Monolith Collection and Preparation For Soils without Restrictive Layers*

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Soil monoliths are useful for displaying soils as they appear *in situ*. They show major soil characteristics, and because they are fairly portable, they can be used in traveling or permanent displays.

Different methods of monolith collection have been tested in Texas over the years. Through trial and error, the following procedure has proven to work best for soils without restrictive layers. For more information on collecting monoliths for problem soils, such as those with restrictive layers, or for questions about this procedure contact the MLRA Region 9 Office in Temple, TX.

Monolith Site Selection and Field Collection

Generally, a monolith is collected to represent a particular soil series; so it is important to select a representative site for sampling. Favorable soil moisture conditions as well as good weather conditions are necessary for success.

The collection site should be free of any underground pipes or above-ground utility lines that would interfere with digging or cause a safety hazard. All safety regulations should be followed as the digging takes place.

The pit from which the monolith will be extracted should be dug a few inches deeper than the height of the finished monolith. If the pit is dug to a depth of over 5 feet, it is necessary to use shoring to stabilize the soil. Hard hats must be worn whenever anyone is in a pit more than 5 feet deep.

Because of the cost and man-hours involved in the monolith collection process, it is important to make the most of the opportunity the sampling provides. Consider the position of the pit to optimize the light for taking pictures. To allow for photographing the complete profile, dig a T-shaped pit. The pedon is described and soil samples are collected for lab characterization

data. Then the actual sampling for the monolith begins.

The face of the soil profile must be smoothed flat. This is done with sharpshooters or knives. The next step is to shape the soil face to fit the collecting board. In order to do this, align the scoring tool (a rectangular frame consisting of welded pieces of angle iron) onto the smooth surface of the profile. Keep the scoring tool in place with large nails at the top and bottom. The scoring tool provides the template that ensures the correct dimensions of the monolith.

Using a large knife, cut a groove in the face of the pit, making the cut flush with the sides of the tool.

In this way the soil is dug deeper into the pit wall until the soil face, which is surrounded by the scoring tool, protrudes from the wall. Once the side cutting is complete, remove the scoring tool. Cut the bottom of the scored area to the same depth as that of the

vertical sides. The exposed rectangular face of soil the height and width of the collecting board is now

visible.

The collecting board is made from ¾-inch plywood and angle iron. An angle-iron frame is attached to the board. The inside dimensions of the frame are the same as those of the finished monolith.

Place the collecting board on the face of the soil and fit into the cuts in the pit wall.

Brace the collecting board so it will fit onto the smooth soil face with no movement. Make cuts 4 or 5 inches deep at a 45-degree angle to the collecting board up and down the pit wall. Extract as

much soil as possible, taking care not to make the collecting board's contact with the pit wall unstable.

To enhance the stability of the sample against the collecting board, bore three or four evenly spaced 2-inch holes through the remaining soil on the pit face. Thread bungee cords through these holes. The cords will be attached at the back of the collecting board after the brace boards are in place. Place brace boards on the open sides to keep the soil in place. Secure the brace boards and collecting board with the bungee

cords.

Loosen the monolith by back-cutting, starting at ground level and working downward. Once it is loosened, lift the monolith, which can weigh up to 200 pounds, to ground level.

When the monolith is out of the pit, place it on a stable, raised surface for some rough trimming. After removing the bungee cords and brace boards, cut away the excess soil material with a handsaw or machete. The objective is to cut the soil so that it is flush against the collecting board.

Once this is done, wrap the monolith in plastic wrap for safe transport.

<u>Preparation of the Display Board and Transfer of the Soil to the Display Board</u>

The finished display board is constructed of ¾-inch plywood and ¾ by 1 ½-inch wood molding. In order to make the framed area of the display board the correct size, use a template to help align the molding onto the plywood backboard. The template is an inch-thick board that has the same dimensions as those of the finished monolith. Drill pilot holes into the molding, nail the molding into place, and then remove the
template.

Stain or paint the parts of the display board that will be visible.

In order to make sure that the soil will stay in place on the display board, several steps are required. First hammer 1 ½-inch galvanized nails through the back of the display board at 2-to 4-

inch intervals. Then, spread full-strength white glue generously across the area of the board that will hold the soil. Press cheesecloth over the nails and glued board and add another layer of glue to the surface of the cheesecloth. Use plenty of glue and spread it uniformly.

This work should be done fairly quickly so the glue does not dry before the soil profile is transferred to the display board.

While the glue is still wet, place the display board on top of the unwrapped collecting board, which contains the soil profile. After all edges line up perfectly, turn the boards over so that the display board is now on the bottom and the soil profile is transferred from the collecting board to the display board.

Store the monolith in a horizontal position and allow it to dry for several days.

Final Preparation for Monolith Display

After the soil monolith has dried thoroughly, final preparation begins. To make the monolith appear more natural, the soil face is picked to show the structure of the soil and individual peds. Use water to moisten, not soak, the soil. This facilitates the picking

process by causing the soil to exfoliate.

As one picks the moistened soil with a knife, the surface pieces break away, and the soil beneath becomes visible. This painstaking process creates the natural look desired in a soil

monolith.

Use pressurized air (20 to 30 PSI) to remove the unwanted soil that breaks away. Use even lower pressures for touch ups.

To ensure stability of the soil monolith for display, more glue is used in the final phase. With a squirt bottle, apply a mixture of one part white glue to three parts water into all cracks that penetrate to the backboard.

This application re-wets the glue on the backboard for better adherence.

For the final finish, use a mixture of one part glue to five to seven parts water. Apply small amounts to coat the surface completely. It is important not to soak the surface with the glue mixture, however. After the surface dries, press gently on any loose peds that have been lifted up during the final gluing. Store the monolith on a horizontal surface for several weeks while

drying.

Complete the process by adding a protective, clear sheet of plastic that is cut to fit and screwed into place. Add name plates to

identify the soil. Now the monolith is ready for display.

*This procedure is adapted from that described in “Soil Survey Horizons,” Fall 1994, by Francis Belohlavy.