

Section 10.12

FOUNDATIONS ON DESIGN-BUILD PROJECTS

10.12.1 Purpose

To establish a procedure for observing, reviewing, and accepting foundations installed by a Design Build Firm.

10.12.2 Authority

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

10.12.3 References

Section 455, Standard Specifications for Road and Bridge Construction and Supplements thereto.

10.12.4 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 personnel group performing CEI services.

Geotechnical Engineer: The Engineer engaged by the Department to review all foundation construction documents submitted by the Design-Build (DB) Firm and provide recommendations to the CEI on foundation issues. 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 District Geotechnical Engineer, or the Geotechnical Engineer employed by the Department's Consultant CEI and performing under the direction of the DCE and the DGE. If the Geotechnical Engineer is engaged by the Consultant CEI, the District Level Responsibilities in this procedure will also be the Resident Level Responsibilities. The CEI Geotechnical Engineer shall coordinate with the DGE in performing his/her responsibilities.

Verification Testing Geotechnical Engineer (VTGE): The Engineer engaged by the Department to perform verification testing. Verification testing could be dynamic testing and integrity testing. It could be the same consultant geotechnical sub consultant working for the CEI, DGE, in-house Department personnel from the DGE, or a consultant working directly for the DGE.

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

Resident Engineer (RE): The Engineer supervising the CEI and responsible for the construction activities in the residency. In this procedure, this could be the Senior Project Engineer responsible for the construction activities of the project.

10.12.5 Piles

10.12.5.1 General

The DB Firm is responsible for the determination of pile lengths and driving criteria, and inspecting and recording the pile installation using the proper FDOT forms. The CEI must perform a review and verification of the work performed by the DB Firm.

It will be the responsibility of the CEI to plan and coordinate with the DGE and other parties involved to make sure the deadlines specified in the contract documents are met, including reviewing, rejecting or accepting submittals, performing verification tests, and providing results to the DB Firm.

10.12.5.2 Acceptance of the Pile Installation Plan

(A) Resident Level Responsibilities

The RE (or PA) shall receive from the Contractor at the preconstruction conference or at least fifteen (15) days prior to driving the initial test pile a completed **Pile Installation Plan (PIP)**.

Within one (1) working day after receiving the PIP from the DB Firm, the RE (or PA) shall forward the document to the DGE and the Geotechnical Engineer for review and comments. The CEI shall perform a concurrent separate review of the PIP. For a revised PIP, the RE (or PA) shall forward the document to the DGE and the Geotechnical Engineer within the same day of receiving it.

Within one (1) working day of receipt of the Geotechnical Engineer's comments, the RE (or PA) shall incorporate the CEI's comments and notify the Contractor of the acceptance or rejection and request additional information and/or changes that may be necessary to satisfy the Contract Documents. The letter of rejection shall contain the comments and reasons for rejection of the PIP. For a revised PIP, provide similar notification to the Contractor within one (1) working day after receipt of the Geotechnical Engineer's comments. The RE (or PA) must ensure that the deadlines allowed by the Specifications are met.

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

The Geotechnical Engineer shall make comments and/or recommendations to the RE (or PA) for the acceptance or rejection of the PIP within three (3) working days of receiving it. For a revised PIP, the Geotechnical Engineer shall make comments and/or recommendations within one (1) working day of receiving the PIP.

10.12.5.3. Test Pile and Production Pile Installation

(A) Resident Level Responsibilities

The CEI must perform an over-the-shoulder inspection of the activities performed by the DB Firm during pile testing and production pile driving and ensure that the DB Firm is following FDOT procedures and documenting the installation using the proper FDOT forms. As soon as the Contractor's schedule for driving test piles is known, the RE (or PA) shall notify the DGE and the Geotechnical Engineer of the schedule so that they have the opportunity to observe the installation of the test piles.

The CEI must ensure the requirements in the Released for Construction (RFC) Plans, Specifications, accepted PIP, and other contract documents are followed throughout the installation of the test and production piles. In addition, the CEI personnel must observe over-the-shoulder and verify the driving criteria are followed during the installation of production piles.

The DB Firm is required to submit pile driving records within one (1) working day of driving piles. The CEI must forward this information to the DGE and the Geotechnical Engineer within one (1) working day.

(B) District Level Responsibilities

Since the deadline to review Foundation Certification Packages is only one (1) working day, the DGE and the Geotechnical Engineer should start reviewing the production pile driving records as soon as possible prior to receiving the Foundation Certification Packages.

10.12.5.4 Production Pile Lengths and Driving Criteria

Production pile lengths and driving criteria are established by the DB Firm utilizing the results of the test pile program and contract documents. Production lengths and driving criteria must be submitted by the DB Firm at least two (2) working days prior to the beginning of the production pile driving. The CEI is not required to submit a formal acceptance document on these submittals. However, if there are issues in the proposed lengths or driving criteria that are in conflict with the RFC Plans, accepted PIP, Specifications or other contract documents that may affect the integrity of the foundation, the RE (or PA) shall notify the DB firm upon receiving comments from the Geotechnical Engineer.

(A) Resident Level Responsibilities

Upon receipt of the production pile length and driving criteria letters from the DB Firm, the RE (or PA) shall forward the package to the DGE and the Geotechnical Engineer within one (1) working day. If comments are received from the Geotechnical Engineer (see item B below), forward them immediately to the DB Firm and request them to be addressed prior to driving piles.

(B) DMRO Level Responsibilities

Within one (1) working day of receiving the production pile length and driving criteria letters the Geotechnical Engineer shall perform a brief review to check for problems in the letters such as whether the DB Firm used the correct nominal bearing resistance, that the lengths are determined based on dynamic test results and geotechnical conditions, that the blow count criteria were developed from analyses performed at the correct elevations, and whether there are stroke limitations in the letter to prevent pile overstress. Submit any concerns or comments to the RE (or PA).

10.12.5.5 Foundation Certification Packages

After completion of the piles driven in one foundation unit, the RE (or PA) will receive from the DB Firm a Foundation Certification Package.

(A) Resident Level Responsibilities

Upon receipt of the Foundation Certification Package from the DB Firm, the RE (or PA) shall forward the package to the DGE and the Geotechnical Engineer within the same working day and perform a concurrent review to verify that the package is complete. After the reviews are performed, the RE (or PA) shall notify the Contractor of the rejection or need for verification of the foundation unit within the same working day of receiving the notification from the Geotechnical Engineer.

(B) DMRO Level Responsibilities

The Geotechnical Engineer shall perform a review of the Foundation Certification Package to make sure it addresses all the requirements for acceptance (such as load capacity, integrity, settlements). Also, the Geotechnical Engineer shall verify that the language of the signed and sealed certification clearly certifies the foundation unit without disclaimers. Refer to **Guidance Documents 10-12-A**, for an **Example of Acceptable Language in Certification Letters**. The Geotechnical Engineer shall perform additional analyses to verify the accuracy of the driving criteria prior to receiving the packages. These analyses shall commence at the time the DB team submits the pile length and driving criteria letters. A careful review of the driving logs shall be performed to determine whether there is a need to perform verification testing.

Within one (1) working day of the receipt of the Foundation Certification Package, the Geotechnical Engineer shall submit a notification to the RE (or PA) recommending one of the following actions:

- Rejection of the Foundation Certification Package indicating the reasons for its rejection.
- Requesting a verification test and the verification test location.

If the Geotechnical Engineer has no comments on the foundation package, no notification is required.

10.12.5.6 Verification Testing and Acceptance

(A) Resident Level Responsibilities

If verification testing is required by the Geotechnical Engineer, the RE (or PA) shall request the DB firm perform a verification test on the pile selected by the Geotechnical Engineer. Once the Contractor indicates when the verification set-check test will be performed, the RE (or PA) shall schedule the VTGE to instrument the pile selected for verification.

After receiving a notification from the Geotechnical Engineer indicating that the verification testing is complete and no further action is required (see item (B) below), the RE (or PA) shall immediately forward the results of the verification testing to the DB Firm and notify it that no further action is required. If the Geotechnical Engineer finds the tested pile unacceptable, the RE (or PA) shall immediately notify the DB Firm, provide the DB Firm with the verification test results and request the DB Firm to follow the corrective procedures specified in the Specifications and other contract documents.

(B) DMRO Level Responsibilities

Within one (1) working day of testing, the Geotechnical Engineer shall provide the results of the verification testing to the RE (or PA). If the results are acceptable, the Geotechnical Engineer shall issue a notification to the RE (or PA) indicating that the verification testing is complete and no further action is required. If the verification test results are unacceptable, the Geotechnical Engineer shall issue a notification to the RE (or PA) recommending rejection of the foundation, provide the verification test results, and request the DB Firm to follow the corrective procedures specified in the Specifications and other contract documents.

10.12.6 Drilled Shafts

10.12.6.1 General

The DB Firm is responsible for the determination of drilled shaft lengths; tip elevations and rock socket lengths; inspection; and recording the drilled shaft installation using the proper FDOT forms. The CEI must perform a review and verification of the work performed by the DB Firm.

It will be the responsibility of the CEI to plan and coordinate with the DGE and other parties involved in this procedure to make sure the deadlines specified in the contract documents are met; including reviewing, rejecting or accepting submittals, performing verification tests, and providing results to the DB Firm.

10.12.6.2 Acceptance of the Drilled Shaft Installation Plan

(A) Resident Level Responsibilities

The RE (or PA) shall receive from the Contractor at the preconstruction conference or at least fifteen (15) days prior to the installing the first shaft in the project a completed **Drilled Shaft Installation Plan (DSIP)**.

Within one (1) working day after receiving the DSIP from the DB Firm, the RE (or PA) shall forward the document to the DGE and the Geotechnical Engineer for review and recommendations. The RE (or PA) shall perform a concurrent separate review of the DSIP. For a revised DSIP, the RE (or PA) shall forward the document to the DGE and the Geotechnical Engineer within the same day of receiving it.

Within one (1) working day of receipt of the Geotechnical Engineer's comments, the RE (or PA) shall incorporate the CEI's comments and notify the Contractor of the acceptance or rejection and request additional information and/or changes that may be necessary. The letter of rejection shall contain the comments and reasons for rejection of the DSIP. For a revised DSIP, the RE (or PA) shall provide similar notification to the Contractor within the one (1) working day from receipt of the Geotechnical Engineer's comments. The RE (or PA) must ensure that the deadlines allowed by the Specifications are met.

(B) DMRO Level Responsibilities

The Geotechnical Engineer shall make comments and/or recommendations to the RE (or PA) of the acceptance or rejection of the DSIP within three (3) working days of receiving it. For a revised DSIP, the Geotechnical Engineer shall make comments and/or recommendations within one (1) working day of receiving the DSIP.

10.12.6.3 Test Shafts and Production Drilled Shafts Installation

(A) Resident Level Responsibilities

The CEI must perform an over-the-shoulder inspection of the activities performed by the DB Firm during installation of test shafts (test holes and load test shafts) and production drilled shafts and ensure that the DB Firm is following FDOT procedures and documenting the installation using the proper FDOT forms. As soon as the Contractor's schedule to construct the test holes and load test shafts is known, the RE (or PA) shall notify the DGE and the Geotechnical Engineer of the schedule so that they have the opportunity of observing the installation of the test shafts.

The CEI must ensure that the requirements in the RFC Plans, Specifications, approved DSIP, and other contract documents are followed throughout the installation of the test and production shafts. In addition, the CEI must observe over-the-shoulder and verify that the DB team is properly recording the drilled shaft construction.

The DB Firm is required to submit drilled shaft logs within 24 hours after concrete placement. The CEI must forward this information to the DGE and the Geotechnical Engineer within the same day. The Geotechnical Engineer may select a shaft for integrity testing after reviewing the drilled shaft logs. The RE (or PA) shall notify the DB Firm of any required integrity testing within one (1) working day of receiving this request from the Geotechnical Engineer, making sure the deadline allowed by the Specifications is met.

(B) DMRO Level Responsibilities

The Geotechnical Engineer shall review the production drilled shaft logs, determine if there are any potential quality problems, and decide if integrity testing is required. The Geotechnical Engineer shall submit the request to the RE (or PA) for integrity testing within one (1) working day after receiving the drilled shaft logs.

10.12.6.4 Pilot Holes, Production Drilled Shaft Tip Elevations and Minimum Rock Socket Lengths

Design production drilled shaft tip elevations, minimum rock socket lengths, and other criteria are established by the DB Firm utilizing the results of the geotechnical exploration, pilot holes, lab testing, and load testing results. Performance of pilot holes shall be witnessed by qualified geotechnical personnel supervised by the Geotechnical

Engineer. The final design drilled shaft tip elevations and rock socket information may be presented in the RFC plans or may be submitted in a document package prepared by the DB Firm after the pilot holes and load tests are completed. The RE (or PA) shall forward this information to the DGE and the Geotechnical Engineer the same day this package is received.

(A) Resident Level Responsibilities

As soon as the Contractor's schedule to perform the pilot holes is known, the RE (or PA) shall notify the DGE and the Geotechnical Engineer of the pilot hole schedule so that the Geotechnical Engineer may schedule his/her personnel to witness the pilot hole operation.

The RE (or PA) shall forward the final design drilled shaft elevations and rock socket lengths package to the DGE and the Geotechnical Engineer within one (1) working day for review. Upon receiving the comments from the Geotechnical Engineer, the RE (or PA) shall forward them to the DB Firm on the same day.

(B) DMRO Level Responsibilities

The Geotechnical Engineer shall perform a review of the load test results, pilot hole, lab test information, calculations, and final drilled shaft tip elevations recommendations submitted by the DB Firm. Within three (3) working days after receiving the information, the Geotechnical Engineer shall make recommendations to the RE (or PA) of the acceptance or rejection of the proposed drilled shaft tip elevations. The letter of rejection shall contain the comments and reasons for rejection.

10.12.6.5 Foundation Certification Packages

After completion of the drilled shafts in one foundation unit, the RE (or PE) will receive from the DB Firm a Foundation Certification Package.

(A) Resident Level Responsibilities

The same day of the receipt of the Foundation Certification Package from the DB Firm, the RE (or PA) shall forward the package to the DGE and the Geotechnical Engineer. Perform a concurrent review to verify that the Foundation Certification Package is complete. After the reviews are performed, the RE (or PA) shall notify the Contractor of the rejection or need for verification of the foundation unit within the same working day of receiving the notification from the Geotechnical Engineer.

(B) DMRO Level Responsibilities

The Geotechnical Engineer shall review the Foundation Certification Package to make sure it addresses all the requirements needed for acceptance (such as load capacity, integrity, and settlements). Also, the Geotechnical Engineer must verify that the language of the signed and sealed certification clearly certifies the foundation unit without disclaimers. Refer to ***Guidance Documents 10-12-A***, for an ***Example of Minimum Language in Certification Letters***.

Within one (1) working day of the receipt of the Foundation Certification Package, the Geotechnical Engineer shall submit a notification to the RE (or PA) recommending one of the following actions:

- Rejection of the Foundation Certification Package indicating the reasons for its rejection.
- Requesting verification tests and the verification test locations.

If the Geotechnical Engineer has no comments on the foundation package, no notification is required.

10.12.6.6 Verification Testing

(A) Resident Level Responsibilities

If verification is required by the Geotechnical Engineer, the RE (or PA) shall coordinate with the VTGE. The test shall be performed within one (1) working day after the DB Firm has been notified on the need of verification testing. The results of the verification test shall be submitted to the DGE and the Geotechnical Engineer within two (2) working days after performing the test. After receiving a notification from the Geotechnical Engineer indicating that the verification testing is complete and no further action is required (see item (B) below), the RE (or PA) shall immediately forward the results of the verification testing to the DB Firm and notify it that no further action is required. If the Geotechnical Engineer finds any tested shaft unacceptable, the RE (or PA) shall immediately notify the DB Firm, provide the DB Firm with the verification test results, and request the DB Firm to address any deficient drilled shaft in accordance with the Specifications and other contract documents and submit a solution to the Department for review.

(B) DMRO Level Responsibilities

After receipt of the verification test results from the RE (or PA), the Geotechnical Engineer shall review the results, determine the acceptability of the shaft or identify additional needs for verification testing, and provide recommendations to the RE (or PA) within two (2) working days.

If the verification testing is performed by the DGE (or a consultant working directly for the DGE), the Geotechnical Engineer shall coordinate with the DGE and shall submit the test results and recommendations to the RE (or PA) within two (2) working days of completing the test in the field.

If the results are acceptable, the Geotechnical Engineer shall issue a notification to the RE (or PA) indicating that the verification testing is complete and no further action is required. If the verification test results are unacceptable, the Geotechnical Engineer shall issue a notification to the RE (or PA) recommending rejection of the foundation, provide the verification test results, and request the DB Firm follow the corrective procedures specified in the Specifications and other contract documents.

10.12.7 Auger Cast Piles

10.12.7.1 General

The Design-Build (DB) Firm is responsible for the determination of auger cast pile lengths and inspecting and recording the pile installation using the proper FDOT forms. The CEI must perform a review and verification of the work performed by the DB Firm.

10.12.7.2 Acceptance of the Auger Cast Pile Installation Plan

(A) Resident Level Responsibilities

The RE (or PA) shall receive from the Contractor at the preconstruction conference or at least fifteen (15) days prior to the installation of the demonstration pile a completed **Auger Cast Pile Installation Plan (ACPIP)**.

Within one (1) working day after receiving the ACPIP from the DB Firm, the RE (or PA) shall forward the document to the DGE and the Geotechnical Engineer for review and recommendations. The CEI shall perform a concurrent separate review of the ACPIP.

For a revised ACPIP, the RE (or PA) shall forward the document to the DGE and the Geotechnical Engineer within the same day of receiving it.

Within one (1) working day of receipt of the Geotechnical Engineer's comments, the RE (or PA) shall incorporate the CEI's comments, notify the Contractor of the acceptance or rejection, and request additional information and/or changes that may be necessary. The letter of rejection shall contain the comments and reasons for rejection of the ACPIP. For a revised ACPIP, the RE (or PA) shall provide similar notification to the Contractor within one (1) working day after receipt of the Geotechnical Engineer's comments. The RE (or PA) must ensure that the deadlines allowed by the Specifications are met.

If the CEI requires technical assistance from the Geotechnical Engineer, as soon as the Contractor's schedule to construct the demonstration pile is known, the RE (or PA) shall notify the DGE and the Geotechnical Engineer of the schedule so that they may observe the installation of the demonstration pile and provide technical assistance.

(B) DMRO Level Responsibilities

The Geotechnical Engineer shall make comments and/or recommendations to the RE (or PA) of the acceptance or rejection of the ACPIP within three (3) working days of receiving it. For a revised ACPIP, the Geotechnical Engineer shall make comments and/or recommendations within one (1) working day of receiving the ACPIP.

10.12.7.3. Demonstration Pile and Production Piles Installation

(A) Resident Level Responsibilities

The CEI shall perform an over-the-shoulder inspection of the activities performed by the DB Firm during installation of demonstration auger cast pile and production auger cast piles and ensure that the DB Firm is following FDOT procedures and documenting the installation using the proper FDOT forms. The CEI must ensure the requirements in the RFC Plans, Specifications, accepted ACPIP, and other contract documents are followed throughout the installation of the demonstration and production piles. In addition, the CEI must observe over-the-shoulder and verify that the required auger cast pile tip elevations and other design requirements established by the DB firm are followed during the installation of the demonstration pile and production piles.

(B) DMRO Level Responsibilities

The Geotechnical Engineer shall provide technical assistance as required by the CEI in resolving auger cast pile installation issues that may arise during construction. This assistance includes the observation of the demonstration pile, field visits, reviewing Engineering Analysis Reports on piles that did not meet the Specifications requirements, and review of the Foundation Certification Packages.

10.12.7.4 Foundation Certification Packages

After completion of the auger cast piles in one foundation unit, the RE (or PA) will receive from the DB Firm a Certification Package. A foundation unit is defined as a group of piles per wall segment or per full wall.

(A) Resident Level Responsibilities

Upon receipt of the Foundation Certification Package from the DB Firm, the RE (or PA) shall forward it to the DGE and the Geotechnical Engineer within the same working day and perform a concurrent review to verify that the package is complete. If after the reviews, the foundation package is considered deficient, the RE (or PA) shall notify the Contractor of the rejection of the foundation within the same working day of receiving the notification from the Geotechnical Engineer.

(B) DMRO Level Responsibilities

The Geotechnical Engineer shall perform a review of the Foundation Certification Package to make sure it addresses all the requirements needed for acceptance (such as load capacity, integrity, and settlements). Also, the Geotechnical Engineer must verify that the language of the signed and sealed certification clearly certifies the foundation unit without disclaimers. Refer to **Guidance Documents 10-12-A**, for an **Example of Acceptable Language in Certification Letters**.

Within two (2) working days of the receipt of the Foundation Certification Package, if the certification is not acceptable, the Geotechnical Engineer shall submit a notification to the RE (or PA) recommending its acceptance or rejection including the reasons for rejection. If the Geotechnical Engineer has no comments on the Foundation Certification Package, no notification is required.

10.12.8 Spread Footings

10.12.8.1 General

The Design-Build (DB) Firm is responsible for the determination of spread footing design, inspection and recording the footing construction. CEI must perform a review and verification of the work performed by the DB Firm.

10.12.8.2 Spread Footing Construction

(A) Resident Level Responsibilities

The CEI must perform an over-the-shoulder inspection of the activities performed by the DB Firm during spread footing construction to ensure the DB Firm is following FDOT procedures and meets the requirements indicated in the RFC Plans, Specifications, and other pertinent contract documents. The CEI must observe and verify that the required foundation depths, dewatering, excavations, support of excavations, foundation subgrade materials, foundation materials and details, and foundation seals are in accordance with the design requirements established by the RFC Plans and Specifications.

(B) DMRO Level Responsibilities

The Geotechnical Engineer shall provide technical assistance as required by the CEI in geotechnical construction issues that may arise during construction. This assistance includes field visits, records review, reviewing Engineering Analysis Reports on questionable footings, field testing, and technical recommendations.

10.12.8.3 Foundation Certification Packages

After completion of the spread footings in one foundation unit, the RE (or PA) will receive from the DB Firm a Foundation Certification Package. A foundation unit is defined as a spread footing.

(A) Resident Level Responsibilities

Upon receipt of the Foundation Certification Package from the DB Firm, the RE (or PA) shall forward it to the DGE and the Geotechnical Engineer within the same working day and perform a concurrent review to verify the package is complete. If after the reviews, the foundation package is considered deficient, the RE (or PA) shall notify the

Contractor of the rejection of the foundation within the same working day of receiving the notification from the Geotechnical Engineer.

(B) DMRO Level Responsibilities

The Geotechnical Engineer shall perform a review of the Foundation Certification Package to make sure it addresses all the requirements needed for acceptance (such as load capacity, integrity, and settlements). Also, the Geotechnical Engineer must verify that the language used in the signed and sealed certification letter clearly certifies the foundation unit without disclaimers Refer to ***Guidance Documents 10-12-A***, for an ***Example of Acceptable Language in Certification Letters***.

Within one (1) working day of the receipt of the Foundation Certification Package, if the certification is not acceptable, the Geotechnical Engineer shall submit a notification to the RE (or PA) recommending its rejection, including the reasons for rejecting it. If the Geotechnical Engineer has no comments on the Foundation Certification Package, no notification is required.

Guidance Document 10-12-A

Example of Acceptable Language in Certification Letters

(ADDRESSEE)

(DATE)

Financial Project ID:

FAP No.:

Contract No.:

County:

Subject: Foundation Certification Letter for Pier/Bent/structure
Project Name, Bridge/structure identification, Bridge #

Dear (_____):

Consultant Firm's Name has completed a review of the (list the documents that the consultant reviewed for this certification such as pile driving records/drilled shaft records/auger cast piles records, dynamic load test data, static, Statnamic, load test data, integrity test data, spread footing field inspection records, etc). All the production piles/shafts/auger cast piles (select one) were inspected by a CTQP certified pile driving/drilled shaft/auger cast pile (select one) inspector under our supervision and the final position and axial alignment were verified. (Note: in case of tolerances being exceeded, an evaluation must be included in the package).

Based on our review, we hereby certify that all these piles/drilled shafts/auger cast piles/spread footings meet the Design and Construction criteria established for this foundation which includes axial capacity including uplift, lateral stability, integrity, and foundation settlement.

Submitted by:

Firm's Name
FPBE CAT

Geotechnical Foundation Design Engineer of Record Name
FBPE license #