Chicago Wilderness Virtual Congress 2020

Web Soil Survey Guide and Case Study

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Web Soil Survey Guide

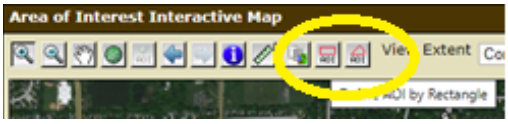
Natural Resource Conservation Service (NRCS) https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/survey/

The Web Soil Survey (WSS) was released in 2005 as the largest public-facing natural resource database in the world! It was created to provide better public access to national soils data and mapping. It is meant to provide general information – such as soil type and basic properties – to more complex data and interpretations.

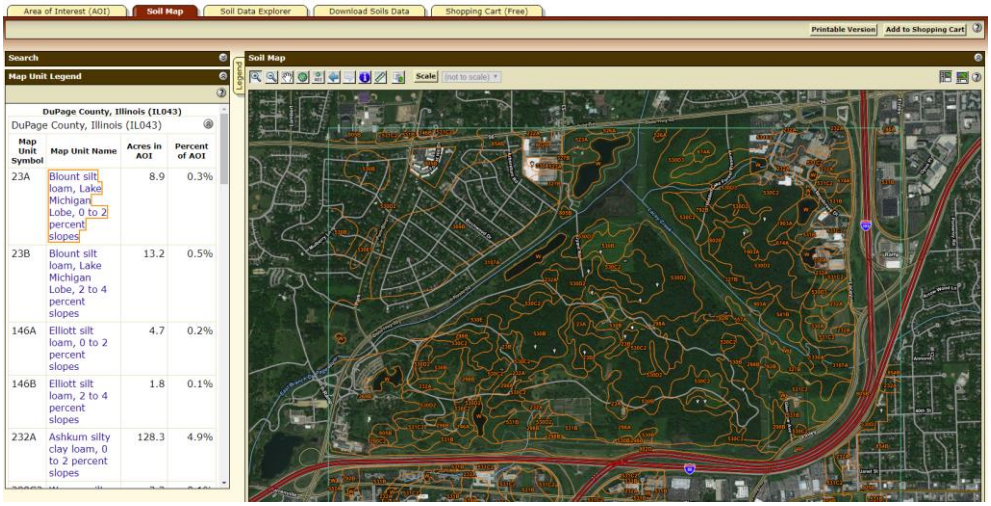
To get started (follow link above):

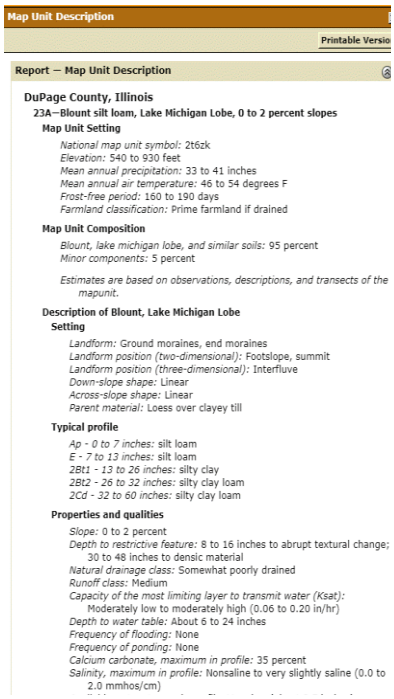
- Select green circle to START WSS
- Tool bar at top of AREA OF INTEREST INTERACTIVE MAP ---------->

- Move map with HAND
- Zoom IN or OUT with magnifying glass (+ or –)
  - Select Area of Interest (AOI) ---------->
  - Draw polygon around AOI



- If done correctly, the AOI will have blue dash marks
- Above the map, is a tool bar (AOI, **SOIL MAP,** SOIL DATA EXPLORER, DOWNLOAD SOILS DATA)
  - Select SOIL MAP
  - There will be a data table on the left and the map with map units marked on the right
  - Be certain to scroll the length of the Legend (on left)
    - Tabulated data includes the total acres selected (bottom), the acres of each soil unit, and percentage of each soil unit in the AOI.
    - Select a Map Unit of interest for detailed information - elevation, climatic conditions, parent material, landscape position, etc. ---------->





- On the toolbar next to SOIL MAP tab, select SOIL DATA EXPLORER tab
    - SOIL REPORTS are generated for your AOI
        - Select OPEN ALL
        - Select a topic of concern (i.e. ORGANIC MATTER)
            - Select VIEW DESCRIPTION = information on how to interpret the REPORT
            - Select VIEW SOIL REPORT = specifics to each soil type for OM throughout solum
    - **This is a great place to explore possible sources for soil improvements and can act as a goal, or end product, for restoration efforts.**
        - For example, if the Blunt silt loam (OM range 2-3% at 0-7" deep) is very light in color, it might have undergone surface scraping (common construction practice) and the subsoil (OM range 0.2-1% at 7-26" deep) is now at the surface.

Be certain to explore in depth the WEB SOIL SURVEY and the NRCS online resources - you paid for it!

WEB SOIL SURVEY CAVEATS

- This is model-based mapping - the data is extrapolated from knowns points over large areas.
    - It has very coarse resolution from past reports, aerial imagery, LiDAR, and soil pits described by certified soil scientists.
- Using slope, vegetative cover, and climatic factors, the WSS creates this fairly accurate map for 95% of the United States.
- In natural or less-disturbed areas, it has very high accuracy of predicting the soil series.
    - Soil series are the smallest units of soil mapping – there are over 20,000 described in the US alone!
- When applied to highly urbanized regions, it should have some ground-truth measurements to test for accuracy in the real world.
    - The next section will provide an example where the WSS mis-represented the observed soil features.

Other Natural Resource Conservation Service (NRCS) Online Resources

https://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

Topics

- **Soil Use** → Soil colors, Urban Soil Issues, Technical Soil Services
- **Soil Research and Laboratory** → Kellogg Soil Survey Laboratory, Methods and Guides, Pubs & Reports
- **Soil Education** → Excellent learning resource (K-6, 7-12, College, National Cooperative Soil Survey)
- Technical References
- International Year of Soils
- Focus Teams

Soil Survey

- **Soil Survey – Home** → Web Soil Survey (discussed during Workshop and in further detail below)
- Soil Survey by State
- Partnerships
- Publications
- Soil Classification

- Soil Geography
- Soil Survey Regional Offices
- Soil Climate Research Stations

Soil Health

- **Soil Health – Home** → Dig Deeper, Learn More
- **Soil Biology** → Soil Biology Primer Chapters
- **Soil Health Assessment** →Soil Quality Indicator Sheets (Physical, Chemical, Biological properties explained)
- Soil Heath Management
- **Resources & Publications** → Links to Soil Quality Information Sheets (Agronomy/Educator based)

GROUND-TRUTH AT THE MORTON ARBORETUM

An Example when site specific conditions over-ride the WSS

The Morton Family had an Estate on the West side of the grounds. It was eventually turned into the Thornhill Campus as the Arboretum evolved. A parking lot was installed (prior to 1939) to support the growing number of visitors. The 1994 redesign of that area included the installation of a new parking lot with large tree planting strips to promote canopy coverage, plus the construction of the new Outpost building. The redesign put the new parking lot on virgin terrain. An Outpost Building was designed to overlay the existing parking lot space. The lawn was to support foot traffic yet provide quality planting sites for trees and other lush gardens.

After construction, there was tree mortality coupled with low growth rates, as well as drainage issues. Understanding how a parking lot is installed is helpful at figuring out what might be the issue and the solution.

Typical parking lot installation procedures:

- Remove top soil (reduce expansion and contraction)
- Compact subsoil
- Apply approximately 12” thick layer of 2” uniformly-sized rock (sub-base material), compact as necessary
- Apply approximately 8” of dense grade aggregate on top of sub-base (base material), compact as necessary
- Apply paver material at approximately 2” thick, compact as necessary

It was determined that the contractor only scrapped off the asphalt, and perhaps the dense aggregates, leaving the compacted sub-base materials. The excavated top soil from the new parking lot was spread on top of this base. Trees were planted and grass was sown.

This issue is known as a ***lithologic discontinuity*** –

Lithology = the character of rock formation having a particular set of characteristics

Discontinuity = a distinct break in physical continuity or sequence in time

A ***lithologic discontinuity*** = significant changes in particle size distribution, suggesting two layers are present.

Two major forces move water through soil: capillary action and gravity. The abrupt layering from the topsoil (small pores) to the paver base (large pore) will impede the flow of water. The pore spaces in the topsoil will need to be completely saturated with water in order for the water to percolate into the next layer.

Soil information from WSS:

Soil 530 C2 - Ozaukee Silt Loam, 2-4% slope (Fine, illitic, mesic Oxyaquic Hapludalf)

The Ozaukee series consists of:

- moderately well drained soils developed in loess (wind blown silt) over till (unsorted, glacial deposit)
- moderately deep or deep to a densic contact with till (Cd).
- formed in as much as 46 cm (18 inches) of loess and in the underlying dense till on ground and end moraines.
- Slope ranges from 0 to 35 percent.
- Mean annual precipitation is about 950 mm (37.4 inches).
- Mean annual air temperature is about 9.7 degrees C (49.5 degrees F)

In the DISTURBED soil profile (right), a majority tree roots were within the top 4” of soil and were unable to penetrate through the rock layer.