

Introduction

With the advent of larger and better construction equipment, including high energy pile driving hammers, and with the competitive desire of industry to design pile members to their full structural capacity, there has been a move toward higher capacity pile foundations. In response to this demand, the material suppliers (concrete, wood, and steel) have been influencing building officials to raise allowable pile stresses in codes and engineers to design for higher stresses than had customarily been used. This has forced the foundation engineer to reassess the true ultimate capacity of piles and the effects of high energy driving on the integrity of the pile member itself.

To address these concerns, a Symposium on the Behavior of Deep Foundations was held on 28 June 1978 under the sponsorship of ASTM Committee D18 on Soil and Rock for Engineering Purposes. The symposium was divided into four sections, each with a state-of-the-art presenter, as follows:

- I. "Design and Evaluation of Load Tests on Piles and Caissons," by Professor L. C. Reese, University of Texas;
- II. "Soil Capacity for Supporting Deep Foundation Members," by Dr. M. I. Esrig and R. C. Kirby, Woodward-Clyde Consultants, presented by Dr. Esrig;
- III. "Stresses in Pile Members-Long Term Performance and Short Term Performance During Driving," by Professor M. T. Davisson, University of Illinois; and
- IV. "Design Practice-Present and Proposed-Including Considerations of Standards and Codes," by Frank M. Fuller, Raymond International Builders, Inc.

The symposium chairman introduced the symposium and chaired the morning session, which contained Sections I and II, and R. D. Darragh chaired the afternoon session, which contained Sections III and IV. In addition to the state-of-the-art speakers, there was a panel for each session, consisting of the following panelists:

Morning Session, Sections I and II:

M. Bozozuk, National Research Council of Canada

D. M. Holloway, Woodward-Clyde Consultants
C. P. Wroth, University of Cambridge, England
J. A. Focht, Jr., McClelland Engineers, Inc.

Afternoon Session, Sections III and IV:

William Gamble, University of Illinois
Thomas Dismuke, Bethlehem Steel Corporation
R. M. Armstrong, University of Illinois
W. F. Swiger, Stone & Webster Engineering Company
W. A. Norum, National Forest Products Association

Each panelist made a short presentation, which was followed by a discussion between the panel members and audience.

Although not presented at the symposium, 31 papers were accepted for publication and are included in this volume. The four state-of-the-art papers are based on the personal experiences and knowledge of the state-of-the-art speakers as well as material contained in the papers submitted for each topic. In several cases, discussions on a particular paper were offered for publication and the author of the original paper was given an opportunity to furnish a closure statement. These discussions and closures are also included in this publication. One of the panelists, W. F. Swiger, did not present a paper for publication but his remarks as a panelist are published herein.

The organization of the papers in this volume is as follows: (1) state-of-the-art papers, in the order in which they were presented; followed by (2) papers, in alphabetical order according to first author's surname; and (3) discussions and closures following the paper to which they pertain.

This symposium volume meets its intended purpose. It has considered: new and innovative testing methods; data from full scale load testing and how these data are interpreted; information gained from the latest experience; advancements made in soil mechanics and how the foundation materials perform both during construction and under long-term loading; recent developments in knowledge of material properties; and how an appropriate specification or standard can be formulated.

Discussions and closures concerning the use of higher stresses are included to provide the reader with information on both sides of this issue, on which complete agreement has not been reached.

ASTM Committee D18 is honored to dedicate this volume to the late William S. Housel, Professor Emeritus of Civil Engineering at the University of Michigan and a pioneer in soil mechanics engineering who had a lifetime interest in deep foundations. In 1936, Bill Housel was made Chairman of an ASTM steering committee to organize the newly authorized Committee on Soil for Engineering Purposes. As a founder of Committee D18, he served as First Vice-Chairman of the Committee from 1940 to

1960, as a member of the Executive Committee from 1960 to 1968, and was chairman of the Deep Foundations Committee for a number of years. He received many honors from his colleagues in ASTM, among them the ASTM Award of Merit in 1966, a Special Award of Committee D18 in 1968, and election to Honorary Membership in Committee D18 in 1971. Bill Housel's energy and dedication to ASTM and to the technology of deep foundations have enriched the profession immeasurably, and we are pleased to add this volume to his list of honors.

We hope this publication will be useful to geotechnical engineers, design engineers, building officials, and material suppliers in giving each a better understanding of the views of the others.

It is the hope and belief of the symposium organizers that the volume will provide the latest update on the technology of deep foundations.

Raymond Lundgren

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