

METHODS OF SAMPLING AND TESTING
MT 412-04
TOPSOIL SAMPLING, SAMPLE PREPARATION AND TESTING

1 Scope:

1.1 It is intended that the procedure for sampling and testing topsoil shall apply (1) only to topsoil that has been imported from another source (other than the project), and (2) to any topsoil intended for use in planting lawns, shrubs, trees or other particular plants which require special soil. It is not necessary to sample or test topsoil (termed salvaging and placing) which has been stripped and is stockpiled for later replacement on median areas, outer separation areas and side slopes of roadway areas.

2 Referenced Documents:

2.1 AASHTO:

T 2 Sampling of Aggregates

3 Sampling Procedures:

3.1 Samples shall be obtained from each kind or type of soil (homogeneous area) Soil types may be identified from visual appearance, present vegetative growth, or soils classification primary group from an Engineering Soil Survey.

3.1.1 Samples of sub-soils may also be taken from borings in conjunction with Engineering Soil Survey.

3.1.2 Samples from stockpiles or from loaded transports may be taken in accordance with procedures outlined in AASHTO T 2.

3.2 Samples from the layer of soil proposed for use as topsoil shall be labeled "topsoil". Samples from the layer of soil over which the topsoil is to be placed shall be labeled "subsoil." Insignificantly small, unusual areas may be omitted in sampling.

3.3 A sample shall be a composite of material taken from three sample sites in the following manner:

3.3.1 Dig a V-shaped hole through the thickness of the layer of soil being sampled (if a surface sample) and remove a ½ inch thick slice of soil from one side of it.

3.3.2 Trim off from each side of the slice all but a thin ribbon of soil down the center of the spade face and place this in a clean bucket.

3.3.3 Mix equal size samples representing similar soils thoroughly and keep two pounds for testing.

3.4 The sampler shall identify the samples by number and the location from which they were taken. Observations concerning the soil's apparent ability to support plant growth such as the presence or absence of usual or unusual vegetative types, swamps, rock, salt encrustations, etc., should be noted and recorded with the identification data.

4 Sample Preparation:

4.1 Samples shall be allowed to air dry. Larger stones shall be removed by hand and the remainder sieved through a 10 mesh sieve.

Note - Material larger than the ten mesh shall be weighed as gravel and the percent by weight recorded on form to accompany sample. The minus 10 mesh fraction is retained for the soils test and submitted to the Helena Laboratory.

5 Testing Procedures:

- 5.1** *Conductivity* - A measured volume of 15 ml. Of soil is placed in a 50 ml. Beaker. To this is added 30 ml. of distilled water. The suspension is allowed to stand about one-half hour, being stirred several times during this period. Conductivity is measured using a pipette cell.
- 5.2** *Soil ph* - The suspension from conductivity measurement sample is decanted and discarded, saving the sediment for the ph measurement. The ph measurement is taken with a glass electrode ph meter.

6 Reagents:

- 6.1** $K_2Cr_2O_7$, $1.0 N$ - Dissolve exactly 49.04 grams $K_2Cr_2O_7$ in distilled water and dilute to one liter.
- 6.2** $Fe(NH_4)_2(SO_4)_2$, *approximately 0.5 N* - Dissolve 200 grams $Fe(NH_4)_2(SO_4)_2 \cdot 6H_2O$ in 800 ml. Distilled water containing 20 ml. H_2SO_4 and dilute to one liter.
- 6.3** *Ferrouin indicator* - 0.025 M solution purchased ready for use.

7 Procedure:

- 7.1** Place 1 gm of soil in a 250 ml. Erlenmeyer flask. Add 10 ml. Potassium dichromate with an automatic pipette. Add 20 ml. Conc. Sulfuric acid from a burette. Mix and let stand 10 minutes. Dilute with 70 ml. Distilled water added from a burette. Titrate the excess dichromate with ferrous ammonium sulfate. At the end point, the ferrouin changes from blue to red. Run a blank using dichromate and acid, but no soil. The blank titration should be between 19.5 and 20.5 ml.

$$\% \text{ O. M. } = \frac{\text{BLANK} - \text{TITRATION}}{3}$$

Note - If the titration is less than 5.0, the soil is re-analyzed using ½ gm. sample and is divided by 1.5.

8 References:

Conductivity and pH:

Montana Agriculture Experiment Station, Plant and Soil Science Department, Circular No. 50 July 1968, Bozeman, MT

Organic Matter:

Jackson, M.L. , Soil Chemical Analysis. pp. 219-221, Prentiss-Hall, Inc., 1958.