Geotechnical Engineering Practice: Ground Improvement Techniques and Geosynthetic Applications in Civil, Transportation and Coastal Engineering

Organised by: Centre for Infrastructure Engineering and Management and Griffith School of Engineering, Griffith University Gold Coast Campus

Date: September 29- October 3, 2008

Venue: Griffith University Gold Coast Campus: Room G30_2.11

PLEASE NOTE THAT ONLINE REGISTRATION IS NOW AVAILABLE

http://www.conferenceonline.com.au/index.cfm?page=details_conference&pg=1&id=12304

See Online Registration Details Inside this Bulletin

For additional information please contact (preferably by e-mail)
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INTRODUCTION

The September 28-October 3, 2008 Workshop and Short Courses at the Griffith University will be on Ground Improvement Techniques and Geosynthetic applications in pavements, earth retaining structures, road and highway embankments, slope protection and coastal protections. The first day of the workshop will deal with different aspects of ground improvement works in soft soils by preloading techniques and vacuum loading. These lectures will concentrate on road and highway embankments, land reclamation and port works. The second day will concentrate on the varied types of geosynthetics, their properties and applications in unpaved and paved roads. On the third day, the use of geosynthetics in slope protection, embankments on soft soils, piled supported embankments , case studies on basal reinforced embankments and design of geosynthetics for earth walls and in particular the FHWA method. Also an additional lecture would be on such earth walls with geosynthetics and laterally loaded piles. The fourth day is on the application of geosynthetics in Geo-environmental problems and finally, the fifth day is exclusively devoted to Geosynthetic and Coastal Protection. The Lecturers are Professor Chu Jian, Professor Jie Han, Mr. Chris Lawson, Professor Malek Bouazza and Professor Hocine Omeraci.

In the recent years, the Griffith University has developed a very strong interaction with the industries through the organization of well structured Short courses, Workshops and lecture series. These activities are found to be very fruitful in constantly upgrading the Geotechnical Engineers, Civil and Mining Engineers, Engineering Geologists and Rock Mechanics specialists. The topics cover Foundations, Earth Structures, Tunnels, Pavements, Soil & Rock Behaviour, Ground Improvements, Site Investigations, Laboratory and In-situ tests and Numerical Analysis using PLAXIS, FLAC and other Softwares. This was followed by a Workshop on Dams Safety & Dam Engineering. Outstanding academicians and practitioners are carefully selected from Australia and abroad so that the participants could enjoy authoritative lectures being presented by highly experienced and most knowledgeable people in the various chosen field of interest. The last event was on July 7-11, 2008 and was devoted to Geotechnical Engineering Practice via Engineering Geology, Rock Mechanics and Rock Engineering. Outstanding geotechnical experts, Prof. Giovanni Barla, Prof. Paul Marinos, Dr. John Read, Mr. Peter Burgess, Prof. Bob Whiteley and Mr. David Lucas will give authoritative lectures. These lectures are of immense value to our practicing engineers in Queensland and in Australia New Zealand.

DAILY PROGRAMME

Technical Program subject to minor changes

Day 1: Monday, September 29

Dr Chu Jian: Soil improvement using PVD and vacuum preloading methods and introduction to some coastal dike construction methods

08:30 – 09:00am **Registration**

09:00 – 10:40am **Introduction to different soil improvement methods**

10:40 – 11:00am **Coffee**

11:00 – 12:30pm **Preloading using PVDs: Case studies**

12:30 – 01:00pm **Lunch**

01:00 – 02:30pm **Vacuum preloading: Case studies**

02:30 – 03:00pm **Coffee**

03:00 – 05:00pm **Ground improvement works in land reclamation and coastal dike construction activities**

Days 2 & 3: September 30 & October 1

Dr Jie Han and Chris Lawson: Geosynthetic Applications in Pavements, Embankments, Slope Stability and Retaining Structures

Day 2: Tuesday, September 30

08:00 – 09:00am **Registration**

09:00 – 09:45am **Geosynthetic types, functions, and applications**

09:45 – 11:00am **Geosynthetic properties and testing**

11:00	**–**	**11:15am**	**Coffee**
11:15	**–**	**12:15pm**	**Design of geosynthetics for separation, filtration & drainage**
12:15	**–**	**01:00pm**	**Lunch**
01:00	**–**	**02:00pm**	**Basics of pavement design**
02:00	**–**	**03:30pm**	**Design of geosynthetics for unpaved roads**
03:30	**–**	**03:45pm**	**Coffee**
03:45	**–**	**05:15pm**	**Design of geosynthetics for paved roads**

Day 3: Wednesday, October 1

08:00	**–**	**09:00am**	**Registration**
09:00	**–**	**10:00am**	**Geosynthetic design in slope stability**
10:00	**–**	**11:00am**	**Geosynthetics in embankments on weak soils**
11:00	**–**	**11:15am**	**Coffee**
11:15	**–**	**12:15pm**	**Geosynthetics in pile-supported embankments**
12:15	**–**	**01:00pm**	**Lunch**
01:00	**–**	**02:00pm**	**Practical examples and case studies of basal reinforced embankments**
02:00	**–**	**03:30pm**	**Geosynthetic design for earth walls – FHWA method**
03:30	**–**	**03:45pm**	**Coffee**
03:45	**–**	**05:15pm**	**Design of geosynthetics for earth walls under special conditions (tiered, with limited space, and with piles subjected to lateral loads)**

Days 4: Thursday, October 2

Prof. Malek Bouazza & Chris Lawson: Geosynthetics in Geo-environmental Engineering

08:00	**–**	**09:00am**	**Registration**
09:00	**–**	**10:15am**	**Introduction to lining systems**
			Geosynthetics overview and applications in waste containment facilities
10:15	**-**	**10:30am**	**Coffee**
10:30	**–**	**12:00am**	**Design by Function (10:30-11:00)**
			Geomembranes in waste containments (11:00-12:00)
12:00	**–**	**12:30 pm**	**Lunch**
12:30	**–**	**02:00pm**	**Introduction to Geosynthetic Clay Liners (GCLs) (12:30-01:00)**
			Hydraulics of GCLs (01:00-2:00)
02:00	**–**	**03:00 pm**	**Designing with GCLs**
03:00	**–**	**03:15pm**	**Coffee**
03:15	**–**	**05:15pm**	**Case histories of Geo-environmental Projects in SE-Asia**

Day 5: Friday, October 3

Prof. Hocine Oumeraci & Mr Simon Restall: Geotextile Tubes and Sand Containers for Coastal Protections

08:00	**–**	**09:00am**	**Registration**
09:00	**–**	**10:15am**	**Introduction, Engineering Properties and Durability Issues**
10:15	**-**	**10:30am**	**Coffee**
10:30	**–**	**12:00am**	**Example Application of Geotextile Sand Containers (GSC) for Shore Protection**
12:00	**–**	**12:30 pm**	**Lunch**

12:30 – 02:00pm Processes Affecting Hydraulic Stability of GSC

02:00 – 03:00pm Simple and Process-Based Stability Formulae and Example Calculation for GSC under Wave Action, including Capabilities and Limitations

03:00 – 03:15pm Coffee

03:15 – 05:15pm Case histories of Coastal Protection in Australia

Registration Can Now Be Done Online

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ON LINE REGISTRATION AND PAYMENT:
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(A) SIMPLY FOLLOW THE LINK, YOU WILL BE REQUIRED TO FILL IN YOUR DETAILS AS BELOW:

First Name:
Last Name:
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Contact phone:
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Contact email:

Address:
City/Suburb:
State/Country:
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Country:

***Please note that password is also required. You will use this password to log into the User Admin area and modify your registration if necessary.**

(B) BY CLICKING "NEXT STEP", YOU WILL BE ABLE TO SELECT THE MODULE YOU INTEND TO ATTEND.

- □ **AUD $ 390 - Monday, 29th September**
- □ **AUD $ 390 - Tuesday, 30th September**
- □ **AUD $ 390 - Wednesday, 1st October**
- □ **AUD $ 390 - Thursday, 2nd October**
- □ **AUD $ 390 - Friday, 3rd October**

By ticking the box, you are now registered for the day you selected.

(C) PLEASE CLICK "NEXT STEP" AGAIN, YOU WILL NOW ABLE TO SELECT THE PAYMENT METHOD YOU WANT TO USE. THESE INCLUDE:

- □ **CREDIT CARD (VISA/ MASTERCARD/ AMEX)**
- □ **CHEQUE**
- □ **DIRECT DEPOSIT (EFT)**

(D) AFTER YOU FILLED IN ALL THESE DETAILS, YOU ARE NOW REGISTERED IN THE WORKSHOP BY CLICKING THE "SUBMIT" BUTTON. AN INVOICE WILL BE SENT TO YOUR EMAIL DIRECTLY.

***For additional information please contact (preferably by e-mail)**
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BIO-DATA OF SPEAKERS

(1) Associate Professor Chu Jian

Dr CHU is an Associate Professor in the School of Civil and Environmental Engineering, Nanyang Technological University, Singapore. He received his Ph.D. from the University of New South Wales, Australia in 1991. He has more than 20 years' research and consulting experiences in geotechnical engineering, in particular in the areas of laboratory and in-situ testing, engineering properties of soils, soil improvement and land reclamation. He is the Chairman of TC39: Geotechnical Engineering for Coastal Disaster Mitigation and Rehabilitation and the Chair of Working Group C in TC17: Ground Improvement, both under the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE). He is a co-author of the book "Soil Improvement – Prefabricated Vertical Drain Techniques" and a co-editor of the book "Ground Improvement – Case Histories". He has published over 190 technical papers in international journals and conferences and has been a keynote or invited speaker at more than 20 local and international conferences. He is a recipient of the prestigious R.M. Quigley Award from the Canadian Geotechnical Society for publishing the best paper in the Canadian Geotechnical Journal in 2003. At the present, he serves as the Co-Editor for Geotechnical Engineering, the Journal of Southeast Asian Geotechnical Society and an Editorial Board Member for 3 other international journals.

(2) Associate Professor Jie Han

Dr. Jie Han is an associate professor at Department of Civil, Environmental, and Architectural Engineering at the University of Kansas in the United States. He received his Ph.D. degree in Civil Engineering from the Georgia Institute of Technology in 1997 and has been a professional engineer in Georgia since 1998. Prior to joining the University of Kansas in August 2004, Dr. Han was an assistant professor at Department of Civil Engineering at Widener University from 2001 to 2004 and a manager of technology development in a world-leading geosynthetic manufacturer from 1997 to 2001. Prof. Han's research and practical experiences have dealt with geosynthetics-reinforced earth structures, ground improvement, pile foundations, and pavement applications. Prof. Han has co-authored three technical books and published more than 100 peer-reviewed journal papers and conference papers. Dr. Han was one of sixteen invited Top Name Speakers for the 1999 ASCE/Pa DOT Geotechnical Seminar. He is a member of the Editorial Board of the ASCE Journal of Geotechnical and Geoenvironmental Engineering, the Advisory Board/Editorial Panel of the International Journal of Geomechanics, the Editorial Board of International Journal of Geomechanics and Geoengineering, ASCE Geosynthetic Committee, ASCE Ground Improvement Committee, and TRB A2K07 Committee on Geosynthetics. He was the Secretary General and Technical Committee Co-Chair for the GeoShanghai International Conference held in Shanghai, China from June 6 to 8 2006; an international advisory board member, session chair, and invited keynote lecturer for a number of international conferences; and a member of the U.S. National Science Foundation and the National Cooperative Highway Research Program review panels. Prof. Han has received several research grants from the National Science Foundation, the Federal Highway Administration, Kansas Department of Transportation, Delaware Transportation Institute, the University of Kansas, Widener University, and industries. The total research expenditure is approximate 2

million dollars. Prof. Han received the Short-Term Invitation Fellowship for Research in Japan from the Japan Society for the Promotion of Science (JSPS) in 2002. He was the recipient of Bellows Scholar Award from School of Engineering at the University of Kansas and several Provost's and Faculty Research and Development awards at Widener University. Recently, he has received two best paper awards from the U.S. Transportation Research Board.

(3) Chris Lawson

Chris Lawson is Managing Director of TenCate Geosynthetics Asia-Pacific based in Hong Kong. Chris received his Bachelor of Engineering and Master of Engineering degrees from The University of New South Wales, Sydney. He has worked in the field of geosynthetics for 30 years in Australia, Europe, North America and Asia. During this period he has served on numerous international organizations developing geosynthetics Standards and Codes of Practice. Chris has acted as technical advisor on many large scale geosynthetics projects in the field of reinforced soil techniques and coastal and hydraulic engineering in Australia, Asia and Europe. He is the author of over 50 technical papers on the subject of geosynthetics, and has been the keynote speaker at numerous conferences and symposia. Chris is an ex-Council Member of the International Geosynthetics Society. In 2006 Chris presented the third Giroud Lecture at the 8th International Conference on Geosynthetics in Yokohama, Japan.

(4) Associate Professor Abdelmalek Bouazza

Dr. Bouazza is an Associate Professor in Civil Engineering and Head of the Geomechanics Group at Monash University, Melbourne, Australia. He is also an Adjunct Research Professor at Cardiff University, Geoenvironmental Research Centre, Cardiff, U.K. Dr. Bouazza's research interests are in the fields of Geosynthetics, Ground improvement, Contaminant Transport, Landfills and Environmental Geotechnics He has an international reputation for research in Geosynthetics and Environmental Geotechnics. His general field of interest is in waste mechanics, contaminant transport, gas migration in porous media, thermo-hydro-mechanical behaviour of porous media and design and performance of liner and cover systems. His research has been recognised by a number of awards including, recently the 2006 International Geosynthetics Society Award and Gold Medal for outstanding contribution to advances in the scientific and engineering developments of geosynthetics. His research findings in Geosynthetic Clay Liners have also been recently incorporated into various standards such as *European Committee for Standardization (CEN)* TC189 and *ISO* TC221. In particular, a testing technique he has developed to test the gas permeability of GCLs has been approved by ISO TC221 and CEN189 to form the basis of the new gas permeability standard for GCLs.

Dr. Bouazza is very prominent in technical and professional society activities and serves on a number of international technical committees. Currently, he is a member of the International Geosynthetics Society (IGS) council and chair of the Asian Activities Committee of the International Geosynthetics Society. He is a core member of the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) Technical Committee No5 (TC5) on Environmental Geotechnics, Vice-President of the Australasian Chapter of the International Geosynthetics Society (ACIGS), co-chair of the International Geosynthetics Society Education

Committee and a member of the Standard Australia committee C20 on Geosynthetics. He is editorial board member of 5 International Journals and very active as a reviewer for several international journals.

Dr. Bouazza has published widely in international journals and refereed conferences and is the author or co-author of more than 180 refereed publications... His skills and experience in the area of waste containment facilities and geosynthetics are well recognized in Australia and abroad. He has been invited to deliver and contribute to several keynote lectures and state of the art reports in international conferences in Africa, Asia, Europe and North America, and delivers short courses on geosynthetics, and liners and cover systems for waste containment facilities on a regular basis locally and internationally. In addition to his academic commitments, Dr. Bouazza gives specialist advice for the industry both nationally and internationally.

(5) Prof. Hocine Oumeraci

Dr. H. Oumeraci is a full professor at the Faculty of Civil Engineering at Technische Universität Braunschweig in Germany. He is also Managing Director of the Coastal Research Center (FZK) in Hanover, a Joint Institute of both universities in Hannover and Braunschweig. He received in 1981 his PhD-degree in Hydraulic Engineering from the Dresden University of Technology, Germany. After many years of engineering practice (in both consulting and contractor companies) he joined the University of Hannover, where he was involved in large research projects on coastal structures up to 1993. He has been teaching Hydromechanics and Coastal Engineering since 1994 in Braunschweig. His research interests encompass a large range of coastal engineering topics, including vertical breakwaters, innovative coastal structures, wave loading and hydraulic performance of coastal and harbour structures, wave overtopping and breaching of sea dikes and coastal structures made of geotextile sand containers. He is the author of more than 200 technical papers, including many papers in the last years on geotextile structures. One of these papers, authored by one of his Phd-students, Mr. J. Recio, and himself was awarded by the Journal "Geotextiles & Geomembranes", Elsevier, as the Best Paper of the Year 2007. He is a member of the Editorial Board of "Coastal Engineering", Elsevier.

Additional Details on Professor Hocine Oumeraci's Presentations on Geotextile Sand Containers for Shore Protection

Hocine OUMERACI: Professor, Leichtweiss-Institute for Hydraulic Engineering and Water Resources, Techn. Univ. Braunschweig, Beethovenstr. 51a, D-38106 Braunschweig, Germany, e-mail: Managing Director, Coastal Research Centre (FZK) of Leibniz University Hannover and TU Braunschweig.

According to the 4th IPCC-Report in 2007 the storminess associated with climate change and its effect on coastal flood and erosion will increase more dramatically than expected. Besides other adaptive non-structural risk mitigation measures, more versatile materials and solutions are required for the design of new, cost effective shore protection structures as well as for the safety assessment and reinforcement of existing coastal barriers and structures, including dune reinforcement, scour protection, etc. In search of low cost, soft, reversible and thus sustainable solutions, the concept of Geotextiles Sand Containers (GSC) as "soft rock" for coastal defence structures, introduced in the 1950s, has now reached such a maturity and broad range of applications that the time is ripe to summarize from a coastal engineering perspective the main achievements and the most significant advances in terms of (i) improvement of the long-term performance of geotextiles, (ii) assessment of the durability and life time prediction, (iii) survey

of GSC-built structures with respect to the degradation mechanisms and (iv) understanding the mechanisms of failure, including hydraulic stability under severe wave action.

The course primarily aims at providing such a summary as well as an introduction to the design of geotextile sand containers with applications in coastal engineering and with particular focus on shore protection and hydraulic stability under severe wave action. First, the most relevant engineering properties required for geotextiles applied for coastal structures are discussed, including the still not fully resolved issue related to the durability and life time prediction in the marine environment. Second, some example applications are provided ranging form sand bags of 0.05m³ to geo-containers of 250m³ and geotubes of many hundreds of m³ and encompassing a broad range of coastal structures, including sea walls, sea groins, artificial reefs, sea dikes, etc. This is to illustrate the versatility of geotextile sand containers as an appropriate soft shore protection alternative to conventional hard coastal structures made of rock and concrete units.

Third, the hydraulic stability of geotextile sand containers built in on a coastal structure under severe wave attack, which represents the major part of the course, is addressed. After an overview of the various failure modes, including hydraulic and geotechnical failure modes and those related to the geotextile itself, simple formulae with example applications are first proposed for the calculation of the size of GSCs on the structure slope and crest which is required to withstand given design wave conditions. Such simple formulae are generally conservative and may thus be applied for feasibility or preliminary design. The physical processes which may affect the hydraulic stability of GSCs are then discussed and well-documented to highlight the necessity of applying more process-based stability formulae.

New physically based and process-oriented formulae derived on the basis of a better understanding of the aforementioned processes are proposed and exemplarily applied to a broad range of coastal structure types and wave conditions in order to illustrate the versatility of the new formulae, their capabilities and limitations. In the example applications, a comparative analysis of the outcomes using the simple formulae and the new process-based formulae with and without consideration of the effect of sand container deformations on the hydraulic stability of the slope and crest containers.

Finally, the key issues of the course are summarized. The main research problems are pointed out, which still need to be solved in order to make use of the full potential of GSCs, including those related to the hydraulic stability under severe conditions as well as to the durability and life time prediction of GSCs. Important Remarks: A CD-Rom with lecture notes (ca. 60 pages) and the corresponding presentation will be handed out, including a comprehensive list of the most relevant references related to each of the topics addressed in the course. The CD will also contain pre-prints of some related papers by the authors and co-workers.

Details of Friday, October 3 Lectures

1. Introduction

    1.1 Historical background
    1.2 Relevance of GSC in Coastal Engineering

2. Engineering Properties and Durability

    2.1 Required Properties of Geotextile for Sand Containers
    2.2 Durability and Life Time Prediction

3. Example Applications of GSC for Shore Protection

    3.1 Types of GSC-Structures and Range of GSC-Sizes
    3.2 Seawalls, Revetments and Reinforcement of Beach-Dune Systems
    3.3 Sea Groins
    3.4 Sea Dikes
    3.5 Scour Protection