PIERO SEMBENELLI MILANO

VOL.107 NO.GT4. APRIL 1981

PROCEEDINGS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS



AMERICAN SOCIETY OF CIVIL ENGINEERS

BOARD OF DIRECTION

President Irvan F. Mendenhall

Past President Joseph S. Ward

President Elect James R. Sims

Vice Presidents Robert D. Bay Francis J. Connell

Lyman R. Gillis Albert A. Grant

Directors Martin G. Abegg Floyd A. Bishop L. Gary Byrd Larry J. Feeser John A. Focht, Jr Sergio Gonzalez-Karg James E. Humphrey, Jr. Richard W. Karn Leon D. Luck Arthur R. McDaniel

Paul R. Munger William R. Neuman Leonard S. Oberman John D. Parkhurst Celestino R. Pennoni Robert B. Rhode S. Russell Stearns William H. Taylor Stafford E. Thornton Robert E. Whiteside Richard S. Woodruff

EXECUTIVE OFFICERS

Eugene Zwoyer, Executive Director Julie E. Gibouleau, Assistant to the Executive Director

Louis L. Meier, Washington Counsel / Assistant Secretary

William H. Wisely, Executive Director Emeritus Michael N. Salgo, Treasurer Elmer B. Isaak, Assistant Treasurer

STAFF DIRECTORS

Donald A. Buzzell, Managing Director for Education and Professional Affairs Robert A. Crist, Jr., Managing Director for Publications and Technical Affairs Alexander Korwek, Managing Director for Finance and Administrative Services Alexandra Bellow, Director, Human Resources David Dresia, Director, Publications Production and Marketing Barker D. Herr, Director, Membership

Richard A. Jeffers, Controller Carl E. Nelson, Director, Field Services Don P. Reynolds, Director, Policy, Planning and Public Affairs Bruce Rickerson, Director, Legislative Services

James M. Shea, Director, Public Communications

Albert W. Turchick, Director, Technical Services

George K. Wadlin, Director, Education Services

R. Lawrence Whipple, Director, Engineering Management Services

COMMITTEE ON PUBLICATIONS

Stafford E. Thornton, Chairman Martin G. Abegg Richard W. Karn John A. Focht, Paul R. Munger William R. Neuman

GEOTECHNICAL ENGINEERING DIVISION

Executive Committee Robert Schuster, Chairman Ernest T. Selig, Vice Chairman William F. Swiger Harvey E. Wahls Robert T. Darragh, Jr., Secretary Elio D'Appolonia, Management Group E Contact Member

Publications Committee

William F. Marcuson III. Chairman O. B. Andersland Fred H. Kulhawy Warren J. Baker C. C. Ladd Don C. Banks Poul V. Lade James M. Bell Leonard J. Langfelder Chandra S. Brahama Felipe A. Len-Rios John T. Christian Gholamreza Mesri Donald J. Murphy S. V. Nathan G. W. Clough Tuncer B. Edil Herbert H. Einstein Thom L. Neff Arley G. Franklin Michael W. O'Neill Jean H. Prevost D. H. Grav **Bobby Hardin** Adel Saada Surendra K. Saxena Cornélius J. Higgins William H. Highter Robert L. Schiffman Woodland G. Schockley Robert D. Holtz Izzat M. Idriss Marshall L. Silver Glen S. Tarbox L. H. Irwin G. R. Thiers D. D. Treadwell Reuben H. Karol H. Y. Ko William D. Kovacs Charles R. Ullrich Leland M. Kraft J. Lawrence Von Thun Raymond J. Krizek R. N. Y E. T. Selig, Exec. Comm. Contact Member R. N. Yong

PUBLICATION SERVICES DEPARTMENT

David Dresia, Director, Publications Production and Marketing

Technical and Professional Publications

Richard R. Torrens, Manager Joseph P. Cerami, Chief Copy Editor Linda Ellington, Copy Editor
Thea C. Feldman, Copy Editor Meryl Mandle, Copy Editor
Joshua R. Spieler, Copy Editor
Shiela Menaker, Production Co-ordinator Richard C. Scheblein, Draftsman

Information Services

Elan Garonzik, Editor

BI

PERMISSION TO PHOTOCOPY JOURNAL PAPERS

Permission to photocopy for personal or internal reference beyond the limits in Sections 107 and 108 of the U.S. Copyright Law is granted by the American Society of Civil Engineers for libraries and other users registered with the Copyright Clearance Center, 21 Congress Street, Salem, Mass. 01970, provided the appropriate fee is paid to the CCC for all articles bearing the CCC code. Requests for special permission or bulk copying should be addressed to the Manager of Technical and Professional Publications, American Society of Civil Engineers.

CONTENTS

. W.-. Classe on the Parth in These D

by George F. Sowers	383
Effect of Wetting and Drying on Shear Strength	40.1
by Mehter Mohamed Allam and Asuri Sridharan	421
Measurement of Porosity in Natural Sand Deposits	
by S. A. Denekamp and Y. Tsur-Lavie	439
Stochastic FEM in Settlement Predictions	
by Gregory B. Baecher and Thomas S. Ingra	449
Ignition Test for Soil Organic-Content Measurement	
by Abdul-Amir W. N. Al-Khafaji and Orlando B. Andersland	465
Centrifuge Modeling of Coal Waste Embankments	
by Mosaid M. Al-Hussaini, Deborah J. Goodings,	
Andrew N. Schofield, and Frank C. Townsend	481
Earthquake-Induced Liquefaction Near Lake Amatitlan, Guatemala	
by H. Bolton Seed, Ignacio Arango, Clarence K. Chan,	
Alberto Gomez-Masso, and Rebecca Grant Ascoli	501

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 \$16.00. Nonmember subscriptions available; prices obtainable on request. Second-class postage paid at New York, N.Y. and at additional mailing offices. GT.

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

publications.

TECHNICAL NOTES

Proc. Paper 16156

Acoustic Emission Monitoring of Seepage

BI

by Robert M. Koerner, W. Martin McCabe, and Luis F. Baldivieso	521
DISCUSSION	
Proc. Paper 16150	
Dam Failure in Benefit/Cost Analyses," by Gregory Baecher, Marie- Elisabeth Paté, and Richard De Neufville (Jan., 1980).	
by Francis G. McLean	529
by Ralph B. Peck	
closure	532
Cracking, Leakage, and Erosion of Earth Dam Materials, by Erik	
I. Hjeldnes, and Bhagwat V. K. Lavania (Feb., 1980).	
I id i p p i	

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 × 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.