

4550201 Structures Foundations

COMMENTS FROM INTERNAL/INDUSTRY REVIEW

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Comments: (Industry 10-5-23)

455-5 Predrilling of Pile Holes: o The statement of “shown in the Plans” is not applicable without a pay item of how it should be paid for. Needs to be called out as preforming.

Response: Disagree – “shown in the plans” is used in “... through rock or other hard materials shown in the plans that may damage the pile during installation, ...” Therefore, rock or other hard materials that may damage the pile will be disclosed in the geotechnical information shown in the Plans.

As you indicated, preforming requires a pay item.

Action(s): No change made.

• 455-5.11.2- Discusses driving to 12” of cutoff and performing a set-check “at the end of the day”. Should there be a minimum amount of time to perform the set-check (No earlier than 30 mins or an hour). End of day is vague. What if it is a night driving situation? Is that by 11:59AM. This may be better suited with an actual timeframe.

Response: The actual time frames for each project should be determined during the test pile program. Hopefully, operations can be adjusted to perform a set check at the end of the day. If the contractor requests to perform the set check at a later date, the request should be accommodated. Deviations for contractor convenience should not change the set check to a redrive.

Action(s): No change made.

• 455-5.11.4 1. Set-checks o “typically up to 24 hours” contradicts pay item 455-11.9. End of of day verbiage (455-5.11.2).

Response: Sentence revised to “Set-checks consist of redriving the pile after certain period of time, typically within the same day.”

Action(s): Change made.

• 455-5.15.2.1- The test pile log is not part of the required submittal information for production lengths. Logs are supposed to be submitted within 24 hrs so I do not know if this should be doubled up. There is also a random date that probably should be omitted.

Response: The test pile logs are normally part of the dynamic load testing report required to be submitted.

Action(s): No change made.

• 455-5.15.2.1- There is a typo of dynamic testing date data. Date needs to be omitted from this.

Response: Good catch. Thanks.

Action(s): Change made.

• 455-7.1 Description o The second paragraph states when splices are desired for the convenience of the Contractor. A statement of “The Engineer will need to be notified of the change to predetermined mechanical splice utilization.” □ This is to ensure that the comments are made about the requirements of splices being located 4’ below the scour elevation. □ The complexities of driving a battered pile with a mechanical splice. □ Any other scenario in the review that may prove difficult for the use of mechanical splice.

Response: “Proposed splice locations and details of proprietary splices” must be noted and attached to the PIP. The PIP must be submitted at least 30 days before driving the first pile.

Action(s): No change made.

• 455-7.9 Pile Cut-offs: The take ownership being omitted leads to questions. Who owns pile cut-offs? With this change, should there be a pay item for disposal? (\$/ft)

Response: This is covered in other sections of the Standard Specifications.

Action(s): No change made.

• 455-10.1- “Additional information that may be required by the Engineer” should be added as a bullet for the PIP. Specification 455-10.2 references other information required by the Engineer to satisfy the contact documents and this verbiage being added backs that specification.

Response: This is sufficiently covered in 455-10.2.

Action(s): No change made.

• 455-11.9.2 Set Checks/ Production Piles: o How will the Engineer order the set-check the day of if the log/data is not submitted until 24 hrs after driving? o This will likely be information taken by CEI/ Verification and relayed to the DGO and take away QC’s ability to recommend based on data interpretation/ log information gathered.

Response: The Engineer will not normally be ordering set checks; the DTE will determine when set checks are needed.

Action(s): No change made.

• 455-11.17 Verification Test: o Based on the language included, will the need of a Verification Pay Item be required?

Response: Yes. The Verification Test pay item will need to be included in the plans with sufficient quantity for all bents/piers.

Action(s): No change made.

• 455-12.14- It states verification tests will be full payment for each instance. 455-11.17 states the test will be the number of piles tested and accepted. 455-12.14 needs to add when a pile has been determined acceptable by the Engineer.

Response: Disagree – 455-12 is basis of payment (what payment covers). The number to be paid is determined in 455-11 (Method of Measurement).

Action(s): No change made.

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Comments: (Industry 10-5-23)

455-10.1 Item 1. It would not be practical for the Dynamic Testing Engineer (DTE) to perform both dynamic load testing and pile driving inspection utilizing a pile inspection device required in the Spec 455-5.3.5 even though the DTE is also certified for a CTQP pile driving inspector. Also, the CTQP pile driving inspector has more roles than just recording blow counts during driving. For example, ensuring the piles are supported properly during transporting, making sure the pile has the proper amount of pick points while the contractor stands the piles, inspecting the piles for cracks/deformities before standing, ensuring predrill/preform depths are achieved per project plans, confirming template, ground, excavation elevations, etc.

Response: The specification makes logging the pile by a dedicated pile inspector optional when the DTO dynamically testing the same pile is a CTQP pile inspector. It will be up to the DTE to decide whether a CTQP pile inspector is keeping the pile record while the DTO is dynamically testing each pile. A CTQP pile inspector is always required for all pile operations other than pile driving.

Action(s): No change made.

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Comments: (Industry 10-5-23)

455 Specification Comments 455-5.9 - It is unclear how piles without minimum tip elevations will achieve enough penetration to ensure the lateral design requirements are met. Are all piles going to have minimum tip elevations in the future? In some areas with shallow cap rock the pile may achieve axial bearing with only a few feet of penetration.

Response: Including the minimum tip elevation in the Plans has been a requirement for several years.

Action(s): No change made.

455-5.10.4 – If preform holes are installed using a fixed lead system a template should not be required.

Response: The first sentence of 455-5.10.4 is revised to “Construct preformed pile holes by drilling, or driving and withdrawing a suitable punch or chisel guided by a template or using drilling equipment with fixed leads at the locations of the piles. ”

Action(s): Change made.

455-5.11.1 – Acceptance is based on minimum penetration which is no longer defined if proposed section of 5.9 is removed.

Response: Disagree – Pile penetration requirements are still defined in 455-5.9.

Action(s): No change made.

455-5.11.2 – It is not likely that an instrumented set check can be performed at the end of the day. Are contractors to have dynamic testing engineers on site full time? I guess this is trying to eliminate payment for the set check. Just does not make sense especially if the design requires a long term set check for capacity as allowed by the specs.

Response: Contractors requesting to set check a pile at a later time for their own convenience should be accommodated. If long term set checks are anticipated during design, a sufficient quantity should be included in the redrive pay item.

Action(s): No change made.

455-5.11.4 - Contract documents, which are generally prepared prior to construction, cannot establish appropriate set check time periods. Set check times should be at the discretion of the DTE.

Response: Agree – Redrives not required by the Engineer, may be performed at the DTE's discretion.

Action(s): No change made.

455-5.11.7 – If 5.9 penetrations are removed they should not be referenced in Item 1.

Response: Disagree – Pile penetration requirements are still defined in 455-5.9.

Action(s): No change made.

455-5.12.1 – It is clear that signal matching is required for external gauges then it should be equally as clear that Tran method calculations are required for embedded gauges. Many times, users of embedded gauges try to accept piles based on UF method, which is not an approved method. In addition, if top only embedded gauges are used Tran method to CASE method calculation are used. It needs to be clear, just as with CAPWAP analysis, that correlations are only reliable near the location where the correlation is made. This is a major loop hole in the Soils & Foundation Handbook that has led to unnecessary VT testing when embedded gauges are chosen.

Response: This is clear in the Soils and Foundations Handbook and the Structures Design Guidelines and the Pile Data Table Notes.

Action(s): No change made.

Also, the Engineer will no longer need sufficient time to mobilize back-up equipment if dynamic testing is now the responsibility of the Contractor.

Response: Agree – The second paragraph of 455-5.12.1 should be deleted.

Action(s): Change made.

455-5.12.7 – The addition of the submission of the driving criteria letter does not make any sense as written. Is the intent to allow the criteria to be used the same day?

Response: The criteria may be used the same day only for the rare situations described in 455-5.12.7.

Action(s): No change made.

455-7.1 – It is contradictory to require full length pile then allow splices for convenience; not to mention just bad practice. Reduced tension stresses at splice locations are very difficult to maintain under allowable limits.

Response: Splices for convenience must be mechanical splices, and mechanical splice tension stress limits must be maintained if this option is chosen.

Action(s): No change made.

455-10.1 – Item 6 needs to remain. It is important, in some instances, that the piles be driven inside to outside to get minimum tip. As this is often a plan note it needs to be resolved prior to the beginning of pile driving. Item 9 needs to remain. It is important to know where the sheet piles tips are relative to the pile tip elevations. Not only for potential relaxation but also to determine the effects of sheet pile removal on pile capacity.

Response: The requirement is in Form 700-020-01. Therefore, it is redundant to include it here.

Action(s): No change made.

455-11.5 – It is understood that internal gauges are completely sacrificial. However, it has been shown that external gauges are partially sacrificial. FDOT audits support the \$600.00 per day PDA usage due to the fact that gauges and associated cabling are often damaged and do not have an infinite life. Why does the spec. ensure that the EDC companies are fully reimbursed for their equipment, but external users are not?

Response: Reimbursement to the Contractor for the costs of casting internal gauges into the piles only occurs when the Plans specifically require their use.

Action(s): No change made.

455-11.17 – Why is there a payment for Verification Testing? VT is performed if the Contractor/GFDEOR/DTE is perceived to be neglectful of their duties. Maybe payment should only be made if a VT shows the foundation to be acceptable.

Response: VT is paid at the bid price for VT. The quantity to be paid will be the number of piles tested and accepted.

Action(s): No change made.

Finally, as stated by nearly all recognized experts associated with dynamic testing, in no case should a pile inspector be eliminated during dynamic testing. Both internal and external dynamic testing systems use capacity methods that are extremely sensitive to pile set. Contrary to marketing claims Tran method algorithms do not always provide the same capacity per blow. Capacity is dependent on pile set. Perhaps even more so that signal matching. And from an even more practical aspect even a highly skilled operator cannot watch wave traces to ensure pile integrity is good and ensure the pile set is marked appropriately in high set conditions.

Response: The specification makes logging the pile by a dedicated pile inspector optional when the DTO dynamically testing the same pile is a CTQP pile inspector. It will be up to the DTE to decide whether a CTQP pile inspector is keeping the pile record while the DTO is dynamically testing each pile. A CTQP pile inspector is always required for all pile operations other than pile driving.

Action(s): No change made.

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Comments: (Industry 10-5-23)

Comments on the proposed revisions to FDOT specifications 455 - (3 pages of comments) By: Mohamad Hussein, P.E. – GRL Engineers, Inc. – MHussein@grlengineers.com

455-5.9 The requirement for pile minimum penetration (i.e., 10 feet into firm or 20 feet into soft material, etc.) has been removed from this section, but reference to it remains throughout the document (e.g., sections 5.11.1, 5.11.7, etc.).

Response: Disagree – Pile penetration requirements are still defined in 455-5.9.

Action(s): No change made.

455-5.11.1 Add “minimum” to the 6 inches, which will then read: “... minimum 6 inches of consecutive driving.”

Response: The word “minimum” is before “required bearing for 6 inches...”. Moving “minimum” to before 6 to read “... and the required bearing for minimum 6 inches ...” may be clearer.

Action(s): Change made.

455-5.11.2 Change “ ...set-check at the end of the day.” to “set-check on the following business day.” Logistically it works better since piles may be driven all the way to the end of day and may need to be setchecked. Technically, gaining the overnight (or longer by default) waiting period is advantageous to assess the time-dependent effects.

Response: The actual time frames for each project should be determined during the test pile program. Hopefully, operations can be adjusted to perform a set check at the end of the day. If the contractor (or DTE on their behalf) requests to perform the set check at a later date, the request should be accommodated. Deviations for contractor convenience should not change the set check to a redrive.

Action(s): No change made.

455-5.11.4.1 The contract documents may contain provisions for performing setchecks, but including specific waiting periods for it may be detrimental, or even impossible to quantify.

Response: When possible, specific waiting periods may be included in the Plans to address issues that can be foreseen. The actual time frames for each project may need to be adjusted based on the test pile program with the Engineer’s concurrence. When multiday waiting periods are expected, a sufficient quantity of redrives should be included in the bid quantities.

Action(s): No change made.

455-5.11.5 Requirements of monitoring pile movement are vague, and monitoring ground surface under water is impossible.

Response: Normal protocols for site survey measurements are sufficient.

Action(s): No change made.

455-5.11.7 The sentence “If the Contractor so desires, it may consider soil set-up.” is not clear. Suggested alternate: “If the contractor requests and the Engineer concurs, set up may be considered to achieve NBR”. Also, the intent that piles can be accepted without setcheck (“ ... without set checks on all piles”) is wrong since piles may not meet blow count criteria or achieve NBR during driving could be due to pile damage and not necessarily only due to soil resistance effects.

Response: The sentence “If the Contractor so desires, it may consider soil set-up.” has been deleted.

Action(s): Change made.

Table 455-1 Rewrite “EDC1, or PDA/GPC2” as “EDC1. 2, PDA2, or GPC2” for the following reasons. PDA/GPC to PDA, or GPC because the two systems are separate from each other and should not be lumped together. The “2” should be added as a superscript to the EDC because signal matching should be required if pile top only instrumentation is used.

Response: “EDC<sup>1</sup>, or PDA/GPC<sup>2</sup>” has been revised to “EDC<sup>1</sup>, PDA<sup>2</sup> or GPC<sup>2</sup>”

Action(s): Change made.

455-5.12.1 Since the methodology is spelled out for the externally mounted instruments, it should also be similarly done for the embedded gages, change the first sentence to read “Dynamic load tests using an externally mounted instrument system and signal matching analyses, or embedded gauges with signal matching if pile top gauges only are used or the Tran Method if pile top and bottom embedded gauges are used will be used to determine pile capacity ...”. Also, the last sentence needs changes to read “allow the DTE sufficient time to mobilize externally mounted instruments system for performing dynamic load testing ...”.

Response: The methods permitted by the Department are documented in Appendix F in the Soils and Foundations Handbook.

Action(s): No change made.

455-5.12.7 The sentence “... except that the letter may be submitted as soon as the driving criteria is determined if piles are driven the same day.” is unclear as to what it intends to communicate.

Response: The driving criteria may be used the same day only for the rare situations described in 455-5.12.7.

Action(s): No change made.

455-5.14 Change Engineer to DTE in the first sentence. Add an item to the 9 items list “Pile Integrity”.

Response: Agree

Action(s): Change made.

455-5.15.2.1 Change “(Windows 10 compatible)” to (Windows 10, or higher compatible).

Response: At this time FDOT computers are running Windows 10. Data needs to be compatible with our computers. Computers running higher versions of Windows should be able to read and produce data compatible with Windows 10.

Action(s): No change made.

455-5.19 Remove “and that the inspection of the pile installation was performed under the supervision of the DTE” since the inspector may not be employed by the DTE, and thus the DTE cannot professionally certify the inspector’s work. As an alternative, it may be changed to “and that the pile driving was generally under the supervision of the DTE”.

Response: Disagree – it has been determined the DTE can professionally supervise and certify the pile inspector’s work without the inspector being their employee. The DTE should carefully consider the ramifications of such a relationship in their contract with the Contractor.

Action(s): No change made.

455-7.1 The second paragraph contradicts the first paragraph in that it allows splicing for convenience while the first paragraph states “... provide piles full length without splices.”

Response: Splices for convenience must be mechanical splices, and mechanical splice tension stress limits must be maintained if this option is chosen.

Action(s): No change made.

455-10.1.1 The last sentence should be changed to “ ... then an additional pile driving inspector is not required when setchecking piles.” The DTE is busy enough performing the all important task of testing and real-time assessment and should not be tasked (under pressure) with the additional work during pile driving, but it can possibly be done for setcheck if needed.

Response: The specification makes logging the pile by a dedicated pile inspector optional when the DTO dynamically testing the same pile is a CTQP pile inspector. It will be up to the DTE to decide whether a CTQP pile inspector is keeping the pile record while the DTO is dynamically testing each pile. A CTQP pile inspector is always required for all pile operations other than pile driving.

Action(s): No change made.

455-10.1 Change “A letter from the DTE certifying concurrence with the PIP.” to “A letter from the DTE certifying concurrence with the hammer driving system aspect of the PIP.” since the DTE is not involved with the other portions of the PIP having to do with the contractor’s crane size, means and methods, etc.

Response: The DTEs need to review the PIPs for fatal flaws and clear Specification violations. They need to be aware of all aspects of the PIPs since they are supervising the pile inspectors.

Action(s): No change made.

455-11.5 Remove the newly added “and type of” since payment should be made based on the number of dynamic load tests and not the type of dynamic test.

Response: Disagree – the type of dynamic test may be specified in the Plans when warranted by the soil conditions.

Action(s): No change made.

455-12.5.3 Payment for dynamic testing is already covered under 455-12.5.1, the newly added 455-12.5.3 section should be removed since implies preferential bias specific to internal gauges; payment should be made similarly to any other system of gauges.

Response: Disagree – Reimbursement to the Contractor for the costs of casting internal gauges into the piles only occurs when the Plans specifically require their use. This reimbursement does not include the cost of dynamic testing.

Action(s): No change made.

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Comments: (Industry 10-4-23)

section 455-10 PIP is dramatically changed, allowing the DTE to serve as both pile inspector if CTQP certified as allowed in the second sentence of subsection 455-10.1.1 is a problem in my opinion for two reasons, first during the pile driving the level of activity is such that the presence of an inspector and DTE technician prevents errors in the recording of the data, and the operations to monitor the PDA equipment and enter data in the pile driving record system cannot be reliably and repeatably done by a single person, it is just too much. second, the collaboration, check and balance of having at least two persons monitoring the driving helps keep the data in the two systems consistent and comparable with each other. Finally, if the DTE technician is allowed to fill both positions, will the contractor be paid for both positions? i would not think that is the intent, but it could be easily interpreted that way. this section also removes the vast majority of what a pile installation plan currently is, are there changes elsewhere in the specifications that would require the submittal of all of the deleted information, i would really like to understand the reasoning behind this degree of change.

Response: The specification makes logging the pile by a dedicated pile inspector optional when the DTO dynamically testing the same pile is a CTQP pile inspector. It will be up to the DTE to decide whether a



CTQP pile inspector is keeping the pile record while the DTO is dynamically testing each pile. A CTQP pile inspector is always required for all pile operations other than pile driving.

Action(s): No change made.

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Comments: (Industry 10-4-23)

Section 455-3 edit below: In the event a pile is broken or otherwise damaged by the Contractor to the extent that the damage is irreparable due to mishandling or incorrect installation, in the opinion of the Engineer, the Contractor shall extract and replace the pile at no additional expense to the Department. In the event that a pile is mislocated by the Contractor, the Contractor shall extract and replace the pile, at no expense to the Department, except when a design change proposed by the Contractor is approved by the Department as provided in 455-5.16.5. In the event a pile is broken or otherwise damaged by no fault of the Contractor, the pile extraction and replacement will be paid for as Unforeseeable Work.

Response: Agree

Action(s): Change made.

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Juan  
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Comments: (Industry 10-4-23)

Article 455-7.7.2 Modify last paragraph first sentence as follows: "When dowel splices need to be driven, perform dynamic instrumentation during the driving of each dowel spliced pile to monitor and control the stresses and verify the splicing integrity." (use "perform" in lieu of "assist the Engineer in performing").

Response: The sentence will be revised to "When dowel splices need to be driven, perform a dynamic load test during the driving of each dowel spliced pile to monitor and control the stresses and verify the splicing integrity."

Action(s): Change made.

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Juan Castellanos  
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Comments: (Industry 10-4-23)

Sub-article 455-5.11.2. Last sentence of last paragraph: remove "at the end of the day".

Response: Agree

Action(s): Change made.

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Comments: (Industry 10-4-23)

Sub-article 455-5.9: Because the minimum tip elevations are going to be shown in the plans, we do not need the second sentence: "When the Contract Documents show a minimum pile tip elevation, drive the tip of the pile to this minimum elevation". Please delete it.

Response: Agree

Action(s): Change made.

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George Walter Tedder III  
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Comments: (Industry 10-3-23)

The pile driving inspector is needed on site, observing pile installation during setting/jetting/preforming/predrilling operations, and recording data during pile driving operations. Ideally this inspector should be independent of the contractor and the dynamic testing Engineer. The inspector should not be under the supervision of the Dynamic Testing Engineer although not excluded from working for the same consultant firm (Geotech design, CEI, Specialty Testing, etc.) The Dynamic Testing Engineer should not be the one keeping the pile driving log at the same time operating the dynamic testing equipment. The pile driving inspector should be responsible logging all pile driving data and events.

Response: The specification makes logging the pile by a dedicated pile inspector optional when the DTO dynamically testing the same pile is a CTQP pile inspector. It will be up to the DTE to decide whether a CTQP pile inspector is keeping the pile record while the DTO is dynamically testing each pile. A CTQP pile inspector is always required for all pile operations other than pile driving.

Action(s): No change made.

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Comments: (Industry 9-28-23)

I notice that language defining firm and soft material is planned to be deleted in section 455-5.9 however, section 455-5.11.1 mentions "firm material" without a specific definition as to what that requires (30 tons/sq in?).

Response: 455-5.11.1 references "firm material" in a sentence addressing practical refusal. Practical refusal is defined in 455-5.11.3.

Action(s): No change made.