

Section 10.5

DRILLED SHAFTS

10.5.1 Purpose

To establish a procedure to monitor and document the installation of load test, methods and production drilled shafts for bridge and non-bridge structures and obtain drilled shaft lengths for bridges. This procedure applies to conventional projects; for Design Build projects refer to **Section 10.12**.

10.5.2 Authority

Sections 20.23(3)(a), and 334.048(3), Florida Statutes (F.S.)

10.5.3 References

Section 455, Standard Specifications for Road and Bridge Construction and any supplements thereto

10.5.4 Scope

The principal users of this document include the State Construction Office District Materials and Research Offices (DMRO), District Construction Offices (DCO), District Operations Centers, the State Materials Office (SMO), and Construction Engineering and Inspection (CEI) firms working for the Department.

10.5.5 Definitions

District Construction Engineer (DCE): The authority on the entire construction activity in the District.

Construction Engineering and Inspection (CEI): In this procedure, it refers to the Consultant personnel performing CEI services or the Department's personnel group performing CEI services.

Geotechnical Engineer: In this procedure, the Geotechnical Engineer may be the District Geotechnical Engineer (DGE), any Department Engineer assigned for the project by the DGE, the Consultant Geotechnical Engineer working directly for the DGE, or the Geotechnical Engineer employed by the Department's Consultant CEI performing under the direction of the DCE and DGE.

Project Administrator (PA): The Administrator who shall be responsible for the everyday construction activity at the project under the direction of the Resident Engineer/Senior Project Engineer.

Resident Engineer (RE): The Department's local area representative who reports directly to the DCE and may be either a Department employee of the District or an employee of an engineering firm which is serving as the Department's Consultant CEI representative.

10.5.6 General

The steps to establish shaft lengths consist of approval of the Contractor's drilled shaft installation plan, recording of method shaft installation, monitoring and analyzing load test data, data from the core borings and pilot holes performed at every shaft location, if available., in accordance with **Section 455, Standard Specifications for Road and Bridge Construction**, and any supplements thereto.

All documents requiring a signature must be executed electronically by both parties in accordance with article 4-1 of the Standard Specifications.

10.5.7 Drilled Shaft Installation Plan

(A) Resident Level Responsibilities

The RE (or PA) shall receive from the Contractor at the preconstruction conference a completed drilled shaft installation plan (DSIP). The plan shall provide detailed information about Contractor's equipment and methods suitable for the intended purpose and the materials encountered. The RE (or PA) shall submit this plan to the Geotechnical Engineer within two (2) working days for evaluation, review and recommendations.

The RE (or PA) shall perform a concurrent separate review of the DSIP and incorporate their own comments to the ones received from the Geotechnical Engineer. Within two (2) working days of the receipt of the Geotechnical Engineer's comments and/or recommendations, the RE (or PA) shall notify the Contractor of acceptance, rejection, or request additional information and/or changes that may be necessary to construct the drilled shafts. The letter of rejection shall contain the reason(s) for rejection of the plan.

All approvals given by the RE shall be subject to trial and satisfactory installation of the test hole, load test shafts, and production shafts.

(B) District Materials and Research Office (DMRO) Level Responsibilities

Within five (5) working days of receiving the drilled shaft installation plan, the DGE shall make comments and/or recommendation to the RE (or PA) of the acceptance or rejection of the drilling system.

10.5.8 Method Shaft, Load Test shaft and Pilot Holes

As soon as the Contractor's schedule for pilot holes and installation of method shafts and load test shafts is known, the PA shall notify the Geotechnical Engineer of the schedule so the Geotechnical Engineer can be present.

(A) Resident Level Responsibilities

A drilling log shall be maintained during pilot hole operations on *the Pilot Hole Log, Form No. 700-010-35* by the inspectors to record the soils and rocks encountered, and document rock core measurements during the drilling of the pilot hole. A drilling log shall be maintained during coring operations on the *Rock Core* page of the *Drilled Shaft for Major Structures, Form No. 700-010-85*, by the Department or by the CEI to document rock core measurements and rock description from cores taken at the base of the shaft.

Method shafts and load test shafts shall be documented as described in section 10.5.10.

Completed installation forms of the Pilot Holes, Method shaft and Load Test Shafts shall be sent to the Geotechnical Engineer within 24 hours of completion for review and use in the analysis and recommendations of the production shaft lengths.

(B) DMRO Level Responsibilities

A representative of the DGE office shall be available on site or over the phone to assist the CEI and resolve questions during these initial phases of the drilled shaft construction. The DGE office shall assist the inspectors to monitor the drilled shafts and fill the inspection logs properly.

10.5.9 Production Shaft Length

Production shaft lengths are established utilizing the results of the pilot holes, test hole installation, and load test/core boring program and contract documents. Actual shaft length of a particular shaft may vary from the Plans length depending on the subsurface soil conditions encountered during shaft installation. (If no new information is available since the plans were developed, plan shaft tip elevations are the authorized tip elevations and no shaft authorization letter is required).

(A) Resident Level Responsibilities

Upon receipt of the **Production Drilled Shaft Tip Elevations** letter from the Geotechnical Engineer, the RE shall approve the recommendation and send it to the Contractor within one (1) working day.

Completed forms shall be sent to the Geotechnical Engineer within twenty-four (24) hours of completion for review and use in recommending the production shaft lengths. All load test data, pilot hole logs and core boring reports, if any, shall also be sent to the Geotechnical Engineer within twenty-four (24) hours after being received from the Contractor. Installation of all drilled shafts including Test Holes, Load Test Shafts, major structure production drilled shafts, and drilled shafts for miscellaneous structures must be inspected by Construction Training Qualification Program (**CTQP**) Qualified Drilled Shaft Inspectors.

(B) DMRO Level Responsibilities

Within seven (7) working days of receipt of the completed **Test Hole Logs, Pilot Hole Logs**, and any **Load Test Reports**, the Geotechnical Engineer shall write a **Production Drilled Shaft Tip Elevations** letter to the RE or higher authority recommending the shaft tip elevations to be used on the project. The RE or higher authority shall send this letter to the prime Contractor authorizing production shaft lengths as indicated in section 10.5.9

(A). A sample letter is included in this chapter. Refer to **Guidance Document 10-5-A** for sample letter and distribution.

If requested, the Geotechnical Engineer may make a telephone call or send an electronic mail to notify the PA of the shaft lengths. The Drilled Shaft installation documents for the **Test Hole Log, Load Test Report, Pilot Hole Log**, and any attachments shall be included with the letter of authorization.

10.5.10 Drilled Shaft Installation

(A) Resident Level Responsibilities

Any Drilled Shaft installation shall be electronically documented in the field by the inspectors, on either **Drilled Shaft for Miscellaneous Structures, Form No. 700-010-84, or Drilled Shaft for Major Structures, Form No. 700-010-85 depending of the type of structure**. These forms contain several pages to document all the phases of the Drilled Shaft Installation. There are several areas on these forms to include notes and comments. These notes or comments may describe any relevant incidents that occurred during the shaft installation, or any information that the recorder feels may be beneficial to the Geotechnical Engineer/PA.

Completed installation forms for all production drilled shafts shall be sent to the Geotechnical Engineer within twenty-four (24) hours of completion of concrete placement for review.

(B) DMRO Level Responsibilities

During production shaft installation, the GE may decide to lengthen the shaft based on the cores taken from the shaft bottom. In these instances, the Geotechnical Engineer will confirm with an electronic mail to the CEI the additional length required.

The GE will perform a review of the drilled shaft logs to ensure the performed construction procedures and constructed shaft tip elevations are in accordance with the contract documents. Based on the logs review and field observations, the GE will decide whether any integrity testing is required to ensure the quality of the foundations. Within two (2) working days after receiving the production drilled shaft logs, the GE will send an e-mail to the PA/RE to inform about the acceptance of the drilled shafts or the need for integrity testing prior to final acceptance of the shaft.

10.5.11 Drilled Shafts for Non-Bridge Structures

To improve the quality of the installation of Drilled Shafts for non-bridge structures, DCEs shall obtain technical support from the District Geotechnical Office on drilled shaft projects involving mast arms, cantilever signs, overhead truss signs, high mast light poles, or other non-bridge structures shown in the **Contract Documents**. This process includes review of DSIP, conduct at the earliest pre-drill/pre-concrete pour meetings, quality assurance checks and inspector assistance, etc. The RE (or PA) shall notify the District Geotechnical Offices of the construction schedules of the drilled shafts for non-bridge structures for the projects so they can schedule time to assist.

Completed installation forms for all production drilled shafts shall be sent to the Geotechnical Engineer within twenty-four (24) hours of completion of concrete placement for review.

Completed installation forms for all production drilled shafts shall be sent to the Geotechnical Engineer within twenty-four (24) hours of completion of concrete placement for review. The GE will perform a review of the drilled shaft logs to ensure the performed construction procedures and constructed shaft tip elevations are in accordance with the contract documents. Within two (2) working days after receiving the production drilled shaft logs, the GE will send an e-mail to the PA/RE to inform about the acceptance of the drilled shafts or the need for integrity testing prior to final acceptance of the shaft.

10.5.12 Training

All FDOT and CEI personnel performing inspections of pile installation must hold a current Construction Training Qualification Program (CTQP) Drilled Shaft Inspector certification.

10.5.13 Forms

The following forms are available from the Policy & Process Management Forms Library at [Procedural Document Library \(fdot.gov\)](https://www.fdot.gov/forms):

- 700-010-35 Pilot Hole Log
- 700-010-84 Drilled Shaft for Miscellaneous Structures Forms Workbook
- 700-020-85 Drilled Shaft for Major Structures Forms Workbook

Guidance Document 10-5-A

(DATE)
(ADDRESSEE)

Re:
Financial Project ID:
Contract No.:
County:
Structure #

Dear (_____):

This office (or the Geotechnical Engineering Form) has completed its review of the test load/core boring data for the subject bridge. Recommended Drilled Shaft Tip Elevations and rock socket lengths are as follows:

LOCATION	SHAFT SIZE	RECOMMENDED SHAFT TIP ELEVATION	MINIMUM SOCKET LENGTH
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If you have any questions or require further information, please let us know.

Recommended by: _____
District Geotechnical Engineer/ Geotechnical Engineer

Recommended for acceptance by: (when consultant generates the letter)

District Geotechnical Engineer

Authorized for contract administration purpose by:

Resident Engineer

(INITIALS/INITIALS)

cc: State Construction Geotechnical Engineer
State Structures Design Engineer's Office (State Design Geotechnical Engineer)
FHWA (only if Federal Aid oversight project)