

Comments Received From Industry Review

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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.

Daniel Haldi

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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.

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

Drilled Shafts Section C

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

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

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

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. ...

Comments Received From Industry Review

I have pictures that are worthy supporters of these refinements.

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 ? ? ?
2. 455-15.6.2, fifth line, change ?? as directed y the Engineer ? to ?? as directed by the Engineer . ?
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 ? ? ?
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?
5. 455-17.6.1.5, third line, change ? replaced ? with ? replace? ?
6. 455-24.1, last line, change ? drilled-shaft ? with ? drilled shaft? ?
7. 455-44, item #11, third line, change ? 5 foot ? to ? 5-foot? ?
8. 455-44, item #11, fourth line, change ? 5 foot ? to ? 5-foot? ?

Mike

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

Wing Heung

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Comment #1:

Comments Received From Industry Review

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.

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.

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.
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Jennifer Taylor

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Comments:

Comments Received From Industry Review

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%.
 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).
 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.
 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.
 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.
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 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."
 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.
 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, ..."

Comments Received From Industry Review

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..."
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."
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 Bearing Capacity value when the tip of the pile is at or below the specified minimum tip elevation or depth of penetration."
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."
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."
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, . . ."
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."
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

Comments Received From Industry Review

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."

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: . . "

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."

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."

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."

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."

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."

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

Comments Received From Industry Review

of the pile. Dynamic load testing of a pile may average up to two hours longer than for driving an uninstrumented pile."

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

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:"

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."

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

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."

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."

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]."

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]."

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."

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

Comments Received From Industry Review

feet [4.5 m] up along the shaft to ensure concentric spacing for the entire length of the cage."

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."

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.

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."

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."

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."

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."

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."
