SP4550000DB STRUCTURES FOUNDATIONS (DESIGN BUILD)
COMMENTS FROM INTERNAL/INDUSTRY REVIEW

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Comments: (6/1/20, Internal)
Changes for Section E … they are highlighted rather than using the tracking feature.
General Response regarding the Auger Cast Pile specification: Auger cast piles for bridge foundations are still not addressed in Section 455 Part E. (Standard and DB 455). Auger cast piles will only be accepted for bridge foundations with the approval of Central Office Structures Design and using the Developmental Specification DEV455ACP. For the DB projects ACP may be accepted using DEV455ACP. The current language in Section 455 addresses noise wall and miscellaneous structure foundations, and the proposed changes were included to make it consistent with parts of the Developmental specs that would apply to non-bridge structures. Some of the changes suggested by Keller appear to be for bridge foundations in the I-395 project, as they resemble what the DB team was able to get acceptance from the Department for that particular project, which is not the intent of this revision.

E. STRUCTURES (OTHER THAN BRIDGE)
FOUNDATIONS-AUGER CAST PILES

455-38 Description.

→ Furnish and install auger cast piles (ACP) or augered cast-in-place (ACIP) piles used for structural support, other than bridge foundations.

→ ACP piles are defined as a foundation made by rotating a hollow-stem auger into the ground to the required pile depth with sufficient crowd ~~(downward thrust)~~ to prevent mining of the soil. A fluid cement grout is injected through the auger shaft under continuous positive pressure as the auger is being withdrawn. A reinforcing steel cage, as specified, is inserted into the column of fluid grout following the completion of grout placement.

Juan Castellanos' Response: No changes made. We consider necessary to keep this additional explanation of what crowd means.

455-41 Grout Mix Proportions.

→ Use a grout mix consisting of a mixture of cementitious materials, admixtures, sand and water. Proportion and mix to produce a grout capable of maintaining the solids in suspension without appreciable bleed water which may be pumped without difficulty and ~~will~~ fill open voids in the adjacent soils and rock. The grout mix may include a fluidifier used in accordance with the manufacturer's technical representative. Proportion these materials to produce a hardened grout of the required strength.

Juan Castellanos' Response: Agreed. Change made.

455-42 Mixing and Pumping Cement Grout.

→ Meet the following requirements:

→ → 1. Only use pumping equipment accepted by the Engineer in the preparation and handling of the grout. Before using the mixers, remove all oil or other rust inhibitors from the mixing drums, stirring mechanisms, and other portions of the equipment in contact with the grout.

→ → 2. Use a quantity of water and mixing time that will produce a homogenous grout having an efflux of not less than ~~21~~15 seconds, when tested with a flow cone in accordance with ASTM D6449 and a ¾ inch orifice. Reject loads with efflux of less than 15 ~~21~~ seconds. Notify the production facility to adjust the mix design. Calibrate the flow cone in accordance with ASTM D6449 and a ¾ inch orifice. Conduct the calibration initially before its first use and as directed by the Engineer, when there is a question of the flow cone's accuracy.

Juan Castellanos' Response. No Changes made. The State Materials Office (SMO) insists that we should not reduce the 21 secs value. Also, there is no need to specify the ¾" because this is what ASTM D6449 specifies.

→ → 7. Accurately monitor the volume and pressure of the grout flow. Test and calibrate the equipment during construction of the demonstration pile to demonstrate flow volume measurement accuracy of plus or minus 3% over the range of grouting pressures anticipated during this work **(What does this mean?)** Provide a pump stroke counter in good working condition on the grout pump. Perform a calibration test of the pumping equipment, prior

Juan Castellanos' Response: Agreed that this is confusing and will remove the highlighted language. Change made.

455-43 Testing Cement Grout.

→ Prepare three 4 inches x 8 inches cylinders for each LOT in accordance with ASTM C31, except pour grout in a single lift into cylinders molds without rodding. Plastic properties in accordance with ASTM C31 are not required. A LOT is defined as the lesser of 50 cubic yards of cement grout placed or one day of pile placement. Prepare three ~~two~~ additional QC "hold" cylinders on the LOT selected by the Engineer for Verification. Provide curing facilities for all QC and Verification test cylinders in accordance with ASTM C31. Test the cylinders at 28 days or 56 days (if higher than a 7000 psi mix), in accordance with ASTM C39.

→ When one of the three QC cylinders from a LOT is lost, missing, damaged or destroyed, use one of the "hold" for determination of compressive strength ~~will be made by averaging the remaining two cylinders~~. If more ~~than one~~ QC cylinder than the ones on "hold" from a LOT is lost, missing, damaged or destroyed, provide proof of strength via load test, if not possible to test then core the structure at no additional expense to the Department to determine the compressive strength. Acceptance of LOT may be based on verification data at the discretion of the Engineer. Obtain the approval of the Engineer to core, and of the core location prior to coring. Repair core holes after samples are taken with a product meeting the approval of the Engineer, at no additional cost to the Department.

Juan Castellanos' Response: First paragraph proposed change. Agreed. SMO is OK with the additional QC hold. First paragraph, second proposed change, disagree. First, 28 days is the current practice for concrete and ACP. Second, for non-bridge foundations we don't go that high in strength.

Second paragraph, no changes made. The suggested revisions will conflict with current practice for ACP for non-bridge foundations and article 346-9.4.

For each QC cylinder that is lost, missing, damaged or destroyed, payment for that LOT will be reduced by $750.00 per 1,000 psi of the specified design strength [Example: For f'_{cc}=5,500 psi, and the loss of two auger cast pile grout QC cylinders that have no verification data will require the element to be cored and a pay reduction will be assessed (5,500 psi / 1,000 psi) x $750 x 2 = $8,250]. This reduction will be in addition to any pay adjustment for low strength.

The Engineer will cast three verification cylinders and ~~two~~ three "hold" cylinders from one of every four consecutive Lots, randomly selected. The Engineer will compare QC and Verification results in accordance with Section 346. If the results do not compare, the Engineer will initiate a Resolution Investigation in accordance with Section 346

Juan Castellanos' Response: Agreed. SMO is OK with the additional QC hold.

→ The·Engineer·will·compute·the·volume·of·grout·for·which·the·reduction·will·be·applied·as·115%·of·the·theoretical·volume·of·the·auger·cast·pile·diameter·required·in·the·Contract·Documents.·Reduction·in·pay·will·be·applied·to·the·entire·length·of·all·piles·containing·low·strength·cement·grout,·in·any·quantity.·The·quantity·of·cement·grout·affected·by·the·payment·reduction·may·exceed·the·quantity·of·cement·grout·contained·in·the·LOT.¶

→ When·a·cement·grout·acceptance·strength·test·falls·more·than·500ºpsi·below·the·specified·minimum·strength,·perform·one·of·the·following:¶

→ → 1.·Remove·or·~~and~~·replace·the·piles·affected·fully·or·partially·by·the·low·strength·LOT·at·no·additional·cost·to·the·Department,·or¶

→ → 2.·Submit·a·structural·analysis·performed·by·the·Contractor's·Engineer·of·Record.·If·the·results·of·the·analysis,·approved·by·the·Department,·indicate·adequate·strength·to·serve·the·intended·purpose·with·adequate·durability,·the·concrete·may·remain·in·place.¶

→ Otherwise,·abandon·and·install·additional·piles·to·the·foundation,·or·remove·or·~~and~~·replace·the·piles·affected·fully·or·partially·by·the·low·strength·LOT·of·grout·at·no·additional·cost·to·the·Department.·When·installing·additional·piles·to·resolve·the·strength·deficiency,·submit·a·foundation·redesign·to·add·piles·into·pile·caps·or·footings,·at·no·expense·to·the·Department·in·accordance·with·455-46.¶

Juan Castellanos' Response: No change made. In scenario 1, you cannot have pile removal without replacement. In the last paragraph, either you abandon the piles and install additional piles, or, you remove the pile and replace it. In the latter scenario you cannot have pile removal without replacing it.

455-44 Pile Installation.

→ Meet the following requirements:

→ → 1. Locate the piles as shown on the drawings.

→ → 2. Should soft, compressible muck, organics, clay or other unsuitable materials (non A-1, A-3, A-2-4 or limestone materials) be encountered, remove the unsuitable material to a maximum depth of 5 feet and a radial distance around the pile centerline of two pile diameters unless otherwise indicated in the Plans. Backfill with clean granular backfill materials (A-1, A-3, A-2-4), placed and compacted in maximum 12 inch lifts to at least 95% of maximum dry density as determined by FM 1-T180. Complete this work to the Engineer's satisfaction prior to ACP construction. Should more than 5 feet depth or excessive quantities of unsuitable material be encountered, submit a revised design to the Engineer for review and acceptance prior to proceeding with pile construction.

→ → 3. Provide continuous auger flighting from the bottom of the pile ~~auger head~~ to the top of ground at the time of drilling ~~auger~~ with no gaps (beside connections) or other breaks. Ensure the auger flights are uniform in diameter throughout its length, and of the diameter specified for the piles less a maximum of 3%. Provide augers with a distance between flights of approximately half the diameter of the auger.

→ → 4. Use augers with the grout injection hole located near the ~~at~~ the bottom of the auger head, on a side of the stem opposite to its rotation, ~~below the bar containing the cutting teeth~~, and with pile auger leads containing a bottom guide.

→ → 5. Construct piles of the length and diameter shown on the Plans.

→ → 6. Clearly mark the auger leads to facilitate monitoring of the incremental drilling and grout placement. Provide individual foot marks with 5 foot increments highlighted and clearly visible. Provide a clear reference mark on the moving auger assembly to facilitate accurately monitoring the vertical movement of the auger.

→ → 7. Place piles by rotating a continuous flight hollow shaft auger into the ground at a continuous rate that minimize ~~prevents~~ removal of excess soil. Stop advancement after reaching the predetermined depth.

Juan Castellanos' Response: Item 3, Change made as "…. with no gaps or other breaks except for connections.

Item 4: Language change made based on DFI specification. "…at the bottom of the auger tip below the cutting teeth, and with pile auger lead…"".

Item 7: No change made. Our target should be preventing.

→ → 8. Should auger penetration to the required depth prove difficult due to hard materials/refusal, the pile location may be predrilled, upon concurrence by the GFDEOR and acceptance of the Engineer, through the obstruction using appropriate drilling equipment, to a diameter no larger than 1/2" the prescribed finish diameter of the ACP. Commence ACP construction immediately upon completion of predrilling to minimize ground loss and soil relaxation.¶

→ → 9. Plug the discharge hole in the bottom of the auger prior to advancing into the ground.¶

→ → 10. Pump the grout with sufficient pressure as the auger is withdrawn to completely fill the auger hole, preventing hole collapse and to cause the lateral penetration of the grout into soft or porous zones of the surrounding soil or rock. Prior to commencing withdrawal of the auger, establish a head ~~of at least 5' feet~~ of grout by pumping a volume of grout as required to prevent "necking" ~~equivalent to 5' feet of pile volume~~. Do not include the volume or strokes required to prime the grout pumping system in the volume required to build this initial head.. Maintain this head ~~of at least 5' feet~~ of grout above the injection point around the perimeter of the auger to displace and remove any loose material from the hole. Maintain positive rotation of the auger at least until placement of the grout.¶

Juan Castellanos' Response: Item 9, Change made as "Plug the injection hole at the bottom…". Item 10: No change made. A head of 5 ft is what we require for non-bridge ACP.

→ → → Use this method of placement at all times. Do not depend on the stability of the hole without the earth filled auger. ~~Place the required steel reinforcement while the grout is still fluid, but no later than 1/2 hour after pulling of the auger.~~¶

→ → 12. Assume responsibility for the grout volume placed. If less than 115% of the theoretical volume of grout is placed in any 5' foot increment (1005% in the top 5' foot increment), redrill 10 foot below that section, or to the tip, whichever is less, and resume pumping ~~install the pile by advancing the auger 10' feet or to the bottom of the pile if that is less~~, followed by controlled removal and grout injection.¶

→ → 13. Furnish and install the reinforcing steel and anchoring bolts as shown in the Contract Documents. Use wheels or other approved noncorrosive spacing devices within 3' feet of the bottom, within 3' feet of the top, and intervals not exceeding 10' feet along the pile to ensure concentric spacing for the entire length of the cage. Do not use block or wire type spacers. Use a minimum of one spacer per 30" inches of circumference or perimeter of cage with a minimum of four ~~three~~ at each level.¶

→ → 14. Use reinforcement that is without kinks or nonspecified bends, free of mud, oil or other coatings that could adversely affect the bond. Make splices in reinforcement as shown on the Contract Documents, unless otherwise accepted by the Engineer. Place the

required steel reinforcement while the grout is still fluid, and immediately after finishing grouting and clearing it from any contaminating material. Install the steel cage into the grout by its own weight or manually. Do not use a mechanical equipment or tool to impact the steel cage or to force it into the grout. If the steel cage cannot be placed completely following this procedure, remove the cage, redrill and regrout the pile.¶

→ → 15. Leave any temporary supports of/for items placed into a grouted pile (reinforcement template, anchor bolt template, precast column supports, etc.) in place for a minimum of 12" hours after completion of the pile. Do not place wall panels or other significant loads, before the grout has set a minimum of seven days or reached the 28" day strength.¶

Juan Castellanos' Response: Item 12. Agreed. Change made.
Item 13: No change made. Three spacers minimum should be enough.
Item 14.: Agreed. Change made.

- **455-45 Construction Tolerances.¶**

  → Locate piles as shown on the Plans. Locate pile centers to an accuracy of plus or minus 3 inches, for piles smaller than 24 inch diameter, and 4 inches for piles larger than 24 inches. Ensure that the top of pile elevation is within plus or minus 3 inches of the Plan elevation. Ensure the tolerances of 534-5.1 can be met.¶

Juan Castellanos' Responses: No change made. We do not use piles smaller than 24" and 3" is the maximum horizontal tolerance we use for all foundations.

- **455-46 Unacceptable Piles.¶**

  → Repair or replace unacceptable piles and/or modify the design to compensate for the deficiency at no cost to the Department. Unacceptable piles are defined as piles that fail for any reason, including but not limited to the following: piles placed out of position that the structure cannot accommodate or to improper elevation; piles with reduced cross section (not accepted by the Engineer), contaminated grout, lack of grout consolidation (honeycombed), or deficient grout strength; and piles with reinforcement, anchor devices or other components cast or placed into the fluid grout out of position. When the Engineer determines that a pile is unacceptable, the Contractor may propose a foundation redesign to add piles to the foundation, at no expense to the Department. The Contractor's Engineer of Record must perform any redesign, and sign and seal the redesign drawings and calculations. Do not begin any proposed construction until the redesign has been reviewed and approved by the Engineer.¶

Juan Castellanos' Response: No changes made. This language is being there for many years without any issues. The proposed changes may cause pressures on Department personnel into accepting something that we do not feel comfortable.

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Larry Jones
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Comments: (6/1/20, Internal)
Juan,
I think some of the requested revisions should be considered. And one, 455-42 (7.), appears to be asking for an explanation of existing language.

I would like to consider the proposed (highlighted) language in 455-41, 455-42 (2.) (with SMOG concurrence), 455-43 [ONLY "Prepare three two additional QC "hold" cylinders on the LOT selected by the Engineer for Verification."] and 455-44. I suggest an explanation of 455-42 (7.) be offered and rephrasing considered.

I agree with the intent of your comments regarding the remainder. I suggest the response regarding those could be edited as follows:

Auger cast piles for bridge foundations are still not addressed in Section 455 Part E. (Standard and DB 455). Auger cast piles will only be accepted for bridge foundations with the approval of Central Office Structures Design and using the Developmental Specification DEV455ACP. For

the DB projects ACP may be accepted using DEV455ACP with modifications approved by the Department. The current language in Section 455 addresses noise wall and miscellaneous structure foundations, and the proposed changes were included to make it consistent with parts of the Developmental specs that would apply to non-bridge structures. Some of the changes suggested by Keller appear to be for bridge foundations, as the resemble what the DB team was able to get acceptance from the Department for that particular project, which is not the intent of this revision.

At this point we will consider changes that are only applicable to noise wall foundations.
Juan Castellanos' Response: Comments were considered and several of the proposed changes were accepted as indicated above.

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Comments: (5/27/20, Internal)
Please add comma after the word "driving" – highlighted below.

B. PILING
455-3 General.
Furnish and install concrete, steel, or wood piling including driving, jetting, preformed pile holes, cutting off, splicing, dynamic load testing, and static load testing of piling. Prior to driving, clearly mark the piles to facilitate inspection. Provide individual straight-line marks at 1-ft intervals numbered at least every 5 ft. Use markers or lumber crayons that can be easily observed by the inspector. Ensure marks are spaced uniformly and perpendicular to the face of the pile. Provide inch marks as needed when set checks or practical refusal checks are required.
Juan Castellanos' Response: Agreed, change made.

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Scott Arnold
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Comments: (6/1/20, Internal)
Rebecca,

Please replace the file I sent you on 27 MAY with this one. There is a another revision in 455-5.19 and the one I proposed in 455-10.1. Thanks.

Scott C. Arnold, P.E.
State Construction Engineer
Florida Department of Transportation
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455-5.19 Foundation Certification Packages: Submit certification packages of pile foundations to the Engineer prior to Pile Verification Testing. A separate Foundation Certification Package must be submitted for each foundation unit. A foundation unit is defined as all the piles within one bent or pier for a specific bridge for each phase of construction. Each Foundation Certification Package shall contain an original certification letter signed and sealed by the GFDEOR certifying the piles have the required axial capacity including compression and uplift, lateral stability, pile integrity, settlements will not affect the functionality of the structure, and that the inspection of the pile installation was performed under the supervision of the GFDEOR. The package shall also include all pile driving logs, EDC records, all

supplemental dynamic testing raw data and analyses for the foundation unit, and the signed and sealed evaluation performed to address out of tolerance piles in accordance with 455-5.16.5. The certification shall not be contingent on any future testing or approval by Engineer.

For foundation units where all piles are monitored using embedded data collectors, the foundation certification package may be prepared by the DTE, and the DTE may sign and seal revisions to the foundation layout and pile data table if the DTE is prequalified under the appropriate category in Florida Administrative Code (F.A.C.) 14-75.

Response: Files were replaced.

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Larry Jones
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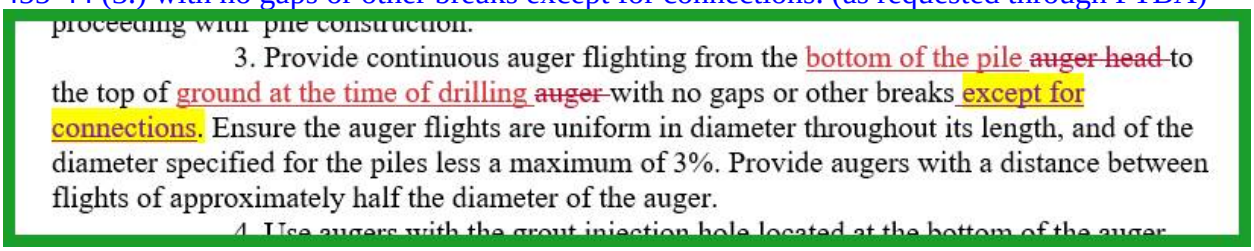
Comments: (6/4/20, Internal)

Two Suggestions:

455-44 (3.) with no gaps or other breaks except for connections. (as requested through FTBA)

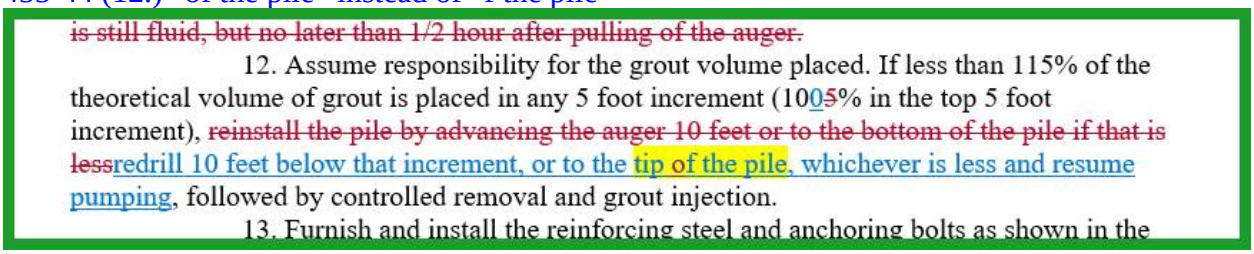


proceeding with pile construction.

3. Provide continuous auger flighting from the bottom of the pile ~~auger head~~ to the top of ground at the time of drilling ~~auger~~ with no gaps or other breaks except for connections. Ensure the auger flights are uniform in diameter throughout its length, and of the diameter specified for the piles less a maximum of 3%. Provide augers with a distance between flights of approximately half the diameter of the auger.

4. Use augers with the grout injection hole located at the bottom of the auger

455-44 (12.) “of the pile” instead of “f the pile”



~~is still fluid, but no later than 1/2 hour after pulling of the auger.~~

12. Assume responsibility for the grout volume placed. If less than 115% of the theoretical volume of grout is placed in any 5 foot increment (100~~5~~% in the top 5 foot increment), ~~reinstall the pile by advancing the auger 10 feet or to the bottom of the pile if that is less~~redrill 10 feet below that increment, or to the tip of the pile, whichever is less and resume pumping, followed by controlled removal and grout injection.

13. Furnish and install the reinforcing steel and anchoring bolts as shown in the

Juan Castellanos’ Response: Agreed. Changes made.

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Teresa Puckett
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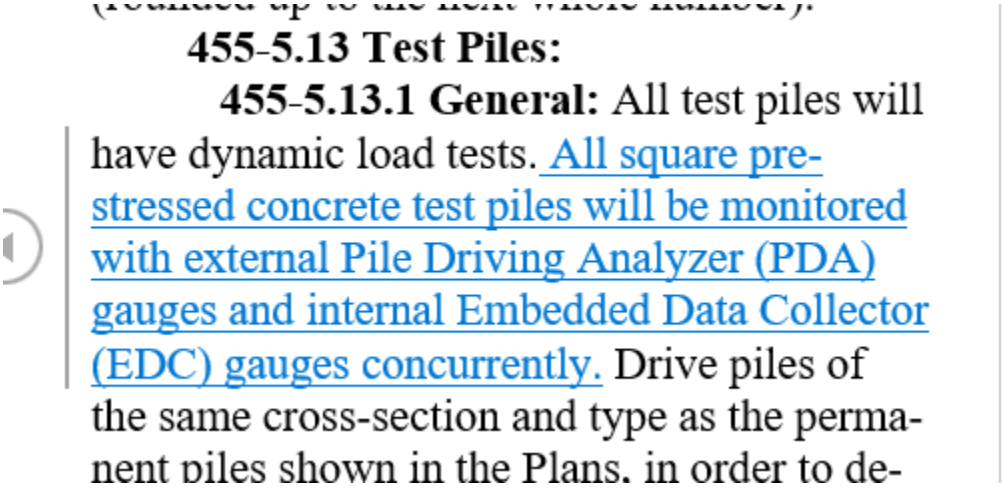
Comments: (6/5/20, Internal)

Daniel, what is the value in this requirement? Should it not be an option? Certainly not all conditions warrant or get value from this but just adds costs.



455-5.13 Test Piles:

455-5.13.1 General: All test piles will have dynamic load tests. All square pre-stressed concrete test piles will be monitored with external Pile Driving Analyzer (PDA) gauges and internal Embedded Data Collector (EDC) gauges concurrently. Drive piles of the same cross-section and type as the perma-nent piles shown in the Plans, in order to de-

Thank you, Terry

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Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.
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Scott Arnold
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Comments: (6/5/20, Internal)
Rebecca,

I have a minor change to the revision in 455-5.19. Thanks.

Scott C. Arnold, P.E.
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455-5.19 Foundation Certification Packages: Submit certification packages of pile foundations to the Engineer prior to Pile Verification Testing. A separate Foundation Certification Package must be submitted for each foundation unit. A foundation unit is defined as all the piles within one bent or pier for a specific bridge for each phase of construction. Each Foundation Certification Package shall contain an original certification letter signed and sealed by the GFDEOR certifying the piles have the required axial capacity including compression and uplift, lateral stability, pile integrity, settlements will not affect the functionality of the structure, and that the inspection of the pile installation was performed under the supervision of the GFDEOR. The package shall also include all pile driving logs, EDC records, all supplemental dynamic testing raw data and analyses for the foundation unit, and the signed and sealed

evaluation performed to address out of tolerance piles in accordance with 455-5.16.5. The certification shall not be contingent on any future testing or approval by Engineer.

For foundation units where all piles are ~~monitored using embedded data collectors~~dynamically load tested, the foundation certification package may be prepared by the DTE, and the DTE may sign and seal revisions to the foundation layout and pile data table if the DTE is prequalified under the appropriate category in Florida Administrative Code (F.A.C.) 14-75.

Response:

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Juan Castellanos
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Comments: (6/8/20, Internal)

I have the following comments:

1. **455-5.13.1 General:** All test piles will have dynamic load tests. All square prestressed concrete test piles will be monitored with external Pile Driving Analyzer (PDA) gauges and internal Embedded Data Collector (EDC) gauges concurrently.

The Department has gone through many costly efforts for the sake of the EDC system. Has the Department evaluated how much money has been spent since the early 2000s, through efforts including but not limited to research, pilot projects, mandated projects, Mandatory Design Memos and spec revisions? We already had similar mandates about 10-12 years ago that involved mandated 100% EDC projects and mandated test piles in all projects with EDC, which captured huge projects that lasted 4 years or more. Projects such as the I-595 and Palmetto sections 2 and 5 ended up with this requirement which required hundreds of test piles that must have cost the Department millions already. The cost incurred is not just the cost of gauges but also the cost of hiring a particular firm to perform the monitoring, which until today, only one firm is qualified to offer. When we issue this type of mandates, the manufacturer which is also the firm supplying the monitoring equipment and currently the only consultant available for monitoring, will not have any incentive to perform these services at an economical cost. On the other hand, Smart Structures has been able to market and get some projects with EDC without the need to be mandated, which shows they don't need this type of help to get projects.

The memorandum introducing the changes indicates that this change was requested by FTBA to determine whether dual monitoring of test piles add value to the Department. We have many thousands of piles already done with dual monitoring to determine whether dual monitoring add value to the Department. For example, the Department authorized and spent $1.5 million on the Tamiami Trail project in Miami Dade to instrument EDC gauges on about 560 piles. The dual instrumentation information is available for evaluation. And there are several other mandated projects throughout the state, from the last 3 years or so which should have the data available for evaluation.

This mandate causes not only excess costs on Florida taxpayers money but also on Federal (FHWA) money. If the Department feels obligated to mandate some projects, at least, limit only to projects with State funds only.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

455-5.13.1 Dynamic Load Tests (third paragraph):

For all square prestressed concrete piles, install internal EDC gauges in the piles in accordance with Standard Plans, Index 455-003 and attach external PDA instruments (strain transducers to measure force and accelerometers to measure acceleration) with bolts to the pile for dynamic testing. For other types of piles, attach external PDA instruments (strain transducers to measure force and accelerometers to measure acceleration) with bolts to the pile for dynamic testing.

Same comments as above.

Larry Jones' Response: This proposed revision has been withdrawn.

455-5.19 Foundation Certification Packages:

For foundation units where all piles are monitored using embedded data collectors, the foundation certification package may be prepared by the DTE, and the DTE may sign and seal revisions to the foundation layout and pile data table if the DTE is prequalified under the appropriate category in Florida Administrative Code (F.A.C.) 14-75.

Can an Engineer who is not the EOR make changes to the Plans and design?

Scott Arnold's Response: The DTE will be allowed to sign and seal revisions to the foundation layout and pile data table reflecting as-built conditions, e.g., where piles are driven out of position resulting in one or more piles in the group having more load on them than was anticipated in the original design if the DTE is prequalified in the appropriate category. Currently the Contractor's EOR or a Specialty Engineer are allowed to do this if they are prequalified in the appropriate category.

Why this language would apply only to foundation units monitored using EDC? This change gives the impression that the intent is to benefit one particular firm over the others.

Scott Arnold's Response: Agree. This revision is being changed to "For foundation units where all piles are ~~monitored using embedded data collectors~~ *dynamically load tested*, the foundation certification package….". This change was based on a comment from and discussion with the State Structures Design Office.

2. **455-10.1 General,** item14 on the PIP list of requirements: The names of the CTQP qualified inspectors assigned to inspect the pile installation. If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded data collectors.

In the past, District Geotechs statewide have expressed concerns on relaxing the inspector requirement when the pile is monitored. We may be getting a cost saving (inspector), but at the expense of lower inspection quality. If the reasoning is that when piles are being monitored, having an inspector is no critical, then why only when using EDC? Why can't this inspector requirement relaxation be applied to external gauges as well?

If you have any questions please let me know.

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Comments: (6/9/20, Internal)
If the scope of the revisions is to be limited to revise the load of piles due to piles being out of tolerance, I would suggest saying it in the specs. Otherwise this could be interpreted more than just addressing as-built conditions. Changes to the Foundation Layout and the Pile Data Table may include changes (reductions) to the number of piles which could require some significant structural analysis and redesign.

Also, I would suggest to specify which Type of Work categories are needed and not just saying "appropriate". "Appropriate" is vague and becomes difficult to enforce. Also, it seems to me like more than the geotech Types of Work (9.4.1, 9.4.2 for example) they would need types of work qualifications from group 4, because a recalculation of the loads per pile is required (not a geotechnical function). I am not sure if any of the firms that typically work for us as DTEs have any group 4 qualification.
S. Arnold's Response: Thank you for your comments. We will take them into consideration as we move forward.

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Daniel Strickland
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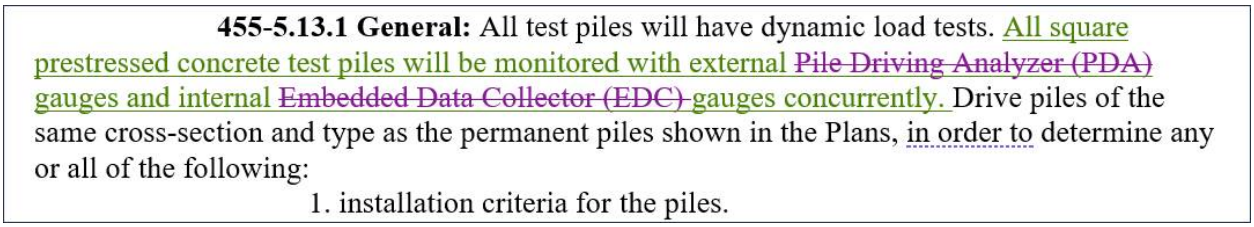
Comments: (6/9/20, Internal)
Larry/Scott – Dan and I had a meeting with Ananth yesterday and he requested that all references to PDA or EDC be removed, similar to what is shown in the screenshot below. Please update all the revisions accordingly. Thank you,



455-5.13.1 General: All test piles will have dynamic load tests. All square prestressed concrete test piles will be monitored with external ~~Pile Driving Analyzer (PDA)~~ gauges and internal ~~Embedded Data Collector (EDC)~~ gauges concurrently. 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:

1. installation criteria for the piles.

Larry Jones' Response: Change made by the Specifications Office prior to Industry Review.

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Comments: (6/11/20, Internal)
Here are comments from D2 on the proposed changes in the Memorandum:

1. **455-5.13.1 General:** All test piles will have dynamic load tests. All square prestressed concrete test piles will be monitored with external Pile Driving Analyzer (PDA) gauges and internal Embedded Data Collector (EDC) gauges concurrently.

Comment: this will increase significant cost for pile dynamic testing for all Design Build projects. I fail to see the benefits associated with this cost increase. It will likely double the coordination time to have two separate data collection systems on the same pile.
It may cost delays to the construction because the limited number of EDC qualified testers.
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

455-5.19 Foundation Certification Packages: … For foundation units where all piles are monitored using embedded data collectors, the foundation certification package may be prepared by the DTE, and the DTE may sign and seal revisions to the foundation layout and pile data table if the DTE is prequalified under the appropriate category in Florida Administrative Code (F.A.C.) 14-75.

Comment: Adding this paragraph will allow the DTE to modify the foundation layout and pile data table without the structural and geotechnical EORs' concurrence. Does this alleviate the geotechnical EOR's responsibility once the project goes into construction? It is not in the Department's best interest to diminish the structural and geotechnical EORs' responsibility. This will also make the reviewing of the foundation certification packages difficult to meet the current required review period.
Scott Arnold's Response: The intent is to allow the DTE to modify the foundation layout and pile data table to reflect as-built conditions, not redesign the foundation. It is not intended to diminish the structural or geotechnical EOR's responsibilities after the project goes into construction.

2. **455-10 Pile Installation Plan (PIP).** … 14. The names of the CTQP qualified inspectors assigned to inspect the pile installation. If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded data collectors.

Comment: The CTQP qualified pile driving inspector and the dynamic testing engineer should be separate. The Dynamic Testing Engineer needs to focus their attention on the dynamic testing details of the pile such as monitoring stress levels, integrity, and capacity. The CTQP qualified pile driving inspector is fully responsible for recording the details of pile driving. It is important to have a CTQP inspector to provide an independent records for the engineer to use.
S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Comments: (6/11/20, Internal)

Daniel: Based on my understanding comments on this proposed Specification change should be sent to you. Please see the following comments.

455-5.13.1: The following sentence is proposed to be added, "*All square prestressed concrete test piles will be monitored with external Pile Driving Analyzer (PDA) gauges and internal Embedded Data Collector (EDC) gauges concurrently*."

1./ Proposed specification change is to use PDA and EDC in all test piles. What is benefit of mandating both PDA and EDC systems instead of allowing the Design-Build Firm to choose an appropriate system based on the local geology and past experience, as the current specification allows? This will add cost to projects with no clear technical benefit.

2./ EDC is a patent system and is currently supplied by one company. No other consultant besides the patent company and its affiliates can collect the EDC data at this time. The proposed specification change will mandate using that company or its affiliates to collect EDC data. Typically, sole sourcing is not deemed favorable by the Department. How is this situation different from others that sole source professional services may become a mandated requirement on all projects?

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

455-10.1: The following sentence is proposed to be added, "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded data collectors*."

1./ Dynamic testing engineers normally watch the PDA wave traces closely for data quality and minor changes throughout pile driving. This proposed change asks them to also perform the role of pile inspectors at the same time which will create quality issues. To demonstrate the point, it is typical that the dynamic testing engineers request for a copy of the inspector's pile log before finalizing their report because they are busy with the PDA data during pile driving and cannot always accurately track the pile depths. Currently they are relying on the pile inspector log to verify or correct their records (blows per foot). This situation is even more critical during set-checks when pile driving records has to record pile penetration in blows per inch for a few inches.

2./ The cost saving of this proposed change is not high but the consequence of not having an accurate report can be significant and costly at the end. It does not look good from a data quality standpoint.

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Comments: (6/11/20, Internal)

I have reviewed the proposed changes and have the following comments.

3. ***455-5.13.1 General:*** *All test piles will have dynamic load tests. All square prestressed concrete test piles will be monitored with external Pile Driving Analyzer (PDA) gauges and internal Embedded Data Collector (EDC) gauges concurrently.*

    a. This may lead to the contractor eliminating test piles rather than having to pay to monitor the test piles utilizing both methods. What is the benefit to the department to have test piles monitored with both EDC and PDA.
    b. Do we require the contractor submit a comparison of each as part of the Foundation Certification Package to utilize this information? If they are going to perform monitoring utilizing both technologies, then they must provide them in the FCP. If there are discrepancies in the data regarding the integrity how do these get accepted?
    c. This would give an advantage to Smart Structures/Radise/AFT, over other companies, to monitor test piles utilizing both PDA and EDC. Add language to require different companies to monitor PDA and EDC. EDC is not being sold or rented to other companies.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

455-5.13.1 Dynamic Load Tests (third paragraph): *For all square prestressed concrete piles, install internal EDC gauges in the piles in accordance with Standard Plans, Index 455-003 and attach external PDA instruments (strain transducers to measure force and accelerometers to measure acceleration) with bolts to the pile for dynamic testing. For other types of piles, attach external PDA instruments (strain transducers to measure force and accelerometers to measure acceleration) with bolts to the pile for dynamic testing.*

    d. No comments.

4. ***455-5.19 Foundation Certification Packages:*** *For foundation units where all piles are monitored using embedded data collectors, the foundation certification package may be prepared by the DTE, and the DTE may sign and seal revisions to the foundation layout and pile data table if the DTE is prequalified under the appropriate category in Florida Administrative Code (F.A.C.) 14-75.*

    a. How can the DTE take responsibility for **certifying** the piles have the required axial capacity including compression and uplift, lateral stability, pile integrity, settlements will not affect the functionality of the structure, and that the inspection of the pile installation was performed under the supervision of the GFDEOR. Without having reviewed any of the structural calculations and geotechnical information? How does this align with FL Board of Professional Engineers?

Scott Arnold's Response: The DTE will have to review the structural calculations and geotechnical information in order to prepare the foundation certification package.

    b. If there are revisions to the plans on the foundation layout sheet, these should only be limited to changing the resistance factor and NBR. The DTE should not be allowed to change the minimum tip, number of piles or spacing. This would

require a re-review of the RFC Plans by the department Structures and Geotechnical office or their representatives.

Scott Arnold's Response: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations.

c. Which Specific categories should the DTE be prequalified for? Assuming they are prequalified for 9.4.1 and 9.4.2, do they need any of the structural design prequalification's?

Scott Arnold's Response: The Foundation Layout Sheet is sealed by a structural engineer, so the DTE would have to be prequalified in the structural category appropriate for the bridge.

d. This is design build if the EOR wants to have 100% testing and 0.75 resistance factor, this will be shown in the RFC plans. Does this assume, that the contractor would elect to use EDC rather than performing PDA as requested by the EOR? Revisions to the plans would not be needed and the DTE would not be signing and sealing anything.

Scott Arnold's Response: This revision will be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

5. ***455-10.1 General,*** *item14 on the PIP list of requirements: The names of the CTQP qualified inspectors assigned to inspect the pile installation. If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded data collectors.*

a. I disagree with removing a separate inspector. The DTE should be focused on monitoring the integrity of the pile. Having them perform both tasks may lead to damaged piles, missing information on the installation or unintended splices if they drive through a layer they were targeting.
b. This is putting an undue burden on the EOR. If the GFDEOR is responsible for the FCP, this decision should be theirs to have a certified inspector observe the pile installation and a DTE monitor the integrity and capacity.
c. Who monitors pile delivery, storage, preforming and standing of the piles. I don't think the DTE will be performing all of these activities, does this mean we will have several inspectors signing the log? This can only lead to more errors in the log if they have to rely on second hand information.
d. This would give an advantage to Smart Structures/Radise/AFT. EDC is not being sold or rented to other companies. If this relaxation in inspection is going to be pursued, it should apply to 100% PDA monitored piles.

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Comments: (6/24/20, Internal)

Gentlemen,

Below are D3 comments for revised SP 4550000DB as referenced above.

- 455-3 – Consider adding "Face pile markings so they are easily visible to pile inspector."

Juan Castellanos' response: Change made to "Face pile so that the pile markings are easily visible to the pile inspector".

- 455-5.13.1 – It's not apparent to the added value or goal to requiring dual testing.
    - We've recently performed two dual testing jobs in our district and do not see how this requirement moving forward will add value, reduce time, reduce costs, or increases the long term performance of the new structure.
    - This requirement will add approximately $2700 per pile for additional monitoring (engineering plus equipment). Also additional cost of non-reusable sensors in pile ($750-$1000) rolled into contractor's cost which department ultimately pays. These prices are from an ongoing project in the district.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

Which test will govern if there are discrepancies?

Larry Jones' Response: When more than one method is used on a pile, it is up the GFDEOR to determine which recommendations will be followed, however, both reports must be submitted to the Department with the Test Pile data.

Each testing submittal must be separate and complete.

Larry Jones' Response: Agree

- 455-5.19 – Raises some concerns. The DTE will likely be a Geotechnical Engineer in practice. So having them sign/seal revisions on foundation layout and pile data tables as well as certify pile capacity/integrity results doesn't match the current industry standards and practices in the Civil Engineering profession.
    - Sign/sealing foundation layout revisions appear to be outside the normal area of responsibility for the DTE, regardless, if they performed the work themselves or had someone in responsible charge.
        - *Statute 471.025 SEALS (3) No licensee shall affix or permit to be affixed his or her seal, name, or digital signature to any plan, specification, drawing, final bid document, or other document that depicts work which he or she is not licensed to perform or which is beyond his or her profession or specialty therein.*
    - This would require the DTE to be qualified to do Group 4 and Group 9 work. We are not aware of any individual practicing both Geotechnical (with significant dynamic testing analysis experience) and Structural Engineering and would be suspect if they were.

- The DTE should not be allowed supersede the structural engineers work without their input.
    - Changes to the foundation layout may have unintended consequences to the structure as a whole.
- What value does this provide to the department?
    - This approach seems to present more liability problems with no added value to the department.
- What if there's a problem, who is responsible?
- If this is pursued further, then FLBPE should be consulted.

Scott Arnold's Response: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE would have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

- 455-10 – Our office strongly disagrees with the removal of the CTQP pile inspector.

o Our office has observed multiple pile installations which required the Dynamic Testing Operators (PDA and EDC) to fully devote their attention to the data collection input display. We are not confident that an Operator can monitor the pile installation while taking accurate notes/blow counts.

 This combination inspection (EDC and SmartPile Inspector) was attempted on a project in our district and numerous blow counts and log entries were missed on the pile inspection log.

o We also have concerns about logging equivalent stroke on Hydraulic hammers which requires the Inspector to observe the energy box display. For our projects, the energy box (BSP Stroke watch) is located near the operator's panel closer to the hammer. EDC operators have to be at a minimum distance away from the pile for the wireless to work. Furthermore, the box does not save the data or average the equivalent stroke per foot. This requires the Inspector (sometimes a second one) to observe the energy box full time in order to estimate the equivalent stroke per foot.

o We understand that the latest Smart pile software allows for air and hydraulic hammer input but it has not been field tested thoroughly.

o The proposed language assumes is that the EDC Software and SmartPile Inspector software are integrated to collect both at the same time, which has not been demonstrated to our office. Based on the current setup, it would require the EDC operator to flip between two programs during the drive.

o We've had limited experience with SmartPile Inspector and question it's reliability.

o At this time, only two firms can provide this service and the two firms are under the same organizational umbrella as SmartPile (EDC manufacturer). This presents sole source concerns and a perception of favoritism.

o The pile inspector has other duties (e.g. inspection upon delivery, inspection of hammer components, etc.).

o If pursued further, we see no reason why it cannot apply to 100% monitoring projects with external gauges.

 Also, the language assumes that the DTE will be the one operating the equipment. Should be changed to "Dynamic Testing Operator is also a CTQP…"

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Comments: (7/2/20, Industry)
Proposed Change: 455-5.13.1 General: All test piles will have dynamic load tests. All square prestressed concrete test piles will be monitored with an external gauge system and an embedded gauge system concurrently. Proposed change: 455- 455-5.14 Dynamic Load Tests: …… For all square prestressed concrete test piles, install embedded gauges in the piles in accordance with Standard Plans, Index 455-003 and attach external instruments (strain transducers to measure force and accelerometers to measure acceleration) with bolts to the pile for dynamic testing. For other types of piles, either install embedded gauges in the piles in accordance with Standard Plans, Index 455-003, or attach external. Proposed Change: 455-7.2 Manufacture: Fabricate piles in accordance with Section 450. When internal gauges will be used for dynamic load testing, supply and install top and tip embedded gauges in all square prestressed concrete test piles and either top or top and tip, embedded gauges in square prestressed concrete production piles monitored with an embedded gauge system, in accordance with Standard Plans, Index 455-003. Ensure the internal gauges are installed by personnel approved by the manufacturer. Comments: All these changes are related to the dual use of external gauge and embedded gauge for test piles. These changes add cost to the Department without any proven benefits. The issue of external and internal monitoring for pile capacity has been researched for years. To mandate on all projects dual monitoring is inefficient and will add unnecessary cost to the project. It should be left to the contractor what process they would like to use based on economics. If the Department would like additional data, they should do some specific project as additional research. Mandate both on all contracts is wrong and give the perception that they are forcing the embedded system or the external gauge system into the contracts because they can't be competitive in the open market.
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

DRILL SHAFTS: 455-17.2 Placement Time Requirements: The elapsed time for placing drilled shaft concrete includes the concrete mixing and transit time, the concrete placement time, the time required to remove any temporary casing that causes or could cause the concrete to flow into the space previously occupied by the casing, and the time to insert any required column steel, bolts, weldments, etc. The elapsed time begins at the time the first truck placed in the shaft

is batched. Maintain a minimum slump of 5 inches throughout the elapsed time. Use materials to produce and maintain the required slump through the elapsed time that meets the class of concrete specified. Provide slump loss tests that demonstrate to the Engineer that the concrete will maintain a 5 inch or greater slump for the anticipated elapsed time before beginning drilled shaft construction. Comment: there has been some interpretation that wet sticking of column steel is not allowed based on Section 415-5.6.1 – Support and Positioning which states "Support the reinforcing prior to placement of the footing concrete and do not insert dowel bars into the plastic concrete". Others have interpreted that a Drill Shaft is not a footing and have referred to this specification that the time elapse includes to insert the column steel. Recommendation is that is wet sticking of column steel is allowed, then Section 415-1.6.1 should be clarify that it does not include drill shafts. If wet stick is not allowed the time elapse should not include the time to insert any column steel, as it implies it is allowed.
Juan Castellanos' response: This comment does not critique the change on 455-17.2 regarding the definition of elapsed time, but rather suggest changes to 41-1.6.1. This comment is out of the scope of the current changes and has been forwarded to the SMO office to be considered in the next cycle of spec revisions.

1) The MSE wall material certifications (panels, reinforcement, filter fabric, etc.), as well as the backfill certified test report. They only included wall shop drawings.
2) The soil anchor walls folder only had test reports/results, and didn't have any shop drawings to get a count of the total # of anchors per wall(s).

STRUCTURES (OTHER THAN BRIDGE) FOUNDATIONS-AUGER CAST PILES 455-42 Mixing and Pumping Cement Grout 7. Accurately monitor the volume and pressure of the grout flow. Provide a pump stroke counter in good working condition on the grout pump. Perform a calibration test of the pumping equipment, prior to construction of the demonstration piles, to determine the average volume of grout for every pump stroke, in accordance with FM 5-612. When the Contractor's installation procedure includes priming the grout pump, grouting lines or auger conduit after drilling the hole, perform a priming demonstration to determine the minimum number of pump strokes required to deliver fresh grout throughout the entire system and flow from the grout injection hole at the bottom of the auger. Perform this grout priming demonstration prior to any calibration test. The Engineer may require additional pump calibrations and priming demonstrations when the pump is repaired, a different pump is used, when the length of the grout lines or hollow auger lengths increase from previous piles for which priming demonstrations were performed and at any time the Engineer determines the grout pump performance may have changed.

Comment: Recommend that the second paragraph … "the Engineer may require additional pump… " be changed to make it mandatory. Suggest: "Perform pump calibrations when the pump is repaired, a different pump is used, when the length of the grout lines or hollow auger lengths increase from previous piles for which priming demonstrations were performed and at any time the Engineer determines the grout pump performance may have changed". Making mandatory will avoid arguments and the Engineer can always waive that requirement if they feel is not necessary.

Juan Castellanos' Response: We prefer language as is. It should not be any arguments about our right to require additional calibration or priming demonstrations. No change made.
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Comments: (7/8/20, Industry)

I have the follow comments on the spec changes: 1. Under 455-5.12.1, 455-5.13.1, 455-5.14, 455-5.19, 455-7.2 and 455-10.1 isn't "embedded" gauges proprietary to EDC? Won't the generic "internal" gauges be better?

Larry Jones' Response: No, "embedded" is not considered proprietary to EDC; the two terms are considered synonymous and interchangeable.

2. Under 455-5.13.1 General: Why is it being required to test the pile with two different systems. Since both systems have been accepted one system should be selected at beginning of project and not waste money using multiple systems. Also, EDC is a sole source system and by requiring its use wouldn't that be in violation Florida statutes.

3. Under 455-5.14 Dynamic Load Tests: Again, why is it being required to test the pile with two different systems. Since both systems have been accepted one system should be selected at beginning of project and not waste money using multiple systems. Also, EDC is a sole source system and by requiring its use wouldn't that be in violation Florida statutes. 4. Under 455-7.2 Manufacture: Again, why is it being required to test the pile with two different systems. Since both systems have been accepted one system should be selected at beginning of project and not waste money using multiple systems. Also, EDC is a sole source system and by requiring its use wouldn't that be in violation Florida statutes.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

5. Under 455-5.19 Foundation Certification Packages it shows that the DTE can provide, sign and seal the certification packages. a. Since both systems are the same why does embedded gauge system allow the DTE to sign and seal cert package and the other system is not? b. Since some of the items being signed and sealed in the certification package are design items, this will require the DTE to be taking over the design which will require that the Board of Professional Engineers rules be followed for this occurrence. 6. Under 455-10.1 General: about the pile driving inspector need. a. Since both dynamic testing methods are basically the same why does one get the advantage of not requiring a pile driving inspector? b. In general, this would work however when there are issues such as potential pile damage, high stresses, etc. the operator (of either system) cannot keep up with both tasks. When you are having issues, it is probably the most critical time to have good pile data which would require a separate inspector.

S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Comments: (7/9/20, Industry)

1.1. Table on page 16: Terminology uses PDA, EDC, and CAPWAP which are trademarked and tied to private companies. Either use terminology such as “internally” or “externally” mounted gauges, or simply reference both as DLT (dynamic load tests). This present a possible legal issue with the State as the table cannot references proprietary technologies to the benefit of private firms when many other options exist. 1.1.1. Clarify annotation in the note for EDC – Embedded Data Collector. This is proprietary and should be replaced with “Internally Mounted Gauges. “ 1.1.2. Similarly, replace PDA with Externally Mounted phraseology. 1.1.3. Please add annotation for DLT in the note: DLT – Dynamic Load Test, performed in accordance with ASTM D4945 - 17. 1.1.4. Please replace CAPWAP with Signal Matching phrase. CAPWAP is not a method, it is a trade-mark propriety computer program. 1.1.5. PDA is not a method, it is a trademarked equipment, standing for Pile Driving Analyzer. 1.2. Page 17: Suggest the specification uses “internally” mounted gauges instead of “embedded”. The industry accepts the distinction between internally and externally mounted gauges, and associated phraseology. 1.3. Page 19: The Specification should not require two systems concurrently. Both systems provide similar information, therefore there is no added value nor cost savings. To the contrary, this is now “added cost” to the detriment of the taxpayer. Furthermore, the FDOT had sponsored the University of Florida, a public institution, to perform research on EDC since 1997. However, the EDC system has been transferred to a private firm. Of additional concern is the risks to the Government/FDOT with only one commercially available “internal” gauge system that is now mandated, at additional cost to the taxpayers, founded over 20 years ago using taxpayer’s dollars. Given that not much can be done now relative to the historical public support now benefiting a private company vis-à-vis the EDC’s origins, the Government should at least now take the opportunity to mitigate those risks to not further waste taxpayer’s money to subsidize a private product. Therefore, the following change is suggested: All square prestressed concrete test piles shall be monitored with EITHER an external gauge system with signal matching OR an internal gauge system with signal matching. The internal gauge option, if selected, should come at no additional cost to the department. 1.4.

Larry Jones’ Response: Thank-you for your comments. This proposed revision has been withdrawn.

Page 30: The proposed specification intention (of not using an additional inspector) is for a project where 100% piles are dynamically tested (either externally or internally mounted DLT systems). For the EDC system, there is currently no working signal-matching program to derive the soil parameters back (i.e., quake, damping, etc.) to develop driving criteria for production piles. As such, the FDOT proposed change in several areas of the specification do not even require signal-matching for production pilings (not 100% DLT) which is problematic. It is understood that FDOT desires to have 100% piles tested for increased confidence in pile capacity evaluation (rather than based on blow counts / stroke heights as in non-instrumented production

piles). However, there will be cases where 100% testing is impossible (such as internal gauge or internal cable running from toe gage to the internal radio unit being malfunction). In fact, for external system, all these parts can be replaceable to resume testing. Both internal and external mounted system behave similarly and should be treated equally. For 100% piles tested, there is no need for pile driving inspector regardless of what dynamic system being used (as there is no non-instrumented production piles). Therefore, the following change is suggested: If the Certified Dynamic Testing Personnel is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when 100% of the piles are dynamically tested
S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Comments: (7/9/20, Industry)
1) We disagree with the change in Section 455-5.13.1 requiring that "All square prestressed concrete test piles will be monitored with an external gauge system with signal matching and an embedded gauge system concurrently". Since the embedded gauge (EDC) system is a private system owned by only one company (Radise), and not open or available to all firms, this change unfairly benefits these specific firms and stifles competition, at the cost of other local firms, including many Disadvantaged Business Enterprises (DBE) and Minority Business Enterprises (MBE), at an increased undue cost to the taxpayer without any measurable benefit. With the one group (Radise) being the only entity that can perform EDC, they will be unfairly advantaged and will be able to provide both internal and external gages with a single on-site representative, significantly handicapping any other competitor. Please note that EDC is currently a practical/unfair monopoly, and the owner of the EDC system does not offer this technology or training to outside firms. Thus, there is no way for any firm (other than Radise- the owners of the EDC system) to be competitive.
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.
2) We also disagree with the change in Section 455-5.18 statement that "For foundation units where all piles are monitored using embedded data collectors, the foundation certification package may be prepared by the DTE, and the DTE may sign and seal revisions to the foundation layout and pile data table if the DTE is prequalified under the appropriate category in Florida Administrative Code (F.A.C.) 14-75.". The change to allow the DTE who may or may not be familiar with the specific project details to prepare Foundation Certification Packages, as well as to override the GFDEOR's recommendations and modify the Pile Data Table is significant, and unreasonably infringes on the professional scope of responsibility of the GFDEOR without any benefit to the taxpayer. Also, there is no reason why this change is only being given when EDC is used, but not when external gages are used. There are no practical differences during pile driving that would justify this preferential treatment (to Radise) that unfairly benefits the sole entity that owns the EDC system, and puts other firms at a huge disadvantage, stifling competition and unduly increasing the cost to the taxpayer without any

measurable benefit. If this change is adopted, then it should apply to both EDC and external gage systems. 3) We also disagree with the change in Section 455-10.1 statement that "If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded data collectors". Our disagreement is two-fold. The first is that having a CTQP qualified pile driving inspector, in addition to the Dynamic Testing Engineer (DTE), is very important. Based on our experience with piles driven using both EDC and external gages, the DTE's primary responsibility is to monitor the dynamic test reading, especially where stresses and/or capacity are of concern, and the DTE often depends on the CTQP qualified pile driving inspector to keep track of things such as the blow by blow pile penetration. Thus, it is not practical or reasonable to have one person fill these roles simultaneously, and will likely lead to issues during pile driving. The second reason for our disagreement, is that it is not clear why this allowance for not requiring an additional pile driving inspector is only being given when EDC is used, but not when external gages are used. There are no practical differences during pile driving that would justify this preferential treatment that unfairly benefits the sole entity that owns the EDC system (Radise), and puts other firms at a huge disadvantage, stifling competition and unduly increasing the cost to the taxpayer without any measurable benefit. If this change is adopted, then it should apply to both EDC and external gage systems.

S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Richard Blake Fowler
No Contact Info.

Comments: (7/12/20, Industry)
Structures Foundations (Design Build) Required EDC for every test pile encourages no test piles in the design of foundations. Miami 595 Signature Bridge currently takes advantage of the no test pile design. Also, if the EDC sensors have issues during a test pile and data is not collected, that would void the test pile. Ensuring no EOR would stamp /approve the test pile due to not following spec.

Response: Thank-you for your comments. This proposed revision has been withdrawn.
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No Name

Comments: (7/12/20, Industry)

455-3: This change can be interpreted as only markers and lumber crayons are allowed to be used to mark a pile. It is typical to mark a pile with survey spray paint. Please re-consider the wording.

Juan Castellanos' response: Change made. Language will include paint as an option for the Contractor.

455-5.12.1: No reason to change the word from internal to embedded.

Larry Jones' Response: Because the two terms are considered synonymous and interchangeable, the request was implemented by the Specifications Office. No change made.

455-5.13.1: There is no added benefit for requiring both internal and external gages on test piles. Point in fact, this will cost more money for requiring 2 systems. Furthermore, will requiring 2 systems on test piles, result in requiring 2 consultants monitoring one or the other system, further increasing cost of the test pile program? If the same consultant can monitor both systems concurrently, that consultant will need to have 2 personnel with 2 systems to monitor both systems, resulting in an elevated cost for the test pile program. It should not be required to have both systems to monitor a test pile. This should be at the discretion of the Engineer or Contractor's option (conventional project or design build project). 455-5.14: See comment for 455-5.13.1. There is no reason to require both internal and external gages for test piles.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

455-5.19: As a GFDEOR and DTE, this does not make any sense from a Professional Engineers responsibility. A DTE is only testing the axial capacity of a pile and has no knowledge of the design aspects of the foundation unit (i.e. lateral stability and settlement) which is required in a foundation certification package. This should be removed from the specifications! 455-7.2: See comments from 455-5.13.1 & 455-5.14. 455-10.1: What added benefit of internal gages allows a DTE who is CTQP certified be able to eliminate a pile inspector? If this is to remain, then remove wording "when driving piles using embedded data collectors." Furthermore, the DTE should be solely responsible for the integrity of the pile while attempting to achieve the required bearing capacity specified in the plans. By eliminating a pile inspector, the DTE becomes further distracted from performing his/her duties on ensuring the pile is safely driven to bearing.

455-16.3: No comments. 455-17.2: Agree with the change. 455-42: No comments. 455-43: No comments. 455-44: No comments.
S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If*

the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors."

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Comments: (7/12/20, Industry)
Structures Foundations (Design Build) Required EDC for every test pile encourages no test piles in the design of foundations. Miami 595 Signature Bridge currently takes advantage of the no test pile design. Also, if the EDC sensors have issues during a test pile and data is not collected, that would void the test pile. Ensuring no EOR would stamp /approve the test pile due to not following spec.

Response: Thank-you for your comments. This proposed revision has been withdrawn.

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Comments: (7/12/20, Industry)
I have the following comments on the proposed changes to Specification SP4550000DB Structures Foundations (Design Build): 1. In reference to 455-5.12.1 General, the proposed specification changes the use of the word "internal" to "embedded" gauges. Is the word "embedded" proprietary in that it references only one technology which shares the same name, Embedded Data Collectors (EDC)? If so, this appears to be a conflict of interest to the extent that it singles out only one company which produces this technology. The use of the word "internal" gauges appears to be more appropriate as it can refer to other technologies that may arise in the future.
Larry Jones' Response: No, "embedded" is not considered proprietary to EDC; the two terms are considered synonymous and interchangeable. Therefore, this change was implemented by the Specifications Office. No change made.
Additionally, the specification also indicates that an externally mounted instrument system must be used in conjunction with signal matching analyses to determine pile capacity while no signal matching is indicated with the use of "embedded" gauges. It is my understanding that the FDOT Tran Method analysis is a requirement when using Embedded Data Collectors (EDC) and thereby serves as a signal matching analysis for EDC data to determine pile capacity. Specifically, FDOT Tran method has been performed in conjunction with EDC as a means to verify bearing capacity and often times the pile capacity determined by FDOT Tran Method varies by more than 10% from that which is presented as the average mobilized pile capacity based on the EDC data. As such, both externally mounted instrument systems and internal gauges require that a signal matching analysis be used to determine pile capacity and the language utilized in the specification should reflect this.
Response: Thank-you for your comments. CEI analysis requirements are discussed in other documents. No change made.

2. In reference to 455-5.13.1 General, the proposed specification change requires that “All prestressed concrete test piles will be monitored with an external gauge system with signal matching and an embedded gauge system concurrently.” Again, the specification indicates that an external gauge system must be used in conjunction with signal matching analyses to determine pile capacity while no signal matching is indicated with the use of the embedded gauge system. It is my understanding that the FDOT Tran Method analysis is a requirement when using Embedded Data Collectors (EDC) and thereby serves as a signal matching analysis for EDC data to determine pile capacity. Specifically, FDOT Tran method has been performed in conjunction with EDC as a means to verify bearing capacity and often times the pile capacity determined by FDOT Tran Method varies by more than 10% from that which is presented as the average mobilized pile capacity based on the EDC data. As such, both externally mounted instrument systems and embedded gauges require that a signal matching analysis be used to determine pile capacity and the language utilized in the specification should reflect this. The cost associated with utilizing both test methods for every test pile does not appear to be of any significant added value. During driving of test piles externally mounted gauges can be damaged which can lead to delays, while on the other hand embedded gauges often have wireless connection issues or require battery changes, which can also lead to delays for the Pile Driving Contractor. By mandating that both test methods be used for test piles, the specification now introduces twice the potential for delays to the Pile Driving Contractor, which costs time and money. Another issue when mandating that both test methods be used for every test pile is the potential conflict that may arise when the engineer operating the externally mounted system is in disagreement with what is being observed by the engineer operating the internal gauge system. For example, if the engineer recording data with the externally mounted system suspects that the pile is developing tension cracks as a result of bending stresses and insists on terminating pile driving to prevent further damage, while the engineer operating the internal gauge system does not agree and insists on continuing to drive the pile. Under what circumstance does one system override the other? Is it the externally mounted system that has been proven and trusted in this industry and been around for more than 45 years or is it the embedded gauge system which has been in the industry for less than half that time and still appears to be in the stages of research and development?

Larry Jones’ Response: When more than one system is used to monitor a pile, it is up the GFDEOR to determine which recommendations will be followed, however, both reports must be submitted to the Department with the Test Pile data.

Further, the last issue when mandating that both test methods be used for every test pile is the monopolizing conflict. Currently only one company, Radise Group, both produces and has access to the embedded gauge system to use for testing purposes. This appears to be in direct conflict with Florida Statute Title XXXIII Chapter 542 Section 542.19 Monopolization; attempts, combinations, or conspiracies to monopolize which states “It is unlawful for any person to monopolize, attempt to monopolize, or combine or conspire with any other person or persons to monopolize any part of trade or commerce in this state.”

Larry Jones’ Response: Thank-you for your comments. This proposed revision has been withdrawn.

3. In reference to 455-5.19 Foundation Certification Packages, the proposed specification states, “For foundation units where all piles are monitored using embedded data collectors, the foundation certification package may be prepared by the DTE, and the DTE may sign and seal revisions to the foundation layout and pile data table if the DTE is prequalified under the

appropriate category in Florida Administrative Code (F.A.C.) 14-75." Based on this specification change, the EDC system is being made out to be superior to that of the external gauge system, while the external gauge system has proven itself time and time again as the industry standard and been used on FDOT projects for far longer than the EDC system. In addition, a vast majority of dynamic testing operators agree that the external gauge system produces far better data quality than that of EDC. If the role of the DTE is to be expanded on Design Build projects when all piles are to be monitored using EDC, then the same role expansion should be given to the DTE when all piles are to be monitored using the external gauge system. If FDOT insist on expanding the role of the DTE then the specification should read, "For foundation units where all piles are monitored using an external gauge system or embedded data collectors, the foundation certification package may be prepared by the DTE…." 4. In reference to 455-7.2 Manufacture, the proposed change states to supply and install "either top or top and tip, embedded gauges in square prestressed concrete production piles monitored with an embedded gauge system." Based on how this is stated, EDC will have the option to eliminate tip gauges for 100% dynamic testing for production piles rendering it practically the same as an externally mounted gauge system. Given this, in combination with the comments stated in reference to 455-5.19 Foundation Certification Packages, there is even more justification to assert that no additional allowance or advantage should be given to a DTE using EDC over that of a DTE using an external gage system when performing 100% dynamic testing. An additional issue that may arise when using EDC with only top mounted gages is there is currently only one acceptable way to use FDOT Tran Method to verify bearing capacity with EDC and it requires that tip gauges be used. Based on this, if a production pile tips at a significantly different elevation than that of the test pile as a result of variable soil conditions and only top gages are being used with the EDC, how do you verify the bearing capacity of the production pile? In this case there are limitations on EDC, as it does not currently contain the means to verify the damping value (Jc) and bearing capacity of a production pile that utilizes only top gauges and is driven to a significantly different elevation than that of the test pile. As is the case in the state of Florida, there are several areas where this can happen and with the use of the external gage system, you can simply perform a signal matching analysis on the pile that drove deeper to verify the damping value and bearing capacity at that elevation. 5. In reference to 455-10.1 General – Item 14, the proposed changes states "If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded data collectors.". The exclusion of a separate CTQP pile driving inspector only when using embedded data collectors and not when using an external gauge system in no way promotes fair competition. At a minimum, the two systems should be given equal status and the same advantage of eliminating a CTQP pile inspector if the dynamic testing operator is CTQP certified should be afforded to the dynamic testing operator who is CTQP certified using the external gauge system as well. The fact of the matter is that eliminating a separate CTQP pile driving inspector is a disservice to the FDOT. When using either system, your attention as a dynamic testing operator should be on the dynamic testing computer as you are continually monitoring for pile integrity, pile stresses, bearing capacity and data quality blow by blow. When your attention is being spent primarily on looking at the pile and keeping track of foot marks, you are not doing your job as a dynamic testing operator. Thank you for allowing me the opportunity to address what I believe to be concerns with the new proposed specification changes.

S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be

changed as follows so embedded data collectors are not referenced: “For foundation units where all piles are dynamically load tested, the foundation certification package….”

S. Arnold’s Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: “*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded data collectors sensors.*”

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Comments: (7/16/20, Industry)

1. Sub-article 455-5.13.1 There is a change requiring "All square prestressed concrete test piles will be monitored with external Pile Driving Analyzer (PDA) gauges and internal Embedded Data Collector (EDC) gauges concurrently." This change should be deleted for the following reasons: • It does not benefit the Department nor taxpayers. • The Department has gone through many costly efforts for the sake of the EDC system. Has the Department evaluated how much money has been spent since the early 2000s, through efforts including but not limited to research, pilot projects, mandated projects, Mandatory Design Memoranda and spec revisions? We already had similar mandates about 10-12 years ago that involved mandated 100% EDC projects and mandated test piles in all projects with EDC, which involved huge projects that lasted 4 years or more. Projects such as the I-595 reconstruction and SR 826 (Palmetto) sections 2 and 5 and many others ended up with this requirement which required hundreds of test piles that must have cost the Department millions already. The cost incurred is not just the cost of gauges but also the cost of hiring a firm to perform the monitoring, which until today, only one firm is qualified to offer. When we issue this type of mandates, the manufacturer which is also the firm supplying the monitoring equipment and currently the only consultant available for monitoring, will not have any incentive to perform these services at an economical cost. On the other hand, this EDC firm has been able to market and get some projects to be changed to use 100% EDC instrumented piles without the need to be mandated by FDOT; this shows they don’t need this type of help to get projects. And very likely the cost offered to the contractors in these cases has been very reasonable because there has not been any mandatory requirement. • The memorandum introducing the changes indicates that this change was requested by FTBA to determine whether dual monitoring of test piles add value to the Department. This is not a valid argument. We have already a lot of piles performed within the last 4 years with dual monitoring to determine whether dual monitoring add value to the Department. For example, the Department authorized and spent $1.5 million on the recently constructed bridges of the Tamiami Trail project in Miami Dade to instrument EDC gauges on about 560 piles. The Design Build firm used PDA in all piles to install and accept them. These $ 1.5 million were not required by the project. In any case, the dual instrumentation information is available for evaluation. And there are several other mandated projects throughout the state, from the last 3 years or so which should have the data available for evaluation. • This mandate causes not only excess costs on Florida taxpayers money but also on Federal (FHWA) money. If the Department feels obligated to mandate some projects, at least, limit only to projects with State funds only. 2. Sub-article 455-

5.14 third paragraph: There is a change requiring "For all square prestressed concrete piles, install internal EDC gauges in the piles in accordance with Standard Plans, Index 455-003 and attach external PDA instruments (strain transducers to measure force and accelerometers to measure acceleration) with bolts to the pile for dynamic testing. For other types of piles, attach external PDA instruments (strain transducers to measure force and accelerometers to measure acceleration) with bolts to the pile for dynamic testing" This change should be deleted from the same reasons stated above. 3. Article 455-7: This change should be deleted for the same reasons stated above.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

4. Sub-article 455-5.9: There is change stating that "For foundation units where all piles are monitored using embedded data collectors, the foundation certification package may be prepared by the DTE, and the DTE may sign and seal revisions to the foundation layout and pile data table if the DTE is prequalified under the appropriate category in Florida Administrative Code (F.A.C.) 14-75." This language needs to be revised or even removed, for the following reasons: • Can an Engineer who is not the EOR make changes to the Plans and design? • What are the appropriate category an sub-categories that the DTE needs to have. They should be spelled out, otherwise it is vague and not enforceable. • Why this language would apply only to foundation units monitored using EDC? This change gives the impression that the intent is to benefit one particular firm to the detriment of other consultants. 5. Article 455-10.1. There is a change indicating that "If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded data collectors." This change has to be either rewritten or deleted. Here are the reasons. • In the past, District Geotechs statewide have expressed concerns on relaxing the inspector requirement when the pile is monitored. We may be getting a cost saving (inspector), but at the expense of lower inspection quality. • If the reasoning is that when piles are being monitored, having an inspector is no critical, then why only when using EDC? Why can't this inspector requirement relaxation be applied to external gauges as well? This change also gives the impression that the intent is to benefit one particular firm over the others.
S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are <u>dynamically load tested</u>, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Patricia Moore
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Comments: (7/17/20, Industry)
TCOPs staff have reviewed the above and offer comments for 4550512 and SP 4550000DB- (K.C.Jose) 4550512:- The proposed change is to evaluate a suggestion from FTBA whether dual monitoring of test piles adds value to the Department. 455-7.2 Manufacture: Fabricate piles in accordance with Section 450. When internal gauges will be used for dynamic load testing, supply and install top and tip embedded gauges in all square prestressed concrete test piles and either top or top and tip, embedded gauges in square prestressed concrete production piles monitored with an embedded gauge system, in accordance with Standard Plans, Index 455-003. Ensure the internal gauges are installed by personnel approved by the manufacturer. Comment- In both cases, the system allows the Engineer to monitor the stresses in the piles; therefore installing dual systems, EDC & PDA concurrently may not add any value to Department. SP 4550000DB-D455-5.13.1 General: All test piles will have dynamic load tests. All square prestressed concrete test piles will be monitored with an external gauge system and an embedded gauge system concurrently: Comment- In both cases of gauges, the system allows the Engineer to monitor the stresses in the piles; therefore installing dual systems, EDC & PDA concurrently may not add any value to Department. No Comment on 5480805 and 7151005. Thanks for the opportunity to review. Sincerely, K. C. JOSE, P.E. Construction Senior Project Manager D4 - Treasure Coast Operations 3601 Oleander Ave., Ft. Pierce, FL 34982 Office: 772-429-4936; Cell: 772-519-2348. Kandarappallil.Jose@dot.state.fl.us
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.
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Christopher Lee Lewis
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Comments: (7/17/20, Industry)
SP4550000DB General Comments: It is very obvious that a majority of the proposed specification changes benefit only the Radise group of companies (Radise, Smart Structures, and their newly acquired Applied Foundation Testing (AFT)) who have monopolized the use of EDC. Prior to the Radise purchase of Smart Structures many companies, including mine, were routinely testing piles with EDC after paying a sum of $10,000.00 to AFT for training. Since the Radise purchase of Smart Structures all of our training has been nullified and only the Radise group of companies can perform the work. Many companies have made the request for training and none have been trained. Thus, all specified EDC work has been done by them for years now. While I do not know the exact amount, it is likely millions of taxpayers' dollars have been paid to this monopoly. This alone is perhaps worthy of filing a whistleblower complaint with the office of the Inspector General. Now seeing this specification providing a more biased spin toward EDC systems is even more concerning as a taxpayer, and as someone who has been in the deep foundations industry for decades. As an Engineer, working exclusively in the deep foundation industry for over 20 years I must state that many of the proposed changes just do not make sense technically. I have used both internal and external systems for 100% dynamic monitoring jobs. Both have worked well under certain conditions and I always support the development of new technologies. Furthermore, I understand that most of the time industry needs a nudge to accept new technology (the EDC has been in play for 20 years). However, at the very least there should be many companies that would have received training and are

qualified to perform the work before a specification change is contemplated. There are not even published guidelines in the Soils and Foundation Manual for evaluating EDC data using current Tran method calculations. What qualifies as a good match? How close should accelerometer calculated displacements and equivalent blow count match inspector observed measurements? Is it acceptable to use quake and damping values well outside of the range that has been historically acquired by practitioners in the industry, and recommended values in WEAP to develop driving criteria? Furthermore, there is not a recognized certification process in place similar to those offered by Foundations QA and PDCA for external gages type testing, which are largely independent of the equipment manufacturer. Radise/Smart Structures authorizes only themselves. It is not well understood which capacity method is to be used with EDC; even by them. On every job I have been involved with there is a dispute if UF or Tran method is used. Utilizing EDC/Tran method as stand-alone test pile has not been well vetted by industry. To my knowledge, only the Radise groups have performed this work. Most of us in the industry are not comfortable with this yet largely based on our past experiences with EDC. This specification is prepared for "Standard" work, not research, or that it only be performed by a single entity (group of closely held singularly-owner companies).
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

Specification Comments: 455-1.2 (for future consideration) It should be made clear that if excavation is not complete prior to installing piles extra work may be necessary to prove capacity and integrity. This work should be done at no cost to the department. 455-2.4 (for future consideration) Item 4 should be called something else. Embedded is not correct. If you drive a steel pile with load transfer gauges attached, they are not embedded. They are likely bolt on or weld on. This portion of the specification is for all foundation types. Item 4 also requires internal strain gages to be placed no more than 5 feet apart. This is entirely too close under most circumstances. The purpose of strain instrumentation is to isolate specific layers of interest. This costs too much money for the data that is collected, and for no practical/effective use. The Engineer should just give concurrence of the proposed gage locations provided by the GFDEOR.

Juan Castellanos' Response: This is outside the scope of the proposed changes. It will be considered in a future cycle.
Larry Jones' Response: Your recommendation for a future change will be considered for a future change. No change made.

455-3 General (regarding pile markings) Does this preclude the use of paint? It should also be required that the marks at the 5 foot interval be distinguishable from other markings. Typically, 5 feet marks are all the way across the pile and 1 foot marks are dots or extend a portion of the way across the pile. 455-5.11.2 (no change required) This is correct. Should not use embedded because it implies EDC. We do not use the term PDA for externally mounted gages for obvious reasons. 455-5.11.3 (for future consideration) This needs to be revisited. Practical refusal needs to be determined at a stress level and/or acceptable overload capacity. This is a huge problem with marginally small and large hammers. Also, some companies are loading up helmets with 20 inches of cushion and calling practical at compression stresses below 2 ksi on concrete piles.

Juan Castellanos' response: Change made. Language changed to allow paint as an option for the Contractor. Regarding your second comment, the proposed language already states numbering the markings every 5 ft, which makes them distinguishable from the 1-ft marks.

455-5.11.7 (no change required / relevant to other proposed changes) To properly apply the Tran method , which is a signal matching algorithm, currently a manual correlation to UF and other methods must be made. Rarely do UF and Tran method calculations of capacity correlate well. Damping calculation for UF method is automatic thus changes cannot be made. Because of this the EDC system cannot display real time reliable pile capacities. I have yet to see an EDC data table showing Tran method capacity for consecutive blows. How can you apply the "FDOT" capacity method if you do not have the appropriate number of Tran method calculations or a UF method correlation output? 455-5.12.1 Regarding the change from internal to embedded. I am not sure if this is a patented term specific to EDC systems or not. Nevertheless, it clearly favors a decided unfair commercial advantage to a group of closely held companies (Smart Structures, Radise, AFT). They are the sole source providers of embedded data collectors, sold to contractor, and EDC monitoring systems. This basically guarantees the Radise group a large portion of work in the state as a sole source provider. This does not promote fair competition instead it supports a monopoly. I suggest before using the term "Embedded" you speak with the Smart Structures and confirm the use of this term does not stop others from using internal gauges. Needs to be clear that Tran method will be used for capacity.
Larry Jones' Response: The word "embedded" is not considered proprietary to EDC; the two terms are considered synonymous and interchangeable. Therefore, this change was implemented by the Specifications Office. CEI analysis requirements are discussed in other documents. No change made.

455-5.13.1 The FDOT specs. requirement to use both internal and external systems is ludicrous and represents a gross neglect of being a good steward of taxpayer money. The EDC systems were approved to be used for 100% dynamic testing years ago. There have been no issues with pile driving that suggest two systems are needed to do the job one or the other has done for nearly 20 years. This accomplishes two things. The first is wasting taxpayer money and the second is guaranteeing public work for the Radise group; essentially creating the conditions for supporting a monopoly. If more research is needed follow the proper channels and put the work up for competitive bid. Although it might be difficult because it is tightly held by the Radise group. I defiantly agree that more research is needed to use EDC piles as test piles without 100% monitoring. While the Tran method has shown to reasonably determine pile capacity the ability to determine reasonable values of quake and damping have yet to be proven. In one instance on a project we were performing VT on EDC test piles and the criteria blow count changed by 100% at the same stroke level. While I attribute this largely to the inexperience of the Radise group operator, the fact is that the signal matching process and associated methods to determine WEAP parameters is highly subjective to the displacement used for the calculations. EDC equivalent top of pile displacement rarely correlates well to the observations of the actual blow counts in the field ad reported by the certified field inspector. In fact, based on poor quality data that I have seen, EDC top equivalent blow counts can be on the order of 3 times less than that observed by the inspector. Much more work is needed to use EDC as standalone test piles! 455-5.14 (requiring all blows be collected for dynamic tests) It is time for this to be gone. It is not necessary to collect each and every hammer blow on concrete piles. In fact, most of the research done to establish the 0.75 resistance factor was based on set check data without collecting all the driving blows. This was just another ploy to give the mistaken impression that EDC monitoring is more competitive with external gages using set checks to utilize increased resistance factors. Again, uselessly costing taxpayers millions of dollars. The whole "we need to know the initial wave speed" claim to identify damage does not hold water. The first thing FDOT requires when

damage is suspected is to hook up external gages to check it. It has worked fine for many years without incident. If you want to know the wave speed prior to driving; PIT test the piles. FDOT has plenty of data to support that. It costs pennies on the dollar when compared to collecting every blow with either system. Besides, the relatively narrow range of stresswave speed values makes calculations of location of damage within acceptable range for practical purposes as well. No change needed with reference to Standard Plans. Requiring embedded gauges in all concrete test piles only serves the sole source provider that is being heavily promoted with these proposed changes.
Larry Jones' Response: This proposed revision has been withdrawn.

455-5.19 How are EDC and PDA supposed to be equivalent but special concessions are made here for EDC. Again, something that blatantly benefits only the Radise group! How is it reasonable for a DTE to make changes to a pile data table prepared by a structural engineer in accordance with recommendations from the GFDEOR. There is a whole process for adoption of another's work (Section 61G15-27.001). Will this happen in a timely manner during construction, or will it cause very costly delays and cause more wasted taxpayers' money? In any event, if it is done legally, correctly, and the requirements are met it should make no difference if EDC or External gages are used. This proposed change is a glaring example of the FDOT specs. forcing an unfair condition on the market place that does not technically or economically serve the FDOT, free public commerce, or the taxpayers of Florida. 455-7.2 Yet another conflict of interest serving the interest of the Radise companies. Now they get to approve who installs the gauges that only they can manufacture and use. I guess that is par for the course since they also certify users of the EDC equipment and will only lease equipment to those they certify. Does PDI, Allnamics, Olson, Geokon, BDI, etc. get to decide who can use their equipment? Is there an approved top only EDC method? 455-7.8 (related to concrete pile) In the hundreds of EDC piles I have driven I have not observed a consistent value for maximum tension stress location along pile length. In addition, I do not believe that the EDC system has the ability to enter a splice location and monitor stress at that location. Thus, I must assume that the max tension must always be used to govern pile driving. Hardly seems like an efficient way to drive a pile when compared to the ability of the PDA to present a tension envelope real time as driving and allow tension stresses to be monitored at several splice locations. 455-10 Wow! Please explain how using an EDC system has such a great advantage over systems that have been successfully used for over 4 decades to do the same job. You cannot monitor Tran method capacities real time, tension envelopes and stresses at splice locations cannot be accurately monitored and any experienced dynamic testing engineer will tell you that the data quality is too poor to accurately set wave speed and/or determine if wave continuity is acceptable throughout driving. In any event, even the most experienced dynamic testing engineers will miss foot marks and rely on inspection records to make corrections to data. Not only is it a bad idea to eliminate the inspector but to specify EDC only is not only outrageous, it is just plain wrong!
S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Anthony Macaluso
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Comments: (7/21/20, Industry)
The State is proposing modifications to the FDOT specifications for both design-build and conventional specifications that favor the use of embedded gauges (i.e., EDC). Essentially the specifications will provide favoritism to the use of EDC, which is solely provided by one company. The proposed specifications would: • 455-5.13: Require the use of EDC and PDA on all test piles: this would increase use of tax payer dollars by using two dynamic load testing systems There is no technical advantage to using an EDC versus PDA therefore no need to use both systems. This specification change seems to favor one family of companies that are the sole provider of embedded gauges (i.e., EDC). I do not agree with this proposed modification. • 455-5.14: Require the use of EDC and PDA on all test piles: this would increase use of tax payer dollars without added benefit. See comments above for 455-5.13. I do not agree with this proposed modification. • 455-5.19: Allow company that provides EDC to sign off on foundation certification packages: This specification would allow a third-party that is not involved during the design phase to certify a foundation. They will certify that the foundation is satisfactory for compression capacity, tension capacity, integrity, settlement, and lateral capacity (testing company is not involved with the majority of these items). To reduce risk and reduce use of tax payer dollars, the Engineer of Record should be the only professional to certify their design. They have intimate knowledge of the design and subsurface conditions, and no other professional should be allowed to certify a foundation. The testing company would be allowed to override design documents prepared by structural or geotechnical engineers. I do not agree with this proposed modification.
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.
• 455-10.1(14): Eliminate piling inspector only when EDC are used: This will reduce the quality of pile installation and make one person perform two assignments during pile driving. This will increase the risk to the department for defective work. I do not agree with this proposed modification. • 455-7.2: Control of Personnel that Install EDC Gauges: EDC manufacturer would be the sole company approving who can install embedded gauges on piles. Other manufacturers do not have say over who can use their equipment (i.e, Pile Dynamics, Olson, GEOKON, etc.) so why should one company have sole oversight? I do not agree with this proposed modification.
S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Comments: (7/22/20, Industry)
455-2.4 Item 1 The following language seems pedantic and unnecessary and I recommend it be removed. Electrical needs for a load test depend entirely on the specialty engineer's means and methods. "Supply 110 V, 60 Hz, 30 A of AC electric power in accordance with the National Electric Code (NEC) to each test pile/shaft site during the installation of the instrumentation, during the load testing, and during any instrumented set-checks/redrives." 455-2.4 Item 4 In most cases, a 5-foot long segment is entirely too short to accurately measure load shed and evaluate skin friction. I recommend strain gage locations be left to the GFDEOR

Juan Castellanos' Response: This comment is outside the scope of the proposed changes. It will be considered in a future cycle.

Larry Jones' Response: Your recommendation will be considered for a future change. No change made.

Table within 455-5.11.7 recommend references to specific commercial systems be removed. EDC refers to a Smart Infrastructure Group commercial system, PDA and CAPWAP refer to commercial products offered by Pile Dynamics, Inc. Within the table these could be combined under the blanket term "Dynamic Load Testing". Comments within this table also imply that a signal matching analysis is applicable only to PDA and not to EDC, which is misleading.

Larry Jones' Response: Your recommendations concerning language not under revision will be considered for a future change. No change made.

455-5.13.1 I disagree with running these two systems concurrently. If they are equivalent to each other, this is only adding unnecessary cost to the test pile program. Either test method should be acceptable.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

This comment also applies to language in 455-5.14 and 455-7.2 455-10.1 Item 14 why does this exception apply only to embedded data collectors? Any accepted dynamic load testing method should be treated equally. I expect for both test methods requiring the dynamic testing engineer to also perform the responsibilities of the pile driving inspector will frequently be requiring too much of a single person, however if the exception for one type of dynamic load test exists it should be granted for the other.

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded data collectors sensors.*"

455-15.11.3 Item 3 modern SID devices are moving away from optical media and using digital video recorders. I recommend the specification reflect this shift and suggest the following language, which would allow DVDs and DVRs but still preclude magnetic tape: "Provides a permanent record of the entire inspection with voice annotation on stable digital media suitable for reproduction, with a resolution of not less than 720 x 480."
Larry Jones' Response: This is a very good comment, your recommendation will be considered for a future change. No change made.

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Comments: (7/23/20, Industry)
I disapprove of the proposed changes as there is a confusing conflict: "455-5.12 Methods to Determine Pile Capacity:455-5.12.1 General: Dynamic load tests using an externally mounted instrument system and signal matching analyses OR embedded internal gauges will determine pile capacity" This is OK as EDS or PDA and be used see word "OR" BUT: 455-5.13 Test Piles:455-5.13.1 General: All test piles will have dynamic load tests. A ll square prestressed concrete test piles will be monitored with an external gauge system with signal matching AND an embedded gauge system concurrently. My objection is that one is "OR" and the other "AND" which is confliction. AND restricts all testing to EDS, which is proprietary; thereby creating a monopoly.
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

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No Name

Comments: (7/23/20, Industry)
Directing the Design-Build firms to utilize both external and embedded gauges seems at odds with the whole concept of design-build. It eliminates ingenuity and will add time and costs. Two of the most compelling cases to be made for design build projects is that they can be brought from concept to completion faster than regular bid-build projects and in a more economical manner.
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

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No Name

Comments: (7/23/20, Industry)
Section 455-10.1, subpart #14 allows for the EDC technician to also act as the pile driving inspector if embedded gauges are used and the EDC tech is CTQP certified for pile inspection. This has the appearance of a "Thumb on the Scale" and could result in some legal complexities for the Department. The appropriate thing to do would also be to allow the PDA technician to

also act as the pile driving inspector if they have the appropriate CTQP certifications.
S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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No Name

Comments: (7/23/20, Industry)
Our experience with the embedded data collectors is rather dated but the last time we did use them they did tend to fail. I do not know if they have been refined but it seems redundant to monitor externally and internally with a product that is prone to failure. Does not seem like there is a return on investment for the additional cost.
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

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Keith Waugh
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Comments: (7/23/20, Industry)
Under 455-10 Pile Installation Plan Note 14 please explain why CTQP pile driving inspection certification of the DTE removes the need for additional personnel ONLY when using embedded data collectors. It would seem that the same logic should apply when using externally mounted instrumentation. If one individual maintains both certifications and can perform the complete tasks required, the device should not dictate the number of personnel.
S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Kal Hussein
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Comments: (7/23/20, Industry)
These changes appear not needed at all and pause a waste of time and money for an unproven and unjustified technique. Current practice is proven, efficient and economical thus, no need to bring in such unjustified modifications.
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

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Will Vaughn
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Comments: (7/24/20, Industry)
455-3 Agreed. The process of using pain can cause subjective points of reference.

Juan Castellanos' response: Based on feedback from others, paint will be allowed. Change made.

455-5.12 Agreed. Allowing optional methods creates more fair practices for the industry. 455-5.13.1 Disagree. Specifying two systems on all test piles seems excessive. Consider leaving the original language as-is or adding a statement to allow select projects to employ the dual monitoring methods for comparison of added value. 455-5.14 Disagree. Reiterates the use of dual dynamic measurement systems concurrently. Consider leaving optional depending on dynamic methods being employed.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

455-5.19 Disagree. Why is the allowance for all piles being monitored by one form of dynamic testing (embedded) signing made distinct and the other (external) not? Allow both or none. 455-7.2 Disagree. Reiterates the use of dual dynamic measurement systems concurrently. Consider leaving optional depending on dynamic methods being employed. 455-10.1 Disagree. An independent qualified person should remain part of the pile inspection process. DTE often have to place attention on the data taking away from the ability focus solely on the pile penetration.
S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Andrew Thomas
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Comments: (7/24/20, Industry)
The requirement to needing both external gauges and embedded gauges on the same pile will not provide any significant technical improvements on the current external gauge system. This would be a very costly process which will likely not help install safer foundations since the embedded gauges and external gauges provide very similar data. In order to improve on the current system, I would propose moving away from the typical test pile program and going to 100% PDA Testing for foundation units. This provides a higher technical and economic impact since PDA data is collected for all piles and the reduced phi factor with 100% PDA testing will result in shorter piles.
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

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Angelo Soldati
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Comments: (7/24/20, Industry)
Embedded gauges provide no additional value to the Owner and will just increase the cost of performing the work. I strongly advise against the changes

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

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David K. Crapps
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Comments: (7/24/20, Industry)
Regarding Proposed Changes to SP4550000DB: Specifications require a consensus between the Department and Industry. I think the Department's proposal will open a lot of hostile discussion about who this helps. I think there will be many who will argue that there is little to no extra benefit to the Public. David K. Crapps
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

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Comments: (7/24/20, Industry)
The changes are highly biased and deliberately unfair against other testing firms. Not really beneficial or needed. Either method of testing is sufficient.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

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Keith Waugh
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Comments: (7/24/20, Industry)
Requiring both external and embedded devices on Test Piles for Design Build is contrary to the intent of DB. Asking two geotechnical engineers to recommend lengths and create driving criteria with two different sets of information will complicate and delay. Specification 455-5.13.1 should use "or" as written in 455-5-12.1 and not "and".
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

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Mike Woodward
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Comments: (7/24/20, Industry)
Regarding the changes related to the determination of whether dual monitoring of test piles adds value to the Department (455-5.13.1 and 455-5140): This sounds like a research project. Is there

a defined period for this evaluation to occur? Requiring EDCs on all test piles will create a monopoly for RADISE, since they are the only ones who can use embedded gauges (per their patent), and other firms who provide PDA testing will be severely hindered because contractors would likely hire RADISE to provide the external gauges too.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

Regarding the changes to the role of the DTE, in 455-5.19, the GFDEOR would be removed from the picture by someone who was not involved with the design from day one. Again, RADISE becomes a sole source for this, which further squeezes out other firms, including that of the GFDEOR. In 455-10.1.14, RADISE would be the sole source for pile-driving inspection. I would be concerned that their DTE would not be able to keep up with both the dynamic pile testing and all the duties of a pile-driving inspector, which involves more than just counting blows.

S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Jack Waldron
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Comments: (7/27/20, Industry)

I would like to start by pointing out the extensive addition of Embedded data collector additions to the specifictions. This appears to be a progressive approach to offering a wider range of dynamic testing options however the reality is different. We offer dynamic testing services using the PDA and would love the ability to offer those services using the embedded data collector as well. The issue is that the Embedded data collector is not being offered for sale from Radise, the company that owns rights to the patent. This is a huge issue now since any contracts that will be awarded in this field will be required to include a company with access to EDC (only Radise). This is a serious violation of monopoly law.

Response: Thank-you for your comments.

With that said, I also have some specific comments on the specifications. Section 455-3 specifies the use of crayons or lumber crayons however the industry standard at this point is paint. Will paint still be allowed.

Juan Castellanos' response: Change made to allow the use of paint as an option for the contractor.

Section 455-5.13.1 Requires the use of internal gauges with signal matching and an embedded gauge system concurrently. This indicates that signal matching is only required for external gauge readings. What will be used to determine capacity for internal gauge readings? Also, what is the purpose of using both systems? This seems redundant at this point and may be a poor use of funding.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

Section 455-5.19 allows the DTE to prepare the FCP, revise the foundation layout and revised the data table ONLY if an embedded data collector is used. The EDC results vs other dynamic testing method results report essentially the same thing (capacity, pile damage, skin/toe capacity) so how does EDC grant so much additional authority to the DTE? Also, this section does not specify if embedded gauges are required since the embedded data collector can used external gauges as well.

Section 455-10.1 sub 14 allows the DTE to act as the pile inspector if the EDC is used. In my experience, having both a pile inspector and DTE is paramount in recording ALL of the data during driving. When the DTE is focused on the dynamic testing data, sometimes they do not catch every foot mark.

S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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JC Miseroy
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Comments: (7/27/20, Industry)
These comments also apply to SP4550000DB. The cover letter states that some changes were requested by FTBA to determine whether dual monitoring of test piles add value to the Department. I don't believe that FTBA is in favor of dual testing. My understanding is that FTBA believes that the type of pile monitoring system should be the choice of the contractor. 455-5.12.1 - This sub-article states External OR Embedded Gauges. 455.5.13.1 - Test Piles. This sub-article states all square prestressed pile will be monitored with an External AND an

embedded gauge system. Why do we need both internal and external systems? Replace AND with OR as in 455-5.12.1 455-5.13.14 - Dynamic Test Loads. This sub-article also states to monitor test piles with internal and external systems. Why? How does this add value to the Department. 455-7.2 - Manufacture of prestressed concrete piles. This sub-article states 'Supply and install top and tip embedded gauges in ALL square PS concrete test piles and either top or top and tip, embedded gauges in square PS concrete production piles monitored with an embedded gauge system'. This needs clarification as follows: Does this mean a). All PS concrete production piles? b). All PS concrete production piles to be monitored? Or c). Only PS concrete production piles to be monitored by embedded gauge systems? As mentioned above, the choice of external or embedded systems should be up the the contractor.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

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Comments: (7/27/20, Industry)

I don't think anyone will object to clearly stating the requirements to label all driven piles, however I'd like to vehemently express my opposition to all the proposed changes to the above referenced section. To mandate a redundant gauge system is fiscally irresponsible. I also struggle to see the benefit to the Department associated with this change. If there is conclusive evidence or data that proves an embedded gauge system provides more accurate or more reliable data, I would love to read that technical bulletin. Without that data, the only application of an embedded gauge systems that I could see working would be giving the Contractor the option to used external OR embedded gauge systems. For the Department to spend more money to received additional data when external gauge data collection works so well is difficult to comprehend. Further, supplying and installing these embedded gauges in the top and tip of the piles is an additional waste of tax payer dollars.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

I also take great exception to the DTE assuming additional roles and responsibilities within the pile driving operation. As a CEI professional, I can assure you that the pile inspection process start long before the hammer falls. This will instantly begin to erode the the quality that we all know the Department prides them self on. Also, is giving the DTE the authority to modify, sign & seal the EOR's pile data and layout really how the state wants to proceed? There are more factor to determining a pile layout than NBR. The EOR fully understands all of those factors as he/she has spent countless hours designing this system. It it should not be changed under any circumstances unless review and sealed by the EOR. In summary, except for the language clearly identifying the contractors responsibility in labeling the driven pile, I object to all other revision proposed in the attached Industry Review. As the Department ultimately makes its decision, I sincerely hope that mandated EDC systems are not including in this coming specification. Thank you,

S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be

prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Randy Cropp
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Comments: (7/27/20, Industry)
Please provide the industry with the basis for this specification change. Please provide the name of the state geotechnical engineer that is proposing such change and the basis for the change? Has this proposed change been approved by the district geotechnical engineers? This specification change has NO MERIT. If FDOT has some merit to this specification change, we would like it provided to the industry. After over 10 years of mandates concerning EDC technology and in my estimate over 5 million dollars being donated or used to support this technology it is time to say stop. You must someday be able to walk on your own without support of public assistance. I have used this technology and I have done many cost analyses on this technology and have never found the benefit to use it. If I did, I would be using it as a competitive advantage to my company. I have talked over the years with many of the contractors and cannot find any that are requesting to use this technology in lieu of PDA. The EDC technology works but it comes at a significantly higher price that as a taxpayer I cannot find any benefit for. I have been promised for years this support would end and it still continues. Please justify this to the people who are not working during a time of crisis in our country. The EDC is a sole source technology and has the EDC gone thru all the process to be approved as a sole source item by FDOT, State of Florida and the FHWA. Is FHWA paying for this sole source item? Has the department done its due diligence in analyzing this specification and notified all parties of the cost impact of this specification? Does this specification provide any benefit to FDOT or the Public?
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

Response from General Counsel's Office: Commodities or contractual services available only from a single source may be exempted from the competitive-solicitation requirements of Florida law pursuant to section 287.057(3)(c), F.S., Rule 60A-1.045, F.A.C., and the FDOT Commodities and Contractual Services Procurement Manual.

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Gary Kuhns
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Comments: (7/27/20, Industry)

Recommend changing to: "All square pre-stressed concrete test piles will be monitored with an external gauge system *or* an embedded gauge system. Comment: In the majority of cases a duplicate system would not be necessary or cost-effective to achieve the required foundation support. Similarly: For all square prestressed concrete test piles, install embedded gauges in the piles in accordance with Standard Plans, Index 455-003 *or* attach external instruments (strain transducers to measure force and accelerometers to measure acceleration) with bolts to the pile for dynamic testing. Further recommend: When indicated in the plans, supply and install top and tip embedded gauges in all square prestressed concrete test piles and either top or top and tip, embedded gauges in square prestressed concrete production piles monitored with an embedded gauge system. Comment: The need to install tip gauges should be determined by the geotechnical engineer based on the geologic conditions at the foundation site.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

Recommend the following change: If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles. Comment: The use of of embedded gauges is not a factor in determining the ability of the DTE to serve as pile driving inspector. Recommend removing the following: For foundation units where all piles are monitored using embedded data collectors, the foundation certification package may be prepared by the DTE, and the DTE may sign and seal revisions to the foundation layout and pile data table if the DTE is prequalified under the appropriate category in Florida Administrative Code (F.A.C.) 14-75. Comment: The use of embedded gauges does not provide the DTE knowledge of the design developed by the structural engineer and geotechnical engineer. Changes to the foundation should be approved by the Engineers of Record.
S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Wing Heung
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Comments: (7/27/20, Industry)
Comment #1: EDC has some technical advantage over PDA in some geological settings but not all. The proposed change in 455-5.13.1 mandates the use of both EDC and PDA systems in all

test piles. Many of these monitoring work will not be benefited from the additional cost. This is especially the situation in Design-Build projects. The Design-Build Team should have the control to choose between PDA or EDC system. If EDC has a clear advantage over PDA in a project site, the Design-Build Team should be able to choose using EDC only and save the cost of PDA testing. That decision should be made by the Design-Build Team.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

Comment #2: The mandated use of EDC system as proposed by 455-5.13.1 is a concern because the system is available only to Smart Structures and its two sister companies (AFT and Radise). Smart Structures has not made the EDC system available to any other consultants either through purchase or rental. The current mandate in using EDC system in all test piles in all FDOT projects essentially sets up a monopoly to this group in EDC data collection and analyses.

Response from General Counsel's Office: Commodities or contractual services available only from a single source may be exempted from the competitive-solicitation requirements of Florida law pursuant to section 287.057(3)(c), F.S., Rule 60A-1.045, F.A.C., and the FDOT Commodities and Contractual Services Procurement Manual.

Comment #3: Proposed change in 455-5.19 states that if EDC is used, the DTE may sign and seal revisions to the foundation layout and pile data table if the DTE is prequalified under appropriate category in Florida Administrative Code (F.A.C.) 14-75. The reviewer disagrees with such a change in practice. Typically, DTE has no prior involvement in the foundation design and structural analyses. Information available to the DTE involves axial capacity of driven pile only. Such information does not qualify the DTE to make significant changes in the foundation layout and the pile data table. For instance, minimum tip elevations in the pile data table can be specified for lateral stability of a foundation and the dynamic testing results cannot offer solution to lateral stability. The Geotechnical Foundation Design Engineer of Record (GFDEOR) who was involved in the original development of the foundation design needs to be involved the changes to cover all aspects of the foundation design to avoid undesirable results and potentially a mix of liability.

Comment #4: Proposed change in 455-10.1, Item 14 allows an additional CTQP pile inspector not be used if embedded data collector is used and the DTE is also CTQP qualified in pile driving inspection. The DTE should focus in the EDC data and have a separate inspector focus on the blow counts (blows per foot or blows per inch of pile penetration). Having dual functions may lead to poor quality data and any perceived saving by not having the attention of a separate person cannot be compensated by drop of data quality.

Comment #5: It is unclear how the difference between EDC and PDA would lead to the proposed changes in 455-5.19 and 455-10.1, Item 14 for EDC but not for PDA. Even though the proposed changes are not warranted for both systems, the proposed change will give a distinct advantage to the EDC system which is not supported by technical merit.

S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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No Name

Comments: (7/28/20, Industry)
Proposed Specification: 4550512 Structures Foundations AND Proposed Specification: SP4550000DB Structures Foundations (Design-Build) We disagree with the proposed changes requiring that "All square prestressed concrete test piles will be monitored with an external gauge system and an embedded gauge system concurrently." Redundancy, in this case, is not warranted. An external gauge system or an embedded gauge system will serve the intended purpose. Requiring both unnecessarily increases cost which is neither in the projects' or the public interest. Engineers and Contractors can use EDC at their discretion. After all, EDC is not exactly new to the market and should be able to stand on its own merits, as do external gauges. If both systems are to be considered equivalent, or at least acceptable, then the market should be able to decide on a case by case basis. The FDOT should also consider that requiring EDC in every situation, they are not only unnecessarily increasing the cost, but assuring revenue to the sole entity that can conduct EDC. Certainly, if EDC is the independent, market driven choice of the users (engineers and contractors) then the sole entity will rightfully benefit, however, the FDOT should look closely at how the proposed unnecessary, but mandated, redundancy may usurp the market choices and, in the process, unfairly enrich a small group of companies owned by a single entity.
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

Specification Section 455-5.18 We disagree with the proposed changes that "For foundation units where all piles are monitored using embedded data collectors, the foundation certification package may be prepared by the DTE, and the DTE may sign and seal revisions to the foundation layout and pile data table if the DTE is prequalified under the appropriate category in Florida Administrative Code (F.A.C.) 14-75." Pile installation is considered an extension of the design process. The DTE has expertise in assessing the performance of individual piles, but the GFDEOR, as past of her/his design has considered the impacts of their complete foundation analysis. Unless one is knowledgeable of the process leading to the design, they cannot effectively assess potential changes during the construction process. Also, the DTE would be modifying a design that was not completed under her or his direct supervision. Any attempt to create a disconnect between the GFDEOR and the substructure construction in not in the best interest of the profession, or, more importantly, of public safety. Also, the FDOT should consider that this unnecessary and potentially disruptive change in current standards may unfairly enrich the EDC providers who are owned by a sole entity and for no beneficial reason. Specification Section 455-10.1 We disagree with the proposed change that "If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded data collectors". The primary responsibility of the

DTE is to monitor pile stresses, integrity and capacity. The observation of pile installation including production of the pile driving log, recording hammer blows, hammer stroke height, alignment etc. requires the full attention of the inspector as does the data collection process conducted by the DTE. The DTE cannot provide both functions within standard of care, and an attempt to do so would clearly impact pile integrity, project quality and above all, public safety.
S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Harry Sommer
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Comments: (7/28/20, Industry)
The use of embedded gauges has been problematic on some of our past projects. Dead batteries, not transmitting data, and inconsistent data have been some of the problems. With the external gauge system problems have also occurred but can usually be corrected by changing gauges. I believe that it should be the choice of the contractor or EOR as which system should be used. I have had projects where for one reason or another an additional test pile is required and by locating another FDOT approve pile, time lost waiting on casting of another pile with the embedded data collector is minimized. I can not see the advantage of having a collector at the tip and top of a pile. Also having to provide both external and embedded also appears to be unnecessary and a waste of money. Having only one firm which can supply and install the embedded type seems to give them a monopoly.
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

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Comments: (7/28/20, Industry)
455-5.13.1 General, 455-5.14 Dynamic Load Tests and 455-7.2 Manufacture: (comments) The requirement to monitor all square prestressed concrete test piles with both external and embedded gauges is unnecessary. One system is sufficient. The Department conducted an extensive embedded gauge research and development process several years ago where piles where monitored concurrently with both systems. The cost of this process was substantial and the results were conclusive. There is more than enough data from that effort to justify the use of

either system by itself. It would be wasteful and irresponsible to spend taxpayer dollars to duplicate what has already been done. 455-5.19 Foundation Certification Packages: (comment) This section should also allow the DTE to prepare the Foundation Certification Package when all piles in a Unit have instrumented set-checks with external gauges. 455-7.2 Manufacture: (comment) The last sentence ("Ensure the embedded gauges are installed by personnel approved by the manufacturer.") may create an inappropriate situation if the manufacturer's personnel are the only ones approved to install gauges. If other companies are not allowed to be trained and certified to install gauges, then this sentence effectively creates a monopoly for the manufacturer. If it does not already exist, a process should be established for approving others such as prequalified Dynamic Testing Engineers (DTE).

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

455-17.2 Placement Time Requirements: (comment) Recommend the word "load" be placed after the word "truck". The truck's load is placed in the shaft, not the truck itself.

Juan Castellanos' Response: Agreed. Change made.

S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

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Comments: (7/29/20, Industry)
The following are additional comments regarding the proposed change in 455-5.19, allowing DTE to sign and seal revisions to the foundation layout and pile data table if DTE is prequalified under the appropriate category in Florida Administrative Code (F.A.C.) 14-75.

Comment #1: A qualified Specialty Engineer has the ability to make changes to the foundation layout and pile data table. It has no connection whether that engineer is also the DTE of the project. Being a DTE does not add to the engineer's ability to modify foundation layout and pile data table. The proposed change is trying to address a very specific situation in which the DTE is also a qualified Specialty Engineer which is unnecessary because the current FDOT system already has a way addressing the situation.

Comment #2: The proposed language change is located in subarticle 455-5.19, "Foundation Certification Package", which by itself is a major concern. This is because it can be interpreted that the proposed changes in foundation layout and pile data table need to be reviewed and responded by both the structural engineer and the geotechnical engineer as a part of the Foundation Certification Package within one working day, per the requirement of 455-5.20. In practice, it is unrealistic to coordinate and complete such a review within one working day. The setup will not allow a quality review by the Department. Changes of the RFC Plans involving

structural analysis need to have sufficient review time and all comments must be resolved before the Foundation Certification Package is submitted.

S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

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Thai Nguyen
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Comments: (7/29/20, Industry)
I have provided my comments 2 weeks ago. I have 1 additional comment: The Tran et al. (2012) method is a Signal Inversion method. Per the publication in 2012, the Signal Inversion technique will solve for a fixed set of parameters. The number of parameters is typically only 10: skin quake, skin unloading quake, toe quake, toe unloading quake, skin damping, toe damping, and 4 segment stiffnesses (ki = fui / qi) for 4 pile segments. The model is missing some parameters, such as toe gap, skin unloading level (i.e., negative value), pile impedance change or pile splice model, etc. The computer will run a fixed number of iterations. Whichever iteration has the lowest least-squares error is the solution. Thus the "simulated signal" search stops here. There is no further effort to improve the match, and thus it is not truly a signal match algorithm. It is well known that despite the total capacity remains approximately the same, many sets of totally different parameters can yield the same least-squares error. Furthermore, often an experienced engineer can yield a better match (i.e., smaller least-squares error) than an automated computer program. It is therefore of significant concern that internal gauge system has no signal matching requirement in the specification as proposed. AGAIN, The Specification should not require two systems concurrently. It should be optional (EITHER this or that). Thank you

Response: Thank-you for your comments. No change made.

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Comments: (7/29/20, Industry)
• 455-5.13: Require the use of EDC and PDA on all test piles: this would increase use of tax payer dollars by using two dynamic load testing systems There is no technical advantage to using an EDC versus PDA therefore no need to use both systems. This specification change seems to favor one family of companies that are the sole provider of embedded gauges (i.e., EDC). I do not agree with this proposed modification.

• 455-5.14: Require the use of EDC and PDA on all test piles: this would increase use of tax payer dollars without added benefit. See comments above for 455-5.13. I do not agree with this proposed modification.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

• 455-5.19: Allow company that provides EDC to sign off on foundation certification packages: This specification would allow a third-party that is not involved during the design phase to certify a foundation. They will certify that the foundation is satisfactory for compression capacity, tension capacity, integrity, settlement, and lateral capacity (testing company is not involved with the majority of these items). To reduce risk and reduce use of tax payer dollars, the Engineer of Record should be the only professional to certify their design. They have intimate knowledge of the design and subsurface conditions, and no other professional should be allowed to certify a foundation. The testing company would be allowed to override design documents prepared by structural or geotechnical engineers. I do not agree with this proposed modification.

• 455-10.1(14): Eliminate piling inspector only when EDC are used: This will reduce the quality of pile installation and make one person perform two assignments during pile driving. This will increase the risk to the department for defective work. I do not agree with this proposed modification.

• 455-7.2: Control of Personnel that Install EDC Gauges: EDC manufacturer would be the sole company approving who can install embedded gauges on piles. Other manufacturers do not have say over who can use their equipment (i.e, Pile Dynamics, Olson, GEOKON, etc.) so why should one company have sole oversight? I do not agree with this proposed modification.

S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Steve Jaime
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Comments: (7/29/20, Industry)

• 455-5.13: Require the use of EDC and PDA on all test piles: this would increase use of tax payer dollars by using two dynamic load testing systems There is no technical advantage to using an EDC versus PDA therefore no need to use both systems. This specification change seems to favor one family of companies that are the sole provider of embedded gauges (i.e., EDC). I do not agree with this proposed modification.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

• 455-5.14: Require the use of EDC and PDA on all test piles: this would increase use of tax payer dollars without added benefit. See comments above for 455-5.13. I do not agree with this proposed modification.

• 455-5.19: Allow company that provides EDC to sign off on foundation certification packages: This specification would allow a third-party that is not involved during the design phase to certify a foundation. They will certify that the foundation is satisfactory for compression capacity, tension capacity, integrity, settlement, and lateral capacity (testing company is not involved with the majority of these items). To reduce risk and reduce use of tax payer dollars, the Engineer of Record should be the only professional to certify their design. They have intimate knowledge of the design and subsurface conditions, and no other professional should be allowed to certify a foundation. The testing company would be allowed to override design documents prepared by structural or geotechnical engineers. I do not agree with this proposed modification.

• 455-10.1(14): Eliminate piling inspector only when EDC are used: This will reduce the quality of pile installation and make one person perform two assignments during pile driving. This will increase the risk to the department for defective work. I do not agree with this proposed modification.

• 455-7.2: Control of Personnel that Install EDC Gauges: EDC manufacturer would be the sole company approving who can install embedded gauges on piles. Other manufacturers do not have say over who can use their equipment (i.e, Pile Dynamics, Olson, GEOKON, etc.) so why should one company have sole oversight? I do not agree with this proposed modification.
S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Mohamad Hussein
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Comments: (7/29/20, Industry)
Comments: **SP4550000DB** Structures Foundations (Design/Build)

By: Mohamad Hussein – MHussein@grlengineers.com – GRL Engineers, Inc.

The following are comments provided in reply to the call for industry feedback on the Florida Department of Transportation's ("FDOT" or "Agency") proposed specification changes to Section 455 of the FDOT's Standard Specifications for Road and Bridge Construction.[i]

FDOT has proposed several specification changes to Section 455 through the issuance on July 2, 2020 of two specification change proposals: 4550512 Structures Foundations ("Proposed SF Specification"), and SP4550000DB Structures Foundations (DB).[ii] The comments herein address the Proposed DB Specification.[iii] The FDOT's approach of seeking feedback from the industry at large to gain consensus as part of the process before implementing proposed changes to the specifications is appropriate and appreciated.

We have serious concerns with some of the proposed changes and urge the Agency to reconsider them, as detailed below. In short, some of the proposed changes clearly violate Florida law and we will seriously consider challenging these changes in state court in the event that the changes take effect. Moreover, the proposed changes run counter to the basic tenant of "fair and open competition" in Florida public procurement. Finally, some of the proposed changes open future public procurements incorporating the specification to challenges based on contrary to competition grounds. The following sections explain these concerns and provide detailed comments on each of FDOT's specification change proposals.

I. The Proposed Changes Violate Florida's Administrative Procedure Act, Violate Fair and Open Competition Concepts, and Open Competitive Procurements to Contrary to Competition Challenges

As an initial matter, some of the proposed changes are objectionable in that they violate the state Administrative Procedure Act, run counter to the basic tenant of "fair and open competition" in Florida public procurement, and open future public procurements relying on the specification to contrary to competition challenges.

Many of the proposed changes will violate Florida's Administrative Procedure Act[iv] because they would be an "invalid exercise of delegated authority" for "fail[ing] to establish adequate standards for agency decisions" and are "arbitrary and capricious." *See* Fla. Stat. § 120.52(8). For example, the proposed addition to 455-5.13.1 concerning Test Piles requires monitoring with an "external gauge system" and an "embedded gauge system concurrently." However, there is no reason to monitor both internal and external gauge systems concurrently. Accordingly, this unnecessary cost to taxpayers fails to provide an adequate standard for FDOT's decision and is arbitrary and capricious.

Similarly, the proposed addition to 455-5.14 concerning Dynamic Load Tests requires installation of "embedded gauges" for all square prestressed concrete piles in addition to attaching external instruments. Beyond the lack of necessity as discussed, this proposed addition applies only to square concrete piles and not to other pile types, such as cylindrical concrete piles, steel pipes and steel H piles. Considering what is technically sufficient for cylindrical concrete piles and steel piles is also technically sufficient for square concrete piles, this addition is plainly arbitrary and capricious.

Some of the proposed changes run counter to the basic tenant of "fair and open competition" in Florida public procurement. *See* Fla. Stat. § 287.001. Specifically, throughout the Proposed Specifications, FDOT proposes to change the term "internal" to "embedded" or adds "embedded gauges" or "embedded data collectors" as a requirement. *See, e.g.*, 455-5.12.1 (proposed); 455-5.19 (proposed). The use of these terms gives clear preference to the system

promoted by a sole source provider for the implied patented embedded gauges system. These proposed changes will unfairly promote a specific commercial EDC system provided commercially by a specific private sole source provider company, which limits industry choices and favors a monopoly. This is a prime example of the proposed changes causing the procurement process to be genuinely unfair or unreasonably exclusive. Consequently, if these proposed specifications are adopted, there will be no competitive bidding for the internal gauges since EDC gauges are provided by only one company, a clear example of creating the appearance of and opportunity for favoritism. Moreover, by favoring one company, the proposed specification change will eliminate, or severely limit, current dynamic testing/signal matching providers from FDOT work. The results will be disastrous—many engineering firms who have been offering these services successfully for years will face significant layoffs and a loss of available experience and expertise to benefit the FDOT's public works. Accordingly, some of the proposed changes, as written, run counter to the basic tenant of "fair and open competition" in Florida public procurement.

Some of the proposed changes open future public procurements incorporating the specification to challenges based on contrary to competition grounds. Agency awards in "competitive-procurements" must not be "clearly erroneous, *contrary to competition*, arbitrary, or capricious." *See* Fla. Stat. § 120.57(3)(f) (emphasis added); *see also R.N. Expertise, Inc. v. Miami-Dade Cty. Sch. Bd.*, Case No. 01-2663BID, 2002 WL 185217, at *16 (Fla. Div. Admin. Hrgs. Feb. 4, 2002) (discussing Fla. Stat. § 120.57(3)(f) provides a standard of review rather than a standard of proof). An agency action is contrary to competition when it creates the appearance of and opportunity for favoritism; erodes public confidence that contracts are awarded equitably and economically; causes the procurement process to be genuinely unfair or unreasonably exclusive; or are unethical, dishonest, illegal, or fraudulent. *See R.N. Expertise, Inc. v. Miami-Dade Cty. Sch. Bd.*, Case No. 01-2663BID, 2002 WL 185217, at *22 (Fla. Div. Admin. Hrgs. Feb. 4, 2002).

Some of the proposed changes are contrary to competition on several fronts. First, as explained, only one company produces the referenced "embedded gauges" or "embedded data collectors" EDC system. Thus, the proposed changes not only "create the appearance of and opportunity for favoritism" towards that company, they in fact do favor that company to the exclusion of all others. Second, for like reasoning, the proposed changes will make future procurements "unreasonably exclusive." Finally, the proposed changes "erodes public confidence that contracts are awarded equitably and economically." There is no reason to monitor with external and "embedded data collectors". *See, e.g.*, 455-5.13.1 (proposed). Thus, these unnecessary additions proposed in the changes will waste the state's taxpayers' dollars. Each of these grounds independently would sustain a procurement protest as contrary to competition. Accordingly, the proposed changes will open future public procurements incorporating the specification to challenges based on contrary to competition grounds—and those challenges likely will prevail.[v]

In sum, some of the proposed changes violate Florida's Administrative Procedure Act, run counter to the basic tenant of "fair and open competition" in Florida public procurement, and open future public procurements incorporating the specification to challenges based on contrary

to competition grounds. Indeed, to the extent these changes are implemented as proposed by the Agency, we, along with others, will seriously consider challenging the changes in court.

In an effort to assist FDOT in revising Section 455, we have provided recommendations on some of the FDOT's proposed changes. Critical recommendations concern FDOT's proposed requirement to conduct tests with both external gauges and embedded gauges concurrently and the use of specific internal gauges. *See, e.g.*, 455-5.13.1 (proposed). Any change FDOT makes concerning the use of testing gauges should not require use of both systems concurrently or dictate a specific system for any of the tests, and instead should allow engineers and contractors the choice of which testing system to use on a project based on the requirements of the job. Since various satisfactory systems are available on the market, giving engineers and contractors a choice on which system to use ensures that a proposed change provides level-field treatment to companies, permitting them to freely procure the appropriate system under the fair rules of open market competition. This in turn promotes technical and economic efficiency within FDOT and protects the public interest. By giving engineers and contractors a choice, FDOT can avoid creating the appearance of and opportunity for favoritism; eroding public confidence that contracts are awarded equitably and economically; and causing the procurement process to be genuinely unfair or unreasonably exclusive.

Response from General Counsel's Office: Commodities or contractual services available only from a single source may be exempted from the competitive-solicitation requirements of Florida law pursuant to section 287.057(3)(c), F.S., Rule 60A-1.045, F.A.C., and the FDOT Commodities and Contractual Services Procurement Manual.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

II. Comments II. Comments Regarding Specific Proposed Changes Under "Proposed Specification: SP4550000DB Structures Foundations (Design Build)"

The following provides comments for specific proposed changes in FDOT's "Proposed Specification: SP4550000DB Structures Foundations (Design Build) ("Proposed DB Specification").[vi] The following is organized sequentially by subsections under Section 455, with comments addressing each FDOT proposed change by subsection.

455-5.12.1 General

The Agency proposes to change the term "internal gauges" to "embedded gauges." Specifically, the current subsection provides:

> *Dynamic load tests using an externally mounted instrument system and signal matching analyses or internal gauges will determine pile capacity for all structures or projects unless otherwise shown on the Plans.*

The Agency's proposed change would read:

Dynamic load tests using an externally mounted instrument system and signal matching analyses or embedded ~~*internal*~~ *gauges will determine pile capacity for all structures or projects unless otherwise shown on the Plans.*

The proposed change is objectionable on two accounts. First, and foremost, the use of "embedded gauges" gives clear preference to the patented system promoted by sole source provider for the implied embedded gauges. This practice unfairly promotes a specific commercial EDC system by a private sole source provider company, which limits industry choices. Consequently, the practice creates the appearance of and opportunity for favoritism. Moreover, this practice will result in future procurements to be genuinely unfair or unreasonably exclusive. As discussed above (§ I), this proposed change runs counter to the basic tenant of "fair and open competition" in Florida public procurement and opens future public procurements relying on the specification to contrary to competition challenges.

Second, the subsection, as written, provides for the first option for a dynamic load test as an "externally mounted" instrument system. The natural word choice to pair with "externally mounted" would be an "internally mounted" system, or as the subsection currently reads, "internal" gauges.

RECOMMENDATION:

- Keep subsection as written. Do not change "internal" to "embedded."
- Reject all other instances where the Agency's proposed change changes "internal" to "embedded."

Larry Jones' Response: Thank-you for your comments and recommendation. Because the two terms are considered synonymous and interchangeable, the request was implemented by the Specifications Office. No change made.

455-5.13.1 General

The subsection, as written, requires: "All test piles will have dynamic load tests." The Agency proposes to insert the additional requirement immediately following that requirement: "All square prestressed concrete test piles will be monitored with an external gauge system with signal matching and an embedded gauge system concurrently."

The proposed additional requirement is objectionable. First, there is no reason or benefit to monitor with both internal and external gauge systems concurrently. Testing a pile effectively twice at the same time increases cost, but provides no additional benefit over testing it normally with just one of the systems or the other (they are considered technically equivalent in other parts of the specifications). This unnecessary expense will erode public confidence that contracts are awarded equitably and economically. Thus, this additional requirement is both an unnecessary requirement and an unnecessary cost to taxpayers. Accordingly, this additional requirement fails to provide an adequate standard for FDOT's decision and is arbitrary and capricious.

Second, the proposed change stifles "fair and open" competition and is contrary to competition in competitive procurements. The use of "embedded gauges" gives clear preference to the system promoted by a sole source provider. This practice unfairly promotes a specific

commercial EDC system commercially provided by a specific private sole source provider company, which limits industry choices and favors a monopoly. A prime example that the proposed change will cause the procurement process to be genuinely unfair or unreasonably exclusive. Consequently, if the proposed specifications are adopted, there will be no competitive bidding for internal gauges since EDCs are provided by only one company. This is a clear example of creating the appearance of and opportunity for favoritism. Moreover, by favoring one company, the proposed specification change will possibly effectively eliminate, or severely limit, current PDA/signal matching providers from FDOT work. The results will be disastrous - many engineering firms currently offering PDA/signal matching services successfully will face significant layoffs and a loss of available experience and expertise to benefit the FDOT's public works. Accordingly, as discussed above (§ I), this proposed change, as written, runs counter to the basic tenant of "fair and open competition" in Florida public procurement and opens future public procurements relying on the specification to contrary to competition challenges.

Finally, both internal and external gauge systems are available in the market; however, the specific EDC internal gauges system is patented and can only be provided by one commercial source. So, if the Agency does make a change to this subsection, the change should allow engineers and contractors the choice of which testing system to use on a project based on the requirements of the job. Giving engineers and contractors a choice on which system to use ensures that a proposed change provides level-field treatment to companies, permitting them to freely procure the appropriate system under the fair rules of open market competition, which in turn promotes technical and economic efficiency within FDOT and protects public interest. By giving engineers and contractors a choice, FDOT can avoid creating the appearance of and opportunity for favoritism; eroding public confidence that contracts are awarded equitably and economically; and causing the procurement process to be genuinely unfair or unreasonably exclusive.

RECOMMENDATION:

- Withdraw the proposed additional requirement that "[a]ll square prestressed concrete test piles will be monitored with an external gauge system with signal matching and an embedded gauge system concurrently."
- In the event the proposed change is not withdrawn, then modify proposed change by changing "and" to "or" and deleting "concurrently." This change would allow for fair and open competition from numerous firms competitively offering pile testing services. The revised proposed change would read: "All square prestressed concrete test piles shall be monitored with an external or internal gauge system."
- Change "embedded" to "internal".

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

455-5.14 Dynamic Load Tests

The Agency proposes to require installation of "embedded gauges" for all "square prestressed concrete test piles." Specifically, the current provision provides:

Either install internal gauges in the piles in accordance with Standard Plans, Index 455-003, or attach instruments (strain transducers to measure force and accelerometers to measure acceleration) with bolts to the pile for dynamic testing.

The Agency's proposed change would read:

~~*Either install internal gauges in the piles in accordance with Standard Plans, Index 455-003, or attach*~~ **For all square prestressed concrete test piles, install embedded gauges in the piles** *in accordance with Standard Plans, Index 455-003 and attach external instruments (strain transducers to measure force and accelerometers to measure acceleration) with bolts to the pile for dynamic testing.* **For other types of piles**, *either install embedded gauges in the piles in accordance with Standard Plans, Index 455-003, or attach external instruments (strain transducers to measure force and accelerometers to measure acceleration) with bolts to the pile for dynamic testing.*

(emphasis added).

The proposed changes are objectionable on several accounts. First, there is no reason for dual monitoring of piles with both internal and external gauge systems concurrently. Testing a pile twice at the same time provides no additional benefit over testing it once by either system (both systems are considered equivalent in other parts of the specifications). There is a clear advantage to using external gauges because centrally located internal gauges cannot evaluate hammer-pile misalignment. Moreover, external sensors are reusable and changeable if/when needed (e.g., to avoid costly construction delays, as opposed to internal gauges that cannot be replaced in case of malfunction). External gauges can simply and quickly be attached to a pile while still on the ground, data can be transmitted wirelessly and analyzed on site. Embedding the testing gauges (EDC) inside the pile does not present a meaningful innovation or provides technical advancements to the state-of-the-art or practice of dynamic pile testing. The unnecessary additional expense of disposable gauges will erode public confidence that contracts are awarded equitably and economically. Thus, this additional requirement is both an unnecessary requirement and an unnecessary cost to taxpayers. Accordingly, this additional requirement fails to provide an adequate standard for FDOT's decision and is arbitrary and capricious.

Second, this proposed addition applies only to certain square concrete piles and not to any other pile type. For example, EDC "embedded gauges" cannot be used on hollow cylindrical concrete piles, voided without solid top square concrete piles, steel pipe piles, steel H-piles, etc. The external gauges system can be used effectively, and has been successfully used for decades worldwide, on all types of concrete, steel, timber, and composite piles. Considering what is technically sufficient for all other types of piles is also technically sufficient for square prestressed concrete piles, this proposed change is arbitrary and capricious.

Third, the proposed change patently favors one specific company over all others. Beyond the previous discussion identifying the proposed changes favoring one company (which apply here too), this proposed change does so egregiously. The proposed change requires procurement of specific EDC equipment from a single source commercial supplier, specifying the ***named***

index that shows the patented system of the supplier for embedded gauges. This will cause the procurement process to be genuinely unfair or unreasonably exclusive. Notably, and conversely, the proposed change does not provide such specificity or impose such limitations on external gauges. As a result, the proposed change does not simply create the appearance of and opportunity for favoritism, it expressly demonstrates favoritism towards the one sole-source supplier of embedded gauges. Accordingly, as discussed above (§ I), this proposed change runs counter to the basic tenant of "fair and open competition" in Florida public procurement and opens future public procurements relying on the specification to contrary to competition challenges.

RECOMMENDATION:

- Withdraw the proposed change.
- Alternatively, modify the proposed change to provide the option to use either system for square prestressed concrete piles. Specifically, the relevant portion of the proposed change would read: "For all square prestressed concrete test piles, install internal gauges in the piles or attach external instruments (strain transducers to measure force and accelerometers to measure acceleration) with bolts to the pile for dynamic testing."
- Change "embedded" to "internal."
- Remove reference to Index 455-003, or modify to make it generic to eliminate all implications of a specific provider's equipment.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

455-5.19 Foundation Certification Packages

The comments for Subsection 455-5.19 address one item in the subsection that the Agency did not propose to change, i.e. the phrase "EDC records" and the Agency's proposed addition to the subsection.

Concerning the item that the Agency did not propose to change, i.e. the phrase "EDC records," the phrase should be changed. The phrase "EDC records" clearly promotes a sole source system. For all the reasons previously discussed, the promotion of a sole source provider system runs counter to the basic tenant of "fair and open competition" in Florida public procurement and opens future public procurements relying on the specification to contrary to competition challenges. Accordingly, the Agency should replace the term "EDC records" with a generic term, such as "dynamic testing records," which allows contractors to procure alternate systems from the industry at large.

Concerning the Agency's proposed addition to the subsection, the Agency proposes to insert the following sentence:

> For foundation units where all piles are monitored using ***embedded data collectors***, the foundation certification package may be prepared by the DTE, and the DTE may sign and seal revisions to the foundation layout and pile data table if the DTE

is prequalified under the appropriate category in Florida Administrative Code (F.A.C.) 14-75.

455-5.19 (proposed) (emphasis added).

These changes are objectionable for several reasons. First, the use of "embedded data collectors" fails for all the previously discussed reasons resulting from the impact of the term requiring contractors to procure EDCs from the one sole source provider for the implied embedded data collectors. Accordingly, as discussed, this proposed change runs counter to the basic tenant of "fair and open competition" in Florida public procurement and opens future public procurements relying on the specification to contrary to competition challenges.

Second, hand-in-hand with the objectionability of using "embedded data collectors" is the scope and parameters of the proposed change. Why is it that only the dynamic testing engineer who is using EDC gauges to test the pile would be exclusively allowed to do such changes, and not others who may be using conventional pile testing means utilizing external gauges? The location of the testing gauges on the pile have nothing to do with any of this proposed change. It may appear that the proposed change is helpful; however, in reality it has the effect of institutionalizing, by specifications, a biased, unfair, and wrongful allowance for the specific patented and sole source EDC testing system operator for commercial gain and profitable advantage. Why is it that only the sole source EDC operator is unfairly exclusively allowed to take on the additional roles of the foundation design engineer and EOR of the work? In short, the proposed change creates the appearance of and opportunity for favoritism; erodes public confidence that contracts are awarded equitably and economically; and causes the procurement process to be genuinely unfair or unreasonably exclusive.

Finally, on a technical level, the independent Dynamic Testing Engineer (DTE) must not be allowed to take on the role of the project design Geotechnical Engineer and/or project Engineer of Record (EOR) for the full certification of the foundation unit. In the role of testing engineer, the DTE has a limited role of assessing individual pile load bearing capacity and integrity. Allowing the testing engineer to effectively override the project geotechnical design engineer / EOR who is ultimately responsible for the project by changing the foundation pile data table, design, pile layout, etc. is not advisable, and potentially could be cause for foundation failure and disaster.

RECOMMENDATION:

- Withdraw the proposed change.
- Alternatively, and only if it has to be, then remove "using ***embedded data collectors".***

455-7.2 Manufacture

Under 455-7.2, the Agency proposes to change the terminology from "internal gauges" to "embedded gauges" and add a requirement to install "top and tip embedded gauges" in all prestressed concrete piles. The current provision provides:

> Fabricate piles in accordance with Section 450. When internal gauges will be used for dynamic load testing, supply and install in accordance with Standard Plans, Index 455-003. Ensure the internal-gauges are installed by personnel approved by the manufacturer.

See 455-7.2.

The Agency proposes the following changes:

> Fabricate piles in accordance with Section 450. ~~When internal gauges will be used for dynamic load testing,~~ S~~s~~upply and install top and tip embedded gauges in all square prestressed concrete test piles and either top or top and tip, embedded gauges in square prestressed concrete production piles monitored with an embedded gauge system, in accordance with Standard Plans, Index 455-003. Ensure the embedded~~internal~~ gauges are installed by personnel approved by the manufacturer.

See 455-7.2 (proposed).

The proposed changes are objectionable for several reasons. First, the requirement to use "embedded gauges" effectively forces contractors to procure these items from a sole source provider, which runs contrary to "fair and open competition" in Florida public procurement and opens future public procurements relying on the specification to contrary to competition challenges. Moreover, this proposed change exponentially violates "fair and open competition" because it dictates that a specific set of patented equipment from a single source supplier must be exclusively used in an application where other suppliers could provide an equivalent or possibly better solution (in our experience, and as we heard from others, the EDC data/results are often-times inconsistent causing concerns about their reliability (e.g., tension stress location along pile length, unbalanced displacements at top and bottom, friction/bearing resistance contributions from blow to blow, etc.)). Accordingly, the proposed change goes beyond simply creating the appearance of and opportunity for favoritism, instead it expressly demonstrates favoritism, and causes the procurement process to be genuinely unfair or unreasonably exclusive.

Second, the additional requirement is not necessary. The proposed change to install top and tip embedded gauges is not needed technically because the widely used conventional external reusable gauges system provides equivalent information that the EDC system provides (as has been shown by FDOT comparison exercises). Accordingly, the proposed change is arbitrary and capricious for this reason alone.

Notably, for pile static load testing, the FDOT does not impose such a monopolistic requirement for procurement of gauges needed for testing.

In sum, this proposed change limits "open and fair competition" through forcing procurement from a sole source provider and is arbitrary and capricious because it is unnecessary and dictates a system that produces unreliable data.

RECOMMENDATIONS:

- Withdraw the proposed change.

- Remove reference to Index 455-003, or modify it to make it generic to eliminate all implications of a specific provider's equipment.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

455-10.1 (14)General

The Agency's proposed changes qualify information required in the Pile Driving Installation Plan. Specifically, as written, Subsection 455-10.1 requires among other things, the "names of the CTQP qualified inspectors assigned to inspect the pile installation." *See* 455-10.1. However, the Agency proposes to add: "If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using ***embedded data collectors***." *See* 455-10.1 (proposed) (emphasis added).

This proposed change is objectionable for several reasons. First, as discussed above, adding the term "embedded data collectors" forces contractors to procure the implied items from a sole source provider, which runs contrary to "fair and open competition" in Florida public procurement and opens future public procurements relying on the specification to contrary to competition challenges.

Hand-in-hand with the objectionable use of "embedded data collectors" is the selective elimination of an independent pile driving inspector. It may appear that the elimination of the independent pile driving inspector during the brief period of the pile driving will save money (keeping in mind, the pile driving inspector must not be eliminated from the project all together and still needs to be hired for the project to complete the inspection work). However, the impact of the proposed change institutionalizes a sole source supplier. Of note, why is it that only the EDC operator is exclusively allowed to take on the additional role of the independent pile driving inspector while performing the important and crucial pile testing work? If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then the same provision should apply regardless of whether the testing system is internal or external gauges. The location of the testing gauges on the pile has nothing to do with the pile inspection activity. In short, the proposed change creates the appearance of and opportunity for favoritism; erodes public confidence that contracts are awarded equitably and economically; and causes the procurement process to be genuinely unfair or unreasonably exclusive.

Finally, the elimination of an independent pile driving inspector potentially jeopardizes successful pile installations and reliable foundations. The role of the pile driving inspector cannot be replaced by a device that merely counts blows. Independent dedicated pile inspection is essential for successful pile installations and safe foundations. The pile driving inspector's role covers aspects of the work that are not just during the relatively brief period of pile driving itself but includes activities prior to and following pile driving as well (besides, for example, for hydraulic hammers, the DTE will not be able to do inspections including hammer settings/readouts, blow counts, depth, observations, etc. while at the same time doing dynamic pile testing – none will be done well). The role of proper attentive inspection is very important to a safe foundation, just as are the foundation design and construction, and testing. Professional pile driving inspection is not a side job that someone can casually do while doing something else; especially if performing the very important and crucial real-time task of dynamic pile

testing. The responsible Dynamic Pile Testing Engineer is very busy performing the important task of testing and should be concentrating on data quality and reading/interpreting a wide variety of results, distractions have the potential of resulting in an unsafe foundation and/or uneconomical work. Additionally, eliminating or severely limiting the role of the pile driving inspectors will possibly result in lost jobs across numerous companies in Florida—for no justifiable reason.

RECOMMENDATION:

- Withdraw the proposed change.
- Alternatively, remove "when driving piles using ***embedded data collectors***."
- Remove, reference to Index 455-003, or modify it to make it generic to eliminate all implications of a specific provider's equipment.

Conclusion

For the reasons stated herein, we urge the Florida Department of Transportation to reconsider the discussed proposed changes to Section 455 of the FDOT's Standard Specifications for Road and Bridge Construction, and adopt the proposed recommendations provided above in their place. The FDOT is a custodian of the public interest and taxpayers' money. Dwindling available public funds must be used efficiently and wisely. In my opinion (based on my Expert status certification in the field of dynamic pile testing and extensive involvement in the industry and on FDOT projects of all sizes and all pile types statewide for over 30 years), the proposed changes to the 455 standard specifications are misguided, wasteful, and unnecessary. They do not solve an existing problem, do not present any real qualitative innovation or technical advancement, do not benefit the FDOT, do not add to the well-being or safety of the public, and are not in conformance with national specifications, guidelines and practices; they do stifle fairness, level-field, competition, and open-market public procurement of pile testing goods and services. The proposed changes clearly violate Florida law and we will seriously consider challenging these changes in state court in the event that the changes take effect.

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[i] *See* Standard Specifications for Road and Bridge Construction, Fla. Dept. of Transportation (July 2020), https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/programmanagement/implemented/specbooks/jul2020/7-20ebook.pdf?sfvrsn=c1f3424e_2 (accessed July 21, 2020).

[ii] *See* Memorandum, Fla. Dept. of Transp. (July 2, 2020) (Subj: Proposed Specification: SP4550000DB Structures Foundations (Design Build)) ("Proposed Design Build Specification"); Memorandum, Fla. Dept. of Transp. (July 2, 2020) (Subj: 4550512 Structures Foundations) ("Proposed SF Specification").

[iii] Comments on SP4550000DB Structures Foundations (Design Build) submitted separately.

[iv] FDOT's issuance of the Proposed Solicitation falls under Florida's Administrative Procedure Act because the Proposed Solicitation is an "agency statement of general applicability that implements, interprets, or prescribes law or policy or describes the procedure or practice requirements of an agency and includes any form which imposes any requirement or solicits any information not specifically required by statute or by an existing rule." Fla. Stat. § § 120.52(16) (defining "Rule"); *see also* Fla. Stat. § 120.51 (terming Chapter 120 of the Florida Statutes as the "Administrative Procedure Act").

[v] Future procurements using the Proposed Specification would also fall to arbitrary and capricious challenges for the same reasons the Proposed Specifications are arbitrary and capricious agency action discussed above. *See* Fla. Stat. § 120.57(3)(f).

[vi] *See* Memorandum, Fla. Dept. of Transp. (July 2, 2020) (Subj: Proposed Specification: SP4550000DB Structures Foundations (Design Build)) ("Proposed DB Specification").

S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

Response: Thank-you for your comments. No change made.

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Comments: (7/29/20, Industry)
I am opposed to the requirement to include both embedded gauges and external gauges in precast concrete test piles. Let the marketplace decide which is more cost effective instead of giving a sole source provider a guaranteed market.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

Also opposed to the DTE signing and sealing revisions to the foundation layout and pile data table if the DTE is prequalified. The GEOR should remain involved with the project from design through the installation of the piles and should not be replaced by the DTE. Also opposed to the Dynamic Testing Engineer who is also a CTQP qualified pile driving inspector, eliminating the need for an additional pile driving inspector when driving piles using embedded data collectors. They each have their own responsibilities.
S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be

changed as follows so embedded data collectors are not referenced: “For foundation units where all piles are dynamically load tested, the foundation certification package….”

S. Arnold’s Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: “*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*”

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No Name

Comments: (7/29/20, Industry)
The modified specifications will provide favoritism to the use of EDC, which is solely provided by one company. The proposed specifications would:

• 455-5.13: Require the use of EDC and PDA on all test piles: this would increase use of tax payer dollars by using two dynamic load testing systems There is no technical advantage to using an EDC versus PDA therefore no need to use both systems. This specification change seems to favor one family of companies that are the sole provider of embedded gauges (i.e., EDC). I do not agree with this proposed modification. • 455-5.14: Require the use of EDC and PDA on all test piles: this would increase use of tax payer dollars without added benefit. See comments above for 455-5.13. I do not agree with this proposed modification.

Larry Jones’ Response: Thank-you for your comments. This proposed revision has been withdrawn.

• 455-5.19: Allow company that provides EDC to sign off on foundation certification packages: This specification would allow a third-party that is not involved during the design phase to certify a foundation. They will certify that the foundation is satisfactory for compression capacity, tension capacity, integrity, settlement, and lateral capacity (testing company is not involved with the majority of these items). To reduce risk and reduce use of tax payer dollars, the Engineer of Record should be the only professional to certify their design. They have intimate knowledge of the design and subsurface conditions, and no other professional should be allowed to certify a foundation. The testing company would be allowed to override design documents prepared by structural or geotechnical engineers. I do not agree with this proposed modification.

• 455-10.1(14): Eliminate piling inspector only when EDC are used: This will reduce the quality of pile installation and make one person perform two assignments during pile driving. This will increase the risk to the department for defective work. I do not agree with this proposed modification.

• 455-7.2: Control of Personnel that Install EDC Gauges: EDC manufacturer would be the sole company approving who can install embedded gauges on piles. Other manufacturers do not have say over who can use their equipment (i.e, Pile Dynamics, Olson, GEOKON, etc.) so why should one company have sole oversight? I do not agree with this proposed modification.

Larry Jones’ Response: Your recommendations concerning language not under revision will be considered for a future change. No change made.

S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Comments: (7/29/20, Industry)
I am president of a bridge contracting business and have over 20 years of pile driving and bridge construction on FDOT projects. We have worked with many testing labs and performed hundreds of test piles. This year on T1747 we drove piling on which the designer had pre-selected all the lengths and used 100% EDC testing. With the above experience in mind, I urge the department not to make the proposed change to the specification. From an engineering perspective, PDA has been used all over the world effectively. I cannot understand why we would test piles twice at the tax payer's expense. From a practical perspective, TMC had an exceeding difficult time at time of bid getting an estimate out of the only company that can bid the work as the only EDC producer. I will never understand why a sole source provider cannot give a critical bid to a contractor until 2 hrs before our entire bid is due. We avoid companies that play those games, but with only one supplier, we could not avoid this issue. Further, it is my understanding that this specification change has been lobbied by the same company that holds the patent on the device. The specification reads "Ensure the internal gauges are installed by personnel approved by the manufacturer." The specification would create a monopoly for the gauge supplier and that supplier, who is a company that also is a CEI firm, can send 100% of the monitoring business to themselves thus cutting all other CEI testing firms that do PDA testing out of the competition. Clearly, there are major ethical hurdles here. FDOT would be dependent on one supplier for all of its pile testing needs. Current PDA labs often give the contractor length date within 36 hrs of driving thus speeding construction. Will this continue to be possible with one firm controlling the whole state? Please leave the option to the EOR and FDOT to choose they type of dynamic pile monitoring that is best for their own individual project by leaving the specifications as they are. Thank you in advance for your consideration.

S. Arnold's Response: Thank you for your comments. We will take them into consideration as we move forward.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

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Comments: (7/29/20, Industry)
455-5.13.1 Our suggested revisions and comments: 1) All square prestressed concrete test piles will be monitored with either an external gauge system or an embedded gauge system, or 2) Delete this sentence as it was already covered by Section 455-5.12.1

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

Based on our experience with previous PDA/EDC test piles in design-bid-build projects, DTE who performed PDA testing was responsible for developing recommended pile length and driving criteria solely based on PDA testing results, CAPWAP and refined WEAP analysis per guideline in Appendix F of soils and foundation handbook. Other than PDA/EDC capacity comparison which was already done as far as we understand, we do not think mandating the installation of EDC system on all prestressed concrete test piles will provide any benefit to the Department since EDC system is not capable of providing recommended driving criteria. This will only increase test pile cost without adding value to the Department. In addition, Radise International is currently the only consultant who owns and is capable of installing and using the embedded gauge system. Radise International would be the only beneficiary to this spec revision. In order to be fair, prior to implementing this revision, EDC/FDOT method training should be provided to all interested FDOT consultants and EDC system should be available for all consultants to rent or own so that all consultants who are certified can provide this EDC service as previously done. 455-5.14 Our suggested revisions and comments: We understand that the only pile type that EDC can be installed is square pre-stressed concrete piles. Therefore, remove " either install embedded gauges in the piles in accordance with Standard Plans, Index 455-003, or" from the second sentence. 455-5.19 Our suggested revision and comments: First of all, EDC/FDOT method training is currently not available to FDOT consultants. The training should be available to all interested FDOT consultants so that DTE can be trained and certified for EDC and FDOT method so that DTE can provide a proper review on foundation certification package as VT consultant. The EDC system is being made out to be superior to that of an external gauge system, while the external gauge system has been the gold standard in the Deep Foundation Testing industry for decades and has proven itself repeatedly to work in all FDOT project environments. If the department feels that the role of the DTE is to be expanded on Design Build projects when piles are to be monitored using EDC, the same should apply to the DTE when using an external gauge system. 455-7.2 Our suggested revisions and comments: Remove "all" and "either top or" from the sentence since capacity and integrity in the EDC system are based on both top and tip measurements in UF method and FDOT. The current method of determining pile integrity for EDC testing incorporates the use of the tip gauge (50-point contribution to MPI if static pre-stress change is more than 100 microstrains for 20 consecutive hammer blows per 1/10/2020 SmartPile MPI Field Update). The consultant will need to modify the EDC pile integrity determination process if the tip gauge is no longer required. Also, during our projects serving the verification role to EDC testing, we have had

numerous piles where the top gauge displayed issues, making the pile appear to be damaged. The justification supplied by the consultant for why the piles were not damaged was because the tip gauge displayed pre-stress loss of less than 100 microstrains. If the tip gauge is removed, we anticipate more verification testing since this justification will be removed from the equation—meaning more cost to the department. In addition, based on our experience with previous PDA/EDC test piles in design-bid-build projects, DTE who performed PDA testing was responsible for developing recommended pile length and driving criteria solely based on PDA testing results, CAPWAP and refined WEAP analysis per guideline in Appendix F of soils and foundation handbook. Other than PDA/EDC capacity comparison which was already done as far as we know, we do not think mandating the installation of EDC system on all prestressed concrete test piles will provide any benefit to the Department since EDC system is not capable of providing recommended driving criteria. This will only increase test pile cost without adding value to the Department. 455-10.1 Our suggested revision and comments: Delete the sentence. It would be practically difficult for DTE to perform both monitoring and pile driving inspection during pile driving even though DTE is also certified for a CTQP pile driving inspector. The CTQP pile driving inspector has more roles than just recording blow counts during driving. For example, ensuring the piles are supported properly during transport, 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. To that end, there is no discernible difference between the EDC technology and PDA—both systems require the same amount of attention and effort to ensure that project/FDOT specification requirements are met during pile driving operations. In fact, it is our opinion that EDC requires more of the user's attention because they must monitor tip gauges, as well as top gauges where the external gauge system only utilizes top gauges (i.e. less information to process while driving). If the department feels that the role of the DTE is to be expanded on Design Build projects when all piles are to be monitored using EDC, then the same role expansion should be given to the DTE when all piles are to be monitored using PDA.

S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Comments: (7/29/20, Industry)

I have reviewed the proposed changes to section 455 and I am pleased to see that FDOT is including embedded gauges in square prestressed concrete piles. It has been 9 years since Peter Middendorp and myself published an article in the Deep Foundation Industry magazine, where we concluded: "While the data available at this time may not yet be extensive enough to completely disqualify the pile impedance based damage analysis (including the Beta method) to assess pile damage, there is sufficient reason to carefully re-evaluate these methods at this time. This applies especially to the damage classification used for the Beta method, for which there is now clear experimental proof to question the validity. Finally, the use of PDA to prevent damage during pile driving should be included in this re-evaluation as the EDC system has shown that piles are being damaged even when PDA is applied when they are driven into the ground". As a direct result of these findings George Goble and myself carefully reviewed the Beta Method, which had been developed by George Goble and Frank Rausche in the late 1970s, and found it flawed. This was published in a peer-reviewed paper in 2012 for the International Stress Wave Conference in Japan. It is therefore surprising that it took 8 years before the requirement to include embedded gauges was proposed. The other surprising thing to me is that the change is only suggested for square piles. I would have expected that the change would apply to bouth round and square piles, but hopefully that will addressed in a future revision.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

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Comments: (7/29/20, Industry)

SP 4550000DB 455-3 It seems a little to specific to say "use markers or lumber crayons" to mark the intervals. A common practice is to use spray paint and on the surface, this practice would not comply with the specification. There are CEI's out there would hold up an operation until the right marking devices were used.

Juan Castellanos' Response: Change made to allow the use of paint as an option for the contractor.

455-5.13.1 General: For DB projects, I think the type of gauges should be left to the discretion of the DB team. I suggest changing "and" to "or". Generally, I would like for some time limit to be imposed on this change once implemented. I understand there may be a desire to obtain more comparative data in various soil conditions. However, it does not seem reasonable to use two testing methods ad infinitum.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

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Comments: (7/30/20, Industry)

Proposed Specification: 4550512 Structures Foundations AND Proposed Specification: SP4550000DB Structures Foundations (Design-Build) We disagree with the proposed changes requiring that "All square prestressed concrete test piles will be monitored with an external

gauge system and an embedded gauge system concurrently." Redundancy, in this case, is not warranted. An external gauge system or an embedded gauge system will serve the intended purpose. Requiring both unnecessarily increases cost which is neither in the projects' or the public interest. Engineers and Contractors can use EDC at their discretion. After all, EDC is not exactly new to the market and should be able to stand on its own merits, as do external gauges. If both systems are to be considered equivalent, or at least acceptable, then the market should be able to decide on a case by case basis. The FDOT should also consider that requiring EDC in every situation, they are not only unnecessarily increasing the cost, but assuring revenue to the sole entity that can conduct EDC. Certainly, if EDC is the independent, market driven choice of the users (engineers and contractors) then the sole entity will rightfully benefit, however, the FDOT should look closely at how the proposed unnecessary, but mandated, redundancy may usurp the market choices and, in the process, unfairly enrich a small group of companies owned by a single entity.
Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

Specification Section 455-5.18 We disagree with the proposed changes that "For foundation units where all piles are monitored using embedded data collectors, the foundation certification package may be prepared by the DTE, and the DTE may sign and seal revisions to the foundation layout and pile data table if the DTE is prequalified under the appropriate category in Florida Administrative Code (F.A.C.) 14-75." Pile installation is considered an extension of the design process. The DTE has expertise in assessing the performance of individual piles, but the GFDEOR, as past of her/his design has considered the impacts of their complete foundation analysis. Unless one is knowledgeable of the process leading to the design, they cannot effectively assess potential changes during the construction process. Also, the DTE would be modifying a design that was not completed under her or his direct supervision. Any attempt to create a disconnect between the GFDEOR and the substructure construction in not in the best interest of the profession, or, more importantly, of public safety. Also, the FDOT should consider that this unnecessary and potentially disruptive change in current standards may unfairly enrich the EDC providers who are owned by a sole entity and for no beneficial reason. Specification Section 455-10.1 We disagree with the proposed change that "If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded data collectors". The primary responsibility of the DTE is to monitor pile stresses, integrity and capacity. The observation of pile installation including production of the pile driving log, recording hammer blows, hammer stroke height, alignment etc. requires the full attention of the inspector as does the data collection process conducted by the DTE. The DTE cannot provide both functions within standard of care, and an attempt to do so would clearly impact pile integrity, project quality and above all, public safety.
S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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No Name

Comments: (7/30/20, Industry)
The sole provider of EDC has embarked on an aggressive misleading marketing campaign of making people (including FDOT, contractors, engineers and practitioners, etc.) wrongly believe that internal/embedded data collector (EDC) gauges are more economical than using externally mounted instrumentation (PDA), when in fact is totally the opposite. Actually, their website states "This method demonstrates the soil-structure interaction and provides several options to the stakeholders resulting in ECONOMICAL AND ACCELERATED CONSTRUCTION." Even though there aren't too many recent projects to compare the cost of EDC vs. using externally mounted instrumentation (PDA), on the recently built 2.6-mile bridging project on Tamiami Trail which used 100% dynamic load testing with both type of instrumentation, the cost of using EDC gauges was almost double the COMBINED cost of using externally mounted instrumentation (PDA), CTQP inspector costs and Foundation Certifications. This is definitely a huge and unfair burden to taxpayers without any added benefit as the EDC technology is no replacement of externally mounted instrumentation (PDA) or engineering judgment. In fact, on a couple of on-going projects, there has been technical issues with the EDC that resulted in the use of externally mounted sensors, thus adding testing costs and construction time and hence contradicting sole provider of EDC own's website that EDC results in ECONOMICAL AND ACCELERATED CONSTRUCTION. When left to the market place to freely choose, EDC is rarely, if even chosen freely.
Response: Thank-you for your comments.

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Comments: (7/30/20, Industry)
I currently manage of the larger providers of Deep Foundation Testing and Evaluation in the State of Florida with a very large percentage of our work on FDOT projects. In general, FDOT specification changes in the past have been understood and justified from an Engineering perspective. This time I find the proposed change to be the opposite of that. I have been in this industry for more than twenty years and have never seen a change that hijacks the abilities of the Engineers and Inspectors. In this proposal the Dynamic Testing Engineer can trump the Geotechnical Design Engineer, t Structural Design Engineer, and Pile Driving Inspector. I am not sure the motivation behind this change or how this change is valuable to the integrity of the design and designers. Being a Dynamic Testing Engineer and now managing a group of 10 Dynamic Testing Engineers, I can assure you there are many factors of the design that need to addressed outside the scope of our service. There is no part of Dynamic Testing that will evaluate lateral stability, overturning, global stability, uplift, ship impact studies, scour, project specific requirements, etc, which are all part of the design. In fact, the Design Engineers have minimum requirements of experience in order to provide their service. However, the Dynamic

Testing Engineer without these requirements can trump the Engineer and accept the foundation. This change appears extremely reckless and dangerous. I believe there are many changes in the proposal that can be adopted, however, there are many that need to be dismissed and/or reworded. I propose that a review committee be provided which should include 1) The FDOT Engineers that work in Deep Foundations (Specifically the Geotechs), 2) Consulting Engineering Firms that specialize in Deep Foundation Testing and Evaluation on FDOT Projects and 3) Contractors that install Deep Foundation Systems. I would gladly be on such a committee to help rework this proposal to something more acceptable. I have some general comments about specific proposed changes that may not have been considered when it was being written.

455-5.5.13.1, 455-5.14, and 455-7.2 the proposal is recommending two types of dynamic monitoring. Based on my experience this additional data is just an additional cost as the additional data does not provide additional understanding. I would compare this to requiring two speedometers in a car.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

455-5.19 the proposal recommends the DTE certify the foundations. Like stated above, having someone that specializes in Dynamic Testing certify foundations without experience in the pile design process and requirements is very dangerous. 455-10.1, the proposal recommends eliminating the pile inspector with the DTE. As a dynamic testing engineer, I strongly disagree with this, there are many things occurring during pile installation that the DTE would need to focus on and removing that focus would lead to loss of integrity in my opinion. As an example, during low blow count movement, I may need to be watching tension stress and letting the contractor know to lower the stroke, if the pile is moving at 5 to 10 blows per foot, the DTE would not be able to focus on hitting the footmarks every 10 seconds. In addition, I believe the inspector plays a larger role than understood, for example, the inspector documents the pile upon deliver, unloading, storing, pre-forming/drilling, jetting, template construction, standing of piles etc. all of these activities typically occur when the DTE is off site. Lastly, I feel this recommendation benefits one specific company more than all the others. As such, this puts the pile driving industry in Florida at the mercy of the one embedded data equipment manufacturer. In addition, the manufacturer is also the sole provider for monitoring the embedded gages, further requiring one company to participate in all pile driving projects, again putting the entire industry at one company. On Design Build, this one company may not part of the DB Team, which just adds expense, scheduling time, and man hours for no benefit.
S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If*

the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors."

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Paul Bullock
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Comments: (7/30/20, Industry)
455-5.13.1 General - Is it really the intent of FDOT to give all test pile work to a sole source company, i.e. Radise? That will be the effect of the proposed change because EDC equipment is only available for installation by them. They will have personnel on site for EDC and can easily double dip to perform external instrumentation at greatly reduced cost to themselves. This effectively removes any competition for dynamic testing work.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

The EDC equipment has obtained limited penetration in the pile driving community for numerous reasons. It is expensive, it does not provide rigorous computation of pile capacity, it does not have extensive technical literature behind it, and it cannot be performed unless pre-installed. Capacity comparisons have been mostly with other dynamic tests, not static testing. Unlike external instrumentation, there is also no redundancy in the measurements, and there is no indication of misalignment or warning of miscalibration. The EDC company had basically failed for these reasons, and I don't understand why the FDOT is propping it up with taxpayer funds. Perhaps there should be some investigation of this process? It also seems wasteful and costly to include both external and internal instrumentation. In essence, EDC will become the only type of dynamic test performed by the FDOT if this requirement is approved. EDC is required but external testing is not. What is driving this change? External dynamic testing has a long, successful, international track record. Why are you killing it? 455-5.14 Dynamic Load Tests and 455-7.2 Manufacture – Same comments as above.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

455-10.1 General 14. – Why only for EDC. Would not the same apply to an engineer performing a dynamic test using external test equipment?

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

455-17.2 Placement Time Requirements ¬– This wording is not so great. What happens if the first truck batched is not for some reason also the first truck placed? Suggest: "The elapsed time begins at the earliest batch time of any concrete placed in the shaft."
Juan Castellanos' Response: 455-17.2: If the first truck batched is not the first truck placed in the

shaft for any reason, then the batching time of this truck does not count. The current language reads “The elapsed time begins at the time the first truck placed in the shaft is batched. This is equivalent to what the reviewer is saying. No Change made.

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No Name

Comments: (7/30/20, Industry)
Page 17: Suggest the specification uses “internally” mounted gauges instead of “embedded” as this borrows the language of a proprietary product. Furthermore, the industry accepts the distinction between internally and externally mounted gauges, and associated phraseology, therefore the used of “internal” is more appropriate than “embedded.”

Page 19: The Specification should not require two systems concurrently. Both systems provide similar information, therefore there is no added value nor cost savings. To the contrary, this is now “added cost” to the detriment of the taxpayer. Therefore, the following change is suggested: "All square prestressed concrete test piles shall be monitored with either an external gauge system with signal matching or an internal gauge system with signal matching. The internal gauge option, if selected, should come at no additional cost to the department."

Larry Jones’ Response: Thank-you for your comments. This proposed revision has been withdrawn.

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No Name

Comments: (7/30/20, Industry)
As a geotechnical PE with more than 20 years of experience, many of those years in Florida, I'm concerned about the proposed revisions of the specifications seems to place an unnecessary economic burden on the state finances at a time of economic hardship in the nation by requiring two separate systems to monitor test piles. It seems redundant and costly without added benefit to the public. The revisions seem to give preference to a technology that is single sourced.

Larry Jones’ Response: Thank-you for your comments. This proposed revision has been withdrawn.

Additionally, there are concerns regarding liability for the Department by allowing the EDC firm to bypass the Geotechnical Engineer of Record and Structural Engineer from the process of revising the Foundation Layout Plans and submitting foundation certifications. Also, removing experienced CTQP site inspectors if EDC is used may result in lower quality pile installation.
S. Arnold’s Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: “For foundation units where all piles are dynamically load tested, the foundation certification package….”

S. Arnold’s Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: “*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an*

additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.”

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No Name

Comments: (7/30/20, Industry)
The proposed “455-5.13.1” is not justifiable technically and costly, or has any logical reason. The choice of which testing system to be used on any given project should be left up to the responsible design engineers and contractors based on the requirements of the job specification to ensure technical and economic efficiency to the FDOT and protect public interest. “Spec 455-7.2.” - Has no justifiable technical, economic, or rational reason. Again, how come embedded data collectors are so much needed to be required for square concrete piles only, while all other types of concrete piles and steel piles can be tested just fine without it. “Spec 455-7.2.” - Requiring Index 455-003 is biased and promotes the exclusive use of a specific patented system [may be offered by limited / a single source supplier], and excludes a fair and competitive open-market procurement process for public work projects.

Larry Jones’ Response: Thank-you for your comments. This proposed revision has been withdrawn.

The proposed changes allow the Dynamic Testing Engineer [DTE] (only if testing with EDC system) to take on additional roles and responsibilities and replace the site CTQP Pile Inspector and certain functions of the GeoEOR. which is quite technically troublesome on how it will affect the proper pile installation work and Certification of the foundation unit; and is highly biased to the EDC provider/providers with DTE. Having worked in the geotechnical design industry for over 25+ years and being GeoEOR for major FDOT/FTE (250+) projects, the proposed changes to the 455 standard specifications do not solve an existing problem, do not benefit the FDOT and are misguided, uneconomical and unnecessary. Being not a provider of dynamic pile testing [with any methodology], there has been no issues with dynamic pile testers who for decades have been successfully using the external reusable gauges system. We believe that FDOT is a custodian of the public interest and taxpayers’ money and hence, available public funds must be used efficiently, economically and wisely.
S. Arnold’s Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: “For foundation units where all piles are <u>dynamically load tested</u>, the foundation certification package….”

S. Arnold’s Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: “*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*”

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No Name

Comments: (7/30/20, Industry)

* The proposed changes will require EDC on all design/build projects. There is only 1 Firm who provides this proprietary technology for the gauges, software, data analysis, and licensing/cost. The FDOT has long avoided specifications that result in sole sourcing; these changes will result in exactly that and will eliminate competition (both pricing and technological) within the industry. * It's also widely believed in the industry that the term "embedded data collector" is proprietary. I recommend avoiding the term "embedded" in this specification and leave the verbiage "internal" as is. There is no downside to leaving the verbiage "internal" as is but an opportunity for price gouging if the specification mandates sole sourcing. * The FDOT has accumulated much information on the EDC technology during the past several years. The value of the technology should stand on it's own merit and use of EDC should not be mandated.

Larry Jones' Response: Thank-you for your comments. Because the two terms are considered synonymous and interchangeable, the request was implemented by the Specifications Office.

The proposed revision to require concurrent monitoring with 2 methods has been withdrawn.

*Section 455-5.19 proposes to allow the DTE to certify the foundations. The DTE does not have the same level of global design knowledge or responsibility as the Geotechnical Foundation Design EOR. The DTE should not be allowed to certify foundations, as this would weaken the integrity of the overall design and construction of foundations. *Section 455-10.1 proposes to eliminate the Pile Driving Inspector. This proposed verbiage weakens the integrity of the process. It is not feasible to have the Dynamic Testing Engineer adequately monitor the pile stresses and also log the pile driving.

S. Arnold's Response for 455-5.19: The intent is to allow the DTE to modify the foundation layout sheet and pile data table to reflect as-built conditions, not redesign the foundations. The Foundation Layout Sheet is sealed by a structural engineer, so the DTE will have to be prequalified in the structural category appropriate for the bridge. This revision will also be changed as follows so embedded data collectors are not referenced: "For foundation units where all piles are dynamically load tested, the foundation certification package…."

S. Arnold's Response for 455-10.1: Thank you for your comments. We will take them into consideration as we move forward. The revision to 455-10.1(14) will be modified as follows: "*If the Dynamic Testing Engineer is also a CTQP qualified pile driving inspector, then an additional pile driving inspector is not required when driving piles using embedded ~~data collectors~~ sensors.*"

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Comments: (7/30/20, Industry)

How does the EDC system accomodate spliced concrete piles? It seems that mandatory use of EDC would prevent the use of splices. Although splices are not yet common in FDOT projects, they are on the Approved Product List, and in fact FDOT sponsored a project with University of

South Florida to develop an improved version. The EDC seems likely to increase cost rather than reduce cost for most projects. Costs are governed by length, quantity, and installation time. Piles are typically driven to a bearing strata which governs the length. How hard the pile is hit quantifies the capacity, but often does not have significant effect on length. Quantity of piles could be affected by increasing the LRFD factor, but geometry and structural capacity often govern the max load. So the effect is diluted. As for the installation time, the EDC does not allow increased driving stresses so the piles likely won't drive any faster. Unless evidence to the contrary has been documented, the mandatory use of EDC will make prestressed concrete piles more expensive and less competive than other pile types. Because the FDOT specifications are also the default specificaions for commercial projects, there will be negative affects on the commercial prestressed concrete pile market as well. Additionally, what are the consequences if the EDC system fails? What is the failure rate of the system? How many spare EDC piles will be required? How long can they be kept in inventory before the battery charge decays?
Larry Jones' Response: Thank-you for your comments. I understand EDC can accommodate pre-planned splices. Other EDC specific questions should be directed to the manufacturer.

The proposed revisions to require concurrent monitoring with both methods and installing EDCs in all test piles have been withdrawn.

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No Name

Comments: (7/30/20, Industry)
The proposed changes to the the FDOT 455 specifications seem to will be limiting the ability to have a competitive market for public work projects. The EDMC have a single approved source which holds the patent and the testing rights. This limits the opportunity for fair competitive pricing on publicly funded projects. There will also be an extreme financial impact on the current organizations that perform the external PDA procedure. With the single source internal organization onsite testing the internal, there would be no need for a secondary company to monitor the external PDA's. There is also an issue with the ability for the monitoring firm making modifications and approvals of the foundation packages. This has never been a practice allowed for the organizations performing the external monitoring.

Response from General Counsel's Office: Commodities or contractual services available only from a single source may be exempted from the competitive-solicitation requirements of Florida law pursuant to section 287.057(3)(c), F.S., Rule 60A-1.045, F.A.C., and the FDOT Commodities and Contractual Services Procurement Manual.

Larry Jones' Response: Thank-you for your comments. This proposed revision has been withdrawn.

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Comments: (7/30/20, Industry)
Daniel,

I tried multiple times to submit this on the web site and was taken to a site saying the website was experiencing difficulties. I'm not sure if it was submitted or not.

My Comments regarding SP4550000DB and 4550512 are below. As I said, I tried multiple times to use the web site as instructed and was unable to successfully get my comments in. I believe the cut-off date is today so I wanted to make sure my comments were included.

I am sure you have seen emails and comments from my competitors regarding the proposed changes to FDOT specifications (SP4550000DB and 4550512). I too am writing to you as a colleague who is also involved in driven piles and cares about the deep foundation industry. In fact, over 30 years ago, a current competitor taught me and my co-workers at the FDOT District 3 Materials office how to do dynamic testing. While I respect the knowledge and skill of my dynamic testing colleagues I would also like to point out that they are fierce competitors. That said, with regard to these proposed changes, I truly believe some of my competitors are putting their vested business interests in PDI equipment (the manufacturer of system that will be exclusively used by FDOT if these changes are not made) and PDI centric training above the interests of the taxpayers of the State of Florida.

Given that belief, I feel it's my obligation as an engineer to point out my thoughts. Before I continue and so that it is clear to my colleagues, I would like to point of that I currently also have a vested interest in seeing the FDOT make these changes as I am currently employed by Applied Foundation Testing which is now part of the Smart Infrastructure Group, the providers of the Smartpile System. That said, I also have been a believer in this system since the idea was first presented to me by Dr. Mike McVay and Dr. Sastry Putcha twenty years ago. After hearing their ideas, my first question was how can I help. I have been on this journey with them since then. Thinking back to that time, I remember Mike and Sastry presenting this as a method to improve the reliability of driven pile foundations while also improving safety, increasing productivity, and lowering costs. Since that time, some of my competitors have done everything they can to prevent the acceptance of the system. Nobody likes to have competition and it was evident to me that recognized what this project meant their business interests.

In general, the EDC system, if fully embraced by the industry offers significant improvements in safety, reliability, and productivity. It offers the possibility of getting CEI firms more involved in the testing by offering Pile Driving Inspectors the ability to take data while reducing the workload of the dynamic testing engineer. I can go through the benefits of the system, however, I believe most if not all of you are aware of them. The system is now at a point where Engineers need to become comfortable with the results the system provides. The only way this will happen is if the Department makes large scale adoption so that everyone can see what it can do.

My comments are as follows:

The change "all square prestressed concrete test piles will be monitored with an external gauge system and an embedded gauge system concurrently" will allow both the department and those engineers involved in deep foundation testing and inspection to gain deeper knowledge in the system (especially the merits of tip sensor data) on a large scale basis. As with all other test methods used by the FDOT, it takes some time and experience for engineers to develop this knowledge and for the industry as a whole to develop a sufficient base of trained engineers to use the method properly. This proposal also allows those consultants who have made a large investment in testing equipment and training from PDI to recoup their investments over the possible transition period. The comments that I have heard about this change are similar to the

comments I heard over 30 years ago when the department switched over from the ENR formula to doing dynamic testing.

Similarly the “supply and install top and tip embedded gauges in all square prestressed concrete test piles and either top or top and tip, embedded gauges in square prestressed concrete production piles monitored with an embedded gauge system” also will allow both the department and those engineers involved in deep foundation testing and inspection to gain deeper knowledge in the system (especially the merits of tip sensor data) on a large scale basis. As with all other test methods used by the FDOT, it takes some time to develop a sufficient base of trained engineers to use the method properly. This proposal also allows those consultants who have made a large investment in testing equipment and training from PDI to recoup their investments over the possible transition period.

“Supply and install top and tip embedded gauges in all square prestressed concrete test piles and either top or top and tip, embedded gauges in square prestressed concrete production piles monitored with an embedded gauge system, in accordance with Standard Plans, Index 455-003. Ensure the embedded gauges are installed by personnel approved by the manufacturer.” Not requiring Index 455-003 also promotes the exclusive use of a specific patented system offered by a single source supplier and excludes every other dynamic testing equipment manufacturer from participating in a fair and competitive open-market procurement process for public works.

The proposed changes allow the Dynamic Testing Engineer only if testing with the EDC system to take on the additional role of inspector reduces the costs associated with the system and offers the opportunity for increasing the role of site inspector. It does not remove any of the requirements for the design engineer. Dynamic testers will still have a role in assisting with the interpretation of the dynamic test data and providing recommendations on how the pile is to be driven.

The FDOT is a custodian of the public interest and taxpayers’ money. Dwindling available public funds must be used efficiently and wisely. In my opinion (based on my over thirty years of testing experience throughout the United States) the proposed changes to the 455 standard specifications are forward-thinking and necessary to increase production and reduce overall foundation costs. They solve existing problems with respect to safety and reliability, they benefit the FDOT and the industry as a whole and add to the well-being or safety of the public. They also increase fairness, level-field, competition, and open-market public procurement of pile testing service by giving a monopoly that has enjoyed this status throughout the US for over thirty years a competitor. This by increasing competition in this industry, the state, and the country as a whole should benefit from reduced costs, greater innovation, and overall improved testing reliability.

Best Regards,
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Response: Thank-you for your comments.

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