

# Introduction

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It is noteworthy that the last full documentation of consolidation performance of soils in the laboratory and field occurred over 20 years ago (*Design of Foundations for Control of Settlements*, ASCE Soil Mechanics and Foundation Division, New York, 1964) and that no ASTM Special Technical Publication has specifically addressed this complex subject in the intervening period. During these past two decades, considerable progress in developing a better appreciation of soil performance has led to the design of new and innovative techniques in assessing soil properties and characteristics pertinent to compression/consolidation behavior.

In addition to the well documented historic concerns dealing with the less-than-accurate correlations between predicted and measured consolidation behavior of field soils, recent encounters with significant problem situations have highlighted the need for a comprehensive documentation of consolidation testing and evaluation. The advent of computers for solving previously restricted numerical analytical schemes, and transducers coupled with data acquisition systems to provide continuous monitoring, have become commonplace. Problem soils, such as soft clays, gaseous soils, organic soils, and slimes, require not only specialized test equipment and techniques but also the development of pertinent theories and field validation tools.

In recognition of the above, the ASTM Symposium on the Consolidation Behavior of Soils, held in Ft. Lauderdale, Florida, 24 January 1985, was planned as a companion to the ASCE Symposium on Sedimentation/Consolidation Models; Predictions and Validation, held in San Francisco in October 1984. It was hoped that through these symposia the advances made in addressing and solving the many issues of consolidation testing, modelling, prediction, and validation would be fully communicated to the profession at large.

To handle properly the difficult task of bringing forward recent studies pertinent to the overall problem of consolidation testing, modelling, prediction, and validation, it was decided that studies which address theory, prediction, and validation would be better accommodated by the ASCE symposium format. The studies and concerns that relate to testing and methods of evaluation and interpretation of test data, being of direct importance to ASTM, should, it was felt, be developed into a format which would provide a record of recent developments in the area of consolidation testing.

The objectives of the ASTM symposium (and of this volume) were as follows: (1) to review the state of the art of consolidation testing, with particular emphasis on developments made in the last two decades, (2) to establish and assess requirements for consolidation testing of problem soils not previously considered in detail via actual studies with new techniques and procedures, (3) to compare and evaluate the various new methods and test equipment used for determination of consolidation behavior, (4) to study the viability of the various data reduction models and methods of application of data and measurements for assessment consolidation behavior, (5) to identify the shortfalls and areas of needed study for development of consolidation testing and evaluation, and (6) to provide a focal point for the development and improvement of ASTM consolidation testing standards.

There have been many advances made in (1) equipment and instrumentation capabilities, (2) test methodologies and data gathering and control systems, and (3) methods for data handling and analysis. All of these combine to provide a better capability of securing a more reliable analysis of the problem of consolidation determination. The ASTM Symposium on Consolidation Behavior of Soils was developed as a two-session presentation which included State-of-the-Art (SOA) presentations, General Reports dealing with papers submitted to the symposium, and General Discussions by the authors, dealing with specific points and issues identified by the moderators. The program details were as follows:

#### *Session I—Theory and Laboratory Testing Requirements*

Chairman: R. T. Donaghe, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi  
 Moderator: R. N. Yong, McGill University, Montreal  
 State-of-the-Art Speaker: R. E. Olson, University of Texas, Austin, "Consolidation Testing"  
 Reporters: V. P. Drnevich, University of Kentucky, Lexington  
 V. Silvestri, École Polytechnique, Montreal  
 General Discussion by authors, reporters, and SOA speaker

#### *Session II—Evaluation and Special Tests*

Chairman: E. T. Selig, University of Massachusetts, Amherst  
 Moderator: F. C. Townsend, University of Florida, Gainesville  
 State-of-the-Art Speaker: C. B. Crawford, DBR/NRC, Ottawa, "Evaluation and Interpretation of Soil Consolidation Tests"  
 Reporters: D. Bloomquist, University of Florida, Gainesville  
 J. F. Peters, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi  
 General Discussion by authors, reporters, and SOA speaker

The two State-of-the-Art papers open this volume. Next appear four General

Reports; these summarize the 31 Technical Papers which follow. Finally, the volume closes with two retrospective evaluations. Significant issues and problems identified during the course of the symposium, and those problems of concern to the active researcher and practitioner, are reviewed by the editors. A brief general discussion on consolidation theory and testing is provided by S. Leroueil and M. Kabbaj.

The editors wish to record their appreciation to all those who participated in the symposium and who contributed to this volume, to the reviewers of the submitted papers, to ASTM Committee D-18 on Soil and Rock for sponsoring the event through its Subcommittee D18.05 on Structural Properties of Soils, and to the editorial staff of ASTM. Without their combined efforts, this STP would not have reached the high quality level associated with ASTM publications. Acknowledgments are also made to Professors H. Y. Ko, A. S. Saada, E. T. Selig, and R. L. Schiffman, for their input and assistance in the planning of the symposium.

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