



## Standard Guide for Field Logging of Subsurface Explorations of Soil and Rock<sup>1</sup>

This standard is issued under the fixed designation D 5434; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This guide describes the type of information that should be recorded during field subsurface explorations in soil and rock.

1.2 This guide is not intended to specify all of the information required for preparing field logs. Such requirements will vary depending on the purpose of the investigation, the intended use of the field log, and particular needs of the client or user.

1.3 This guide is applicable to boreholes, auger holes, excavated pits, or other subsurface exposures such as road side cuts or stream banks. This guide may serve as a supplement to Guide D 420.

1.4 This guide may not be suited to all types of subsurface exploration such as mining, agricultural, geologic hazardous waste, or other special types of exploration.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care of which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:

D 420 Guide to Site Characterization for Engineering, Design, and Construction Purposes

D 653 Terminology Relating to Soil, Rock, and Contained Fluids<sup>2</sup>

D 1452 Practice for Soil Investigation and Sampling by Auger Borings<sup>2</sup>

D 1586 Method for Penetration Test and Split-Barrel Sampling of Soils<sup>2</sup>

D 1587 Practice for Thin-Walled Tube Geotechnical Sampling of Soils<sup>2</sup>

D 2113 Practice for Diamond Core Drilling for Site Investigation<sup>2</sup>

D 2488 Practice for Description and Identification of Soils (Visual-Manual Procedure)<sup>2</sup>

D 2573 Test Method for Field Vane Shear Test in Cohesive Soil<sup>2</sup>

D 3441 Test Method for Deep, Quasi-Static, Cone and Friction/Cone Penetration Tests of Soil<sup>2</sup>

D 3550 Practice for Ring-Lined Barrel Sampling of Soils<sup>2</sup>

D 4083 Practice for Description of Frozen Soils (Visual-Manual Procedure)<sup>2</sup>

D 4220 Practices for Preserving and Transporting Soil Samples<sup>2</sup>

D 4403 Practice for Extensometers Used in Rock<sup>2</sup>

D 4544 Practice for Estimating Peat Deposit Thickness<sup>2</sup>

D 4622 Test Method for Rock Mass Monitoring Using Inclometers<sup>2</sup>

D 4623 Test Method for Determination of In Situ Stress in Rock Mass by Overcoring Method—USBM Borehole Deformation Gage<sup>2</sup>

D 4633 Test Method for Stress Wave Energy Measurement for Dynamic Penetrometer Testing Systems<sup>2</sup>

D 4645 Test Method for Determination of the In-Situ Stress in Rock Using the Hydraulic Fracturing Method<sup>2</sup>

D 4719 Test Method for Pressuremeter Testing in Soils<sup>2</sup>

D 4750 Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)<sup>2</sup>

D 4879 Guide for Geotechnical Mapping of Large Underground Openings in Rock<sup>2</sup>

D 5079 Practices for Preserving and Transporting Rock Core Samples<sup>3</sup>

### 3. Terminology

#### 3.1 Definitions:

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of D18.07 on Identification and Classification of Soils.

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<sup>2</sup> Annual Book of ASTM Standards, Vol 04.08.

<sup>3</sup> Annual Book of ASTM Standards, Vol 04.09.

3.1.1 Except as listed below, all definitions are in accordance with Terminology D 653.

### 3.2 Description of Term Specific to This Standard:

3.2.1 *field log*—a record prepared during subsurface explorations of soil and rock to document procedures used, test data, descriptions of materials and depths where encountered, ground water conditions, and other information.

## 4. Summary of Guide

4.1 This guide describes the type of information that should be recorded during the execution of field subsurface explorations in soil and rock. The information described relates to the project, personnel, methods of investigation and equipment used, visual description of subsurface materials and ground water conditions, in-situ testing, installation of monitoring equipment, and other data that may be appropriate.

## 5. Significance and Use

5.1 The preparation of field logs provides documentation of field exploration procedures and findings for geotechnical, geologic, hydrogeologic, and other investigations of subsurface site conditions. This guide may be used for a broad range of investigations.

5.2 The recorded information in a field log will depend on the specific purpose of the site investigation. All of the information given in this guide need not appear in all field logs.

## 6. Summary of Work

6.1 Soil and rock field logs should include the following written information:

6.1.1 Project information should include:

6.1.1.1 Name and location of the project or project number, or both,

6.1.1.2 Name of personnel onsite during the exploration, such as drilling crew, supervisor, geologist, engineer, and technicians,

6.1.1.3 Names and addresses of organizations involved,

6.1.1.4 Name of person(s) preparing log,

6.1.1.5 Reference datum for project if available and description of datum, and

6.1.1.6 General remarks as appropriate.

6.1.2 Exploration information should include:

6.1.2.1 Exploration number and location (station and coordinates if available and applicable, position relative to a local permanent reference which is identified, or markings of exploration location),

6.1.2.2 Type of exploration, such as drill hole, auger hole, test pit, or road cut,

6.1.2.3 Date and time of start and finish,

6.1.2.4 Weather conditions including recent rain or other events that could affect subsurface conditions,

6.1.2.5 Depth and size of completed exploration,

6.1.2.6 The condition of exploration prior to and after backfilling or sealing, or both, and

6.1.2.7 Method of backfilling or sealing exploration, or both.

6.1.3 Explorations by drill hole or auger hole should include the following drilling information:

6.1.3.1 Type and make (manufacture and model if known)

of drilling machine or description and name of contractor,

6.1.3.2 Method of drilling or advancing and cleaning the borehole. State if air, water, or drilling fluid is used. Describe type, source of water and additives, concentration, and tests performed on fluid,

6.1.3.3 Size, type, and section length of drilling rods (rod designations should conform with Table 3 of Method D 2113) and drilling bits used.

6.1.3.4 Dates and times of each stage of operation and time to complete intervals,

6.1.3.5 Size of hole (diameter and depth),

6.1.3.6 Ground elevation at top of borehole,

6.1.3.7 Orientation of drill hole, if not vertical (azimuth or bearing and angle),

6.1.3.8 Size and description of casing, if appropriate, method of casing installation (driven, drilled, or pushed) and depth of cased portion of boring (casing size designations should conform with Table 2 of Method D 2113), hollow-stem augers,

6.1.3.9 Methods used for cleaning equipment or drilling tools, or both, when required, and

6.1.3.10 Describe and state depth of any drilling problems such as borehole instability (cave in, squeezing hole, flowing sands), cobbles, lost drilling fluid, lost ground, obstruction, fluid return color changes, and equipment problems.

6.1.4 Exploration by test pit, road cut, stream cut, etc., should include:

6.1.4.1 Method of exploration,

6.1.4.2 Equipment used for excavation,

6.1.4.3 Type of shoring used, and

6.1.4.4 Excavation problems: instability of cut (sloughing, caving, etc.), depth of refusal, difficulty of excavating, etc.

6.1.5 Subsurface information should include:

6.1.5.1 Depth of changes and discontinuities in geologic material and method used to establish change (such as Practice D 4544).

6.1.5.2 Description of material encountered with origin or formation name, if possible, and type of samples used for description. The system or method of soil (such as Practices D 2488 and D 4083) or rock description should be referenced.

6.1.5.3 Description of nature of boundary between strata (gradual or abrupt, as appropriate) and other relevant structural features such as breccia, slickensides, solution zones, discolorations by weathering or hydrothermal fluids, and other stratigraphic information.

6.1.6 Soil or rock sampling and testing information should include:

6.1.6.1 Depth of each sample and number (if used),

6.1.6.2 Method of sampling (reference to appropriate ASTM standard, for example, Practice D 1452, Test Method D 1586, Method D 1587, Practice D 3550, or other method).

6.1.6.3 Description of sampler: inside and outside dimensions, length, type of metal, type of coating, and type of liner,

6.1.6.4 Method of sampler insertion: pushed, cored, or driven,

6.1.6.5 Sampler penetration and recovery lengths of samples (rock quality designation (RQD) and rate of coring in the case of rock),

6.1.6.6 Method of sample extrusion. Mark direction of extrusion,

6.1.6.7 Method of preserving samples and preparing for transport (refer to Practices D 4220 or D 5079),

6.1.6.8 Mark top and bottom of samples and orientation, if possible,

6.1.6.9 Depth and description of any in-situ test performed (reference to applicable ASTM standard, for example, Test Methods D 1586, D 2573, D 3441, D 4623, D 4633, D 4645, D 4719, or other tests if applicable),

6.1.6.10 Description of any other field tests conducted on soil and rock during the exploration such as pH, hydraulic conductivity, pressuremeter geophysical, pocket penetrometer, soil gas/vapor analysis, or other tests, and

6.1.6.11 Destination or recipient of samples and method of transportation.

6.1.7 Ground water information should include:

6.1.7.1 Depths and times at which ground water is encountered, including seepage zones, if appropriate,

6.1.7.2 In the case of drilling using drilling fluid, depth of fluid surface in boring and drilling depth at the time of a noted loss or gain in drilling fluid,

6.1.7.3 Depth to ground water level at the completion of drilling and removal of drill steel and description of datum (note condition of borehole, for example, cased or uncased). Date and time measured,

6.1.7.4 Depth to ground water level at some reported time period following completion of drilling and description of datum, when possible.

6.1.7.5 Method or equipment used to determine depth of ground water level, such as Test Method D 4750,

6.1.7.6 Method and depth of ground water samples obtained, including size of samples taken and description of sampler, and

6.1.7.7 Description of any field tests conducted on ground water samples such as pH, temperature, conductivity, turbidity, or odor.

6.1.8 Information regarding installation of instrumentation or monitoring equipment should include:

6.1.8.1 Type of equipment installed, for example, piezometers, monitoring well screens, inclinometer, including sizes and types of materials,

6.1.8.2 Depth and description of equipment installed (reference to applicable ASTM standard, for example, Test Method D 4622, Practice D 4403, or other standards or procedures),

6.1.8.3 Methods used for installation of equipment and method used for sealing annular space, and

6.1.8.4 Methods used to protect equipment (casing cap or locks).

6.2 Soil and rock field logs should include the following pictorial information:

6.2.1 Maps, drawings, or sketches of area of exploration and subsurface surfaces observed. Include pertinent surface information such as neighboring outcrops, as appropriate. Describe system of mapping, such as Guide D 4879 for rock, or legend for symbols of materials. Include dimensions, directions, and slopes, and

6.2.2 Photographs of activities, surfaces, or core. Describe sequence, dates and time, direction, objects used for scale, and subject.

## **7. Keywords**

7.1 drilling; explorations; geologic investigations; ground water; logging; preliminary investigations; sampling; soil investigations; subsurface investigations

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