LABORATORY SHEAR TESTING OF SOILS

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INTRODUCTION

Committee D-18 on Soils is currently composed of eleven technical and five administrative subcommittees for handling the work assigned to it. These cover the various technical phases of soils engineering and administrative functions. The establishment of one or more subcommittees to handle technical work on rock engineering is presently under consideration.

As in all ASTM technical committees, the primary function of these subcommittees is to develop standard test methods and conduct related research. In developing test methods, the subcommittees draft the proposed method after suitable discussions. The method must pass by a two-thirds vote of the membership, and, if acceptable, the proposal is put to a committee ballot where a two-thirds affirmative vote is required prior to submittal to the Society. All negative votes are given detailed consideration. Those members who have worked on standardizing methods can assure the profession that it is a long process, and many compromises are necessary to include the varied ideas and backgrounds of the membership.

It is often appropriate to hold symposia or formal papers sessions to assess the state of the art, evaluate the need for standard methods, and evaluate factors which must be considered in developing the standard. By this means, the investigations and research of the membership and others are utilized. When such symposia are deemed desirable, the appropriate subcommittees are responsible for their organization and presentation.

In some instances, the responsible subcommittee may conclude that there is insufficient information on which to base definite standards requirements. In such cases, cooperative research and evaluation programs may be undertaken by the laboratories of the subcommittee members. Surveys are often conducted among the committee members or the profession to collect data necessary for their work.

Ever since its organization, Committee D-18 has been subjected to criticism by some soils engineers outside, as well as within, the committee. This criticism is generally caused by a misunderstanding of the committee's objectives and general philosophy. For this reason, I would like very briefly to review our position. This position is stated clearly and in detail in the General Introduction to *Procedures for Soil Testing*,[2] 1958 edition.

The criticisms are of two types: (1) some engineers feel that the science of soil mechanics is in a fluid state and that it is too early to write standards for even the simplest soil tests; (2) the

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[2] ASTM Compilation of Procedures for Soil Testing (1958).

second type of argument is that soil mechanics is a special science which does not lend itself to standardization in any form. Soils engineers concerned with the administration of Committee D-18 are aware of these matters, but they are also aware of serious pitfalls which are created when soils engineers throughout the profession are securing critical design and control data by different procedures which may result in misleading interpretations.

We realize that current research in soil mechanics may require continued changes in standard test methods. This is one of our objectives and well within the concepts of ASTM.

Whether soils engineers like to admit it or not, there are numerous soil test methods in addition to the ASTM standards used every day. Numerous textbooks on soils engineering contain information on how to make laboratory and field tests. In practically every university teaching soil mechanics courses, the instructors are using these textbooks or duplicated notes describing testing procedures. Most of our federal and state agencies and many engineering firms have manuals covering soil test procedures.

The soils engineers of Committee D-18 are very cognizant that soil cannot be treated like many controlled materials and that quality soil testing never was or never will be a routine matter. Obviously a soil must be evaluated in terms of its past history, constituent parts, the treatment contemplated, and the conditions to which it will be subjected. Thus, some details of soil test procedures must be flexible to take into account these factors. This demands experience and judgment of a high order. Soil testing like soil mechanics itself is not an end in itself; rather it is a tool and should be employed in this manner.

In the light of the above comments, one may ask what we mean by standardization of soil tests. We mean that: (1) certain basic steps in the test should be defined, (2) suitable equipment and samples should be described within acceptable limits, (3) required variations to fit the problem should be discussed, and (4) all information on these variations necessary for the proper interpretation of the data should be included with the report of the test data.

We feel that there are so many test procedures used today and oftentimes reported without adequate description that the use of the data is dangerous. We are not concerned about universities and others performing research tests, nor are we so much concerned about large engineering organizations which have well-coordinated laboratory geology and design activities. We are particularly concerned about those engineers who must rely on reports of soil investigations made by others. In all cases, however, we feel that there is great advantage for those working in the field of soil mechanics to be able to compare results and to understand what those results mean. Many general engineering firms do not appreciate the difference between a comprehensive testing program and a minimum program providing data of questionable value. A written standard would be of great value to them and to those soils engineers trying to perform truly competent services.

Soils engineering is a big and complicated business today, therefore each soil problem cannot be handled as an individual research problem. For these reasons, we feel that adequate and sensible guidelines for exploration, sampling, and testing are a necessity.