

## **Exhibit A**

### **Preliminary Geologic Investigations**

#### **Soil Borings or Test Pits Bedrock Profiles in Karst Areas**

##### Scope

The work shall consist of inventorying (logging), evaluating, and reporting soil characteristics and bedrock profiles in the designated areas.

Individual Conservation Practice Standards may require a minimum number of test pits or borings required. The number, type, and distribution of soil investigation borings or test pits shall be sufficient to characterize the subsurface conditions.

##### Marking

The extent of the areas to be investigated will be marked by stakes, flags, tree markings, or other suitable methods. The limits may also be shown on a plan view map of the site or determined by the footprint of proposed practices

##### Equipment

Soil borings or test pits will typically be used for conducting subsurface investigations. A backhoe or excavator may be used to construct soil test pits. For shallow investigations, soil borings shall be created by means of a soil bucket auger, soil probe, split-spoon sampler or Shelby tube having at least a 2 inch diameter. A soil boring may not be created by means of a solid stem auger.

##### Soil Boring or Test Pits

Soil test pits shall be constructed to meet OSHA standards and be of adequate size, depth and construction to enable a person to safely enter and exit the pit, if required. Excavation requirements are contained in 29 CFR 1926.651 and 1926.652.

Soil profile descriptions shall be written in accordance with the descriptive procedures, terminology, and interpretations found in:

- ASTM D 2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), and
- NRCS National Engineering Handbook, Part 650, Engineering Field Handbook, Chapter 4 Elementary Soil Engineering, "Field Identification and Description of Soils."

Soil color (Munsell) evaluations shall be performed under natural light conditions to give the most accurate color determinations. Changes in soil color due to exposure to the air should be noted. Frozen soil material shall be thawed prior to conducting evaluations for soil color, texture, structure and consistency.

##### Depth

Soil profile descriptions shall extend an adequate depth below the land surface to identify critical soil properties such as bedrock or subsurface water regimes where these properties will affect the project, design, and construction.

### Elevation and Location

The site shall have a vertical bench mark(s) established. Horizontal location shall be surveyed and/or tied to onsite reference point(s).

The existing undisturbed surface grade elevation and location shall be obtained for all test pits or soil borings and included in the investigation report.

### Bedrock

The type of bedrock, if encountered, such as sandstone, limestone, dolomite, shale, or granite, shall be noted. The elevation of the top surface of bedrock will be recorded. Bedrock condition and ability to be excavated should be noted.

### Soil Moisture<sup>1</sup>

- Dry – Absence of moisture, dusty, dry to the touch
- Slightly Moist – Apparent Moisture but well below optimum moisture content
- Moist – Damp, but no visible water; at or near optimum moisture content
- Very Moist- Above optimum moisture content
- Wet – Visible free water, usually soil is below water table

<sup>1</sup>NEH 631 Chapter 3 Table 3-5

Subsurface saturation indicators, if encountered, such as seepage from sand and gravel lenses or soil texture changes, thickness of lenses, estimated volume of flow, and elevation shall be noted.

Redoximorphic features (mottles) and the soil matrix shall be characterized by the use of the Munsell soil color charts. If the site contains clean sand or gravel the site should be investigated during the wettest time of the year (i.e. spring or late fall) to maximize potential of seasonal high level of the free water table. This may be necessary due to limitations in redoximorphic feature formation within geologic materials with low amounts of organic matter and/or Iron.

The soil profile descriptions must contain the following information (additional criteria can be included as described in ASTM D 2488) for each soil horizon or layer:

- USCS group name and modifiers (i.e.-Silt with Sand)
- USCS group symbol (i.e.-ML w/sand)
- Layer thickness as defined by changes in moisture, color, geologic material, or texture (depth in feet and tenths)
- Percent of cobbles (3 inch to 12 inches) or boulders (>12 inches), or both (estimated by volume)
- Percent of gravel (3 inch to #4 sieve), sand (#4 to #200 sieve), or fines (Passing #200 sieve), or all three (estimates by dry weight)
- Dilatancy: none, slow, rapid
- Plasticity of fines: non-plastic, slightly plastic, low, medium, high
- Munsell color (in moist condition)

- Percent of redoximorphic features defined by matrix color, redox concentration, redox depletions, gleyed matrix, depleted matrix, or reduced matrix color, and/or manganese concentrations with the associated Munsell color (i.e. – Matrix - 70%, 10 YR 5/4; Redox. Depletions - 15%, 10 YR 6/1; Redox. Concentrations - 15%, 10 YR 5/8)
- Odor (mention only if organic or unusual)
- In-situ moisture content: dry, slightly moist, moist, very moist, wet
- Consistency (fine-grained soils only): very soft, soft, firm, hard, very hard
- Structure: stratified, laminated, fissured, slicken-sided, blocky, prismatic, lensed, homogeneous (massive)
- Local geologic / parent material (i.e. - Alluvium) name and soil map unit name
- Seepage or water table depth

Additional comments such as: presence of roots or root holes, presence of mica, gypsum, etc., surface coatings on coarse-grained particles, caving or sloughing of auger hole or pit sides, difficulty in boring, probing or excavating, etc. should be noted.

The depth to standing water in the soil boring or test pit at the end of excavation and when the hole is refilled shall be noted. The time of day shall be noted for these two depths. The test pit or soil boring should not be refilled until the end of the investigation to maximize the time allowed for water to seep back into the hole. Any borings or test pits greater than 10 feet deep which intersect the water table shall be abandoned in accordance with WI Administrative Code, Chapter NR 141. If no standing water is present, that should be noted.

#### Evaluation of Soil Investigation Data

A narrative summary of the soil profile descriptions (logs) shall be included with the investigation report. This summary shall contain a narrative discussing the conclusions that can be drawn from an analysis of the investigations. The summary shall note limiting features such as the interpreted: depth to bedrock, seasonal high water table, regional water table, and perched water table elevations found during the investigation. These limiting factors as well as the geologic material name and USCS group name and modifier will be used by the investigator and/or designer to construct a geologic profile.

#### Bedrock Profiles in Karst Areas

Bedrock profiles for a proposed practice located within 1000 feet of a karst feature will require further investigation by subsurface sounding equipment. The field data will be collected by the NRCS Geologist, private consultant, or field staff trained in the use of the specialized equipment. The data collected will be submitted to the NRCS Geologist for evaluation of the bedrock profile for soil-filled joints, discontinuities, voids, or other indications that may warrant further investigation or design alternative limitations.

#### Investigation Report

The report shall contain:

1. A legible site map, drawn to scale, no smaller than 8.5 inches by 11 inches, showing the soil investigation and bedrock profile locations evaluated along with the vertical and horizontal reference point(s) (see Figure 1).

2. A soil profile description prepared for each boring or test pit. Each description shall contain the person's name that collected the data and the date and time the data was collected.
3. Bedrock profile data, interpretations, and recommendations by the NRCS Geologist, qualified field staff, or private sector geologist.
4. A narrative of the limiting design factors as a result of the subsurface investigation.
5. Recommendations for further investigation needed.

**Figure 1. Example of Geologic Profile**

