**Soil & Site Evaluator - Need to Know**

1. **The professional will understand the factors of soil development and demonstrate their importance to site evaluations.**
   1. Topography
      1. Landscape & landform description
         1. Position
         2. Slope
            1. Summit/ridge
            2. Shoulder
            3. Back or side
            4. Foot
            5. toe
         3. Because useful in estimating surface and subsurface drainage patterns
      2. Landscape position
         1. Where on the property are these landforms
   2. 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
         1. Weathering
         2. Soil formation
         3. Soil horizon development
      9. Why do you need to know about parent materials?
         1. Mottle color is often related to parent material
         2. Parent material plays the biggest part of whether the soil will be expansive
   3. Climate
      1. Precipitation
      2. Temperature
   4. Time of soil development
      1. Soil structure needs time to develop, therefore fill will not become soil or develop structure
   5. Vegetation and organisms
      1. Indicator of oxygen
2. **The professional will be able to identify and describe physical and morphological soil properties.**
   1. Components of soil
      1. Organic matter
      2. Pore spaces
      3. Clay, sand, silt
      4. Water/moisture
      5. Organisms
   2. 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
   3. Soil structure
      1. Define soil structure
      2. Factors influencing soil structure development
         1. Time
         2. Physical weathering
         3. Gluing agent
      3. Field identification
         1. Shape
         2. Grade
         3. Consistence
      4. Appropriate sampling procedures
      5. Significance of soil structure to onsite systems
         1. 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
         1. Driving on soil
         2. Presence of heavy animals
   4. Soil porosity
   5. Soil water movement
   6. Soil colors
      1. Influences on soil color
      2. Significance of soil color to onsite systems
      3. Use of soil color chart
         1. Hue
         2. Value
         3. Chroma
         4. Natural light conditions
         5. Moisture
      4. Redoximorphic features
         1. Conditions for formation
         2. Identification
         3. Description
            1. Concentrations
            2. Depletions
            3. Gleying
         4. Limitations
      5. Interpretation of soil colors
         1. Depth to seasonally saturated soil
      6. Field determination
      7. Mottles
         1. Any color that differs from the matrix
         2. Can occur anywhere in soil
      8. Stains and coatings
         1. Soil component(s) coating soil
         2. Occur in layers
      9. Nodules
      10. Other sources of soil color variation
          1. E horizon formation
   7. Lithologic discontinuities
      1. Abrupt textural boundary
      2. Abrupt structural boundary
      3. Abrupt color boundary
   8. Role of soil surveys in site evaluation
      1. Sources
         1. USGS
         2. USDA
      2. General landscape, landform, and parent material(s)
      3. Ranges of field and laboratory determined soil properties
      4. Use and management limitations
   9. Soil variability
   10. Disturbed soils
       1. Identification
       2. Determination
       3. Interpretation
       4. Solutions
3. **The professional will be able to identify and describe the following external and subsurface landscape features.**
   1. Landscape position
      1. Identification
      2. Significance
   2. Slope
      1. Determination
      2. Significance
   3. Vegetation
      1. Identification
      2. Significance
   4. Flooding
      1. Determination
      2. Significance
   5. Mud flows
      1. Determination
      2. Significance
   6. Identify and describe rock
      1. Percentage
         1. Visual
         2. Field method
      2. Type and size
   7. Bedrock determination
   8. Water table determination
      1. Use of ADWR website
      2. Nearby wells
4. **The professional will be able to demonstrate knowledge and apply the site evaluation procedures.**
   1. 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
   2. Field evaluation
      1. Site restrictions
         1. Utilities
         2. Trees
      2. Setbacks - located, mapped, and displayed on site plan
         1. Well
         2. Property lines
         3. Building
         4. Water lines
         5. Roads
         6. Easements
      3. Surface features
         1. Vegetation
         2. Slope percent and direction
         3. Disturbed or compacted soil
         4. Flooding or run-on potential
         5. Landscape position
      4. Utility location
         1. Blue Stake for public utilities
         2. Locator company for private utilities
      5. Soil investigation equipment
         1. Probe
            1. Limitations – lose ability to determine structure
         2. Auger
            1. Limitations – lose ability to determine structure
         3. Backhoe
         4. Shovel
         5. Soil sieves
         6. Graduated cylinders
         7. Horizontal ID markers to identify horizons (nails, screws)
         8. Water/Spray bottle
         9. Acid bottle
         10. Percolation-test equipment
             1. Pre-soaking device
             2. Hole scarifier
             3. Water reservoir
             4. Water-drop measuring device
             5. Stop watch
         11. Munsell Color book
         12. Applicable regulations
      6. Soil investigation procedure
         1. Identify and mark excavation(s) in system area
         2. Discovery hole (soil morphology method)
            1. Depth of each excavation recorded
            2. Depth and description of each horizon
            3. Number of excavations needed
         3. Use of a standard method
            1. ASTM
            2. USDA-NRCS
            3. OSHA
            4. Other?
      7. Site protection
         1. Protect discovery holes
         2. Protect potential soil treatment areas
      8. Site evaluation reporting requirements
         1. Preliminary and field evaluations
         2. All dates of work completed
         3. Site map drawn to scale and dimensions noted
         4. Depth to seasonally saturated soil, limiting conditions, standing water table or flooding elevation
         5. Elevations
            1. Soil surface at test hole
            2. Slopes
         6. Determine soil absorption rate for each horizon
         7. 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
         8. Potential construction issues
      9. Other considerations
         1. Accountability/Certified statement of soil and site evaluation accuracy
         2. Require some sort of apprenticeship
         3. Oversight for all soils evaluation
         4. “Feel” needs to be standardized frequently, ongoing, calibration
            1. Needs source of standards for texture
            2. Structure is site-specific