

## Responses 2 Comments Received From Industry Review

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**Bert Woerner**

File: 4550000 - Structures Foundations  
Username: Bert Woerner  
UserEmail: bert.woerner@dot.state.fl.us  
UserTel: 386-740-3499  
Date: Wednesday, July 13, 2005  
Time: 10:54:28 AM

Comments:

In section 455-5.11.2 (c) Maximum Allowed Pile Stresses for Concrete Piles. Is  $f_{pe} = 0$  for mechanically spliced piles or only for Epoxy spliced piles? Section 455-7.8 Preplanned Splices (b) tensile strength is 900 psi. Can we use 900 psi as the maximum tension stress.

**RESPONSE:** No; 900 psi is the required ultimate capacity for the design of the mechanical splice. Therefore, the  $S_{apt}$  shall be limited to 800 psi [5.52 MPa] within 10 feet [3 m] of the mechanical splice in mechanically spliced piles. In a preplanned doweled splice,  $S_{apt}$  during driving is  $6.5(f'_c)^{0.5}+0$  or  $3.25(f'_c)^{0.5}+0$  for piles less than or greater than 50 feet, respectively. This will be clarified in 455-5.11.2(c)(2)

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**Daniel Haldi**

File: 4550000 - Structures Foundations  
Username: Daniel F. Haldi, DCT D5  
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UserFAX86-736-5178  
Date: Friday, July 15, 2005  
Time: 09:25:12 AM

Comments:

Auger Cast Pile Section E  
455-39.1 ADD ... when readi-mix producers or previously approved design mixes have changed, additional demonstrations may be required by the Engineer.

**RESPONSE:** Disagree. This is already covered in other specifications.

455-41 WHERE ... mixture of cement, flyash, ADD slag, ...

**RESPONSE:** Disagree. This is already covered in other specifications.

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Drilled Shafts Section C

455-16.3 ... Use spacing devices near the bottom ADD and the top, and at intervals not exceeding 15 ft ...

**RESPONSE:** Agree. This should be common sense, however, the clarification will be added.

455-17.1 CONSIDER using colored concrete to verify good clean quality concrete at the top of shaft after concrete operations ....

**RESPONSE:** Disagree. This could cause too many other problems and aesthetic issues.

455-17.2 Maintain minimum slump of 4 inch CHANGE TO 5 inch (see SMO for Details - Mike Bergin)

**RESPONSE:** The benefits of increasing the minimum slump during concreting of a drilled shaft from 4" to 5" or 6" would be very high, however, this additional spec change would not be minor and would require another industry review. Therefore, this change cannot be added at this time.

455-17.3 ADD Use a removable temporary casing form for all drilled shafts 4 ft minimum in depth during concrete operations that will ensure no intermingling of surface debris, mud, waste grout, sloughing, etc. during final finishing, embedments, etc. ...

**RESPONSE:** Disagree. This is already covered in 455-15.1.3.

I have pictures that are worthy supporters of these refinements.

**RESPONSE:** Please send copies of these pictures to Larry Jones.

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**Michael Woodward**

I have reviewed the proposed changes to Section 455, and offer the following comments /suggestions :

1. 455-15.6.2, third line , ? 3 to 5 ? is not a minimum, but rather a range. Change to ?? minimum distance of 3 times ? ? ?

**RESPONSE:** Will clarify.

2. 455-15.6.2, fifth line, change ?? as directed y the Engineer ? to ?? as directed by the Engineer . ?

**RESPONSE:** Agree.

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3. 455-15.6.2 , twenty-first line, part (c), . ? 3 to 5 ? is not a minimum, but rather a range. Change to ?? from a minimum depth of 3 times the diameter ? ? ?

**RESPONSE: Will clarify.**

4. 455-17.1, relating to the sentences inserted at the end, it is not clear how the CSL testing is to be performed in the new holes. Will new casing be required to be installed in the new cored holes? How will that be accomplished? Isn't the bond between the shaft concrete and the casing important?

**RESPONSE: Disagree whether it is clear; fill core holes with water and perform test. If the core holes wont hold water, there is a defect in that portion of the shaft.**

5. 455-17.6.1.5, third line, change ? replaced ? with ? replace? ?

**RESPONSE: Deleted and rephrased.**

6. 455-24.1, last line, change ? drilled-shaft ? with ? drilled shaft? ?

**RESPONSE: Agree.**

7. 455-44, item #11, third line, change ? 5 foot ? to ? 5-foot? ?

**RESPONSE: Disagree.**

8. 455-44, item #11, fourth line, change ? 5 foot ? to ? 5-foot? ?

**RESPONSE: Disagree.**

**Mike**

**Michael B. Woodward, P.E.** | Principal Geotechnical Engineer

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**Wing Heung**

File: 4550000 - Structures Foundations

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UserTel: 954-934-1154

Date: Thursday, July 07, 2005

Time: 01:42:41 PM

Comment #1:

455-15.6.1: Fifth line shows "as directed by the engineer". The word, "engineer" should be shown as "Engineer" (capitalize letter E) to be consistent with other parts of the Specifications.

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**RESPONSE: Agree.**

Comment #2:

455-15.6.2: Fifth line, the text "as directed y the Engineer." is added. The word "y", probably should be "by". Typo error.

**RESPONSE: Agree.**

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**Jeffrey Pouliotte**

As discussed with Larry Jones and in conjunction with my review of his proposed re-write of the above referenced Specification, I recently learned about a construction project where prestressed concrete piles were driven in order to facilitate the construction of a future bridge. The piles were subsequently cut-off at plan elevation, left unprotected. and buried. The concern is that the exposed strand and rebar at the tops of these piles will corrode over time, and require remedial action (such as build-ups) at the time of the future bridge construction. In order to avoid this situation for future projects, I suggest adding the following paragraph beneath the existing paragraph in subsection 455-7.9:

*For piles that are to be driven, buried, cut-off at plan elevation, and left in place to support the construction of future structures, coat the surface of the pile cut-off with epoxy bonding compound meeting the requirements of Section 926 and pour a 2 inch layer of mortar. If piles are hollow, plug the hole at the top of the piles prior to pouring the layer of mortar.*

I think it is understood and does not need to be written into the specification, that an alternative method for protecting the piles would be not to cut-off the piles at plan elevation, until the time that the future structure is constructed.

Thank you for your cooperation.

Jeffrey A. Pouliotte, P.E.  
Construction Structures Engineer  
Phone: (850)414-4146, 994-4146 sc

**RESPONSE: Disagree. Because of the very low frequency of this situation, this should be handled as a mandatory plans note or TSP. The Structures Design Guidelines will be revised to reflect the language of and the need for this note. Jeffrey Pouliotte will be included in the discussions regarding this SDG addition.**

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**Jennifer Taylor**

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## Responses 2 Comments Received From Industry Review

UserTel: 386-740-3471

Date: Wednesday, July 27, 2005

Time: 07:25:04 AM

Comments:

1. 455-42, Item 6: We should add an exception to this item that would take into account reduced top lift OGF reduction when applicable (OGF reduction from 115% to 105%, as noted in Item 11). In that case, the 115% would apply to all lower lifts only, while the top lift is reduced to 105%. Overall OGF calculated could then possibly be < 115%.

**RESPONSE: Agree. Will clarify.**

2. 455-42, Item 7: I would suggest that we add a requirement that a pump stroke counter be installed on the grout pump, and that it be maintained in functional condition (this is very useful tool for the QC inspector).

**RESPONSE: Agree. Will add.**

3. 455-44, Item 4: I would suggest that we include the requirement that the auger leads be clearly marked to facilitate the QC inspector's monitoring of the incremental drilling & grout placement. Individual foot marks, with 5 ft increments hi-lited/ID'd, should be clearly applied/visible. Also, the moving auger assembly needs to also have a clear reference mark/line that allows the inspector to accurately monitor vertical movement of the auger.

**RESPONSE: Agree. Will add.**

4. 455-44, Item 8: "... or with the reinforcing bar." - does this ever apply? I am not familiar with the rig set-up or process where this option would apply. I would assume that displacing the auger tip plug (usually a cork, which is secured by hammering into the auger's tip discharge hole) via grout pumping/pressure is the current standard.

**RESPONSE: This is an old provision; however, it should not be removed without another Industry Review.**

5. 455-44, Item 11: I would recommend that the reduced OGF of 105%, for the top 5 ft lift, only be allowed if the grout return to the surface occurs when the auger head is at least 5 ft from ground surface. If grout return to the surface doesn't occur until later (5 ft to 0 ft depth), the reduced OGF of 105% may not be a prudent. So, a conditional statement to the preceding condition is likely required.

**RESPONSE: Agree. Will add.**

1. Section 455-2.1: "Employ a professional testing laboratory, or Specialty Engineer with a minimum of three (3) years experience in load testing prior load test

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experience, to conduct the load test in compliance with these Specifications, to record all data, and to furnish reports of the test results to the Engineer except when the Contract Documents show that the Department will supply a Geotechnical Engineer to provide these services. A Florida Licensed Professional Engineer shall supervise the collection and interpretation of the data.”

**RESPONSE:** Will add similar language

2. Section 455-5: Move Section 455-10 Pile Installation Plan (PIP) under Section 455-5. Since the PIP is one of the first things done on the job, it is appropriate to have it near the front of the Piling Section under General Requirements rather than in the back. This is the way the Drilled Shaft Installation Plan is done in the Drilled Shaft Section.

**RESPONSE:** Not at this time.

3. Section 455-5.5.1: “For predrilled holes that are required through rock or other hard (i.e. debris, obstructions, etc.) materials that may damage the pile during installation, ...”

**RESPONSE:** Agree.

4. Section 455-5.2: The following change is recommended because the example Pile Data Table shown in the Structures Design Guidelines Manual uses the term Nominal Bearing Capacity. “Supply driving equipment which provides the required Nominal Bearing Capacity resistance at a blow count ranging from...”

**RESPONSE:** Disagree; Resistance is the term used in the AASHTO code. The SDG will be revised as needed.

5. Section 455-5.2: “Supply driving equipment which provides the required resistance at a blow count ranging from 3 blows per inch [3 blows per 25 mm] (36 blows per foot [36 blows per 300 mm]) to 10 blows per inch [10 blows per 25 mm] (120 blows per foot [120 blows per 300 mm]) within 72 hours of the end of initial drive unless approved otherwise by the Engineer after satisfactory field trial.”

**RESPONSE:** Will add “at the end of initial drive”

6. Section 455-5.8: “In all such cases, the Engineer will accept the bearing capacity of a pile only if the Contractor achieves the required Nominal Bbearing Capacity value when the tip of the pile is at or below the specified minimum tip elevation or depth of penetration.”

**RESPONSE:** The correct term is bearing resistance. Will add “below tip of preformed hole”.

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7. Section 455-5.9.4: “Construct a hole that is equal to or slightly greater than the pile and of sufficient depth to obtain the required penetration. The hole must remain open long enough for the pile to be placed to the required penetration prior to driving.”

**RESPONSE:** Disagree; the intent of the specification is for the preformed hole to facilitate pile installation without damage to the pile, unless specified in the plans that the purpose is to reduce vibrations. It is not necessary for the pile to drop to the bottom of the hole prior to any driving whatsoever. However, if the pile stresses exceed allowed limits after preforming, the pile is to be extracted and preforming repeated in an appropriate manner. This is already covered in this section.

8. Section 455-5.11.2: “(a) General: The Engineer may use the Wave Equation Analysis for Piles (WEAP) programs. The Engineer will use the Wave Equation to evaluate the suitability of the Contractor’s proposed driving system (including the hammer, follower, capblock and pile cushions) as well as to estimate the driving resistance, in blows per 12 inches [300 mm] or blows per inch [25 mm], to achieve the pile bearing requirements required Nominal Bearing Capacity and to evaluate pile driving stresses.”

**RESPONSE:** Disagree, this revision proposed in this comment is not needed.

9. Section 455-5.11.2: The following changes are recommended to make the Specification compatible with the terminology used in the Structures Design Guidelines Manual. “The Engineer will not approve any hammer for driving unless Use Wave Equation Analyses to show it the hammer is capable of driving to a resistance equal to at least 3.0 times the Factored Design Load design service load plus the scour and down drag resistance (if applicable) shown in the Contract Documents or 1.25 times the Nominal Bearing Capacity ultimate (nominal bearing) resistance shown in the Contract Documents, whichever is higher, . . .”

**RESPONSE:** The comment does not propose a correct revision. 3.0 is correct only if service loads are considered. The appropriate coefficient for (Factored Design Load + Scour + Down Drag) is approximately two. Because “factored design loads” rather than “service loads” are now provided in the plans, the Section will be revised to “2.0 times the factored design load plus the scour and down drag resistance (if applicable) shown in the Contract Documents”

10. Section 455-5.11.2: “In the event that piles require different hammer sizes, the Contractor may elect to drive with more than one size hammer or with a variable energy hammer, provided the hammer is properly sized, cushioned, and the Wave Equation analyses show that it will not damage the pile and will develop the required capacity resistance.”

**RESPONSE:** Will delete “that”.

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11. Section 455-5.11.2: "(1) General: The allowable maximum allowed driving stresses for concrete, steel, and timber piles are given below. In the event Wave Equation analyses show that the hammer will overstress the pile, the Engineer will reject the proposed driving system. Upon such rejection, modify the driving system or method of operation as required to prevent overstressing the pile. In such cases, meet the Engineer's reevaluation requirements by providing provide additional cushioning or make making other appropriate agreed upon changes. For penetration of weak soils by concrete piles, use thick cushions and/or reduced stroke to control tension stresses during driving."

**RESPONSE: Agree.**

12. Section 455-5.11.2: "(2) Concrete Piles: The Engineer will u Use the wave equation to evaluate the proposed pile cushioning. the Contractor proposes to use. The maximum allowed stresses for piles with preplanned splices shall be as indicated in Section 455-7.8. For all other piles, U use the following equations to determine the maximum allowable allowed pile stresses as predicted by the wave equation, and/or measured during driving when driving prestressed concrete piling: . ."

**RESPONSE: Disagree. However, see revision to this section made in response to a comment from Bert Woerner**

13. Section 455-5.11.2: "(3) Steel Piles: Ensure that the maximum allowable allowed pile compression and tensile stresses as predicted by the Wave Equation, and/or measured during driving are no greater than equal to 0.9 times the yield strength (0.9 fy) of the steel."

**RESPONSE: Will delete "that".**

14. Section 455-5.11.2: "(4) Timber Piles: Ensure that the maximum allowable allowed pile compression and tensile stresses as predicted by the wave equation, and/or measured during driving are no greater than are 3.6 ksi [25 MPa] for Southern Pine and Pacific Coast Douglas Fir and 0.9 of the ultimate parallel to the grain strength for piles of other wood."

**RESPONSE: Will delete "that".**

15. Section 455-5.11.3: "Submit for the Engineers approval, a Wave Equation analysis signed and sealed by a Specialty Engineer which establishes the driving criteria for temporary piles. The required bearing capacity driving resistance is equal to the Factored Design Lload multiplied by the appropriate factor of safety plus the scour and down drag resistance shown in the plans (no safety factor is required) or the ultimate Nominal Bearing Capacity shown in the plans, whichever is higher."

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**RESPONSE:** Disagree. The language in this section is intended to include requirements for all old temporary pile designs that may appear in plans. Will clarify that "safety factors apply to service load designs."

16. Section 455-5.12.1: "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 safe bearing capacity value of the piles."

**RESPONSE:** The above refers to meeting the blow count / authorized installation criteria for the production piles. Will revise to (a) the installation criteria for the piles

17. Section 455-5.12.1: "Because test piles are exploratory in nature, drive them harder (within the limits of practical refusal), deeper, and to a greater bearing capacity value than required for the permanent piling. Where practical, drive test piles their full length. Build up test piles which have been driven their full length and have not developed the required Nominal Bearing Capacity only minimal required bearing, and proceed with further driving."

**RESPONSE:** Will revise "bearing value" to "bearing resistance" & Drive test piles their full length or to practical refusal. Disagree with the other proposed changes in the comment.

18. Section 455-5.13: "Drive the pile to the required penetration and capacity resistance or as directed by the Engineer. The Engineer may elect to interrupt driving for up to two waiting periods, 15 60 minutes each (set-checks) during the initial driving of the pile. Dynamic load testing of a pile may average up to two hours longer than for driving an uninstrumented pile."

**RESPONSE:** Disagree, resistance is correct.

19. Section 455-14.3: "These lengths represent the lengths that the Department has assumed to will remain in the completed structure."

**RESPONSE:** Agree.

20. Section 455-7.8: "Mechanical pile splices shall have the following minimum strengths in the splice zone 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 or splice:"

**RESPONSE:** Disagree.

21. Section 455-8.3: "Where the pile length authorized is not sufficient to obtain the required bearing capacity value or penetration, order an additional length of pile and splice it to the original length."

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**RESPONSE:** The above refers to meeting the blow count / authorized installation criteria for the production piles.

22. Section 455-10: Recommend this Section be moved under the Section 455-5 General Requirements for Piling.

**RESPONSE:** Not at this time.

23. Section 455-12.6.2: "For critical temporary steel sheet pile walls, walls necessary to maintain the safety of the traveling public or structural integrity of nearby structures, roadways and utilities during construction; that are detailed in the plans, price and payment will be full compensation for all labor, equipment, and materials required for furnishing and installing steel sheet piling including preformed holes, and including anchors (when an anchored wall system is required), and all necessary anchor testing required by Section 451."

**RESPONSE:** This would change the current intent of the specification.

24. Section 455-15.8.2: "When using mineral slurry, such tests shall be performed by engage an approved soil testing laboratory engaged by the Contractor a CTQP Certified Drilled Shaft Inspector by an experienced person furnished by the Contractor and approved by the Engineer to perform slurry testing."

**RESPONSE:** Will revise to: "When using mineral slurry, engage an approved soil testing laboratory to provide a CTQP Qualified Drilled Shaft Inspector, or furnish an experienced person, approved by the Engineer to perform slurry testing."

25. Section 455-15.11.4: "Adjust cleaning operations so that a minimum of 50% of the bottom of each shaft will have less than 1/2 inch [13 mm] of sediment at the time of placement of the concrete. Ensure that the maximum depth of sedimentary deposits or any other debris at any place on the bottom of the shaft excavation does not exceed 1 1/2 inches [40 mm]."

**RESPONSE:** Agree.

26. Section 455-15.11.5: "Ensure that the minimum depth of over-reaming the shaft diameter sidewall is 1/2 inch [13 mm] and the maximum depth is 3 inches [75 mm]."

**RESPONSE:** Agree.

27. Section 455-15.11.5: "When using mineral slurry, adjust excavation operations so that the maximum time that slurry is in contact with the bottom 5 feet [1.5 m] of the shaft (from time of drilling to concreting) does not exceed 12 hours."

**RESPONSE:** Agree.

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28. Section 455-16.3: "Use concrete wheels or other approved non-corrosive spacing devices near the top and bottom of the shaft and at intervals not exceeding 15 feet [4.5 m] up along the shaft to ensure concentric spacing for the entire length of the cage."

**RESPONSE:** See the response to the similar comment from Daniel Haldi

29. Section 455-16.4: "Exercise care in removing the caps from the top of the tubes after installation so as not to apply excess torque, hammering or other stress which could break the break the bond between the tubes and the concrete."

**RESPONSE:** Agree.

30. Section 455-16.4: Are Cross -hole Sonic Logging Tubes required in Miscellaneous Drilled Shafts? If not, there needs to be a sentence in this Section stating that.

**RESPONSE:** They are required for shafts supporting miscellaneous structures also. This is why the section states "all".

31. Section 455-17.1: "Immediately after concreting, check the water levels in the CSL access tubes and refill as necessary. If tubes become unserviceable, core new holes in the drilled shaft as directed by the Engineer."

**RESPONSE:** Agree.

32. Section 455-17.6.1.5: "If the Engineer determines that the a drilled shaft is unacceptable based on the CSL tests and tomographic analyses, replaced or core the shaft to allow further evaluation and repair."

**RESPONSE:** Will revise to core the shaft to allow further evaluation and repair or replace the shaft.

33. Section 455-17.6.1.5: "If the drilled shaft offset CSL testing, 3-D tomographic analyses and coring indicate that the shaft is defective, propose remedial measures for approval by the Engineer."

**RESPONSE:** Will delete "that".

34. Section 455-18: "Ensure that the diameter and depth of the test hole or holes are the same diameter and maximum depth as the production drilled shafts. Reinforce the test hole unless otherwise directed in the Contract Documents. Fill the test hole with concrete in the same manner that production reinforced drilled shafts will be constructed."

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**RESPONSE:** Will delete “that”.

35. Section 455-31: "For A-1 materials, place backfill in 6-inch (150 mm) maximum thick lifts compacted with a minimum of 5 passes of a mechanical tamper or sled vibratory compactor. For A-2 or A-3 materials, Compact the bottom of the excavation with suitable equipment. C compact the soil beneath footing excavation (whether dug to the bottom of footing or over-excavated) to a density not less than 95% of the maximum density as determined by AASHTO T 180 for a minimum depth of 2 feet [0.6 m] below the bottom of the excavation or to the depth shown in the plans before backfilling begins."

**RESPONSE:** The section could be revised for the foundation preparation of some structures. The commenter is referring to foundation preparations for box culverts, and this section applies to spread footings for bridge foundations. The proposed revision is not appropriate for bridge foundations. The commenter will be consulted for comments regarding additions to this section specifically addressing box culverts and other non-bridge foundations.

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