

from Russell

VOL.95 NO.SM6. NOV. 1969

**JOURNAL
OF THE
SOIL MECHANICS
AND FOUNDATIONS
DIVISION**

PROCEEDINGS OF
THE AMERICAN SOCIETY
OF CIVIL ENGINEERS



BITCOLD

R

ASCE

1969

4

2-R-34

**AMERICAN SOCIETY
OF CIVIL ENGINEERS
BOARD OF DIRECTION**

President

Thomas M. Niles

President Elect

Samuel S. Baxter

Past President

Frank H. Newnam, Jr.

Vice Presidents

Graham P. Willoughby

John M. Hayes

Michael N. Salgo

James R. Sims

Directors

Arthur J. Fox, Jr.

Robert K. Fogg

John W. Frazier

E. Manford Fucik

Ralph W. Hutchinson

Emory E. Johnson

Russel C. Jones

George J. Kral

James L. Konski

Austin B. Milhallin

George P. Palo

Malcolm Pirnie, Jr.

James E. Sawyer

Francis B. Sessums

Ivan M. Viest

Joseph S. Ward

Eugene W. Weber

Laurens L. Wise

Eugene M. Zwayer

EXECUTIVE OFFICERS

William H. Wisely, *Executive Secretary*

Don P. Reynolds, *Assistant Secretary*

William N. Carey, *Secretary Emeritus*

William S. LaLonde, Jr., *Treasurer*

Elmer K. Timby, *Assistant Treasurer*

COMMITTEE ON PUBLICATIONS

James L. Konski

Arthur J. Fox, Jr.

Francis B. Sessums

Eugene M. Zwayer

**SOIL MECHANICS AND
FOUNDATIONS DIVISION**

Executive Committee

Jack W. Hill, *Chairman*

Elio D'Appolonia, *Vice Chairman*

James K. Mitchell

Richard J. Woodward

Roy E. Olson, *Secretary*

Ralph W. Hutchinson, *Board Contact Member*

Publications Committee

Bramlette McClelland, *Chairman*

Rudy J. Dietrich

David J. Henkel

Charles C. Ladd

William H. Perloff

Ernest T. Selig

E. Vey

James M. Duncan

Harry M. Horn

Robert G. Lukas

Paul Rizzo

W. G. Shockley

Raymond Yang

Tien H. Wu

J. K. Mitchell, *Exec. Comm. Contact Member*

TECHNICAL PUBLICATIONS

Paul A. Parisi, *Manager*

Robert D. Walker, *Senior Technical Editor*

Richard R. Torrens, *Technical Editor*

Irving Amron, *Information Editor*

Diane C. Hines, *Senior Editorial Assistant*

Lois C. Haimowitz, *Editorial Assistant*

Joan Lederman, *Editorial Assistant*

Veronica Mahanger, *Editorial Assistant*

Frank J. Loeffler, *Draftsman*

CONTENTS

INTERNATIONAL ABSTRACTS SECTION

- by Joseph M. DeSalvo, Chmn. of Committee on Information
Retrieval 1585

Papers

SAND DENSIFICATION BY PILES AND VIBROFLOTATION

- by Carl E. Basore, and Joseph D. Boitano 1303

BUILDING DAMAGE FROM EXPANSIVE STEEL SLAG BACKFILL

- by Carl B. Crawford and Kenneth N. Burn 1325

PRELOADING FOR HEAVY INDUSTRIAL INSTALLATIONS

- by Panaghiotis C. Kotzias and Aris C. Stamatopoulos 1335

MIXING-IN-PLACE SOIL AND PORTLAND CEMENT

- by James L. Sherard 1357

EFFECTS OF VIBROFLOTATION ON CLAYEY SANDS

- by Desmond L. Webb and R. Ian Hall 1365

ENGINEERING PROPERTIES OF SOME SEA-FLOOR DEPOSITS

- by George H. Keller 1379

ELASTIC BEHAVIOR OF SAND

- by Mohamed A. El-Sohby 1393

(over)

This Journal is published bimonthly by the American Society of Civil Engineers. Publications office is at 2500 South State Street, Ann Arbor, Michigan 48104. Editorial and General Offices are at 345 East 47th Street, New York, N.Y. 10017. Subscription price is \$8.00 per year with discounts to members and libraries. Second-class postage paid at Ann Arbor, Michigan. EM, HY, SA, SM.

	Page
VIBRATION OF NONCIRCULAR FOUNDATIONS by Yong S. Chae	1411
FOUNDATION STUDY FOR MATERIALS TEST STRUCTURE by Melvin C. Hironaka and Raymond J. Smith	1431
ANALYSIS OF SHEFFIELD DAM FAILURE by H. Bolton Seed, Kenneth L. Lee and I. M. Idriss	1453
PROBLEMS IN DESIGN AND INSTALLATION OF OFFSHORE PILES by Bramlette McClelland, John A. Focht, Jr., and William J. Emrich	1491
<hr/>	
DISCUSSION	
Proc. Paper 6894	
<hr/>	
STABILITY ANALYSIS OF EMBANKMENTS, by John Lowe III, (July, 1967. Prior Discussion: Mar., 1968). closure	1517
COMPARISON OF FOOTING VIBRATION TESTS WITH THEORY, by F. E. Richart, Jr., and R. V. Whitman (Nov., 1967. Prior Discussion: Jan., 1969). closure	1518
DESIGN PROCEDURES FOR DYNAMICALLY LOADED FOUNDATIONS, by R. V. Whitman and F. E. Richart, Jr. (Nov., 1967. Prior Discussion: Jan., 1969). closure	1519
SEISMIC FAILURES OF CHILEAN TAILINGS DAMS, by Ricardo Dobry and Leonardo Alvarez (Nov., 1967. Prior Discussion: Jan., 1969). closure and errata	1521
GENERAL STRESS-STRAIN-TIME FUNCTION FOR SOILS, by Awtar Singh and James K. Mitchell (Jan., 1968. Prior Discussion: Jan., 1969). closure	1526
DESIGN AND TESTING OF CONE AND HYPAR FOOTINGS, by Robert L. Nicholls and Mohammad V. Izadi (Jan., 1968. Prior Discussion: Jan., 1969). closure	1528
BUCKLING OF PARTIALLY EMBEDDED PILES IN SAND, by Kenneth L. Lee (Jan., 1968. Prior Discussion: Jan., 1969). closure	1529

	Page
GUIDE SPECIFICATIONS FOR CHEMICAL GROUTS, by the Committee on Grouting (Mar., 1968. Prior Discussions: Mar., 1969).	
closure	1529
VIBRATION MODULUS OF NORMALLY CONSOLIDATED CLAY, by Bobby O. Hardin and William L. Black (Mar., 1968. Prior Discussions: Mar., 1969).	
closure	1531
EFFECTS OF LOADING ON TRIAXIAL TEST RESULTS, by Raymond Lundgren, James K. Mitchell, and James H. Wilson (Mar., 1968. Prior Discussion: Mar., 1969).	
closure	1537
END BEARING AND SKIN FRICTION RESISTANCE OF PILES, by Bengt B. Broms and Lars Hellman (Mar., 1968. Prior Discussions: Mar., 1969).	
closure	1538
SETTLEMENT OF STRIP LOAD ON ELASTIC-PLASTIC SOIL, by Kaare Hoeg, John T. Christian, and Robert V. Whitman (Mar., 1968. Prior Discussions: Mar., 1969).	
closure and errata	1540
ELECTRICAL DISPERSION IN RELATION TO SOIL STRUCTURE, by James K. Mitchell and Kandiah Arulanandan (Mar., 1968. Prior Discussion: Mar., 1969).	
closure	1541
GRAPHICAL STABILITY ANALYSIS OF SLOPES IN JOINTED ROCK, by Klaus W. John (Mar., 1968. Prior Discussions: Mar., 1969).	
closure and errata	1541
EMBANKMENT PORE PRESSURES DURING CONSTRUCTION, by Walter C. Sherman and Gerald W. Clough (Mar., 1968. Prior Discussions: May, 1969).	
closure and errata	1546
CYCLIC STRESS-STRAIN CHARACTERISTICS OF CLAY, by Gerald R. Thiers and H. Bolton Seed (Mar., 1968. Prior Discussion: May 1969).	
closure	1547
NUMERICAL ANALYSIS OF FLEXIBLE RETAINING STRUCTURES, ^a by T. Allan Haliburton (Nov., 1968. Prior Discussion: May, 1969).	
by Peter Kocsis	1549
by James B. Rauhut	1553
GENERAL SLOPE STABILITY ANALYSIS, by James M. Bell (Nov., 1968).	
errata	1564

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

STRENGTH OF COMPACTED CLAY AT HIGH PRESSURE, ^a by Kenneth L. Lee and Steven C. Haley (Nov., 1968).	
by T. S. Ramanatha Ayyar	1564
THEORETICAL BEARING CAPACITY OF VERY SHALLOW FOOTINGS, ^a by Lawrence A. Larkin (Nov., 1968).	
by Bent Hansen and N. H. Christensen	1568
by Leslie L. Karafiath	1572
CONTROLLED GRADIENT CONSOLIDATION TEST, ^a by John Lowe III, Ernest Jonas and Vladimir Obrician (Jan., 1969).	
by Rakhishwar N. Bhasin	1574
by Carlo Viggiani	1574

TECHNICAL NOTE

Proc. Paper 6926

EARTH PRESSURE AGAINST BRACED EXCAVATIONS by J. S. Kim and Terje Preber	1581
--	------

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.

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