

**CITY OF COLUMBUS
PUBLIC SERVICE DEPARTMENT
TRANSPORTATION DIVISION**

**SUPPLEMENTAL SPECIFICATION 1501
COMPACTION TESTING OF SOILS, GRANULAR MATERIALS,
SHALE AND OTHER MATERIALS**

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COMPACTION TESTING OF SOILS, GRANULAR MATERIALS, SHALE AND OTHER MATERIALS

1501.01 General. Perform all compaction testing of soils, granular material, bases or backfill in accordance with this supplement for all applicable work items within the City.

The City's Testing Section will perform the compaction tests unless specifically stated otherwise in the contract documents.

All personnel performing test in a trenching operation must have OSHA approved confined space training.

Perform the in-place density tests by utilizing a nuclear gauge according to ASTM D-2922.

A nuclear gauge standard count shall be performed daily and a record of results maintained.

Nuclear gauges shall be verified for calibration at twelve month intervals.

The Contractor will be responsible for surface preparation of the section to be tested.

It is the Contractor's responsibility to provide and maintain access to the area selected for testing.

The Contractor shall cooperate to the fullest extent to accommodate compaction testing and no extra payment will be allowed for delay or time lost due to the verification of compaction.

1501.02 Compaction Testing for Soils. For nuclear gauge operations, use the direct transmission method. The tested depth will correspond to the compacted depth of the layer of material being tested.

Perform a one-point proctor test in accordance with AASHTO T-272, Method C, if a laboratory- established curve has not been previously developed, a change in soil type is observed, or if test results indicate a verification of materials is required.

Use the Family of Curves prepared by the Ohio State Highway Testing and Research Laboratory.

Plot the proctor wet density and the moisture percent indicated by the nuclear gauge to determine the compaction curve to be used. When the intersection point is between two curves, choose the higher of the curves.

All compaction percentages will be calculated based on the dry densities of the material.

When the material or field conditions warrant, a test section (1501.05) may be performed in lieu of the above procedures.

Use form T-100 to record the compaction results.

1501.03 Compaction Testing Requiring an Aggregate Correction. If the material contains by weight, more than 5 percent and less than 30 percent over size material (material retained on the $\frac{3}{4}$ inch sieve), this procedure must be followed. If the material contains more than 30 percent retained, utilize a Test Section (1501.05).

Obtain a representative sample of the material from directly below the gauge. Sieve the material through a $\frac{3}{4}$ inch (19 mm) sieve. Divide the weight of the material retained on the $\frac{3}{4}$ inch (19 mm) sieve by the weight of the total sample.

Use this percentage to calculate the aggregate correction factor in accordance with AASHTO T-224.

Use form T-110 to record the results.

1501.04 Compaction Testing for Granular Material. Follow the same procedure set forth in section 1501.02 with the following exception:

If required to perform a field one-point proctor test, use Method C of AASHTO T-99 if using the Ohio State Highway Testing and Research Laboratory curves or Method D if applied to a laboratory established curve.

Use form T-100 to record the compaction results.

1501.05 Test Section.

1. Designate a test section of sufficient size to permit the operation of compacting equipment in a normal manner.
2. Spread the material using approved methods, in layers not to exceed 8 inches (200 mm) in thickness (loose depth), unless otherwise specified or authorized in writing by the Engineer.
3. Insure that the moisture content of the material is not less than optimum minus 2 percent and not more than optimum plus 1 percent. Watering, drying or manipulating may be necessary to secure uniform distribution of moisture throughout the material.
4. Compact the material using approved compaction equipment. Keep an accurate record of the number of coverages.
5. Perform a density test in the compacted test section after the initial seating of the material.
6. Further compact the test section with two additional passes.

7. Perform a second density test in the compacted test section near the location of the first test. If the two tests vary by less than 2.0 pounds per cubic foot (32 kgb/m³), the higher of the two tests will be considered a satisfactory test section density.
8. If the density after additional rolling has increased more than 2.0 pounds per cubic foot (32 kgb/m³), repeat this process of compacting and testing until the density increase is less than 2.0 pounds per cubic foot (32 kgb/m³). The resulting highest density will be considered a satisfactory test section density.
9. Determine and record the wet density, dry density and moisture content. For the remainder of the work, the material shall be compacted to at least 98 percent of the dry weight obtained from the test section.

A new test section density may be required if the material characteristics or the supporting materials change appreciably.

A pass is defined as one coverage over the specified area with the compaction equipment.

Use form T-120 to record the details.

1501.06 Compaction Testing for Shale. Severely deteriorated, or weathered shale will be tested in accordance with 1501.02.

Soft or hard shale will be tested according to 703.11(C).

If by weight, less than 25 percent of the material is retained on the ¾ inch (19 mm) sieve, the compaction testing will be in accordance with 1501.02. If 25 percent to 75 percent is retained on the ¾ inch (19 mm) sieve, a test section shall be performed.

If more than 75 percent of the shale is retained on the ¾ inch (19 mm) sieve or when the material does not deteriorate, the shale will be field tested for hardness in accordance with 703.11(C). If less than 40 percent of the shale breaks down, by visual inspection, the material will be considered hard shale. Use the procedure detailed in 203.06 for compaction acceptance. If greater than 40 percent breaks down, perform a test section according to 1501.05.

Use form T-150 to record the results.

1501.07 Compaction Acceptance. Once the initial control data has been established, the remainder of the installation will be verified for specification compliance based on these results.

If a test fails to meet the requirements, the moisture content shall be adjusted, if required, and further compaction effort applied.

1501.08 Minimum Number of Tests. The project work items will be divided into sections and the number of tests will be performed as described below:

Work Item	Minimum Number of Tests	Section Size
203 Embankment	One	500 Cubic Yards (382 Cubic Meters).
204 Subgrade	One	1000 Square Yards (833 Square Meters)
304 Aggregate Base	One	250 Square yards (209 Square Meters)
Controlled Backfill	One	50 Lineal Feet (15 Meters)

The above is a minimum number of compaction tests required, however this number may be increased or decreased at the discretion of the City.