

PIERO SEMBENELLI
MILANO

VOL.94 NO.SM6. NOV. 1968

JOURNAL OF THE SOIL MECHANICS AND FOUNDATIONS DIVISION

PROCEEDINGS OF
THE AMERICAN SOCIETY
OF CIVIL ENGINEERS



BITCOLD

D

ASCE

1968

5

2-R-30

AMERICAN SOCIETY OF CIVIL ENGINEERS

BOARD OF DIRECTION

President

Frank H. Newnam, Jr.

President-Elect

Thomas M. Niles

Past President

Richard H. Tatlow III

Vice Presidents

Graham P. Willoughby

John M. Hayes

Clifford D. Williams

Charles W. Yoder

Directors

Daniel B. Barge, Jr.

Arthur J. Fox, Jr.

Robert K. Fagg

John W. Frazier

E. Manfred Fucik

Richard Hazen

Ralph W. Hutchinson

Emory E. Johnson

James L. Konski

Austin B. Milhollin

William W. Moore

Malcolm Pirnie, Jr.

Francis B. Sessums

Robert E. Shaver

Ivan M. Viest

Eugene W. Weber

Longino A. Woodman

J. Harold Zoller

Eugene M. Zwayer

Executive Officers

William H. Wisely, *Executive Secretary*

Don P. Reynolds, *Assistant Secretary*

William P. Kimball, *Assistant Secretary—Education*

William N. Carey, *Secretary Emeritus*

William S. Lalonde, Jr., *Treasurer*

Elmer K. Timby, *Assistant Treasurer*

COMMITTEE ON PUBLICATIONS

Daniel B. Barge, *Chairman*

James L. Konski, *Vice Chairman*

Arthur J. Fox, Jr.

J. Harold Zoller

Francis B. Sessums

Eugene M. Zwayer

SOIL MECHANICS AND FOUNDATIONS DIVISION

Executive Committee

F. E. Richart, Jr., *Chairman*

Richard T. Woodward, *Vice Chairman*

Jack W. Hill

T. W. Lambe

James K. Mitchell, *Secretary*

Ralph W. Hutchinson, *Board Contact Member*

Publications Committee

Bramlette McClelland, *Chairman*

Richard G. Ahlvin

James M. Duncan

Bernard B. Gordon

Harry M. Horn

J. H. Schmertmann

W. G. Shockley

E. D'Appalonia

W. D. Liam Finn

David J. Henkel

Robert L. McNeill

H. Bolton Seed

T. H. Wu

Aleksandar S. Vesic

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

TECHNICAL PUBLICATIONS

Paul A. Parisi, *Manager*

Robert D. Walker, *Senior Technical Editor*

Richard R. Tarrens, *Technical Editor*

Richard E. Luna, *Technical Editor*

Irving Amron, *Information Editor*

Sandra Matis, *Senior Editorial Assistant*

Andrea E. Clune, *Editorial Assistant*

Elizabeth S. Parnes, *Editorial Assistant*

June Rieber, *Editorial Assistant*

Frank J. Loeffler, *Draftsman*

CONTENTS

Papers	Page
NONLINEAR PARAMETERS OF VIBRATING FOUNDATIONS by O. M. Christof Ehrler	1199
ELASTIC BEHAVIOR OF COHESIONLESS SOIL by Igor Holubec	1215
NUMERICAL ANALYSIS OF FLEXIBLE RETAINING STRUCTURES by T. Allan Haliburton	1233
GENERAL SLOPE STABILITY ANALYSIS by James M. Bell	1253
DISTRIBUTION OF EARTH PRESSURE ON SHEET-PILE WALLS by Dafalla Abdulla Turabi and Arpad Balla	1271
STRENGTH OF COMPACTED CLAY AT HIGH PRESSURE by Kenneth L. Lee and Steven C. Haley	1303
UNDRAINED STRESS DISTRIBUTION BY NUMERICAL METHODS by John T. Christian	1333
THEORETICAL BEARING CAPACITY OF VERY SHALLOW FOOTINGS by Lawrence A. Larkin	1347

(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.

DISCUSSION

Proc. Paper 6202

FAILURE MECHANISM OF CANAL LINING IN EXPANSIVE CLAY, by Gabriel Kassiff, Ariel Etkin, and Joseph G. Zeitlen (Jan., 1967. Prior Discussion: Sept., 1967). closure.	1361
FOUNDATION CUTOFF WALL FOR ALLEGHENY RESERVOIR DAM, by Garth A. Fuquay (May, 1967. Prior Discussion: Sept., 1967, Mar., 1968). closure.	1363
ANALYSIS OF SOIL LIQUEFACTION: NIIGATA EARTHQUAKE, by H. Bolton Seed and I. M. Idriss (May, 1967. Prior Discussion: Sept., 1967, Mar., 1968). closure.	1367
ELECTRO-OSMOTIC STABILIZATION OF WEST BRANCH DAM, by Claude A. Fetzer (July, 1967. Prior Discussion: Mar., 1968). closure.	1372
BEHAVIOR OF A COLLUVIAL SLOPE, by Elio D'Appolonia, Robert Alperstein, and David J. D'Appolonia (July, 1967. Prior Discussion: Mar., 1968). closure.	1374
SPECIAL PROBLEMS IN SLOPE STABILITY, by Willard J. Turnbull and Mikael J. Hvorslev (July, 1967. Prior Discussion: Mar., 1968). closure.	1375
STABILITY PROBLEMS OF COLLAPSING SOIL, by Harold J. Gibbs and John P. Bara (July, 1967. Prior Discussion: May, 1968). closure.	1378
EFFECTS OF PILE DRIVING ON SOIL PROPERTIES, by Olle Orrje and Bengt Broms (Sept., 1967. Prior Discussion: Mar., 1968). closure.	1379
SOME EXPERIENCES WITH BORED PILING ^a , by Vishnu Jee Pandey (Sept., 1967). by S. Viswanathan	1380

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

CORRECTIONS FOR STRENGTH TEST DATA, by James M. Duncan and H. Bolton Seed (Sept., 1967. Prior Discussion: May, 1968). closure.	1382
FOUNDATION REBOUND AT DOS AMIGOS PUMPING PLANT, by John P. Bara and Ronald R. Hill (Sept., 1967. Prior Discussion: Mar., 1968). closure.	1383
FOOTING VIBRATION WITH NONLINEAR SUBGRADE SUPPORT, by Nelson E. Funston and William J. Hall (Sept., 1967. Prior Discussion: Mar., May, 1968). closure.	1384
FUNDAMENTAL ASPECTS OF ELECTRO-OSMOSIS IN SOILS ^a , by Donald H. Gray and James K. Mitchell (Nov., 1967). by Leo Casagrande.	1385
by René-Jacques L. Bally and Ion P. Antonescu	1387
by Melvin I. Esrig	1388
by Richard P. Long	1390
SOIL CREEP AS A RATE PROCESS, by James K. Mitchell, Richard G. Campanella, and Awtar Singh (Jan., 1968). errata	1393

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