Designation: D 7015 – 07

Standard Practices for Obtaining Intact Block (Cubical and Cylindrical) Samples of Soils[1]

This standard is issued under the fixed designation D 7015; 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 (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 These practices outline the procedures for obtaining intact block (cubical and cylindrical) soil samples.

1.2 Intact block samples are obtained for laboratory tests to determine the strength, consolidation, permeability, and other geotechnical engineering or physical properties of the intact soil.

1.3 Two sampling practices are presented. Practice A covers cubical block sampling, while Practice B covers cylindrical block sampling.

1.4 These practices usually involve test pit excavation and are limited to relatively shallow depths. Except in the case of large diameter (that is, >0.75 m) bored shafts of circular cross-section in unsaturated soils, for depths greater than about 1 to 1½ meters or depths below the water table, the cost and difficulties of excavating, cribbing, and dewatering generally make block sampling impractical and uneconomical. For these conditions, use of a thin-walled push tube soil sampler (Practice D 1587), a piston-type soil sampler (Practice D 6519), or Hollow-Stem Auger (D 6151), Dennison, or Pitcher-type soil core samplers, or freezing the soil and coring may be required. This practice does not address environmental sampling; consult Guides D 6169 and D 6232 for information on sampling for environmental investigations.

1.5 Successful sampling of granular materials requires sufficient cohesion, cementation, or apparent cohesion (due to moisture tension (suction)) of the soil for it to be isolated in a column shape without undergoing excessive deformations. Additionally, care must be exercised in the excavation, preservation and transportation of intact samples (see Practice D 4220, Group D).

1.6 The values stated in SI units are to be regarded as the standard. No other units are included in this standard.

1.7 *This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by 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.*

1.8 *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 requirements prior to use.* For specific hazard statements, see Section 6.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 653 Terminology Relating to Soil, Rock, and Contained Fluids

D 1587 Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes

D 1785 Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

D 2488 Practice for Description and Identification of Soils (Visual-Manual Procedure)

D 2937 Test Method for Density of Soil in Place by the Drive-Cylinder Method

D 3740 Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

D 4220 Practices for Preserving and Transporting Soil Samples

D 5434 Guide for Field Logging of Subsurface Explorations of Soil and Rock

D 6151 Practice for Using Hollow-Stem Augers for Geotechnical Exploration and Soil Sampling

D 6169 Guide for Selection of Soil and Rock Sampling Devices Used With Drill Rigs for Environmental Investigations

[1] These practices are under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.02 on Sampling and Related Field Testing for Soil Evaluations.

Current edition approved Nov. 1, 2007. Published November 2007. Originally approved in 2004. Last previous edition approved in 2004 as D 7015 – 04.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

D 6232 Guide for Selection of Sampling Equipment for Waste and Contaminated Media Data Collection Activities
D 6519 Practice for Sampling of Soil Using the Hydraulically Operated Stationary Piston Sampler

3. Terminology

3.1 *Definitions*—For definition of terms in this standard refer to Terminology D 653.

4. Significance and Use

4.1 Intact block samples are suitable for laboratory tests where large-sized samples of intact material are required or where such sampling is more practical than conventional tube sampling (Practices D 1587 and D 6519), or both.

4.2 This method of sampling is advantageous where the soil to be sampled is near the ground surface. This is the best available method for obtaining large intact samples of very stiff and brittle soils, partially cemented soils, and some soils containing coarse gravel.

4.3 Excavating a column of soil may relieve stresses in the soil and may result in some expansion of the soil and a corresponding decrease in its unit weight (density) or increase in sampling disturbance, or both. Usually the expansion is small in magnitude because of the shallow depth. Stress changes alone can cause enough disturbances in some soils to significantly alter their engineering properties.

4.4 The chain saw has proved advantageous in sampling difficult soils, which are blocky, slickensided, or gravelly, or materials containing alternating layers of hard and soft material.[3] The chain saw uses a special carbide-tipped chain.[4]

NOTE 1—The quality of the result produced by this standard is dependent on the competence of the personnel performing it, and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D 3740 are generally considered capable of competent and objective sampling. Users of this practice are cautioned that compliance with Practice D 3740 does not in itself assure reliable results. Reliable results depend on many factors; Practice D 3740 provides a means of evaluating some of those factors.

5. Apparatus

5.1 Excavating and trimming tools are required. This may include such items as backhoe, pick, shovel, chain saw, trowel, large and small knives, hacksaw blades, thin wire such as piano wire. In addition, a sample container having sufficient strength and rigidity to avoid deformations that could damage the sample.

5.1.1 The chain for the chain saw is of standard design except that carbide tips are brazed to the cutting teeth. The chain saw's bar length should be greater than 457 mm.

5.2 For cubical block sampling, a cubical wooden, steel box or any relatively rigid material that can be assembled into a box 10 mm to 15 mm larger than the sample side dimensions may be used to contain the cubical block sample during the required cutting process (see 7.1.8) or transportation or both. Steel boxes should have some form of protective coating as outlined in 5.3, unless the soil is to be extruded in less than 3 days. The box should be fastened using screws, or bolts and nuts preferable before going to the field to verify that the parts fit together and can be assembled without vibration of the sample. Do not use nails or other devices that require hammering to assemble or dissemble the box.

5.3 For cylindrical block sampling, cylindrical tubes made of steel or any relatively rigid material may be used to contain the cylindrical block sample during the required cutting process (see 7.2.5) or transportation or both. Steel tubes should have some form of protective coating, unless the soil is to be extruded in less than 3 days. The type of coating to be used may vary depending upon the material to be sampled. Plating of the tubes or alternate base metals may be specified. Galvanized tubes are often used when long-term storage is required. Tubes may be protected with a light coating of lubricating oil, lacquer, epoxy, TFR fluorocarbon, or zinc oxide. One end of the tube should have a sharpened cutting edge to assist in cutting the soil. Cylindrical tubes made of PVC pipe should have a minimum sidewall thickness of no less than that of a Schedule 80 pipe (Specification D 1785).

NOTE 2—Experience with thin-wall push tube sampling of soils (Practice D 1587) indicates disturbance is minimized when the cutting edge is about 10 degrees or less. This sharp angle is possible with metal tubes, but may not be with other materials such as PVC, and a sharp angle may not be critical to hand trimmed samples.

5.4 Cheesecloth or similar cloth wrapping material.

5.5 Sealing wax, paintbrush, and melting stove or heater. Use a sealing wax that does not shrink appreciably, does not permit evaporation from the sample, and does not exhibit brittle characteristics. Microcrystalline waxes are preferable to paraffin.

5.6 Shipping containers, packing materials, labels, data forms, and other necessary supplies. Packing material may be light, resilient polystyrene plastic, sawdust, or smaller material.

5.7 Fuel for the wax melting stove or heater, and fuel and lubricating oil for the chain saw.

5.8 Personal protective equipment (PPE) should be considered when necessary. If a chain saw is used, eye and hearing protection are necessary. A hard hat may also be appropriate. A first aid kit should be available and a fire extinguisher should also be handy especially where a stove or heater is being used.

6. Hazards

6.1 *Warning Statement*—Trenching and excavation work presents serious risks, such as slope instability, ventilation, hearing etc. to all workers involved. All excavations must be constructed in accordance with applicable OSHA requirements.[5]

7. Procedure

7.1 *Practice A—Cubical Block Sampling*:

7.1.1 At the location where the block sample is to be obtained level and smooth the ground surface and mark the

[3] Tiedemann, D. A., GR-83-8, "Undisturbed Block Sampling Using a Chain Saw," Bureau of Reclamation, Denver, CO, 1983, p. 19.

[4] USBR 7100-89, "Obtaining Undisturbed Block Samples by the Hand and Chain Saw Methods," *Earth Manual—Part 2* , Bureau of Reclamation, Denver, CO, 1990, pp. 1079-1083.

[5] 29 CFR 1926 "Labor," Code of Federal Regulations, U.S. Printing office, 1991.