

PIERO SEMBENELLI
MILANO

VOL.105 NO.GT7. JULY 1979

**JOURNAL
OF THE
GEOTECHNICAL
ENGINEERING
DIVISION**

PROCEEDINGS OF
THE AMERICAN SOCIETY
OF CIVIL ENGINEERS



AMERICAN SOCIETY OF CIVIL ENGINEERS

BOARD OF DIRECTION

President

Walter E. Blessey

Past President

William R. Gibbs

President Elect

Joseph S. Ward

Vice Presidents

Virgil Meedel
Irvan F. Mendenhall

Cranston R. Rogers
John H. Wiedeman

Directors

Donald S. Austin	James N. Glenn
George D. Barnes	James E. Humphrey, Jr.
Floyd A. Bishop	Richard W. Karn
John A. Bonell	Eugene R. McMaster
Edward A. Bryant	Franklin D. Meyers
William J. Carroll	David A. Novick
Francis J. Connell	S. Russell Stearns
Ronald J. Drnevich	William H. Taylor
D. Allan Firmage	Stafford E. Thornton
James W. Gillespie	Richard G. Vaughan
Robert E. Whiteside	

EXECUTIVE OFFICERS

Eugene Zwoyer, *Executive Director*
Louis L. Meier, *Washington Counsel/Assistant Secretary*
William N. Carey, *Secretary Emeritus*
William H. Wisely, *Executive Director Emeritus*
Michael N. Salgo, *Treasurer*
Elmer B. Isaak, *Assistant Treasurer*

STAFF DIRECTORS

Gail Bays, *Managing Director for Administrative Services*
Donald A. Buzzell, *Managing Director for Education and Professional Affairs*
Robert A. Crist, Jr., *Managing Director for Publications and Technical Affairs*
Richard A. Jeffers, *Controller*
Carl E. Nelson, *Director, Field Services*
Paul A. Parisi, *Director, Publication Services*
Don P. Reynolds, *Director, Policy, Planning and Public Affairs*
James M. Shea, *Director, Public Communications*
Albert W. Turchick, *Director, Technical Services*
George K. Wadlin, *Director, Education Services and Continuing Education*
R. Lawrence Whipple, *Director, Engineering Management Services*

COMMITTEE ON PUBLICATIONS

James W. Gillespie, *Chairman*
Ronald J. Drnevich, *Member*
Richard W. Karn, *Member*

James N. Glenn, *Member*
David A. Novick, *Member*
Stafford E. Thornton, *Member*

GEOTECHNICAL ENGINEERING DIVISION

Executive Committee

William F. Swiger, *Chairman*
John A. Focht, Jr., *Vice Chairman*
John Lysiner, *Member*
Ernest T. Selig, *Secretary*
Woodland G. Shockley, *Management Group E Contact Member*
Robert L. Schuster, *Member*

Publications Committee

William F. Marcuson III, *Chairman*
O. B. Andersland, *Member*
Warren J. Baker, *Member*
Don C. Banks, *Member*
James M. Bell, *Member*
Joseph E. Bowles, *Member*
Chandra S. Brahma, *Member*
Ralph Brown, *Member*
J. T. Christian, *Member*
G. W. Clough, *Member*
C. S. Desai, *Member*
Tuncer B. Edil, *Member*
Herbert H. Einstein, *Member*
D. H. Gray, *Member*
Bobby O. Hardin, *Member*
Cornelius J. Higgins, *Member*
Robert D. Holtz, *Member*
Izzat M. Idriss, *Member*
L. H. Irwin, *Member*
Reuben H. Karol, *Member*
H. Y. Ko, *Member*
William D. Kovacs, *Member*
Leland M. Kraft, *Member*
Raymond J. Krizek, *Member*
Fred H. Kulhawy, *Member*
C. C. Ladd, *Member*
Poul V. Lade, *Member*
E. T. Selig, *Exec. Comm. Contact Member*
L. J. Langfelder, *Member*
Roberto Lastrico, *Member*
Felipe A. Len-Rios, *Member*
Francis G. McLean, *Member*
Gholamreza Mesri, *Member*
Donald J. Murphy, *Member*
S. V. Nathan, *Member*
Thorn L. Neff, *Member*
Ed Nowatzki, *Member*
Michael W. O'Neill, *Member*
Ted Park, *Member*
Jean H. Prevost, *Member*
Adrian F. Richards, *Member*
Adel Saada, *Member*
Walter C. Sherman, Jr., *Member*
Marshall L. Silver, *Member*
Glen S. Tarbox, *Member*
G. R. Thiers, *Member*
David E. Thompson, *Member*
Donald Treadwell, *Member*
Kuei-Wu Tsai, *Member*
Charles R. Ullrich, *Member*
C. V. G. Vallabhan, *Member*
V. N. Vijayvergiya, *Member*
J. Lawrence Von Thun, *Member*
R. N. Yong, *Member*

PUBLICATION SERVICES DEPARTMENT

Paul A. Parisi, *Director*

Technical Publications

Richard R. Torrens, *Editor*
James T. Halston, *Assistant Editor*
Timothy O. Bakke, *Editorial Assistant*
Mary Ann Canino, *Editorial Assistant*
Joseph P. Cerami, *Editorial Assistant*
Antoinette Cimino, *Editorial Assistant*
Mark H. Roaman, *Editorial Assistant*
Shiela Menaker, *Production Editor*
Richard C. Scheblein, *Draftsman*

Information Services

Irving Amron, *Editor*

CONTENTS

Model Study of Circular Sheetpile Cells <i>by J. K. Maitland and W. L. Schroeder</i>	805
Cellular Bulkheads and Cofferdams <i>by W. L. Schroeder and J. K. Maitland</i>	823
Pore Distribution and Permeability of Silty Clays <i>by Ignacio Garcia-Bengochea, Charles William Lovell, and Adolph G. Altschaeffl</i>	839
Landslide in Claystone Derived Soil <i>by Archie M. Richardson</i>	857
Anisotropic Shear Modulus due to Stress Anisotropy <i>by Stephan K. Roesler</i>	871
Zero Extension Line Theory of Earth Pressure <i>by Karim Habibagahi and Arsalan Ghahramani</i>	881

TECHNICAL NOTES

Proc. Paper 14665

Uncertainty Analysis of Relative Density <i>by Achintya Haldar and Wilson H. Tang</i>	899
---	-----

→

This Journal is published monthly by the American Society of Civil Engineers. Publications office is at 345 East 47th Street, New York, N.Y. 10017. Address all ASCE correspondence to the Editorial and General Offices at 345 East 47th Street, New York, N.Y. 10017. Allow six weeks for change of address to become effective. Subscription price to members is \$12.00. Nonmember subscriptions available; prices obtainable on request. Second-class postage paid at New York, N.Y. and at additional mailing offices. GT, HY.

The Society is not responsible for any statement made or opinion expressed in its publications.

DISCUSSION

Proc. Paper 14661

Parameter Effects on Dynamic Properties of Frozen Soils,* by Ted
S. Vinson (Oct., 1978).

by Yong S. Chae 907

INFORMATION RETRIEVAL

The key words, abstract, and reference "cards" for each article in this Journal represent part of the ASCE participation in the EJC information retrieval plan. The retrieval data are placed herein so that each can be cut out, placed on a 3 x 5 card and given an accession number for the user's file. The accession number is then entered on key word cards so that the user can subsequently match key words to choose the articles he wishes. Details of this program were given in an August, 1962 article in CIVIL ENGINEERING, reprints of which are available on request to ASCE headquarters.

*Discussion period closed for this paper. Any other discussion received during this discussion period will be published in subsequent Journals.