

4551501 STRUCTURES FOUNDATIONS – C. DRILLED SHAFTS  
COMMENTS FROM INTERNAL/INDUSTRY REVIEW

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Comment: (10-11-10) Page 4, Paragraph 2, sentence 1 should be modified as follows, “For drilled shafts installed to support mast arms, cantilever signs, overhead truss signs, high mast light poles or other miscellaneous structures, provide temporary surface casings from at least 1 foot above the ground surface to at least 5 feet below the ground surface. ~~to aid shaft alignment and position, to prevent sloughing of the top of the shaft, to provide for additional slurry head inside the shaft and to facilitate overpouring of the shaft during concreting.~~” While those may be the reasons why casings are required, that language does not belong in the contract.

Response: Text deleted.

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OHagan, David

Comments: (10-12-10) 455-15.1.3, paragraph 4, last sentence: Why are we specifying what to do when these shafts are “located within permanent sidewalks”? These shafts should never be located in these regions. If they are, then there is a bust in the plans

Response: This language was inserted at the request of industry due to the increasing frequency these foundations within (widened) sidewalks in some areas where RFIs confirmed the plans were correct.

No changes made.

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Comments: (10-12-10) Rather than “within”, consider “adjacent to”. Mast arm supports and other structures supported by drilled shafts are often immediately adjacent to sidewalk if not completely surrounded by sidewalk. ...but I agree with David that the term “within” is not a good way to state this.

Response : “Within” describes the partial to complete surrounding of a circle by a rectangular area more clearly than “adjacent to.”

No changes made.

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Comments: (10-13-10)

**1 – Subarticle 455-15.1.3 General Methods & Equipment Last Paragraph: the first sentence very lengthy. It is about five lines. Delete the phrases “ ... to aid shaft alignment and position, to prevent sloughing of the top of the shaft, to provide for additional slurry head inside the shaft and to facilitate overpouring of the shaft during concreting.”**

Instead start the second sentence by mentioning “maintain the shaft alignment in its position, prevent sloughing of the top of the shaft, provide space for additional slurry head inside the shaft and facilitate over pouring of the shaft during concreting.”

Last Sentence of the first paragraph: “ ..provide temporary surface casings from no lower than the top of sidewalk to at least 5 feet below the ground surface.” . Change “no lower” to “not lower”.

**2- Subarticle 455-15.3 Wet Construction Method- Last paragraph: Change “..before the drill advances” to “before the drilling operation advances”**

**3- 455-15.8.2 Polymer Slurry For Shafts For Miscellaneous Structures- paragraph below the Table:**

The phrase “manufacturer’s published procedures” is open to interpretation, whether it is a publication in a national journal or it indicates a printed document such as manufacturer’s printed brochure or handbook..

**4- 455-15.11.3 Shaft Inspection Device (SID)- First and second Paragraphs: Change “debris using a SID” to “debris using an SID” and “Furnish a SID meeting the following requirements:” to “Furnish an SID meeting the following requirements:”**

**5- 455-17.1 General- Second Paragraph: Delete “in accordance with Section 400.”**

Response:

1. Most of this text has been used for many years without incident. However, some revisions were made after discussions with Dan Hurtado.
2. Disagree – no change made.
3. Disagree – no change made.
4. Disagree – no change made.
5. Disagree – no change made.

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Lou Buenaventura  
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Comments: (10-13-10) Still reviewing the Spec, but one comment is - When is a Shaft Inspection Device (SID) to be used??

Is it on every drill shaft installed or just as deemed required by the Engineer. And how is it to be paid for??

The Drill Shaft Installation plan is detailed in 455-15.1.2. and requires us to "*Provide the make and model of the shaft inspection device, if applicable.*"

Further, in Section 455-15.11.3, the Specifications detail the requirements of what a SID is to be capable of. I may have missed it, but I did not see exactly when the SID is to be utilized?

Every shaft or not??

Response: The SID is to be used when shown in the plans for shafts indicated in the plans. (Generally it is used on all bridge foundation shafts if the requirement is shown in the plans.) When it is required, all cost related to the shaft inspection device is included in the cost of drilled shaft items.

“When shown in the plans,” and “Include all cost related to the inspection device in the cost of drilled shaft items.” in the deleted text were restored to the text revision.

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Sastry Putcha Ph.D., P.E  
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Comments: (10-14-10) It appears that the portion “when shown in the plans” was deleted inadvertently and needs to go into the final version. I will talk to Rudy and add back the deleted part in the final version so that the spec will read “**When shown in the plans**, furnish all power and equipment necessary for the Engineer to inspect the bottom conditions of a drilled shaft excavation and to measure the thickness of bottom sediment or any other debris using a SID.”

Response: Text added.

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Comments: (10-14-10) Based on testing performed during the FDOT Sponsored research project titled “EVALUATION OF HYBRID SLURRY RESULTING FROM THE INTRODUCTION OF ADDITIVES TO MINERAL SLURRY” BDK84 977-08, the minimum mineral slurry viscosity should be 30 sec/qt rather than 28 sec/qt.

Response: Change made.

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Comment: (11-9-10) I have reviewed the above referenced specification. So long as “Proposed CSLS Specialty Engineer” and “Engineer” are defined terms in the provision, I have no further comments. In the event Proposed CSLS Specialty Engineer and Engineer refer to the same person, one or the other term should be used for consistency.

Response: There is not a reference to a “Proposed CSLS Specialty Engineer” in the specification. The terms Specialty Engineer and Engineer are defined in Section 1 of the Standard Specification. No Changes Made

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Castellanos, Juan

Comments: (11-9-10) 1. **455-15.1.2 Drilled Shaft Installation Plan**, in item 4: Contractor is not required to log the drilling: “Details of shaft excavation methods ~~and drilling log procedures.~~”

2. **455-16.3 Support, Alignment, and Tolerance**, second paragraph: add a specific requirement for the bottom spacer: “Use concrete wheels or other approved noncorrosive spacing devices within 3 feet from the bottom ~~near~~ the bottom, within 3 6 feet of the top, and intervals not exceeding 15 feet along the shaft to ensure concentric spacing for the entire length of the cage. Do not use block or wire type spacers....”

3. **455-16.4 Cross-Hole Sonic Logging (CSL) Tubes:** “Install CSL access tubes full length in all drilled shafts from the **actual** tip of shaft to a point high enough above top of shaft to allow cross-hole-sonic-logging testing....
4. **Section 455-15-11.5.** This section needs to be revised to delete the references to the sidewall sampler. The time of excavation should be enough to call for overreaming, whether there is a sampler or not. I have never seen a sidewall sampler and the Department does not even have one anymore. And in miscellaneous shafts, I really doubt that we will ever have a sidewall sampler available for miscellaneous shafts.
5. Perhaps this is a good time to put back the overreaming pay item. The specs (section 455-23.5) talk about measure it and even correct the overream quantity when the casing ID is slightly smaller than the plan diameter. It would not make sense to measure it, if we don't have a pay item. Alternatively, if putting back the pay item is not desired, then section 455-23.5 should be deleted.
6. **Section 455-16.1 Pilot Hole:** Add the following sentence at the end of the one paragraph: “Before starting to drill any pilot hole, provide at least 3 working days notice to the Engineer.”

**Response:**

1. Agree – Change made
2. Agree – Change made
3. Disagree – No change made
4. Agree – Changes made
5. This will be considered for a future revision to the Specification – No change made
6. This will be considered for a future revision to the Specification – No change made

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**Ken Zinck**

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Comments: (12-6-10) Section 455-16.2 last paragraph ... deeper shafts; “the rebar cage may be spliced or suspended”, seems to me to need a little more explanation: IE ... “lengthened by spicing per section 415-5.4, or suspend the cage by temporary support from ground elevation, as approved by the Engineer.”

**Response: Disagree – No change made**

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Comments: (12-6-10) Don Rauch is not here today. But I got what he was doing. I have highlighted in red his recommended changes to the proposal. Section 455-15.11.5.1 is to be deleted, rather than delete he recommends the verbiage listed below. Section 455-15.9.3 is not addressed in this change however he recommends changing that section to the verbiage listed below. For section 455-17.1 He added a line to the current proposed change and it is also marked in red. Hope this helps, Sorry for the confusion.

SUBARTICLE 455-15.11.5.1 (Pages 569 – 570) is deleted and the following substituted:

455-15.11.5.1 Excavation Time for shafts for miscellaneous Structures: For drilled shafts installed to support mast arms, cantilever signs, overhead truss signs, high mast light poles or other miscellaneous structures, adjust excavation operations so that the maximum time that slurry is in contact with the bottom 5 feet of the shaft (from time of drilling to concreting) does

not exceed 12 hours. If exceeding the 12 hour time limit, overream the bottom 5 feet of shaft at no additional expense to the Department prior to performing other operations in the shaft.

**Response: Disagree; this already covered in the last paragraph of 455-15.11.5. No changes made.**

SUBARTICLE 455-15.9.3 (Page 567) is deleted and following substituted:

455-15.9.3 Wet Excavations: Construct the tremie or pump line used to deposit concrete beneath the surface of water so that it is water-tight and will readily discharge concrete. Construct the discharge end of the tremie or pump line to prevent water intrusion and permit the free flow of concrete during placement operations. Ensure that the tremie or pump line has sufficient length and weight to rest on the shaft bottom before starting concrete placement. Ensure that the discharge end of the tremie or pump line is embedded at least **5 feet into the concrete at all times during the concrete placement when the shaft length is less than 15 feet in length and** 10 feet into the concrete at all times during placement operations after 10 feet of concrete has been placed **when the shaft length is greater than 15 feet long.** Ensure that the free fall of concrete into the hopper is less than 5 feet at all time. Support the tremie so that it can be raised to increase the discharge of concrete and lowered to reduce the discharge of concrete. The Engineer will not allow rapid raising or lowering of the tremie to increase the discharge of the concrete. Maintain a continuous flow of concrete and a positive pressure differential of the concrete in the tremie or pump line at all times to prevent water or slurry intrusion into the shaft concrete.

**Response: Disagree; no changes made.**

SUBARTICLE 455-17.1 (Page 571) is deleted and the following substituted:

455-17.1 General: Place concrete in accordance with the applicable portions of Sections 346 and 400, 455-15.2, 455-15.3, 455-15.4, 455-15.5, 455-15.8, 455-15.9, and the requirements herein. Place concrete as soon as possible after completing all excavation, cleaning the shaft excavation, inspecting and finding it satisfactory, and immediately after placing reinforcing steel. Continuously place concrete in the shaft to the top elevation of the shaft. **For drilled shafts under miscellaneous structures, after placing concrete to the top of the ground and flushing and cleanup, remove the temporary casing, set the top form and hand install the conduit to the correct depth. Continue concrete placement to the top of the form representing the top of shaft elevation, flush and cleanup and then remove the tremie.** Place concrete through a tremie or concrete pump using approved methods.

After the shaft is overpoured sufficiently to eliminate all contaminated concrete, additional concrete may be added to the shaft without the use of a tremie or pump in accordance with Section 400.

**Response: Disagree; for all shafts above the water elevation, there is not a need to place concrete through the tremie once the temporary casing has been flushed free of soil, debris and slurry contaminated concrete. For land shafts constructed above the groundwater elevation, there is not a need to leave the tremie or temporary casing in place after the contaminated concrete is removed from around the shaft. The casing can be removed, concrete added from the chute to the top of the shaft and rodded into the tremie placed concrete to prevent a cold joint. No changes made.**

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Comments: (12-6-10) Currently Section 415 has the following sections for approved QPL items: Mechanical Rebar Splices and Plastic Chair and Bolsters. Will there eventually be a section for Spacers? 455-16.3 states, "Use concrete wheels or other approved noncorrosive spacing devices." It goes on to state, "Use spacers constructed of approved material equal in quality and durability to the concrete specified for the shaft. The Engineer will approve spacers subject to satisfactory performance in the field." I would like it cleared up where these are approved. How can the Engineer ever approve a spacer for the first time on satisfactory performance in the field? How would spacers ever get approved?

Response: These spacers are not QPL items. All references to spacers are listed in 415, removed last two sentences from paragraph 2 in 455-16.3

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