

## Soil & Site Evaluator - Need to Know

### I. The professional will understand the factors of soil development and demonstrate their importance to site evaluations.

- A. Topography
  - 1. Landscape & landform description
    - a. Position
    - b. Slope
      - (1) Summit/ridge
      - (2) Shoulder
      - (3) Back or side
      - (4) Foot
      - (5) toe
    - c. Because useful in estimating surface and subsurface drainage patterns
  - 2. Landscape position
    - a. Where on the property are these landforms
- B. Parent materials **NEED TO EDIT FOR ARIZONA SOIL**
  - 1. Lacustrine
  - 2. Alluvium
  - 3. River terrace deposits
  - 4. Glacial outwash
  - 5. Glacial till
  - 6. Loess
  - 7. Organic soils
  - 8. Bedrock
    - a. Weathering
    - b. Soil formation
    - c. Soil horizon development
  - 9. Why do you need to know about parent materials?
    - a. Mottle color is often related to parent material
    - b. Parent material plays the biggest part of whether the soil will be expansive
- C. Climate
  - 1. Precipitation
  - 2. Temperature
- D. Time of soil development
  - 1. Soil structure needs time to develop, therefore fill will not become soil or develop structure
- E. Vegetation and organisms
  - 1. Indicator of oxygen

**Commented [k1]:** Need to check the Arizona Soils Book for what to include

**Commented [k2]:** Find more

**II. The professional will be able to identify and describe physical and morphological soil properties.**

- A. Components of soil
  - 1. Organic matter
  - 2. Pore spaces
  - 3. Clay, sand, silt
  - 4. Water/moisture
  - 5. Organisms
- B. Define and determine soil texture
  - 1. Soil separates (peds)
  - 2. Soil textural classes
  - 3. Use soil textural triangle to determine soil texture class
  - 4. Field determination of soil texture class
  - 5. Significance of soil texture to onsite systems
- C. Soil structure
  - 1. Define soil structure
  - 2. Factors influencing soil structure development
    - a. Time
    - b. Physical weathering
    - c. Gluing agent
  - 3. Field identification
    - a. Shape
    - b. Grade
    - c. Consistence
  - 4. Appropriate sampling procedures
  - 5. Significance of soil structure to onsite systems
    - a. Significant influence on the soil's acceptance and transmission of water, thereby directly influencing the size of the treatment system design
  - 6. Impacts on soil structure
    - a. Driving on soil
    - b. Presence of heavy animals
- D. Soil porosity
- E. Soil water movement
- F. Soil colors
  - 1. Influences on soil color
  - 2. Significance of soil color to onsite systems
  - 3. Use of soil color chart
    - a. Hue
    - b. Value
    - c. Chroma
    - d. Natural light conditions
    - e. Moisture
  - 4. Redoximorphic features
    - a. Conditions for formation
    - b. Identification

- c. Description
  - (1) Concentrations
  - (2) Depletions
  - (3) Gleying
- d. Limitations
- 5. Interpretation of soil colors
  - a. Depth to seasonally saturated soil
- 6. Field determination
- 7. Mottles
  - a. Any color that differs from the matrix
  - b. Can occur anywhere in soil
- 8. Stains and coatings
  - a. Soil component(s) coating soil
  - b. Occur in layers
- 9. Nodules
- 10. Other sources of soil color variation
  - a. E horizon formation
- G. Lithologic discontinuities
  - 1. Abrupt textural boundary
  - 2. Abrupt structural boundary
  - 3. Abrupt color boundary
- H. Role of soil surveys in site evaluation
  - 1. Sources
    - a. USGS
    - b. USDA
  - 2. General landscape, landform, and parent material(s)
  - 3. Ranges of field and laboratory determined soil properties
  - 4. Use and management limitations
- I. Soil variability
- J. Disturbed soils
  - 1. Identification
  - 2. Determination
  - 3. Interpretation
  - 4. Solutions

**III. The professional will be able to identify and describe the following external and subsurface landscape features.**

- A. Landscape position
  - 1. Identification
  - 2. Significance
- B. Slope
  - 1. Determination
  - 2. Significance
- C. Vegetation
  - 1. Identification

- 2. Significance
- D. Flooding
  - 1. Determination
  - 2. Significance
- E. Mud flows
  - 1. Determination
  - 2. Significance
- F. Identify and describe rock
  - 1. Percentage
    - a. Visual
    - b. Field method
  - 2. Type and size
- G. Bedrock determination
- H. Water table determination
  - 1. Use of ADWR website
  - 2. Nearby wells

**IV. The professional will be able to demonstrate knowledge and apply the site evaluation procedures.**

- A. Preliminary evaluation
  - 1. Easements and property lines
  - 2. Ordinary high water level of water bodies
  - 3. Floodplain designation and flooding elevation
  - 4. Soil survey determination of applicable characteristics
  - 5. Legal lot description
  - 6. Wellhead protection area
- B. Field evaluation
  - 1. Site restrictions
    - a. Utilities
    - b. Trees
  - 2. Setbacks - located, mapped, and displayed on site plan
    - a. Well
    - b. Property lines
    - c. Building
    - d. Water lines
    - e. Roads
    - f. Easements
  - 3. Surface features
    - a. Vegetation
    - b. Slope percent and direction
    - c. Disturbed or compacted soil
    - d. Flooding or run-on potential
    - e. Landscape position
  - 4. Utility location
    - a. Blue Stake for public utilities

- b. Locator company for private utilities
- 5. Soil investigation equipment
  - a. Probe
    - (1) Limitations – lose ability to determine structure
  - b. Auger
    - (1) Limitations – lose ability to determine structure
  - c. Backhoe
  - d. Shovel
  - e. Soil sieves
  - f. Graduated cylinders
  - g. Horizontal ID markers to identify horizons (nails, screws)
  - h. Water/Spray bottle
  - i. Acid bottle
  - j. Percolation-test equipment
    - (1) Pre-soaking device
    - (2) Hole scarifier
    - (3) Water reservoir
    - (4) Water-drop measuring device
    - (5) Stop watch
  - k. Munsell Color book
  - l. Applicable regulations
- 6. Soil investigation procedure
  - a. Identify and mark excavation(s) in system area
  - b. Discovery hole (soil morphology method)
    - (1) Depth of each excavation recorded
    - (2) Depth and description of each horizon
    - (3) Number of excavations needed
  - c. Use of a standard method
    - (1) ASTM
    - (2) USDA-NRCS
    - (3) OSHA
    - (4) Other?
- 7. Site protection
  - a. Protect discovery holes
  - b. Protect potential soil treatment areas
- 8. Site evaluation reporting requirements
  - a. Preliminary and field evaluations
  - b. All dates of work completed
  - c. Site map drawn to scale and dimensions noted
  - d. Depth to seasonally saturated soil, limiting conditions, standing water table or flooding elevation
  - e. Elevations
    - (1) Soil surface at test hole
    - (2) Slopes
  - f. Determine soil absorption rate for each horizon
  - g. Items to be shown on site map (vertical and horizontal)

- (1) Buildings
  - (2) Source of drinking water
  - (3) Waterbodies
  - (4) Wash or drainage easement
  - (5) Contours
  - (6) Down slopes and cut banks greater than 15%
  - (7) Any limiting condition
  - (8) North-south-east-west
  - (9) Roads and driveway(s)
  - (10) Property dimensions
  - (11) Trees
  - (12) Earth fissures
  - (13) Location of test holes/excavations
  - (14) Additional onsite wastewater septic systems
  - (15) Other improvements
  - (16) Easements
  - (17) Any additional required regulatory items
- h. Potential construction issues
9. Other considerations
- a. Accountability/Certified statement of soil and site evaluation accuracy
  - b. Require some sort of apprenticeship
  - c. Oversight for all soils evaluation
  - d. “Feel” needs to be standardized frequently, ongoing, calibration
    - (1) Needs source of standards for texture
    - (2) Structure is site-specific