5.10.2 Bearing Criteria: The Engineer will determine the bearing resistance of the pile using the data received from Embedded Data Collector (EDC) equipment installed in each pile according to the methods described herein.

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damping value, the Engineer will determine the capacity of the production piles for each pier or bent based on EDC equipment using the Fixed Method of analysis.

If the EDC does not perform to the satisfaction of the Engineer due to actions of the Contractor, engage a Specialty Engineer to perform Dynamic Load Testing of the pile installation at no additional cost to the Department. Set Dynamic Load Test equipment to the damping value provided by the Engineer prior to driving the production pile.

If the Engineer requires an additional Dynamic Load test for comparison purposes on piles with a properly functioning EDC, the Contractor will be paid an additional Dynamic Load Test. If the Engineer directs the Contractor to engage a specialty engineer to perform Dynamic Load Tests on a pile with a properly functioning EDC, the Specialty Engineer will be paid for as Unforeseeable Work.

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455-12.16 Payment Items: Payment will be made under:

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Item No. 455- 14-	Concrete Sheet Piling - per foot.
Item No. 455- 18-	Protection of Existing Structures - lump sum.
Item No. 455- 34-	Prestressed Concrete Piling - per foot.
Item No. 455- 35-	Steel Piling - per foot.
Item No. 455- 36-	Concrete Cylinder Piling - per foot.
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