



**DEVELOPMENTAL SPECIFICATIONS  
FOR  
MOISTURE AND DENSITY TESTING FOR SPECIAL COMPACTION OF SUBGRADE**

**Effective Date  
October 19, 2010**

**THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

**09051.01 DESCRIPTION.**

Test and ensure moisture content and density of material meets requirements of Article 2109.03, C, of the Standard Specifications.

**09051.02 MATERIAL.**

Specified in the contract documents

**09051.03 CONSTRUCTION.**

**A. Quality Control**

1. Provide Quality Control Technician to perform testing for 'Special Compaction of Subgrade'. As a minimum, Quality Control Technician shall have a high school education. Technician shall obtain 'Soils Technician Lab Certification' through a two day course held at Des Moines Area Community College in Boone through the Technical Training and Certification Program (TTCP) of the Department. Arrange training through the Iowa DOT's Office of Construction (telephone 515.239.1280). TTCP requirements of Materials I.M. 213 apply.
2. Ensure Quality Control Technician is present on project when 'Special Compaction of Subgrade' is being performed.
3. Provide laboratory facility and calibrated equipment to perform required tests.

**B. Test Procedures.**

1. Use test procedures and equipment complying with applicable Materials I.M.'s, Iowa DOT Materials Laboratory Test Methods, or equivalent AASHTO or ASTM standards.
2. Allow Engineer to review equivalent standards. Use equivalent standards only if approved by the Engineer.
3. Acceptable test methods for determining moisture content and density are:
  - Oven drying AASHTO T 265
  - Pan drying AASHTO T 265 modified to use an open burner

- Microwave ASTM D 4643
- Nuclear gauge Materials I.M. 334
- Density of soil cores Materials I.M. 326
- Sand Cone Test ASTM D1556

4. Use AASHTO T 265 oven drying method for the reference method for calibration.

### **C. Moisture and Density Testing**

1. Determine optimum moisture content and maximum density by Proctor testing of material being placed and compacted.
2. With Engineer's approval and for material that can be identified during excavation, Contractor may use optimum moisture content and maximum density as shown on soils 'Q' sheets in the contract documents. In lieu of using values from the 'Q' sheets, Contractor may choose to determine optimum moisture and maximum density from field sample.
3. If Engineer deems optimum moisture and maximum density of material is not represented by that shown on 'Q' sheets, determine optimum moisture and maximum density from field sample.
4. When determined from field sample at the option of the Contractor or at the Engineer's request, optimum moisture and maximum density values from field sample prevails over that shown on 'Q' sheets.
5. Test and verify moisture content and density of material placed and compacted meets requirements of Article 2109.03, C, of the Standard Specifications.

### **D. Test Frequency**

Test moisture content, in-place density, proctor optimum moisture content, and maximum density at minimum frequencies in Materials I.M. 204. Samples shall be randomly selected.

### **E. Field Records.**

Document observations, records and inspection, changes in material type, material moisture and density, and test results weekly. Note results of observations and records of inspection in a permanent field record as they occur. Submit copies of field moisture and density tests to the Engineer on a weekly. Submit original testing records (raw field and lab data sheets) and control charts to the Engineer in a neat and orderly manner within five calendar days after completion of project.

### **F. Corrective Action.**

Notify Engineer when moisture content falls outside specified control limits or when density falls below required minimum. If a single moisture content does not meet requirements, subgrade material in this area will be considered unacceptable for compaction. Perform corrective action(s) to bring uncompacted material, after a retest, within specified moisture control limits. If material has been compacted, disk it, bring it to within moisture control limits, and recompact it. If a single density does not meet requirements, subgrade in this area will be considered unacceptable. Perform corrective action(s) to subgrade to meet density requirements.

### **G. Quality Assurance.**

#### **1. Required Testing.**

- a. Contractor's Quality Control Technician shall perform field testing and data analysis. Quality Control Technician shall retain split samples of Materials I.M. 309 testing when requested by Engineer. Engineer may select any or all of the Contractor-retained split samples for independent assurance and verification testing.

- b. Engineer will determine random location of verification tests and will test at the minimum frequencies in Materials I.M. 204. Contractor's Quality Control Technician shall obtain a sample at the same location as directed by the Engineer and provide results to the Engineer. Verification test results will be provided to the Contractor within one working day after their quality control test results have been reported.
- c. Engineer will periodically witness field testing being performed by the Contractor. If the Engineer observes quality control field tests are not being performed according to applicable test procedures, the Engineer may stop production until corrective action is taken. The Engineer will notify the Contractor of observed deficiencies, promptly, both verbally and in writing. The Engineer will document witnessed testing.
- d. Quality control test results become part of the project files.

## **2. Verification and Independent Assurance Precision.**

- a. The Contractor's quality control test results will be validated by the Engineer's verification test results using criteria in Materials I.M. 216. If the Engineer's verification test results validate the Contractor's test results, the Contractor's results will be used for material acceptance.
- b. In the event the Contractor's results cannot be validated, the Engineer will investigate the reason immediately. The Engineer's investigation may include:
  - Testing of other locations,
  - Observations of the Contractor's testing procedures and equipment, and
  - Comparison of test results of the Contractor with those of the Engineer.
- c. Personnel and laboratories performing tests used in the acceptance of material shall participate in independent assurance program covered in Materials I.M. 205.

## **3. Referee Testing.**

If a difference in procedures for sampling and testing and/or test results exists between the Contractor and Engineer which they cannot resolve, the Iowa DOT's Central Materials Laboratory will provide referee testing. The Engineer and Contractor shall abide by the results of referee testing.

## **H. Acceptance.**

The Engineer will base final acceptance of tests and materials on results of the Contractor's quality control testing as verified by the Engineer's quality assurance.

### **09051.04 METHOD OF MEASUREMENT.**

Work connected with moisture and density testing for Special Compaction of Subgrade will not be measured for payment.

### **09051.05 BASIS OF PAYMENT.**

No direct payment will be made for moisture and density testing for Special Compaction of Subgrade, including furnishing a Quality Control Technician, sampling and testing, and process control inspection. The cost of moisture and density testing for Special Compaction of Subgrade is incidental to the contract unit price for Special Compaction of Subgrade.