

**SAMPLING SOILS**  
DOTD Designation: S 401-99

**Note 1:** *For samples other than for moisture content testing, select the appropriate quantity and place in standard DOTD sample sacks.*

**Note 2:** *If the moisture content is to be determined, protect the sample from moisture loss prior to testing. When the sample is taken, place it in a plastic bag, seal, then place the sample in the bag in a clean, dry friction top can of a size sufficient to contain the needed quantity for moisture content testing. Place a properly completed, unsoiled sample identification form in the can with the sample. Seal the can with the lid immediately. Failure to properly seal the sample will invalidate the use of the sample for moisture content testing.*

**I. Borrow Pits, Subgrades or Roadway Cut Areas**

**A. Equipment**

1. Spiral augers with motorized equipment or hand augers.
2. Shovels, picks, and other hand tools, as needed.
3. Sample sacks and string, plastic bags for moisture content samples, several 1 gal friction top cans.
4. MATT forms and envelopes.

**B. Safety Precautions**

Personnel are to have successfully completed training in the operation of mechanized equipment. It is the responsibility of the user of this sampling method to establish appropriate safety practices, including but not limited to handling heavy loads and using hand augers to drill holes.

**C. Procedure**

1. Determine size and location of area to be sampled based on approved borrow pit sketch.
2. Divide the pit area into units based on physiographic and/or soil characteristics. Space borings in each unit so that each boring represents no more than one acre.
3. Remove any vegetation from boring site.
4. Begin an individual bore hole. As soil is removed from the bore hole, stratify the soils in accordance with vertical breaks, based on color, moisture content, texture, plasticity, organic content, etc. Each change in soil characteristics signals the beginning of a new sample. Place each sample in a sample container as given in Notes 1 and 2.
5. Place a properly completed, unsoiled sample identification form into an envelope. Securely attach envelope to the sample container.
6. Extend each boring a minimum of 2 ft below the expected excavation depth or to ground water.
7. If the drilled hole is less than 25 ft deep and does not penetrate ground water, plug the hole with cuttings removed from the hole. Push a concrete cylinder into the hole to form a permanent seal at ground surface. If the drilled hole is greater than 25 ft deep or penetrates ground water, plug the entire hole with a cement-bentonite slurry from the bottom of the hole up to the ground surface using the pump-down method. Or plug the hole with bentonite slurry from the bottom of the hole up to a depth of 25 ft below the ground surface and then plug the upper 25 ft of the hole with cement-bentonite slurry using the pump-down method. If the drilled hole penetrates known contamination, grout the hole in accordance with the applicable regulations.

## II. Stockpiles

### A. Equipment

Same as in Step I.A.

### B. Procedure

1. Determine the size and location of the stockpile. Calculate the approximate quantity of material in the stockpile.
2. Divide the stockpile into sections of approximately equal size, meeting at least the minimum frequency requirements of the Materials Sampling Manual.
3. Remove any vegetation from boring site.
4. Begin an individual bore hole. As soil is removed from the bore hole, stratify the soils in accordance with vertical breaks, based on color, moisture content, texture, plasticity, organic content, etc. Each change in soil characteristics signals the beginning of a new sample. Place each sample in a sample container as given in Notes 1 and 2.
5. Place a properly completed, unsoiled sample identification form into an envelope. Securely attach envelope to the sample container.
6. Extend each boring into the underlying natural ground and establish the elevation of the natural ground and the total thickness of stockpiled material.

## III. Conveyor Belts

### A. Equipment

1. Template.
2. Brushes.
3. Catch pan.
4. Shovel or scoop.
5. Sample sacks and string, plastic bags for moisture content samples, several 1 gal friction top cans.
6. MATT forms and envelopes.

### B. Procedure

1. Determine the proper frequency for sampling in terms of flow rate, time and quantity.
2. After the flow of material onto the belt has stabilized, stop the belt.
3. Select a template of proper length and cross section to obtain a representative sample of proper size. The cross section of the template must match that of the belt.
4. Place the template through the material, making sure the template is in contact with the belt for the full cross section of the belt.
5. Using the shovel or scoop, remove all material within the template into the catch pan. Use a brush to retrieve all fines.
6. Place the sample into the proper container as given in Notes 1 and 2.
7. Place a properly completed, unsoiled sample identification form into an envelope. Securely attach envelope to the sample container.

## IV. Railroad Cars, Trucks, and Barges

### A. Equipment

Same as in Step I.A., with the exception of the motorized equipment

### B. Procedure

1. Estimate the volume of the material and determine the number of samples needed.
2. Select a car, truck or barge to represent that quantity.
3. Obtain a sample from the full depth of the railroad car, truck bed or barge.
4. Place the sample into the proper container as given in Notes 1 and 2.
5. Place a properly completed, unsoiled sample identification form into an envelope. Securely attach envelope to the sample container.

## V. Windrows

### A. Equipment

1. Sample sacks with string, plastic bags for moisture content samples, several 1 gal friction top cans.
2. Shovels or scoops.
3. MATT forms with envelopes.

### B. Procedure

1. Estimate the volume of the material and determine the number of samples needed. Divide the quantity into contiguous increments of equal size, conforming to the minimum frequency requirements of the specifications.
2. Sample the entire cross section of the windrow.
3. Place the sample into the proper containers as given in Notes 1 and 2.
4. Place a properly completed, unsoiled sample identification form into an envelope. Securely attach envelope to the sample container.

## VI. In-place in Lifts or Courses During Construction

### A. Equipment

1. Hand augers.
2. Shovels.
3. Sample sacks and string.
4. MATT forms and envelopes.

### B. Procedure

1. Determine the quantity of material representing the minimum frequency in accordance with the appropriate sampling schedule in the Materials Sampling Manual.
2. Randomly select three staggered sampling locations by station number within this area.
3. Obtain 1/3 of each sample from each location. Use the appropriate sampling device to dig a vertical hole the full depth of the course or lift. Remove all material from the hole and place in a sample sack.
4. Place a properly completed, unsoiled sample identification form into an envelope. Securely attach envelope to the sample container.
5. Move to the next location and repeat.