FLORIDA DEPARTMENT OF TRANSPORTATION
State Materials Office
5007 NE 39th Avenue
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May 10, 2017

Florida Testing Method for MOISTURE-DENSITY RELATIONS OF SOILS USING A 2.5-kg [5.5-lb] RAMMER AND A 305-mm [12-in.] DROP

Designation: FM 1-T 099

FM 1-T 099 is identical to AASHTO T 99 except for the following provisions:

REFERENCED DOCUMENTS

AASHTO Standards:

AASHTO M 145 – Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

AASHTO T 27 – Sieve Analysis of Fine and Coarse Aggregates

1. Delete Section 1.2 and the engineer will determine which method shall govern.

2. "Calibration of Measure" in sections 3.1.1 and 3.1.2 shall not be required. Volume of molds shall be determined by calculation of the volume of a cylinder by use of the measured diameter and height. Mold volume can be assumed to be 0.0333 ft^3 for 4 inch diameter molds or 0.0750 ft^3 for 6 inch diameter molds as long as the mold remains within the tolerances outlined for volume, diameter, and height outlined in sections 3.1.1 and 3.1.2. Alternative mold assemblies such as Limerock Bearing Ratio (LBR) or California Bearing Ratio (CBR) molds, as allowed per AASHTO Note 2, shall be verified as outlined in section 7.1.1 and 7.1.5 of FM 1-T 180.

3. Add the following required apparatus to section 3:

   3.1. Jaw Crusher – An electric-powered mechanical jaw crusher having a minimum jaw plate dimension of 2.25-in x 3.50-in (57mm x 90 mm) set at a maximum opening of 3/4-in (19 mm) with an under tolerance of 1/8-in (3.175 mm).

4. Replace sections 4.3 and 8.3-8.4 with the following procedure:

   4.1. Materials with coarse aggregate: Particles larger than ¾-in (19 mm) cannot be separated from the sample before crushing. Immediately after completion of air drying, the entire sample shall be passed incrementally through a mechanical jaw crusher so that the entire sample passes between the jaw

crusher's plates. The sample shall be passed through the crusher one time. After crushing, the sample shall be passed over a 3/4 inch (19 mm) sieve. Those pieces not reduced to below 3/4 inch (19 mm) in size by mechanical crushing shall be discarded. The material shall then be passed over a No. 4 (4.75-mm) sieve, and the percentages retained on the No. 4 sieve and passing the No. 4 sieve shall be determined and recorded. Sieving shall be for a sufficient time period and in such a manner as described in AASHTO T 27 section 8.4.

NOTE: If the material retained on the No. 4 (4.75 mm) sieve is seven percent (7%) or less of the total sample mass, the material may be added back into the sample and thoroughly mixed with no correction.

4.2. The materials separated on the plus No. 4 sieve and minus No. 4 sieve shall then be recombined into sample specimens of at least 11 pounds (4.99-kg) using the gradation percentage of each recorded in the previous step. If no correction was necessary, samples should be obtained from the mixed bulk sample. The minimum number of specimens obtained for compaction shall be in compliance with the requirements of the AASHTO test method. For non-cohesive well drained soils (A-1, A-3, and A-2-4 non-plastic) a minimum of 4 specimens representing two points below the optimum moisture, one at or near optimum, and one past optimum shall be acceptable. For non-cohesive well drained soils begin 3 percentage points below the optimum moisture content.

4.3. Apply AASHTO Note 6 to all soil types except A-3 and Non-Plastic A-2-4. For A-3 and Non-Plastic A-2-4 soils, the engineer will decide whether to apply Note 6. Preparation of separate samples with varying moisture contents is an acceptable option for all types of soils, regardless of the soaking period. If separate samples are prepared, Note 6 can be applied immediately prior to compacting the materials and determine moisture contents as outlined in section 5.3 or by ASTM D 4643 (Determination of Water (Moisture) Content of Soil by the Microwave Oven Method).

5. Prior to compaction samples of soil-water mixtures prepared in sections 5.1 and 9.1 shall be placed in covered containers and allowed to stand in accordance with Table 1.

Table 1. Dry Preparation Method Soaking Times

Classifications (based on AASHTO M 145)	Minimum Soaking Times (Hours)
A-3	No Requirement
A-2-4 (Non-Plastic)	3
A-1, A-2-4 (Plastic), A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7	12

6. The wording “approximately equal layers” shall be defined as, for 3 layers, 1.8 ± 0.5 inches. To quickly ensure proper layer height during compaction it is recommended to permanently mark the compaction rammer in such a way that when the rammer face makes contact with the surface of the soil the height of each layer can be identified. Just prior to compacting each layer, the amount of soil placed into the mold shall be slightly more than the height of the layer after light tamping. Immediately after compaction of each layer the height of the soil should fall within 0.5 inches of the mark on the rammer.