TESTING FORUM

Possible Changes in Consolidation Test Standard

ASTM Test Method for One-Dimensional Consolidation Properties of Soils, (D 2435) is being revised by Subcommittee D18.05 on Structural Properties of Soils. A major change in procedure is being considered. The current standard test method requires that deformation data be taken with time *for only two of the load values.* It has been suggested that deformation data be taken with time *for all load values and possibly unloading values as well.* Two persons on the Subcommittee have been invited by the Technical Editor to outline some of the rationale for keeping the current procedure, at least as an option, and for changing it to require time readings for all load values. John Germaine is the director of geotechnical laboratories at the Massachusetts Institute of Technology and Jan Wildman is the manager of technical services at Ardaman and Associates.

Your views on these changes are being solicited by the subcommittee. Comments should be set to

Mr. Jorgen F. Christiansen
ASTM D18.05.04 Task Force
c/o Empire Soils Investigations
105 Corona Ave.
Groton, NY 13073

Time Readings Should Not be Required for All Load Values

The proposed standard substantially improves the current form in many respects. It reflects both ASTM's spirit to improve testing and Jorgan Christiansen's dedication to developing a complete standard. However, I am compelled to dispute the axiom that more data are tantamount to better testing. The purpose of ASTM standard procedures is to assure the *quality* of a test. The standard should only specify the minimum conditions that are necessary for a given test result to be useful. If part of the profession chooses to practice more rigorous techniques, they should be rewarded, but the others should not be penalized.

The debate over time readings is a perfect example of overregulation. I personally prefer (and require when possible) that data be collected for every load increment. This practice provides a better understanding of the soil specimen and allows a more rigorous interpretation, which accounts for time effects. However, every engineer does not routinely use time data. Unless the engineer intends to consider time effects or ASTM is willing to specify exclusive use of the end-of-primary-compression curve, I see no logical reason to require collection of all time data. Collecting and presenting such data requires too much effort for the sake of a standard.

The present standard procedure requires time data for two load increments (one in the virgin region), limits the load increment ratio (0.7 to 1.0), and specifies equal load increment durations (preferring the 24-h increment). This method is less rigorous, but provides the *minimum* requirements to obtain compression characteristics and the preconsolidation pressure for normal engineering purposes. The combination of equal time increments and reasonable load increment ratios will eliminate scatter in the compression curve because of time effects. The two consolidation curves provide assurance that the soil is generally as expected and that sufficient time has passed to allow full consolidation. This is sufficient standardization to measure only the load-deformation characteristics of a soil.

A more rigorous standard procedure is justified in order to measure rates of consolidation or for projects of a more complex nature. Under such circumstances, time readings are essential for each load increment. Such time data must be collected to properly understand the evolution of deformation.

The new ASTM standard procedure should incorporate two options. The standard procedure should require complete time readings. Hopefully, this will encourage the profession to adopt more rigorous testing practices. The optional standard procedure should require two time curves and restrict the load increment duration and load increment ratio. This will assure quality testing yet will recognize the need for labor saving options.

ASTM must continue to be aware of the practical testing details and guard against overspecification. It is unnecessary, and hence unfair to the geotechnical community, to require complete time histories. However, the practicing profession should be guided towards more rigorous procedures. Complete time histories should become common as automation becomes more popular. And remember, the normal review cycle of ASTM standards will again allow revision of this important standard in five years.

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Time Readings Should be Required for All Load Values

The ASTM Test Method for One-Dimensional Consolidation Properties of Soils (D 2435) should require deformation with time readings for every load. Measuring deformation with time will verify that primary consolidation is completed before proceeding with the loading sequence. The additional information will significantly improve interpretation of the test data, minimize bias, and allow for detection of test errors.

Presently in lieu of time-deformation readings, an arbitrary time of 24 h is assumed to be adequate to insure that primary consolidation is completed. This assumption is valid for most soils. However, for some highly compressible yet relatively impermeable soils, primary consolidation may not be completed after 24 h. For a sample with a drainage height of 1.5 cm, a coefficient of consolidation less than 2.6×10^{-5} cm^2/s would require more than 24 h for primary consolidation to be completed. Some clays from Tallahassee, FL, with a liquid limit of about 140% and a plasticity index of about 100% are characterized by coefficients of consolidation in the virgin compression range on the order of 1 to 3×10^{-5} cm^2/s. If such a soil is tested using the 24-h approach, the results would be incorrect. The final strain would be underestimated giving a nonconservative error.

Additionally, the deformation versus time readings would allow for the coefficient of consolidation to be calculated at every load. As is commonly known, there can be a large variation in c_v and reporting only two points can be dangerously inaccurate. A testing laboratory should not be put in a position to make engineering judgment as to which load increments are representive. Moreover, the coefficient of consolidation can be used to evaluate inaccuracies in test data quality, sample disturbance, and is an indicator of maximum past pressure.

Another benefit of time-deformation readings would be that the strain versus log of pressure curve can be constructed using the deformation at the end of primary consolidation. As ASTM D 2435 presently suggests, that is a preferred method, and if it were required, it would eliminate any testing bias caused by differences in initial sample height and secondary compression effects.

In order to obtain high quality results, time-deformation readings are mandatory. The standard test method should yield quality test results for any soil tested. Short-cuts, which occasionally give erroneous data, should not be endorsed. Moreover, ASTM is not in a position to make a judgment as to which c_v data are relevant, nor should it delegate that responsibility to the testing laboratory.

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Call for Papers

The Seventh International Conference on Ground Control in Mining will be held 3-5 Aug. 1988 at the Sheraton Lakeview Resort and Conference Center, Morgantown, WV. This conference series, begun in 1981, is becoming widely acknowledged as a forum for the exchange of information among researchers, consultants, manufacturers, and operators in the mining industry and profession all over the world.

Papers are invited in the field of ground/strata/roof control, including applied theoretical, problem solving, and case studies. Abstract are due 2 Jan. 1988. Notification of acceptance will be 29 Feb. 1988. Final papers are due 20 May 1988.

Send abstracts and inquiries to Dr. S. S. Peng, Department of Mining Engineering, College of Mineral and Energy Resources, West Virginia University, P.O. Box 6070, Morgantown, WV 26506-6070; Telephone: 304-293-5695.

Awards

A. Ivan Johnson received the American Water Resources Association's (AWRAS) Icko Iben Award during the recent AWRA Annual Conference in Atlanta. The award recognizes outstanding contributions to the promotion of communication among the disciplines concerned with water resources problems. He is President, A. Ivan Johnson, Inc., Arvada, CO, in water and soil engineering consulting.

Ivan was Chairman of Committee D-18 on Soil and Rock from 1976 to 1982. Currently, he is chairman of D18.20 on Impermeable Barriers and of D18.93 on Nomenclature for Soil and Rock Mechanics.

Awards

The following awards were presented at the Annual Meeting of ASTM in Cincinnati in June.

FIG. 1—*Dr. Roy E. Olson of the University of Texas at Austin is the 1987 C.A. Hogentogler Award winner. This award, named in honor of the first chairman of Committee D18, was given for Dr. Olson's paper "State of the Art: Consolidation Testing," which appeared in* Consolidation of Soils, Testing and Evaluation, STP 892, *published in May 1986. Starting this past July, Dr. Olson is a visitor to the National Science Foundation where he will direct the Geomechanics Program.*

FIG. 2—*Dr. Ernest T. Selig has been awarded the 1987 Dudley Award of ASTM. This award, selected by the Committee on Publications, is for his founding and work as first editor of the* Geotechnical Testing Journal. *Dr. Selig is a professor at the University of Massachusetts and continues on the Editorial Board of the Journal.*

FIG. 3—*Dr. Robert C. Deen has been presented an Honorary Membership in Committee D18 for meritorious service to the Committee over a period of years. The award was presented by Woodland G. Shockley, Chairman of Committee D18. Dr. Deen is the Director of the Transportation Research Program at the University of Kentucky and is Vice-Chairman of Committee D18.*

FIG. 4—*Adrian Pelzner (center), immediate past chairman of Committee D18 received ASTM's Award of Merit for his leadership and work in Committee D18 over the years. The award was presented by Robert Baboian, Chairman of ASTM's Board of Directors. With them is Adrian's wife, Barbara.*

FIG. 5—*Dr. Howard J. Pincus has been named the recipient of the 1987 Frank W. Rinehart Award for his work in terminology associated with rock mechanics and rock testing. Dr. Pincus has recently retired from the Department of Geological Sciences at the University of Wisconsin—Milwaukee. Currently, he maintains a consulting practice in San Diego.*

FIG. 6—*Committee D18 bestowed six Special Service Awards this year. The four awardees shown above are: Robert J. Stephenson (upper left) of the U.S. Army Corps of Engineers, South Atlantic Division Lab and Secretary of Committee D18; Robert T. Donaghe (upper right) U.S. Army Corps of Engineers, Waterways Experiment Station and Chairman of Subcommittee D18.05 on Structural Properties of Soils; Kenneth R. Demars (lower left) University of Connecticut; and Jean Audibert (lower right) Earth Technology Corporation.*

FIG. 7—*Ronald C. Chaney of Humbolt State University and Chairman of Subcommittee D18.13 on Marine Geotechnics. The last recipient, Jean Louis Briaud of Texas A&M University was not present for the award.*

TESTING FORUM

Environmental Standards for Soil, Rock, and Ground Water

ASTM is recognized as a leading concensus standards writing organization. Within ASTM Committee D18 on Soil and Rock, Subcommittee D18.14 on Geotechnics of Waste Management has established a Task Group to develop a list/matrix of existing and potential standards, which are applicable to environmental contamination problems in soil, rock, and ground water. To date, this list includes over 60 existing and draft ASTM Standards from ASTM committees in the areas of site characterization, construction evaluation, and geosynthetics.

It is the intent of ASTM Subcommittee D18.14 that this information will be used as a reference document and planning tool for the entire environmental community. Input is being sought from ASTM committees and subcommittees and from other professional and technical organizations. Guidelines, protocols, standards from other organizations, etc., applicable to waste management/contamination issues, are needed. Persons interested in participating should contact the task group chairman:

William McKinnell
Task Group Chairman, ASTM D18.14
c/o WEST Corp., Environmental Contractors
3676 South Natches Court
Englewood, CO 80110
Phone (303) 789-1332

ASTM Committee D-18 on Soil and Rock

Scope

The promotion of knowledge; stimulation of research; the development of specifications and methods for sampling and testing; and the development of nomenclature, definitions, and practices relating to the properties and behavior of soil, rock, and the fluids contained therein. Excluded are the uses of rock for building stone and for constituent materials in portland cement and bituminous paving and structures coming under the jurisdiction of other committees. Included are the properties and behavior of: (1) soil-like materials such as peats and related organic materials, (2) geotextiles, and (3) fluids occupying the pore spaces, fissures, and other voids in soil and rock insofar as such fluids may influence the properties, behavior, and uses of the soil and rock materials.

Officers

Chairman: W. G. Shockley, 326 Lake Hill Dr., Vicksburg, MS 39180.
First Vice-Chairman: R. E. Gray, GAI Consultants, 570 Beatty Rd., Monroevill, PA 15146.
Vice-Chairman: Robert C. Deen, University of Kentucky, Kentucky Transportation Research Program, Transportation Research Bldg., Lexington, KY 40506.
Vice-Chairman: P. M. Jarrett, Royal Military College, Department of Engineering, Kingston, Ontario, Canada K7L 2W3.
Vice-Chairman: H. J. Pincus, University of Wisconsin—Milwaukee, Department of Geological Sciences, Sabin Hall, Milwaukee, WI 53201.
Vice-Chairman: R. S. Ladd, Woodward-Clyde Consultants, 1425 Broad St., Clifton, NJ 07012.
Secretary: R. J. Stephenson, U.S. Army Corps of Engineers, South Atlantic Division Lab., 611 S. Cobb Dr., Marietta, GA 30060.
Membership Secretary: H. F. Hanson, Los Angeles City, Department of Water and Power, P.O. Box 111, (510 E. Second St.), Los Angeles, CA 90051.

Subcommittees and Their Chairmen

TECHNICAL

D18.01 Surface and Subsurface Reconnaissance
C. B. Petterson
D18.02 Sampling and Related Field Testing for Soil Investigations
R. E. Brown
D18.03 Texture, Plasticity, and Density Characteristics of Soils
T. S. Hawk
D18.04 Hydrologic Properties of Soil and Rock
D. E. Daniels
D18.05 Structural Properties of Soils
R. T. Donaghe
D18.06 Physico-Chemical Properties of Soils and Rocks
K. Hoddinott
D18.07 Identification and Classification of Soils
K. Hoddunott
D18.08 Special and Construction Control Tests
J. R. Talbot
D18.09 Dynamic Properties of Soils
R. L. Ebelhar
D18.10 Bearing Tests of Soils in Place
G. Y. Baladi
D18.11 Deep Foundations
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D18.12 Rock Mechanics
W. G. Austin
D18.13 Marine Geotechnics
R. C. Chaney
D18.14 Geotechnics of Waste Management
G. D. Knowles
D18.15 Stabilization by Additives
M. C. Anday
D18.16 Chemical Grouting
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D18.17 Rock for Erosion Control
C. H. McElroy
D18.18 Peats and Organic Soils
A. L. Burwash
D18.19 Frozen Soil and Rock
C. W. Lovell
D18.20 Impermeable Barriers
N. J. Cavalli
D18.21 Ground Water Monitoring
D. M. Nelson

ADMINISTRATIVE

D18.91 Editorial
G. N. Durham
D18.92 Geotechnical Testing Journal
V. P. Drnevich
D18.93 Nomenclature for Soil and Rock Mechanics
A. I. Johnson
D18.94 Education and Training
J. D. Antrim
D18.95 Information Retrieval and Data Automation
W. A. Marr
D18.96 Research Steering and Standards Development
Adrian Pelzner
D18.97 Awards
R. G. Packard
D18.98 Hogentogler Award
R. E. Gray
D18.99 Quality Control
T. A. Spellerberg