GEOTECHNICAL PRACTICE PUBLICATION NO. 3

Geotechnical Applications for Transportation Infrastructure

Featuring the Marquette Interchange Project in Milwaukee, Wisconsin

Edited by Hani H. Titi

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Featuring the Marquette Interchange Project in Milwaukee, Wisconsin

PROCEEDINGS OF THE 13TH GREAT LAKES GEOTECHNICAL AND GEOENVIRONMENTAL CONFERENCE

May 13, 2005
Milwaukee, Wisconsin

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Preface

This Proceedings contains 12 papers presented at the 13th Great Lakes Geotechnical and Geoenvironmental Conference (GLGGC) held in Milwaukee, Wisconsin, May 2005. Since major transportation infrastructure reconstruction was taking place in Milwaukee at the time of the conference, the conference theme addressed the role of geotechnical engineering in transportation infrastructure. The $810 million Marquette Interchange Project in the heart of downtown Milwaukee connects interstate highways I-43, I-94, and I-794. The role of geotechnical engineering in such projects is significant. The conference was designed as a forum for discussion of the latest advances in geotechnical engineering applications for transportation infrastructure including earth retaining structures, deep foundations, and geotechnical /pavement engineering.

Each paper published in this Proceedings was peer reviewed by at least one reviewer before being accepted for publication. The peer review was conducted in accordance with the Geo-Institute standards and practices. All papers are eligible for discussion in the Journal of Geotechnical and Geoenvironmental Engineering and for ASCE award nomination.

The peer review of the papers was conducted by the following reviewers: Murad Abu-Farsakh, Khalid Alshibili, Tuncer Edil, Mohammed Elias, Richard Finno, Dante Fratta, Mohammed Gabr, Sam Helwany, Andrew Heydinger, Baoshan Huang, Robert Liang, Eyad Massad, Radhey Sharma, Hani Titi, and Xiong (Bill) Yu.

I would like to express my appreciation to Nina McLawhorn of the Wisconsin Department of Transportation who made this work possible. I would like to acknowledge the support of the following: ASCE Wisconsin Section, HNTB, CH2M HILL, Edward E. Gillen Company, and Professor Edward Beimborn. I would like to thank John Siwula for his help and support in planning and organizing various activities. I would also like to thank the Technical Session Chairs: Nina McLawhorn, Bruce Pfister, Bob Arndorfer, Steve Maxwell, John Siwula, and Therese Koutnik.

The 13th GLGGC keynote speakers are Mr. Frank Busalacchi, Secretary, Wisconsin DOT and Mr. Jerry A. DiMaggio, principal geotechnical engineer and national program manager, FHWA. Their contribution to the conference is highly appreciated.

I would like to thank the authors and presenters of the papers for their contribution to the GLGGC. Special thanks are due to the following University of Wisconsin-Milwaukee individuals for their help in various conference activities: Jean Carlson, Mohammed Elias, and Dan Mielke.

Finally, I would like to acknowledge Harold Olsen and Richard Wiltshire for their help and assistance, the Geo-Institute Technical Publication Committee, Carol Bowers, and Donna Dickert.

Hani H. Titi, Ph.D., P.E.
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History of the Great Lakes Geotechnical and Geoenvironmental Conferences

The Great Lakes region is a highly populous and industrialized area of North America with a distinct economic and social character. The region was also subjected to active glaciation during the Pleistocene Epoch. This left behind unique surface and subsurface soil conditions and difficult groundwater problems. Because of this, the region has always posed great challenges to Geotechnical Engineers. These challenges continue to produce advances in classical Soil Mechanics, Foundation Engineering, and Groundwater Engineering. In addition, as the region struggles with environmental quality, the specialty of Geoenvironmental Engineering has matured to address problems such as groundwater pollution and solid waste disposal.

With these thoughts in mind, the Steering Committee of the annual Great Lakes Geotechnical/Geoenvironmental Conference has endeavored to ensure the continuation of the annual meetings. Each year a different theme is selected to focus on a topic pertinent to the Great Lakes region. Universities, local sections of ASCE or other professional organizations throughout the region host the conferences. It is hoped that these opportunities to discuss technical issues will be of value to researchers and practitioners dealing with problems related to soils of glacial origin. It is also hoped that the one-day format including oral and poster presentations, displays, and published proceedings will help facilitate the exchange of information among all of us struggling with the geotechnical/geoenvironmenal engineering challenges of the Great Lakes region.

Conference History

The Great Lakes Geotechnical and Geoenvironmental Engineering Conference is a one-day conference covering topics pertinent to the Great Lakes region. The purpose of the conference is to disseminate the latest information on current practices in engineering and related professions. The conference includes a Proceedings, including all conference papers presented at the conference. Previous and future Great Lakes Geotechnical and Geoenvironmental Engineering Conferences are listed in Table 1.

Awards

The GLGGC Steering Committee, responsible for organizing the conferences, meets on the evening of each conference. The GLGGC Steering Committee voted to establish awards for service, education and outstanding engineering at the 2000 meeting. Recipients of awards are usually recognized at the Annual GLGGC in the

Table 1: History and contact information of the Great Lakes Geotechnical and Geoenvironmental Conferences

Conf.	Title	Location	Date	Contact Person
1st	Engineering of Landfills in Glacial Soils	Toledo, OH	May 14, 1993	Andrew Heydinger, andrew.heydinger@utoledo.edu
2nd	Waste Materials and Their Geotechnical/ Geoenvironmental Applications	West Lafayette, IN	May 20, 1994	Rodrigo Salgado, salgado@purdue.edu
3rd	Geotechnical and Geoenvironmental Applications of Geosynthetics	Cleveland, OH	May 19, 1995	Andrew Heydinger, andrew.heydinger@utoledo.edu
4th	Insitu Remediation of Contaminated Sites	Chicago, IL	May 17, 1996	Krishna R. Reddy, kreddy@uic.edu
5th	Site Characterization for Geotechnical and Geoenvironmental Problems	Ann Arbor, MI	May 16, 1997	Richard Woods, rdw@engin.umich.edu
6th	The Design and Construction of Drilled Deep Foundations	Indianapolis, IN	May 8, 1998	Andrew Heydinger, andrew.heydinger@utoledo.edu
7th	Recent Advances in Ground Improvement Methods	Kent, OH	May 10, 1999	Andrew Heydinger, andrew.heydinger@utoledo.edu
8th	Geotechnology for Urban Renewal and Redevelopment	Detroit, MI	May 19, 2000	Nazli Yesiller, yesiller@eng.wayne.edu
9th	SlipSlidin' Away Contemporary Solutions to Land Mass Stabilization	Dayton, OH	May 11, 2001	Manoochehr Zoghi, Manoochehr.Zoghi@notes.udayton.edu
10th	Transportation Geotechniques	Toledo, OH	May 10, 2002	Andrew Heydinger, andrew.heydinger@utoledo.edu
11th	Advances in Characterizing and Engineering Problem Soils	West Lafayette, IN	May 23, 2003	Maria Santagata, mks@purdue.edu
12th	Advances in Deep Foundation, Design Construction and Quality Control	Akron, OH	May 7, 2004	Robert Liang, rliang@uakron.edu
13th	Geotechnical Applications for Transportation Infrastructure	Milwaukee, WI	May 15, 2005	Hani Titi, hanititi@uwm.edu
14th	Earth Retention/Coastline Protection Design and Construction	Chicago, IL	May, 2006	Sara Knight, knight@stsconsultants.com

year following their selection. Table 2 presents information about the individuals who have been recognized by the committee.

Table 2: GLGGC Awards

Award	Recipient	Affiliation	Year Award
Excellence for Service	Bill Lovell	Purdue University	2001
Distinguished Engineer	Richard Woods	University of Michigan	2001
Excellence Plaque	Bill Lovell	Purdue University	2001
Excellence Plaque	Andrew Bodosci	University of Cincinnati	2001
Excellence Plaque	Donald Gray	University of Michigan	2001
Excellence Plaque	Robert Lennertz		2001
Distinguished Engineer	Vincent Drnevich	Purdue University	2002
Special Service Award	Andrew Heydinger	University of Toledo	2002
Excellence for Service	William Cutter	ATC Associates, Inc., Indianapolis, IN	2003
Excellence for Geotechnical Education	Brian W. Randolph	University of Toledo	2003
Outstanding Educator in the Region	Manoochehr Zoghi	University of Dayton	2004
Distinguished Geotechnical Engineer in the Region	Clyde Baker	STS Consultants, Ltd, Vernon Hills, Illinois	2005
Excellence in Service	Robert Liang	University of Akron	2005
Outstanding Geotechnical Educator in the Region	Kevin Sutterer	Rose-Hulman Institute of Technology	2005
Distinguished Geotechnical Engineer in the Region	John Siwula	HNTB, Milwaukee	2006
Excellence in Service to GLGGC	Hani Titi	University of Wisconsin - Milwaukee	2006
Outstanding Geotechnical Educator in the Region	Krishna Reddy	University of Illinois - Chicago	2006

13th Annual Great Lakes Geotechnical and Geoenvironmental Conference

The 13th GLGGC was held at the University of Wisconsin-Milwaukee Campus in Milwaukee on May 13, 2005. The conference was organized by the Department of Civil Engineering and Mechanics, University of Wisconsin-Milwaukee and Wisconsin Department of Transportation/Wisconsin Highway Research Program. The conference planning committee consisted of the following individuals:

Hani Titi, Sam Helwany, and Mohammed Elias – University of Wisconsin-Milwaukee
Nina McLawhorn, Bruce Pfister, and Robert Arndorfer – Wisconsin Department of Transportation

John Siwula, Brian Powell, Therese Koutnik, and Viki Streich – Milwaukee Transportation Partners
Tuncer Edil – University of Wisconsin-Madison
Alan Wagner – Wagner Komurka Geotechnical Group
Timothy Bate – American Society of Civil Engineers, Wisconsin Section

Planning for the 13th GLGGC started on May 2004 with the steering committee meeting. In the 13th conference, the steering committee has chosen to address the role of geotechnical engineering in transportation infrastructure. The conference is intended to be a forum for discussion of the latest advances in geotechnical engineering applications for transportation infrastructure including earth retaining structures, deep foundations, and geotechnical /pavement engineering. The conference will feature the Marquette Interchange Project in Milwaukee. Based on that the following conference themes were adopted:

- Innovative construction methodologies of earth retaining structures
- Testing/instrumentation of earth retaining structures
- Innovative construction/design of deep foundations
- Innovative geotechnical applications in pavements
- Case histories

The 2005 GLGGC Steering Committee consists of the following individuals:

President: Robert Liang – University of Akron
Vice President: Hani Titi – University of Wisconsin-Milwaukee
Secretary/Treasurer: Krishna Reddy – University of Illinois
Executive Director: Andrew Heydinger – University of Toledo
Member Emeritus: C.W. "Bill" Lovell – Purdue University
Member Emeritus: Richard D. Woods – University of Michigan
Member: Marika Santagata – Purdue University
Member: Manoochehr Zoghi – University of Dayton
Member: Radhey Sharma, Iowa State University
Member: Sarah Knight: STS Consultants

A website was established for the conference detailing information needed. The website address is: http://www.uwm.edu/CEAS/glggc/. In addition, video of the 13th GLGGC presentations is available on the following website, http://www.dot.wisconsin.gov/library/research/reports/whrp.htm.

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