

GROUTING, SOIL IMPROVEMENT AND GEOSYNTHETICS

VOLUME 1

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of the American Society of Civil Engineers

In cooperation with the
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and Foundation Engineering — ISSMFE, TC-17

New Orleans, Louisiana
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Edited by Roy H. Borden, Robert D. Holtz and Ilan Juran



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ABSTRACT

The proceedings of the 1992 ASCE Specialty Conference on Grouting, Soil Improvement and Geosynthetics, addresses advances in the state-of-practice, research and technological developments in four rapidly expanding geotechnical areas: 1) Grouting techniques and materials, 2) soil improvement technologies, 3) geosynthetics engineering, and 4) ground modification for geo-environmental applications. The 105 contributed papers and 4 invited keynote papers provide a broad-based technical discussion of design practice, innovative construction technologies and products, and monitored case studies of new engineering applications. Overall, these proceedings represent a significant contribution to the state-of-the-art, which will effectively assist practicing engineers, manufacturers, potential users, and researchers to recognize the limitations of current practice, evaluate the feasibility of innovative technologies, and address the technical challenges that will undoubtedly face the profession in the next century.

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PREFACE

The 1992 Specialty Conference on Grouting, Soil Improvement and Geosynthetics, was conceived as a broad based forum to review the current state-of-the-art in the U.S. and abroad, in design and practice of grouting techniques and materials, soil improvement technologies, geosynthetics engineering, and ground modification for geo-environmental applications. The prime goals of the conference and the resulting proceedings are to: (i) provide a major ten year update on grouting practice and materials since the 1982 ASCE Specialty Conference on Grouting in Geotechnical Engineering, (ii) create an effective framework for sharing recent technological advances, engineering applications and research results among researchers, practitioners and potential users, who are actively involved in the specialty areas of the conference, (iii) recognize the limitations in current practice and assess the potential and feasibility of innovative technologies, and, ultimately, (iv) enhance the development of our engineering capabilities to effectively address the more restrictive environmental constraints and the more complex technical challenges that will undoubtedly face us in the next century.

The conference was proposed by the Grouting Committee, chaired by James P. Gould, and the Soil Improvement and Geosynthetics Committee, chaired by Loren R. Anderson, of the ASCE Geotechnical Engineering Division. An organizing committee was established in spring 1988 to plan for the conference and a formal proposal was submitted to ASCE in November of 1988. The members of the Organizing Committee, who are listed below, developed, coordinated and executed the technical tasks pertaining to the planning of the conference:

Ilan Juran, Polytechnic University of New York, Chairman
Roy H. Borden, North Carolina State University
Donald A. Bruce, Nicholson Construction of America
Robert D. Holtz, University of Washington
Joseph P. Welsh, GKN Hayward Baker

A Publications Subcommittee was formed with Roy H. Borden, Robert D. Holtz, and Ilan Juran as proceedings editors to coordinate the review process and final submission of camera-ready typescripts to ASCE.

In order to efficiently use the Conference as a productive vehicle for technology transfer on a worldwide basis and to enhance the international exchange among manufacturers, practicing civil engineers and researchers, the Technical Committee of the International Society of Soil Mechanics and Foundation Engineering on Ground Improvement, Reinforcement and Grouting (ISSMFE, TC-17), and the North American Geosynthetics Society agreed to co-sponsor this conference. The participation of ISSMFE, TC-17 was made possible through the cooperation and support of the National Science Foundation, coordinated by M.T. Tumay, which is gratefully acknowledged.

A general call for abstracts of papers was issued in the spring of 1990, stressing the specialty topics of this conference. A total of 180 abstracts were submitted for consideration and reviewed

by the Publications Subcommittee. The abstracts were also used to establish a preliminary technical program. A total of 130 completed papers were submitted for review and evaluation. These papers were reviewed employing the same technical standards as the ASCE Geotechnical Engineering Journal. All papers had at least two technical reviews, coordinated by the Publications Subcommittee. Uniform editorial reviews and standards also were applied to ensure that the proceedings were of as high a quality as can be expected of camera-ready papers. Of the 130 papers reviewed, only few were accepted "as-is". Twenty-five papers were declined on technical grounds, and 56 papers required major re-working to address reviewer comments.

In addition to the members of the Publications Subcommittee, the persons listed below acted as referees during the review process:

P.P. Aberle	G.K. Burke	J.P. Gould	L.D. Keil	C.J. Santamarina
Y.B. Acar	M.J. Byle	E.D. Graf	B.L. Kilpatrick	R.L. Schiffman
L.R. Anderson	R.J. Byrne	H. Grice	R.J. Krizek	F. Schlosser
H.R. Al-Alusi	B. Christopher	F. Gularte	M.L. Leming	J.H. Schmertmann
R.C. Bachus	W.J. Clarke	E. Güler	M.S. Leonard	S.A. Sefferls
J.I. Baez	E.R. Colle	R. Gupta	D. Leshchinsky	W.G. Smoak
R.D. Barksdale	G.G. Collin	M.D. Haug	M. Lewis	G.R. Tallard
R.J. Bathhurst	D.E. Daniel	R.F. Hayden	G.S. Littlejohn	G. Taylor
G. Ballivy	B.M. Das	W. Heartz	R.G. Lukas	S. Thevanayagam
J.F. Beech	R.R. Davidson	J.F. Henry	M.H. Maher	M.T. Tumay
J. Benoit	J.A. DiMaggio	R.D. Holtz	P.W. Mayne	K.W. Tsai
R. Berry	P.H. Edinger	R.D. Hryciw	J. Mehnert	W.S. Tsai
P.M. Blakita	J. Egan	A.B. Huang	G.A. Munfakh	C. Vipulanandan
J.A. Boa, Jr.	J.C. Evans	I. Ishai	P.P. Nelson	M. Vucetic
R. Bonaparte	R.J. Finn	M. Jaber	N. Osborne	J.F. Warner
R.H. Borden	J.A. Fischer	L.F. Johnsen	S. Pamukcu	S. Wright
J.J. Bowders	K.L. Fishman	I. Juran	E.B. Perry	K. Weaver
G.T. Brill	H.N. Gazaway	S.A. Jefferis	C.J. Poran	D. Yang
D.A. Bruce	A. Ghorbanpoor	M.C. Jones	R.K. Rowe	J.P. Welsh
R.J. Bryne	R.R. Goughnour	R.H. Karol	R.M. Rubrite	
M.P. Bruen	J.H. Gosain	J.L. Kauschinger	C.R. Ryan	

Without the conscientious efforts of these reviewers, a quality proceeding would not have been possible.

In addition to the contributed papers, four distinguished experts were invited to prepare keynote lectures and papers on subjects suggested by the Organizing Committee. The invited keynote papers are grouped together in these proceedings.

All of the papers published in these proceedings are available for discussion, just as any paper published in the ASCE Journals. The due date for any discussion is the same as that for a February 1992 journal paper. All of these proceedings papers also are eligible for appropriate ASCE awards.

Finally, and most importantly, thanks are extended to ASCE staff particularly Shiela Menaker, and to the staff and graduate students of North Carolina State University and Polytechnic University of New York who made it possible to produce these proceedings. In particular, Catherine Tucker and graduate students Shuih-Liang Yan and Phillip Morrison at NCSU and Karni Dorell, graduate student Ashutosh Potnis, and the ASCE Student Chapter at Polytechnic have made significant effort providing continuous support during the paper review and the editorial process. Special thanks are also extended to A. Simons and the ASCE staff who have contributed much to the successful preparation of the conference.

Roy H. Borden
Robert D. Holtz
Ilan Juran

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