

Soil Monolith Extraction, Preparation and Mounting

Manitoba Soil Science Society 2020 Summer and Winter Activity



Written instructions follow – as do videos:

Official instructions for monolith mounting is available at: Belohlavy, F. Making Soil Monoliths using white glue as a fixative. Soil Survey Horizons. Vol 35, Issue 3.
<https://access.onlinelibrary.wiley.com/doi/full/10.2136/sh1994.3.0074>

But our monoliths were extracted differently and I follow with the approach I was taught (principles are the same)

Videos can be found at the following link:

- | | |
|---|---|
| Step 1 https://youtu.be/2TZr6Ppm1aA | Step 5 https://youtu.be/8rsZA835Jvg |
| Step 2 https://youtu.be/Kbj8z7WorhY | Step 6 https://youtu.be/Jz0U6RCzCAU |
| Step 3 https://youtu.be/A56qCABvejY | Step 7 https://youtu.be/OVOw8qIM_vk |
| Step 4 https://youtu.be/LmBywXagCDI | Step 8 https://youtu.be/QJIB8NGM528 |
| | Step 9 https://youtu.be/8CYBMGv7WkA |

To characterize a soil pit or soil monolith see the following resources:

Manitoba's Manual for Describing Soils in the Field:

https://www.gov.mb.ca/agriculture/soil/soil-survey/pubs/manual_for_describing_soils_in_the_field.pdf

Government of Manitoba's Soil Survey Website:

<https://www.gov.mb.ca/agriculture/soil/soil-survey/>

AgriMaps: an interactive map with Manitoba soil survey data and related interpretations

<https://agrimaps.gov.mb.ca/agrimaps/>

The Canadian System of Soil Classification:

https://sis.agr.gc.ca/cansis/publications/manuals/1998-cssc-ed3/cssc3_manual.pdf

Collecting and Extracting the Soil Monolith:

Step 1: Extracting soil monolith from the field

Tools: Dutch auger, knives, trowels putty knives, drywall saws, monolith extraction box, sledge hammer and rebar.

Dig a soil pit slightly deeper than the desired length of the soil monolith. When selecting an area to be the face of the monolith within the soil pit be sure to look for interesting features like mottles, distinct soil structure, roots and kortovenas. When you have selected the area that will be the face of your soil monolith start carving away the soil to match the dimensions of the extraction box.



Note: In sandier textured soils be gentle when scrapping the edges of the monolith.

Once an area has been carved away to fit the extraction box make sure the face that is going to sit in the back of the box is flat to sit flush in the box. Once flush place the box over the area of the soil to be extracted and scrap at an angle behind the monolith. Behind the box to help support the bottom, hammer the rebar into the soil. At the top of the pit take a dutch auger and auger into the soil at least 6 to 8 inches back and start auger to the bottom of the monolith. Watch the direction you are augering as you do not want to auger towards the soil monolith. When the auger has reached the bottom of the monolith gently with pressure push forward on the auger and aid the monolith into the extraction box.



Now that the monolith is settled in the extraction box, you will want to scrap back excess soil so it is not too heavy to carry out of the pit and field. Once excess soil is removed, wrap the monolith with saranwrap. Your monolith is now ready for transport and the next steps to mount your soil monolith.



Prepping and Mounting the Soil Monolith at Home (Videos and Steps 2 to 10):

Additional supplies you will need:

- White Elmer's glue (not carpenter's glue)
- Cheesecloth
- White latex paint and brushes – primer is optional.
- 4 screws (or reuse the ones you will have from disassembling the case)
- Tools – putty knives, knives, small screw drivers (Phillips for disassembling box), brushes, vacuum, squirt bottles (for water:glue mixtures), dentists pick

Step 2: Undressing the monolith and scrapping soil flush with the box

Tools: exacto knife, putty knives, knives, hack saw

Cut the saranwrap cover with an exacto knife and peel back to expose the soil. Trim back the soil flush with the top of the box. Do this while the soil is still moist. This is rather easy with the sand and loam soils but a challenge with clay soils since it has such strong structure and especially if it was dry when extracted. Try not to remove too many chunks while trimming back. Save some soil for later one to fix any boobos, Be sure to keep the different layers separate. Leave soil exposed to dry for several days. Save some soil from each horizon in case, you need to fill some cracks.



Step 3: First soaking with a dilute water: glue mixture

Tools: Squirt bottle, glue, water

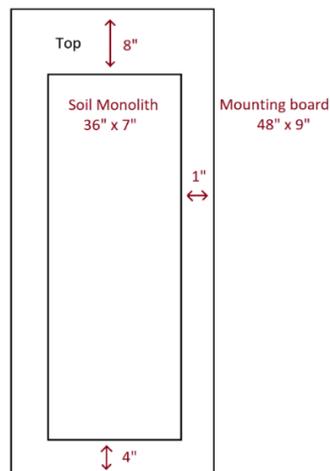
Soil should be dry so the glue mixture will penetrate better. For sandy and loam soils, use a 5:1 water: white glue mixture. For clay soils, use a 10:1 mixture. Mix up with warm water for better mixing and penetration. Put into a squirt bottle, and then start at one end of profile, saturating the soil until the entire profile is saturated. A 36" x 7" monolith will take at least 500 ml of the glue water solution to fully saturate. Be sure to wash out the squirt bottles thoroughly. Allow to dry for several days.



Step 4: Second soaking with stiffer water: glue mixture

Tools: Squirt bottle, glue, water

Treat again with the solution in a thicker mixture, 3:1 for sand and loams and about 5:1 for clay. This will penetrate less. Again this will take at least 500ml of the water glue solution. Be sure to wash out the squirt bottles thoroughly. Allow to dry for several days. While you wait outline your mounting board. Apply masking tape or use a sharpie outline the profile on the mounting board – about 7" wide by profile length (36") – so you can centre your profile within it. Be sure to leave adequate room on the top, sides and bottom for labels.



Step 5: Removing the boards and gluing to mounting board

Tools: Drill or screwdriver, cheesecloth, undiluted glue, screws (under 2" in length)

Unscrew the plywood sides confining your soil. Apply a thick layer of glue to the soil face and a double thickness of cheesecloth, working it into the glue. Additional glue is placed on top of the cheesecloth. Then position the mounting board above the soil (this can be tricky and help is useful). Then place 4 screws through the mounting board and into the soil. Finally place weights (bricks, books, etc) on the mounting board. Let dry for several days.



Step 6: Flip the soil and start prepping the face

Tools: Screwdrivers, dentist picks, knives, putty knife, brushes, vacuum.

Once dry, remove weights and gently turn over the monolith, with the mounting board on the bottom. The remainder of the box should lift off easily with a little soil. Once soil is exposed, prepare the soil profile to expose representative structure and features (like roots, wormholes, mottles, krotovenas). I use a dentist's pick – but small screwdrivers can work also. There is little structure to the sands and shaving smooth with a putty knife is good. Vacuum or brush to remove loose soil.



Step 7: Third gluing of soil

Tools: Glue, water, putty knife, picks, knives

Add more glue (5:1 water: glue). Use the thinner mixture to penetrate deeper. Let dry.



Step 8: Touch ups and final gluing.

Tools: Glue, water, putty knife, picks, knives, soil saved from earlier steps

If there are any booboos where you were too aggressive in preparing the face, you can glue aggregates into place using full strength glue or make up "body filler" from some crushed soil and add 3:1 water: glue solution to make a slurry. Be sure to check all sides of monolith. Apply the thicker mixture last (3:1) to the whole monolith. Check the top of the monolith for any loose aggregates and apply glue water mixture. Let dry.



Step 9: Painting

Scrape or sand glue off the board. Then apply white latex paint to the board – generally 2 coats, the first one primer. Or you can use an all in one latex – primer paint.



Step 10: Labelling

Glue labels on your monolith board – the soil name and texture and horizon labels.

Generally the labels are printed up on paper, then laminated and glued to the board. Some may prefer to label with black paint, Sharpie or otherwise. You may even wish to record the day and occasion of your hunt and where you bagged your trophy.

