Florida Department of Transportation

RICK SCOTT
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

ANANTH PRASAD, P.E.
SECRETARY

July 18, 2012

Monica Gourdine
Program Operations Engineer
Federal Highway Administration
545 John Knox Road, Suite 200
Tallahassee, Florida 32303

Re: Office of Design, Specifications
Section **548**
Proposed Specification: **5480500 Retaining Wall Systems.**

Dear Ms. Gourdine:

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

These changes were proposed by Rudy Powell of the State Construction Office, to clarify the definition of a LOT when three walls form a "U" like at a bridge abutment. Language is also added to simplify LOTs when the same material is used between back-to-back walls.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via email to SP965TT or trey.tillander@dot.state.fl.us.

If you have any questions relating to this specification change, please call me at 414-4140.

Sincerely,

V. Y. "Trey" Tillander, III, P.E.
State Specifications Engineer

TT/cah
Attachment
cc: Florida Transportation Builders' Assoc.
State Construction Engineer

RETAINING WALL SYSTEMS.
(REV *7*~~5~~-1*8*4-12)

ARTICLE 548-5 (of the Supplemental Specification) is deleted and the following substituted:

548-5 Concrete Component Construction.

Construct concrete components in accordance with Section 400. Precast wall components are produced using certification acceptance; therefore, assume responsibility for performance of all quality control testing and inspections required by Sections 346 and 400 for the precast component construction. Perform all Quality Control (QC) inspection and testing using Construction Training and Qualification Program (CTQP) qualified personnel. Perform compressive strength testing in a laboratory *meeting and maintaining at all times the qualification requirements listed in Section 105*~~*meeting and maintaining at all times the qualification requirements listed in Section 105*~~. [hrp1]The minimum time for form removal is 12 hours. Unless otherwise indicated in the Contract Documents, apply a Class 3 finish to the concrete surface for the front face, and roughly screed the rear face to eliminate open pockets of aggregate and surface distortions in excess of 1/4 inch.

548-5.1 Curing: Cure concrete components in accordance with Section 400.

548-5.2 Tolerances: Meet the following manufactured tolerances:

1. Precast Component Dimensions: Lateral position of soil reinforcement attachment devices-within 1 inch. All other dimensions-within 3/16 inch.

2. Precast Component Squareness: Angular distortion of the component shall not exceed 0.2 inches in 5 feet.

3. Precast Component Surface Finish: Surface defects on smooth formed surfaces measured on a length of 5 feet shall not exceed more than 0.1 inch. Surface defects on textured finished surfaces measured on a length of 5 feet shall not exceed 5/16 inch.

548-5.3 Marking of Precast Components: Permanently and legibly mark the following information on the back of each precast wall panel by etching: the panel number or type, piece mark, project number (if applicable), date cast and precast manufacturer's name or symbol with the approved producer's QC stamp affixed.

SUBARTICLE 548-8.5.1 (of the Supplemental Specification) is deleted and the following substituted:

548-8.5.1 Compacted Select Backfill: Perform work in accordance with an approved QCP meeting the requirements of 105-3. A LOT is defined as a single lift of finished embankment not to exceed 500 feet in length *or cumulative length of continuous, interconnected walls. Backfill within 3 feet from the panels and backfill beyond 3 feet from the panels are separate LOTs. Overlapping retaining volumes may be considered one LOT, excluding the 3 feet width behind the panels. Strips up to 8 feet wide between two retaining volumes constructed with the same material in one operation may be considered as one LOT with the retaining volumes.[hrp2]* Isolated compaction operations

will be considered as separate LOTs. For multiple phase construction, a LOT will not extend beyond the limits of the phase.

Place the backfill closely following the erection of each course of precast components or soil reinforcement layers and spread by moving the machinery parallel to the wall face. Do not allow equipment heavier than 8 tons closer than 3 feet behind the wall face. Place backfill in a manner to avoid any damage or disturbance to the wall materials or misalignment of the facing materials. Remove and replace any wall materials which become damaged or disturbed during backfill placement at no cost to the Department, or correct as directed by the Engineer. Remove and reconstruct any misalignment or distortion of the wall facing due to placement of backfill outside the limits of this specification at no cost to the Department.

Sheepfoot, grid rollers or other types of equipment employing a foot are not allowed. Achieve compaction within 3 feet of the back of the wall face using a power operated roller or plate weighing less than 1,000 lbs. At a distance greater than 3 feet from the back of the wall, a vibratory roller may be used, provided that the frequency and amplitude combined with bulk weight of the roller has performed satisfactorily at a trial section of the same type of wall. A smooth wheel or rubber tire roller is considered adequate. Ensure that the maximum lift thickness after compaction does not exceed 6 inches. Decrease the lift thickness if necessary, to obtain specified density.

Perform backfill compaction in a way that the compactor moves in a direction parallel to the wall face and proceeds from a distance not less than 3 feet behind the wall face toward the end of the soil reinforcement element.

Ensure that the moisture content of the backfill material prior to and during compaction is uniformly distributed throughout each layer of material. Use backfill material having a placement moisture content at the dry side of the Optimum Moisture content. To achieve the required compaction moisture content, use water that meets the requirements of Section 923. Do not use saltwater. Do not transport excessively moist backfill materials to the site for any reason. The Engineer will determine the Optimum Moisture Content in accordance with FM 5-521.

At the end of each day's operation, shape the last level of backfill to permit runoff of rainwater away from the wall face or provide a positive means of controlling run off away from the wall such as temporary pipe, etc.

ARTICLE 584-9 (of the Supplemental Specification) is deleted and the following substituted:

548-9 Acceptance Program.

548-9.1 General Requirements: Meet the requirements of 120-10 except delete the requirement of 120-10.1.4.1, 120-10.1.4.3, 120-10.2 and 120-10.3.

548-9.2 Maximum Density Determination: *Determine the maximum* ~~Obtain a minimum~~ QC density ~~*to be*of 100% of the maximum density~~ *in accordance with*~~as determined by~~ FM 1 T-180*. Determine the maximum density in accordance with AASHTO T-99, Method C*.

Perform gradation tests on the sample collected in accordance with AASHTO T 27 and FM 1-T 011. Classify soils in accordance with AASHTO M–145 in order to determine compliance with embankment utilization requirements.

548-9.3 Density Testing Requirements: Ensure compliance with the requirements of nuclear density testing in accordance with FM 1-T 238. Determine the in-place moisture content for each density test. Use FM 1-T 238, FM 5-507 (Determination of Moisture Content by Means of a Calcium Carbide Gas Pressure Moisture Tester), or FM 5-535 (Laboratory Determination of Moisture Content of Granular Soils by Use of a Microwave Oven) for moisture determination.

Perform these tests at a minimum frequency of one set of tests per LOT. ~~One set of tests is defined as a density test for the fill within 3 feet behind the wall face and another density test for the fill beyond 3 feet behind the wall face.~~ [hrp3]

Determine test locations including stations and offsets, using the random number generator provided by the Engineer. Do not use note pads or work sheets to record data for later transfer to the density log book. Notify the Engineer upon successful completion of QC testing on each LOT.

548-9.4 Acceptance Criteria: Obtain a minimum density of 90% of the maximum dry density as determined by FM 1 T-180 within 3 feet behind the wall face and obtain a minimum density of 95% of the maximum dry density as determined by FM 1 T-180 from beyond 3 feet behind the wall face.

548-9.4.1 Optional Acceptance Criteria for A-3 and A-2-4 Materials:

Obtain a minimum density of 95% of the maximum dry density as determined by AASHTO T-99 within 3 feet behind the wall face and obtain a minimum density of 100% of the maximum dry density as determined by AASHTO T-99 beyond 3 feet behind the wall face.

The combined width from both MSE wall backfill (excluding the 3 feet zone from the panels) and embankment material may be considered the same LOT if the same material is used; the material in both wall backfill and embankment is compacted with the same procedure, equipment and compacting effort; and the maximum lift thickness after compaction in both wall backfill and embankment is 6 inches.

[hrp4] **548-9.5 Frequency:** Conduct sampling and testing at a minimum frequency listed in the table below. The Engineer will perform Verification sampling and tests at a minimum frequency listed in the table below.

Test Name	Quality Control	Verification
Maximum Density	One per soil type	One per soil type
Density	One set of tests per LOT	One set of tests per four LOTs for each type of QC test.
Gradation	One per Maximum Density	One per Maximum Density
LL&PI	One per Maximum Density	One per Maximum Density
Soil Classification	One per Maximum Density	One per Maximum Density
Organic Content	One per soil type	One per soil type

In addition, for permanent walls utilizing metallic soil reinforcement, test for corrosiveness at a minimum frequency of one test per soil type at point of placement according to the electro-chemical table in 548-2.6. The Engineer will collect enough material to split and create two separate samples and retain one for Resolution at point of placement until LOTs represented by the samples are accepted. The Engineer will perform Verification tests for corrosiveness at a minimum frequency of one test per soil type.

548-9.6 Verification Comparison Criteria and Resolution Procedures:

548-9.6.1 Maximum Density Determination: The Engineer will collect enough material to split and create two separate samples and retain one for Resolution until LOTs represented by the samples are accepted.

The Engineer will meet the requirements of 120-10.4.1 except replace AASHTO T 99, Method C with FM 1-T 180, Method D. *If the Contractor selects the Optional Acceptance Criteria, the Engineer will verify the Quality Control results of AASHTO T-99, Method C in accordance with 120-10.4.1.*

548-9.6.2 Density Testing: Meet the requirements of 120-10.4.2.

548-9.6.3 Soil Classification: The Engineer will meet the requirements of 120-10.4.3 except test the sample retained in 548-9.6.1 instead of taking the additional one.

548-9.6.4 Gradation: The Engineer will verify the QC results if the Verification result meets the gradation limits set forth in the gradation table of 548-2.6. Otherwise, the Engineer will test the sample retained in 548-9.6.1. The State Materials Office or an AASHTO accredited laboratory designated by the State Materials Office will perform Resolution testing. The material will be sampled and tested in accordance with AASHTO T 27 and FM 1-T 011.

If the Resolution Test result satisfies the required gradation limits, the LOTS will be verified. If the Resolution Test results do not meet the required gradation limits, reconstruct the LOTS with acceptable material. The Engineer will perform new verification testing.

548-9.6.5 Liquid Limit and Plasticity Index (LL&PI): The Engineer will verify the QC results if the Verification result satisfies the plasticity index and liquid

limit criteria set forth in 548-2.6. Otherwise, the Engineer will test the sample retained in 548-9.6.1. The State Materials Office or an AASHTO accredited laboratory designated by the State Materials Office will perform Resolution testing. The material will be sampled and tested in accordance with AASHTO T 90 and AASHTO T 89 respectively.

If the Resolution Test result satisfies the required criteria, LOTS of that soil type will be verified. If the Resolution Test results do not meet the required criteria, reconstruct the corresponding LOTS with acceptable material. The Engineer will perform new verification testing.

548-9.6.6 Corrosiveness: The Engineer will verify the QC results if the Verification result satisfies the electro-chemical test criteria set forth in 548-2.6. Otherwise, the Engineer will test the sample retained in 548-9.5. The State Materials Office or an AASHTO accredited laboratory designated by the State Materials Office will perform Resolution testing. The material will be sampled and tested in accordance with FM 5-550, FM 5-551, FM 5-552 and FM 5-553.

If the Resolution Test result satisfies the required criteria, material of that soil type will be verified and accepted. If the Resolution Test results do not meet the required criteria, reject the material and reconstruct with acceptable material.

548-9.6.7 Organic Content: The Engineer will verify the QC results if the Verification result satisfies the organic content test criteria set forth in 548-2.6. Otherwise, the Engineer will collect three additional samples. The material will be sampled and tested in accordance with FM 1-T 267 and by averaging the test results for three randomly selected samples from at least one lift per soil type. The State Materials Office or an AASHTO accredited laboratory designated by the State Materials Office will perform Resolution testing.

If the Resolution Test result satisfies the required criteria, material of that soil type will be verified and accepted. If the Resolution Test results do not meet the required criteria, reject the material and reconstruct with acceptable material.

RETAINING WALL SYSTEMS.
(REV 7-18-12)

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548-5.1 Curing: Cure concrete components in accordance with Section 400.

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2. Precast Component Squareness: Angular distortion of the component shall not exceed 0.2 inches in 5 feet.
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Place the backfill closely following the erection of each course of precast components or soil reinforcement layers and spread by moving the machinery parallel to the wall face. Do not allow equipment heavier than 8 tons closer than 3 feet behind the wall face. Place backfill in a manner to avoid any damage or disturbance to the wall materials or misalignment of the facing materials. Remove and replace any wall materials which become damaged or disturbed during backfill placement at no cost to the Department, or correct as directed by the Engineer. Remove and reconstruct any misalignment or distortion of the wall facing due to placement of backfill outside the limits of this specification at no cost to the Department.

Sheepfoot, grid rollers or other types of equipment employing a foot are not allowed. Achieve compaction within 3 feet of the back of the wall face using a power operated roller or plate weighing less than 1,000 lbs. At a distance greater than 3 feet from the back of the wall, a vibratory roller may be used, provided that the frequency and amplitude combined with bulk weight of the roller has performed satisfactorily at a trial section of the same type of wall. A smooth wheel or rubber tire roller is considered adequate. Ensure that the maximum lift thickness after compaction does not exceed 6 inches. Decrease the lift thickness if necessary, to obtain specified density.

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548-9.2 Maximum Density Determination: Determine the maximum QC density in accordance with FM 1 T-180, determine the maximum density in accordance with AASHTO T-99, Method C.

Perform gradation tests on the sample collected in accordance with AASHTO T 27 and FM 1-T 011. Classify soils in accordance with AASHTO M–145 in order to determine compliance with embankment utilization requirements.

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If the Resolution Test result satisfies the required gradation limits, the LOTS will be verified. If the Resolution Test results do not meet the required gradation limits, reconstruct the LOTS with acceptable material. The Engineer will perform new verification testing.

548-9.6.5 Liquid Limit and Plasticity Index (LL&PI): The Engineer will verify the QC results if the Verification result satisfies the plasticity index and liquid limit criteria set forth in 548-2.6. Otherwise, the Engineer will test the sample retained in 548-9.6.1. The State Materials Office or an AASHTO accredited laboratory designated by the State Materials Office will perform Resolution testing. The material will be sampled and tested in accordance with AASHTO T 90 and AASHTO T 89 respectively.

If the Resolution Test result satisfies the required criteria, LOTS of that soil type will be verified. If the Resolution Test results do not meet the required criteria, reconstruct the corresponding LOTS with acceptable material. The Engineer will perform new verification testing.

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Otherwise, the Engineer will collect three additional samples. The material will be sampled and tested in accordance with FM 1-T 267 and by averaging the test results for three randomly selected samples from at least one lift per soil type. The State Materials Office or an AASHTO accredited laboratory designated by the State Materials Office will perform Resolution testing.

If the Resolution Test result satisfies the required criteria, material of that soil type will be verified and accepted. If the Resolution Test results do not meet the required criteria, reject the material and reconstruct with acceptable material.