Quick Soils Processing Guide

Step 1:
Fresh (field condition) soil sieving

Limitations
Soils that are predominantly clay or aggregated should be sieved through a 4 mm sieve and then air dried before further processing. Extremely wet or waterlogged soils are best dried prior to sieving. Soils can be air dried or oven dried at 50°C.

Equipment Needed
2 mm (No. 10) stainless steel sieve and bottom
Wire brush
Paper towels
Weighed Ziploc bags
Forceps
Balance

Procedure
1. Clean the sieve before starting with the wire brush on both sides of the mesh. Wipe any dust or dirt out of the sieve using a dry paper towel.
2. Pour soil into the sieve and gently shake the soil through the mesh.
3. Ensure that all of the soil has gone through the mesh by gently running your hand over the mesh surface and ensuring all aggregates are broken up.
4. After sieving the entire sample, pick out large roots. If you are subsampling for Elemental Analysis take a 5 g subsample and follow the root picking procedure outlined in Step 2 Section C.
5. Pour the sieved soil into a weighed Ziploc bag and record the weight.

Step 2:
Subsample for analyses

a) Gravimetric Water Content

Equipment needed
Soil tins
Spoon or spatula
Kimwipes and isopropyl alcohol to clean spoon between samples
Desiccator and fresh desiccant
Coarse balance (0.01 g)
105°C oven

Procedure
1. Record soil tin weight. Mark bottom of tin with ID # or record existing tin #. Do not use Sharpie; engrave tins using a pen or pencil with ID number.
2. Place 20-30 g of sieved (<2 mm) soil into tin and weigh, this is your ***wet*** or ***pre-oven wt***. Record.

3. Place soil tins in 105°C oven for 24 to 48hr.
4. After at least 24hrs, place tins in desiccator to let cool for 15 minutes, then weigh your ***dry*** or ***post oven wt***. Do not remove all the samples from the desiccator at once to weigh and do not leave desiccator door open, samples will absorb moisture from the atmosphere and will gain wt; weigh in batches of 10 tins.
    a. Make sure the Drierite in desiccator is fresh (should be blue if fresh, purple if spent).

Relevant equations and calculations
Calculate the fraction of soil moisture (remember to subtract the tin weight from the wet and dry weights):

Soil Gravimetric Water Content (GWC) (i.e. based on mass) =

$$\frac{\text{wet soil (g) - dry soil (g)}}{\textbf{dry} \text{ soil (g)}}$$

Soil Moisture = (i.e. used for soil nutrient concentration calculations) =

$$\frac{\text{wet soil (g) - dry soil (g)}}{\textbf{wet} \text{ soil (g)}}$$

b) Archive sample

Equipment needed
Sieved soil sample
Envelopes, scintillation vials, etc.
Scoop or spatula
KimWipes and isopropyl alcohol
Sharpie
Clear lab bench or other space to dry samples

Procedure
1. Mix the sample well to ensure even distribution of particles.
2. Using a clean scoop or spatula put ~25 g of soil into a labeled envelope or other storage container.
3. Set the envelope upright in a box or out on the lab bench to dry for a minimum of 2-3 days.
4. Clean the scoop or spatula with a KimWipe and isopropyl alcohol.
5. Repeat with all samples.
6. Once dry the samples can be stored in a box or other container until needed.

c) Sample for Elemental Analysis (for C and N determination)

Equipment Needed

Sieved soil sample
Envelopes, scintillation vials, etc.
Scoop or spatula
KimWipes and isopropyl alcohol
Sharpie
Oven set at 55°C
Forceps
2 mm reference
White pan

Procedure

1. Mix the sample well to ensure even distribution of particles.
2. Using a clean scoop or spatula weigh ~5 g of soil into a weigh boat or tin.
3. Pour the sample into the white pan and spread the sample around the base.
4. With forceps, pick out all roots longer than 2 mm that are light colored leaving darker pieces of decayed or decaying organic matter in the sample.
5. Continually mix the sample to ensure all roots have been picked from the entire sample.
6. Once finished transfer the sample to a tin being sure to get as much of the sample from the white pan.
7. Place the sample in an oven set to 55°C for 24-48 hours.
8. Remove the sample and store in a dessicator until rolled into tin boats*.
9. Clean the scoop or spatula with a KimWipe and isopropyl alcohol.
10. Repeat with all samples.

*see protocol for weighing tin boats for analyzing samples on the EA

d) Fresh soil

All soil left after subsampling should be refrigerated in the original undamaged Ziploc bag with as little air as possible.