



*Florida Department of Transportation*

**RICK SCOTT**  
**GOVERNOR**

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**SECRETARY**

May 11, 2016

Khoa Nguyen  
Director, Office of Technical Services  
Federal Highway Administration  
3500 Financial Plaza, Suite 400  
Tallahassee, Florida 32312

Re: State Specifications Office  
Section **451**  
Proposed Specification: **4510200 Prestressed Soil Anchors.**

Dear Mr. Nguyen:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

The changes are proposed by Juan Castellanos of the State Construction Office to clarify the language related to acceptance testing.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via email to [dan.hurtado@dot.state.fl.us](mailto:dan.hurtado@dot.state.fl.us).

If you have any questions relating to this specification change, please call me at 414-4130.

Sincerely,

Signature on file

Dan Hurtado, P.E.  
State Specifications Engineer

DH/dt

Attachment

cc: Florida Transportation Builders' Assoc.  
State Construction Engineer

**PRESTRESSED SOIL ANCHORS.****(REV ~~3-24-16~~ 5-11-16)**

ARTICLE 451-2 is deleted and the following substituted:

**451-2 Definitions.**

1. Anchorage Devices: The anchor head wedges or nuts which grip the prestressing steel.
2. Bearing Plate: The steel plate which distributes the prestressed soil anchor force to the structure.
3. Bond Length: The length of the prestressed soil anchor which is bonded to the ground and transmits the tensile force to the soil or rock. For a compression prestressed soil anchor, the bond length will be different from the tendon bond length.
4. Factored Design Load: The maximum anticipated load that will be applied to the prestressed soil anchor during its service life after completing stressing and testing. The factored design load includes appropriate load factors to ensure that the overall structure has adequate strength for its intended use.
5. Fine-grained Soils: Soils with at least 50% of the material smaller than the No. 200 sieve size.
6. Tendon: The complete anchor assembly, excluding grout, consisting of anchorage and prestressing steel with sheathing and coating when required.
7. Coupling: The means by which the prestressing force may be transmitted from one partial-length of prestressing tendon to another.
8. Sheathing: Enclosure around the prestressing steel to avoid temporary or permanent bond between the prestressing steel and the surrounding grout or to provide corrosion protection.
9. Coating: Material used to protect against corrosion or lubricate the prestressing steel.
10. Anchor Grout: Portland cement grout that is injected into the anchor hole to provide anchorage at the bond length of the tendon.
11. Proof Load: Temporary loading of an anchor to its factored design load for testing purposes.
12. Transfer (Lock-Off) Load: Prestressing force in an anchor after proof loading immediately after the force has been transferred from the jack to the stressing anchorage.
13. Stressing Anchorage: That portion of assembly not within the earth fill.
14. Alignment Load: A small load maintained on an anchor during testing sufficient to keep the testing equipment positioned.
15. Performance Test: Incremental test loading and unloading of a prestressed anchor recording the movement of the tendon at each increment.
16. Proof Test: Incremental loading of a prestressed anchor recording the movement of the tendon at each increment.
17. Creep Test: A test to determine the movement of the tendon at constant load during a certain period of time.
18. Lift-Off Reading: A check made to determine that the actual transfer load is within 10% of the desired transfer load. This check is made immediately after transferring the load to the stressing anchorage.
19. Residual Movement: The non-elastic (non-recoverable) movement of an anchor measured during soil anchor testing.

20. Elastic Movement: The recoverable movement of an anchor measured during soil anchor testing.

21. Prestressed Soil Anchor: A system, referred to as a tieback or a ground anchor, used to transfer tensile loads to soil or rock. A prestressed soil anchor includes all prestressing steel, anchorage devices, bearing plates, grout, coatings, corrosion protection, sheathings and couplers if used.

22. Minimum Specified Ultimate Tensile Strength: The minimum breaking strength of the prestressing steel as defined by the specified standard.

23. Tendon Bond Length: The length of the tendon which is bonded to the anchor grout.

24. Total Anchor Length: The unbonded length plus the tendon bond length.

25. Unbonded Length ~~(Stressing Length)~~: The length of the tendon which is not bonded to the grout ~~and free to elongate during stressing~~. The grout surrounding the unbonded length is a void filler and provides corrosion protection.

26. Service Load: The load anticipated to be applied to the prestressed soil anchor during its service life after completing stressing and testing in order to limit deflection. The service load does not include load factors.

27. Test Stressing Length: The unbonded length plus the length extending through the jack up to the anchorage devices during any anchor acceptance test (i.e. Performance Test, Proof Test or Creep Test).

SUBARTICLE 451-7.6 is deleted and the following substituted:

**451-7.6 Prestressed Soil Anchor Load Test Acceptance Criteria:** The Engineer will accept a performance or proof-tested prestressed soil anchor with a 10 minute load hold if the:

1. ~~p~~Prestressed soil anchor carries the maximum test load with less than 0.04 inches of movement between 1 minute and 10 minutes; and
2. For performance tests, totalnet movement at the maximum test load cycle (movement between alignment load after 0.90 DL and the final movement reading at 1.00 DL) exceeds 80% of the theoretical elastic elongation of the ~~unbonded~~test stressing length. For proof tests, net movement at the maximum test load (movement between alignment load and the final movement reading at 1.00 DL) exceeds 80% of the theoretical elastic elongation of the test stressing length.

The Engineer will accept a performance or proof-tested prestressed soil anchor with a 60 minute load hold if the:

1. ~~p~~Prestressed soil anchor carries the maximum test load with a ~~creep~~deformation rate that does not exceed 0.08 inches/~~in the last~~ log cycle of time; and
2. For performance tests, totalnet movement at the maximum test load cycle (movement between alignment load after 0.90 DL and the final movement reading at 1.00 DL) exceeds 80% of the theoretical elastic elongation of the ~~unbonded~~test stressing length. For proof tests, net movement at the maximum test load (movement between alignment load and the final movement reading at 1.00 DL) exceeds 80% of the theoretical elastic elongation of the test stressing length.

The Engineer will accept a creep tested prestressed soil anchor if the:

1. ~~p~~Prestressed soil anchor carries the maximum test load with a creep rate that does not exceed 0.08 inches/log cycle of time; and

2. ~~total~~Net movement at the maximum test load cycle (movement between alignment load after 0.90 DL and the final movement reading at 1.00 DL) exceeds 80% of the theoretical elastic elongation of the ~~unbonded~~test stressing length.

If the total movement of the prestressed soil anchors at the maximum test load does not exceed 80% of the theoretical elastic elongation of the ~~unbonded~~test stressing length, replace the prestressed soil anchor at no cost to the Department.

Stop the creep test as soon as the creep rate exceeds 0.08 inches/log cycle of time. Incorporate prestressed soil anchors which have a creep rate greater than 0.08 inches/log cycle of time in the finished work at a load equal to one-half its failure load. The failure load is the load carried by the prestressed soil anchor after the load has been allowed to stabilize for 10 minutes without exceeding 0.04 inches of movement between 1 and 10 minutes.

When a prestressed soil anchor does not satisfy the load test acceptance criteria, the Contractor may modify the design and/or the construction procedures. These modifications may include, but are not limited to, installing replacement prestressed soil anchors, reducing the factored design load by increasing the number of prestressed soil anchors, modifying the installation methods, increasing the bond length or changing the prestressed soil anchor type. Obtain the Engineer's approval prior to making any modification which requires changes to the structure. Perform any modifications at no additional cost to the Department. The Department will not allow additional Contract Time for modifications. The Engineer will not allow retesting of the failed prestressed soil anchor.

**PRESTRESSED SOIL ANCHORS.****(REV 5-11-16)**

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**451-2 Definitions.**

1. Anchorage Devices: The anchor head wedges or nuts which grip the prestressing steel.
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3. Bond Length: The length of the prestressed soil anchor which is bonded to the ground and transmits the tensile force to the soil or rock. For a compression prestressed soil anchor, the bond length will be different from the tendon bond length.
4. Factored Design Load: The maximum anticipated load that will be applied to the prestressed soil anchor during its service life after completing stressing and testing. The factored design load includes appropriate load factors to ensure that the overall structure has adequate strength for its intended use.
5. Fine-grained Soils: Soils with at least 50% of the material smaller than the No. 200 sieve size.
6. Tendon: The complete anchor assembly, excluding grout, consisting of anchorage and prestressing steel with sheathing and coating when required.
7. Coupling: The means by which the prestressing force may be transmitted from one partial-length of prestressing tendon to another.
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9. Coating: Material used to protect against corrosion or lubricate the prestressing steel.
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25. Unbonded Length: The length of the tendon which is not bonded to the grout. The grout surrounding the unbonded length is a void filler and provides corrosion protection.

26. Service Load: The load anticipated to be applied to the prestressed soil anchor during its service life after completing stressing and testing in order to limit deflection. The service load does not include load factors.

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**451-7.6 Prestressed Soil Anchor Load Test Acceptance Criteria:** The Engineer will accept a performance or proof-tested prestressed soil anchor with a 10 minute load hold if the:

1. Prestressed soil anchor carries the maximum test load with less than 0.04 inches of movement between 1 minute and 10 minutes; and

2. For performance tests, net movement at the maximum test load cycle (movement between alignment load after 0.90 DL and the final movement reading at 1.00 DL) exceeds 80% of the theoretical elastic elongation of the test stressing length. For proof tests, net movement at the maximum test load (movement between alignment load and the final movement reading at 1.00 DL) exceeds 80% of the theoretical elastic elongation of the test stressing length.

The Engineer will accept a performance or proof-tested prestressed soil anchor with a 60 minute load hold if the:

1. Prestressed soil anchor carries the maximum test load with a deformation rate that does not exceed 0.08 inches in the last log cycle of time; and

2. For performance tests, net movement at the maximum test load cycle (movement between alignment load after 0.90 DL and the final movement reading at 1.00 DL) exceeds 80% of the theoretical elastic elongation of the test stressing length. For proof tests, net movement at the maximum test load (movement between alignment load and the final movement reading at 1.00 DL) exceeds 80% of the theoretical elastic elongation of the test stressing length.

The Engineer will accept a creep tested prestressed soil anchor if the:

1. Prestressed soil anchor carries the maximum test load with a creep rate that does not exceed 0.08 inches/log cycle of time; and

2. Net movement at the maximum test load cycle (movement between alignment load after 0.90 DL and the final movement reading at 1.00 DL) exceeds 80% of the theoretical elastic elongation of the test stressing length.

If the total movement of the prestressed soil anchors at the maximum test load does not exceed 80% of the theoretical elastic elongation of the test stressing length, replace the prestressed soil anchor at no cost to the Department.

Stop the creep test as soon as the creep rate exceeds 0.08 inches/log cycle of time. Incorporate prestressed soil anchors which have a creep rate greater than 0.08 inches/log cycle of time in the finished work at a load equal to one-half its failure load. The failure load is the load carried by the prestressed soil anchor after the load has been allowed to stabilize for 10 minutes without exceeding 0.04 inches of movement between 1 and 10 minutes.

When a prestressed soil anchor does not satisfy the load test acceptance criteria, the Contractor may modify the design and/or the construction procedures. These modifications may include, but are not limited to, installing replacement prestressed soil anchors, reducing the factored design load by increasing the number of prestressed soil anchors, modifying the installation methods, increasing the bond length or changing the prestressed soil anchor type. Obtain the Engineer's approval prior to making any modification which requires changes to the structure. Perform any modifications at no additional cost to the Department. The Department will not allow additional Contract Time for modifications. The Engineer will not allow retesting of the failed prestressed soil anchor.