



Standard Guide for Using the Gravity Method for Subsurface Investigation¹

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1. Scope

1.1 Purpose and Application:

1.1.1 This guide summarizes the equipment, field procedures, and interpretation methods for the assessment of subsurface conditions using the gravity method.

1.1.2 The gravity method described in this guide is applicable to investigation of a wide range of subsurface conditions.

1.1.3 Gravity measurements indicate variations in the earth's gravitational field caused by lateral differences in the density of the subsurface soil or rock or the presence of natural voids or man-made structures. By measuring spatial changes in the gravitational field, variations in subsurface conditions can be determined.

1.1.4 Detailed gravity surveys (commonly called micro-gravity surveys) are used for near-surface geologic investigations and geotechnical, environmental, and archaeological studies. Geologic and geotechnical applications include location of buried channels, bedrock structural features, voids, and caves, and low-density zones in foundations. Environmental applications include site characterization, groundwater studies, landfill characterization, and location of underground storage tanks (1)².

1.2 Limitations:

1.2.1 This guide provides an overview of the gravity method. It does not address the details of the gravity theory, field procedures, or interpretation of the data. Numerous references are included for that purpose and are considered an essential part of this guide. It is recommended that the user of the gravity method be familiar with the references cited and with the Guides **D420**, **D5753**, **D6235**, and **D6429**, and Practices **D5088**, and **D5608**.

1.2.2 This guide is limited to gravity measurements made on land. The gravity method can be adapted for a number of special uses: on land, in a borehole, on water, and from aircraft

and space. A discussion of these other gravity methods, including vertical gravity gradient measurements, is not included in this guide.

1.2.3 The approaches suggested in this guide for the gravity method are the most commonly used, widely accepted, and proven. However, other approaches or modifications to the gravity method that are technically sound may be substituted.

1.2.4 *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, experience, and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM document 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.*

1.3 Precautions:

1.3.1 *It is the responsibility of the user of this guide to follow any precautions in the equipment manufacturer's recommendations and to establish appropriate health and safety practices.*

1.3.2 *If this guide is used at sites with hazardous materials, operations, or equipment, it is the responsibility of the user of this guide to establish appropriate safety and health practices and to determine the applicability of any regulations prior to use.*

1.3.3 *This guide does not purport to address all of the safety concerns that may be associated with the use of the gravity method. It is the responsibility of the user of this guide to establish appropriate safety and health practices and to determine the applicability of regulations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:³

D420 Guide to Site Characterization for Engineering Design

¹ This guide is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.01 on Surface and Subsurface Characterization.

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² The boldface numbers in parentheses refer to the list of references at the end of this standard.

³ 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.