

GEOTECHNICAL

ENGINEERING

Journal of the

SOUTHEAST ASIAN GEOTECHNICAL SOCIETY

&

ASSOCIATION OF GEOTECHNICAL SOCIETIES IN SOUTHEAST ASIA

Sponsored by

ASIAN INSTITUTE OF TECHNOLOGY

Editors: Prof Buddhima Indraratna

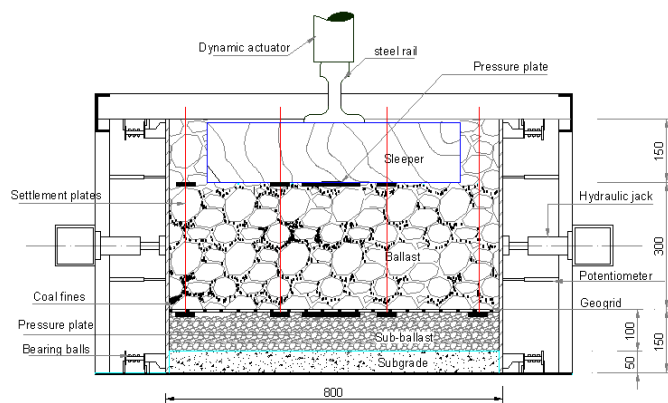
& A/Prof Cholachat Rujikiatkamjorn



AGSSEA



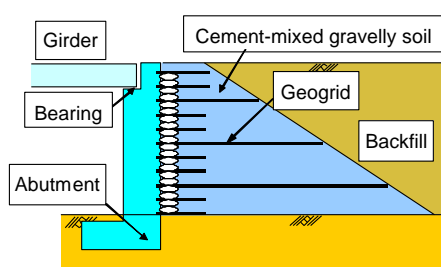
AIT
Asian Institute of Technology



1. High Speed Rail Process Simulation Apparatus, (Indraratna *et al*, 2014)



2. Track Displacement Monitoring (Indraratna *et al*, 2014)



a. GRS bridge abutment



b. GRS abutment at Mantaro for Hokkaido Shinkansen

3. Geosynthetic Reinforced Soil Structure (GRS) in High Speed Rail (after Tatsuoka *et al*, 2014)

GEOTECHNICAL ENGINEERING

Published by the:

SOUTHEAST ASIAN GEOTECHNICAL SOCIETY &
ASSOCIATION OF GEOTECHNICAL SOCIETIES IN SOUTHEAST ASIA

EDITOR-IN-CHIEF

A.S. Balasubramaniam

EDITORS

Teik Aun Ooi

Noppadol Phienwej

CO-EDITORS

Der Wen Chang

D.T.Bergado

Jian Chu

Darius Wanatowski

EDITORIAL ADVISERS

A.S. BALASUBRAMANIAM, *Australia*
E.W. BRAND, *U.K.*
WEN HUI TING, *Malaysia*
KWET YEW YONG
CHUNG TIEN CHIN
DENNES T. BERGADO

ZA-CHIEH MOH, *Taiwan*
CHIN-DER OU, *Taiwan*
JOHN CHIEN-CHUNG LI
H.G. POULOS, *Australia*
PEDRO SECO E PINTO

SEAGS GENERAL COMMITTEE 2013 - 2016

DR. TEIK AUN OOI (*President*)
DR. ZA-CHIEH MOH (*Founding President*)
PROF. KWET YEW YONG (*Past President*)
DR. WEN HUI TING (*Past President*)
DR. CHIN DER OU (*Past President*)
IR. YEW WENG YEE
IR. SHAW SHONG LIEW
PROF. HUNG-JIUN LIAO
PROF. MEEI-LING LIN
PROF. T. LIANG

DR. NOPPADOL PHIENWEJ (*Hon. Secretary General*)
DR. CHUNG TIEN CHIN (*Immediate Past President*)
DR. JOHN CHIEN-CHUNG LI (*Past President*)
PROF. A.S. BALASUBRAMANIAM (*Past President*)
PROF. JIAN CHU
IR. KENNY K.S. YEE
PROF. DER-WEN CHANG
DR. SOKTAY LIM
PROF. Dennes T Bergado
MR. V. SIVISAY

Geotechnical Engineering is the official journal of the Southeast Asian Geotechnical Society and the Association of Geotechnical Societies in Southeast Asia. It is published four times a year in March, June, September and December and is free to members of the Society. The annual subscription rate for non-members is **US\$30** to individuals and **US\$50** to libraries and companies. Back issues are available. Cheques or money orders should be made payable to the Asian Institute of Technology. Membership application forms and other details can be obtained from:

*The Secretariat, SEAGS
Room 211, AIT Library
Asian Institute of Technology
P.O. Box 4, Klong Luang
Pathumthani 12120, Thailand
Website: <http://www.seags.ait.ac.th>*

***Ir. Kenny Yee
Hon. Secretary General
Association of Geotechnical Societies in Southeast Asia
E-mail: kenny.yeeks@gmail.com
<http://www.agssea.org>***

GEOTECHNICAL ENGINEERING

AGSSEA COUNCIL SESSION 2013 - 2016

Chairman
Hon. Secretary-General
Hon. Treasurer
Immediate Past Chairman
Hon. Founder Chairman
Council Members

Southeast Asian Geotechnical Society (SEAGS)
Vietnamese Society for Soil Mechanics and Geotechnical Engineering (VSSMGE)
Hong Kong Geotechnical Engineering Society (HKGES)
Geotechnical Society of Singapore (GeoSS)
Thai Geotechnical Society (TGS)

Chinese Taipei Geotechnical Society (CTGS)
Indonesian Society for Geotechnical Engineering (HATTI)
Malaysian Geotechnical Society (MGS)

Nominated Co-opted
Members

Advisors

Prof. Kwet-Yew YONG
Ir. Kenny YEE
Prof. Charles Wang-Wai NG
Dr. Teik-Aun OOI
Dr. Za-Chieh MOH
Prof. Noppadol PHIENTWEJ
- Vacant -
Prof. NGUYEN Truong Tien
Mr. Mai Trieu QUANG
Ir. Tony Chin-To CHEUNG
Prof. George THAM
Dr. Tiong Guan NG
Prof. Chun-Fai LEUNG
Prof. Suttisak SORALUMP
Dr. Apinit JOTISANKASA
Prof. Yung-Show FANG
Prof. San-Shyan LIN
Prof. Masyhur IRSYAM
Dr. Pinto Tua SIMATUPANG
Dr. Sin-Fatt CHAN
Ir. Yew Weng YEE
Prof. Jian CHU
Prof. Hung-Jiun LIAO
Prof. Trinh Minh THU
Dr. Wen-Hui TING
Prof. A S BALASUBRAMANIAM
Dr. John Chien-Chung LI
Prof. Dennes BERGADO
Ir. Raymond CHAN
Dr. Jack PAPPIN
Dr. Chung-Tien CHIN

Ir. Kenny Yee
Hon. Secretary General
Association of Geotechnical Societies in Southeast Asia
E-mail: kenny.yeeks@gmail.com

IEM Training Centre Sdn. Bhd.
No. 33-1A, Jalan SS 52/18
P.O. Box 224 (Jalan Sultan)
46200 Petaling Jaya, Selangor Darul Ehsan, MALAYSIA
Tel: (60) 03 7958 6851
Fax: (60) 03 79582851
E-mail: choy.iemtc@gmail.com

GEOTECHNICAL ENGINEERING

EDITORIAL PANEL

Prof. D.T. Bergado
Asian Institute of Technology
Bangkok Thailand

Dr. R.P. Brenner
Weinfelden
Switzerland

Prof. D.W. Chang
Tamkang University
Tamsui Taiwan

Prof. Jian Chu
Iowa State University
Iowa U.S.A

Prof. Fuping Gao
Institute of Mechanics
Chinese Academy of Sciences
Beijing China

Dr. Ivan Gratchev
Griffith University Gold Coast Campus
Gold Coast Queensland Australia

Dr. Wei-Dong Guo
University of Wollongong
Wollongong
Australia

Dr. Abuel-Naga Hossam
The University of Manchester
Manchester U.K.

Prof. Dong-Sheng Jeng
Griffith University Gold Coast Campus
Gold Coast
Queensland Australia

Prof. A (Malek) Bouazza
Monash University
Melbourne Australia

Prof. Jin-Chun Chai
Saga University
Saga, Japan

Prof. Y.K. Chow
National University of Singapore, NUS
Singapore

Prof. Roger Frank
Université Paris-Est
École des Ponts ParisTech
Laboratoire Navier-geotechnical team
(CERMES)
Marne-la-Vallée cedex 2 France

Prof. Christophe Gaudin
University of Western Australia
Perth Australia

Prof. Jürgen Grabe
Karlsruhe University
Germany

Prof. Jie Han
The University of Kansas
Lawrence, Kansas
USA

Prof. B. Indraratna
University of Wollongong
Wollongong Australia

Dr. Apinit Jotisankasa
Department of Civil Engineering
Kasetsart University
Bangkok Thailand

Prof. C. H. Juang
Clemson University
U.S.A.

Dr. Eng Choon Leong
Nanyang Technological University
Singapore

Prof. Robert Liang
Akron University
U.S.A.

Prof. San-Shyan Lin
Taiwan Ocean University
Keelung Taiwan

Prof. Tatsunori Matsumoto
Kanazawa University
Kakuma-machi, Kanazawa Japan

Prof. Fusao Oka
Kyoto University, Kyoto Japan

Prof. Charles W. W. Ng
The Hong Kong University of Science and
Technology Kowloon Hong Kong

Dr. T.A. Ooi
The Institution of Engineers, Malaysia
Kuala Lumpur Malaysia

Prof. C.Y. Ou
National Taiwan University of Science and
Technology
Taipei, Taiwan

Prof. Anand J. Puppala
The University of Texas at Arlington
Texas U.S.A

Prof. Paulus P. Rahardjo
Parahyangan Catholic University
Indonesia

Prof. Helmut F. Schweiger
Graz University of Technology
Graz Austria

Prof. Poul V. Lade
The Catholic University of America
Washington, D.C., U.S.A.

Prof. Chun-Fai Leung
National University of Singapore
Singapore

Prof. Meei-Ling Lin
Department of Civil Engineering
National Taiwan University
Taipei, Taiwan

Prof Hanlong Liu
Dean, College of Civil and Transportation
Engineering
Hohai University, Nanjing, China

Mr. Tom Lunne
Norwegian Geotechnical Institute
Oslo, Norway

Prof. Akira Murakami
Kyoto University
Kyoto Japan

Dr. Farrokh Nadim
Technical Director
Norwegian Geotechnical Institute (NGI)
Oslo, Norway

Dr. Erwin Oh
Griffith University Gold Coast Campus
Gold Coast
Queensland Australia

Dr. N. Phienwej
Asian Institute of Technology
Bangkok Thailand

Prof. Harianto Rahardjo
Nanyang Technology University
Singapore

Dr. Shinji Sassa
Port and Airport Research Institute
Nagase Yokosuka Japan

Prof. Shui-Long Shen
Shanghai Jiao Tong University
Shanghai China

Prof. D. N. Singh
Indian Institute of Technology Bombay
Powai, Mumbai, India

Prof. Ikuo Towhata
University of Tokyo
Tokyo Japan

Dr. Dariusz Wanatowski
The University of Nottingham
Ningbo
China

Dr. Albert T. Yeung
University of Hong Kong (HKU)
Hong Kong

Prof. Shuwang Yan
Director, Geotechnical Research Centre
Tianjin University, Tianjin, China

Prof. Mitsutaka Sugimoto
Nagaoka University of Technology
Nagaoka Japan

Prof. B.V.S. Viswanadham
Indian Institute of Technology Bombay
Powai, Maharashtra, India

Prof. Li-zhong Wang
Zhejiang University
China

Prof. Jian-Hua Yin
Hong Kong Polytechnic University
Hong Kong

Prof. Zhen-Yu Yin
Shanghai Jiao Tong University
Shanghai China

GEOTECHNICAL ENGINEERING

GUEST EDITORS

Prof. Jie Han (March 2011)

Prof. Tatsunori Matsumoto (June 2011)
Prof. Der-Wen Chang

Prof. Chang Yu Ou (September 2011)

Dr. Dariusz Wanatowski (December 2011)

Prof. Charles W W Ng (March 2012)
Dr. Apiniti Jotisankasa

Prof. Ikuo Towhata (June 2012)
Prof. Der-Wen Chang
Dr. Ivan Gratchev

Prof. Abdelmalek Bouazza (September 2012)

Tom Lunne (December 2012)
Prof. Don de Groot

Prof. Der-Wen Chang (March 2013)
Dariusz Wanatowski

Prof Akira Murakami (June 2013)
Dariusz Wanatowski

Prof. Fusao Oka (September, 2013)
Prof. Helmut F. Schweiger
Prof. Muhunthan Balasingham

Prof Jinchun Chai (December, 2013)
Prof Shuilong Shen

PAST EDITORS

Dr. E.W. Brand (1970 – 1973)

Dr. E.W. Brand, Prof. A.S. Balasubramaniam (1974 – 1976)

Dr. E.W. Brand, Dr. V.K. Campbell (1977 – 1978)

Dr. V.K. Campbell (1978 – 1980)

Mr. J.S. Younger (1980 – 1985)

Mr. D.R. Greenway (1986 – 1987)

Mr. P.G.D. Whiteside (1988 – 1989)

Mr. C.A.M. Franks (1990 – 1995)

Prof. D.T. Bergado (1996 – 2001)

Dr. N. Phienwej (2002 -2010)

GEOTECHNICAL ENGINEERING

PREFACE

This Special Issue of the *Geotechnical Engineering Journal of the Southeast Asian Geotechnical Society & Association of Geotechnical Societies in Southeast Asia* on the **Geotechnics for Advancing Transport Infrastructure** is the result of keen discussion among various experts, for highlighting the key geotechnical issues encompassing modern transport infrastructure. This special issue includes a dozen invited papers from around the globe, including numerical and analytical methods, design parameters, field and laboratory testing, and case studies.

The issue begins with an invited paper by Tatsuoka et al titled “Geosynthetic-Reinforced Soil Structures for Railways: Twenty Five Year Experiences in Japan.” It draws our attention to the importance of the application of Geosynthetic-reinforced soil retaining walls constructed for high-speed train lines considering for both high seismic loads and subsequent over-topping tsunami current.

The article on the “Enhancement of Rail Track Performance through Utilisation of Geosynthetic Inclusions” by Indraratna et al. proposes the use of artificial inclusions such as polymeric geosynthetics and rubber shock mats with the aim of reducing particle breakage as a cost-effective option. The relative performance of different types of geogrids, geocomposites and shock mats installed in fully instrumented field tracks has been evaluated in the towns of Bulli and Singleton in the State of New South Wales, Australia.

In their study on “Railway Track Transition Dynamics and Reinforcement Using Polyurethane GeoComposites,” Woodward et al. investigate the application of a polyurethane reinforcement technique to control the ballast migration behaviour in the transition zone to reduce dynamic effects from problems like hanging sleepers. The paper demonstrates the effectiveness of the application through numerical simulation and a case study at Tottenham Hale Junction in the United Kingdom.

In the paper “How to Overcome Geotechnical Challenges in Implementing High Speed Rail Systems in Australia,” Khabbaz and Fatahi summarise lessons learnt from other countries experienced with high speed rail. The challenges and the effective solutions associated with implementing HSR systems in Australia are explained including selection and design of proper tracks, geographical issues, environmental concerns, economics and project costs and construction procedures.

In their contributions “Maintenance Model for Railway Substructure,” by Ebrahimi et al. propose a maintenance model for railway substructure to predict the deformation of railway track and to estimate a schedule for ballast maintenance and tamping. A mechanistic-based maintenance planning software program was developed by incorporating the mechanistic empirical deformation model for railway substructure.

In their study “Dynamic Behaviour of Railway Ballasted Track Structures in Shaking Table Tests and Seismic Resistant Performance Evaluation in Japan,” Ishikawa et al. present an experimental and analytical study to explain the dynamic response of ballasted track structures subjected to horizontal seismic motions using small-scale model ballasted tracks with shaking table tests. They show that this technique could roughly assess the seismic performance of ballasted track structures for practical use.

The article “Mechanical Properties of Polyurethane-Stabilized Ballast,” by Keene et al. presents the mechanical properties of Polyurethane-Stabilized Ballast (PSB) compared to other materials commonly used in transportation infrastructure. It is found that PSB has mechanical properties similar to cement-stabilized soil (i.e., displays flexural strength), but has much greater compressive strength than ballast, which is critical for stabilization of track substructure.

“Dependency of Cyclic plastic Deformation Characteristics of Unsaturated Recycled Base Course Material on Principal Stress Axis Rotation” is an experimental study by Inam et al. who present the strength-deformation characteristics of unsaturated recycled crusher-run material, under various loading conditions and saturation degrees using multi-ring shear apparatus. The results from the multi-ring shear tests during repeated axial and shear loading tests can produce the real permanent deformation behaviour inside the base course and such results can be incorporated in practical pavement design.

The paper “Quickness Test Approach for Assessment of Flow Slide Potentials” by Thakur and Degago introduces a novel and pragmatic test procedure referred to as the quickness tests to evaluate remoulded shear strength of the sensitive clays. Based on relevant Norwegian landslides data, a quickness based criteria is proposed to assess the potential for occurrence of flow slides.

“Cement Stabilization for Pavement Material in Thailand” presented by Horpibulsuk et al. is a detailed review on the application of lightweight cemented clay and recycled pavement material, which are commonly used in Thailand. The effects of water content, cement content, air content and curing time play a major role in controlling the field strength development.

The study on “Stone Columns Field Test: Monitoring Data and Numerical Analyses” Almeida et al. presents a case study of a field test performed on a set of sixteen stone columns loaded with iron rails for one month. The numerical calculations of vertical and horizontal displacements reproduced the field measurements with satisfactory accuracy up to limit state conditions. The yield of stone columns provided by 3D analysis appears to be more realistic than that provided by 2D analysis.

“Numerical Analysis of Response of Geocell Confined Flexible Pavement,” by S. Babu and R. Babu investigates the behaviour of geocell reinforcement in the flexible pavement. The paper elaborates on the effects of secant modulus of geocell material, aspect ratio, thickness of geocell-reinforced layer, and type of subgrade material using a series of numerical analyses.

Our invitation to be Guest Editors of this Special Issue is gratefully appreciated. The 11 articles plus the technical note included in this Special Issue covers an array of issues from theory to practice in transport infrastructure development. We gratefully acknowledge the efforts of all Authors who accepted our invitation to submit high quality articles in a timely manner. All papers have been peer-reviewed according to journal guidelines to maintain high standards, and we acknowledge these efforts by all Reviewers.

It is hoped that this Special Issue on Transport Geotechnics would be of immense benefit to both researchers and practitioners alike.

**Prof Buddhima Indraratna,
A/Prof Cholachat Rujikiatkamjorn**

GEOTECHNICAL ENGINEERING

ACKNOWLEDGEMENT

We are very fortunate to begin Year 2014 with this excellent Issue on Geotechnics for Advancing Transport Infrastructure. Also no one else can be better Guest Editors than Prof. Buddhima Indraratna and A/Prof Cholat Chulachit Rujikiatkamjorn. Prof. Buddhima Indraratna is currently Professor of Civil Engineering at the Faculty of Engineering, University of Wollongong. Concurrently, Buddhima is also the Research Director, Centre for Geomechanics and Railway Engineering; Program Leader, ARC Centre of Excellence in Geotechnical Science and Engineering; and Node Coordinator, CRC for Rail Innovation. Dr Cholat Chulachit is an Associate Professor at the Centre for Geomechanics and Railway engineering, School of Civil, Mining and Environmental Engineering, University of Wollongong. In the Preface, the Guest Editors proudly say, “ This special issue includes a dozen invited papers from around the globe, including numerical and analytical methods, design parameters, field and laboratory testing, and case studies”. Indeed it is truly remarkable to have such an excellent set of papers, so eloquently presented in a systematic manner by the authors in an authoritative manner.

Appropriately the Issue begins with a novel contribution by Prof. Tatsuoka and co-authors on twenty five years of experiences in Japan on Geosynthetic reinforced soil structures for railways. The subsequent papers by Prof. Indraratna and Dr. Rujikiatkamjorn on enhancement of rail track performance through utilisation of geosynthetic inclusions; Railway Track Transition Dynamics & Reinforcement Using Polyurethane GeoComposites by P. Woodward, O. Laghrouche and A. El-Kacimi; How to Overcome Geotechnical Challenges in Implementing High Speed Rail Systems in Australia by H. Khabbaz and B. Fatahi; Maintenance Model for Railway Substructure by Ali Ebrahimi, James M. Tinjum, and Tuncer B. Edil; Dynamic Behaviour of Railway Ballasted Track Structures in Shaking Table Tests and Seismic Resistant Performance Evaluation in Japan by T. Ishikawa, S. Miura and E. Sekine; and Mechanical Properties of Polyurethane-Stabilized Ballast and Infrastructure Materials by A. Keene, J.M. Tinjum, and T.B. Edil; all of them are invaluable contributions related to railways and use of geosynthetics.

The following four papers and a Technical note as described makes this Special Issue a special volume by itself on Geotechnics for Advancing Transport Infrastructure;

Dependency of Cyclic Plastic Deformation Characteristics of Unsaturated Recycled Base Course Material on Principal Stress Axis Rotation by A. Inam, T. Ishikawa, and S.A. Miura; Quickness Test Approach for Assessment of Flow Slide Potentials by V. Thakur and S. A. Degago; Cement Stabilization for Pavement Material in Thailand by S. Horpibulsuk, A. Chinkulkijniwat, A. Suddeepong, and A. Neramitkornburee; Stone Columns Field Test: Monitoring Data and Numerical Analyses by Marcio Almeida, Bruno Lima, Mario Riccio, Holger Jud, Maria Cascão, Felipe Roza ; Numerical Analysis of Response of Geocell Confined Flexible Pavement by G. L Sivakumar Babu and Ram Babu.

Grateful thanks are due to all the contributing authors for their dedicated contributions.

A very high standard is maintained in the contributions in this Issue and the subsequent three Issues are also expected to be of great value. They will form a very useful contribution to our profession.

K. Y. Yong
N . Phienwej
T. A. Ooi
A. S. Balasubramaniam

GEOTECHNICAL ENGINEERING

MARCH 2014 SPECIAL ISSUE ON GEOTECHNICS FOR ADVANCING TRANSPORT INFRASTRUCTURE

Editors: Prof. Buddhima Indraratna & Dr. Cholachat Rujikiatkamjorn

Prof. Buddhima Indraratna

Prof. Buddhima Indraratna is currently Professor of Civil Engineering at the Faculty of Engineering, University of Wollongong. Concurrently, Buddhima is also the Research Director, Centre for Geomechanics and Railway Engineering; Program Leader, ARC Centre of Excellence in Geotechnical Science and Engineering; and Node Coordinator, CRC for Rail Innovation.

Since his PhD from the University of Alberta in 1987, his significant contributions to geotechnical and railway research have been acknowledged through numerous national and international awards, including the 2009 EH Davis Memorial lecture, regarded as one of the highest accolades within the Australian Geomechanics Society. Honoured as a Fellow of the Australian Academy of Technological Sciences and Engineering (FTSE) and as a recipient of the 2011 Engineers Australia Transport Medal and 2009 Business Higher Education Round Table (BHERT) award by Australian Commonwealth for Rail Track Innovations, his contributions to Transportation Geotechnics and Ground Improvement have been further acclaimed. He has published over 500 peer-reviewed articles (200+ Journal papers) and 5 research-based Books, and successfully supervised over 40 PhD graduates. His research income is approx. \$1.2 M/year. He is the Founding Director of the Centre for Geomechanics and Railway Engineering (GRE). In this Centre, he is mentoring over a dozen full-time staff and overseeing the progress of over 30 PhD students. GRE is one of the three research centres forming the ARC Centre of Excellence in Geotechnical Sciences and Engineering (ARC-CGSE) funded recently (with Newcastle and UWA), of which he is a Program Leader. He is also the node coordinator of the CRC for Rail Innovation at UOW in charge of several rail track innovation projects including a real track design at Singleton, near Newcastle, NSW. The National Rail Testing Facility will be soon established at the University of Wollongong under his leadership through funding by the Australian Research Council.

Dr. Cholachat Rujikiatkamjorn

Dr Cholachat is an Associate Professor at the Centre for Geomechanics and Railway engineering, School of Civil, Mining and Environmental Engineering, University of Wollongong. He received his B Eng (1st Class Honours) from the Khonkaen University, Thailand in 2000 with a Masters (M Eng) from the Asian Institute of Technology, Thailand in 2002. He obtained his PhD in Geotechnical Engineering from the University of Wollongong in 2006. He received the Australian Geomechanics Society Thesis Award in 2006. In 2009, he received an award twice from the International Association for Computer Methods and Advances in Geomechanics (IACMAG) for an outstanding paper by an early career researcher, and the 2006 Wollongong Trailblazer Award for innovations in soft soil stabilisation for transport infrastructure. Recently he received the 2012 DH Trollope award and the 2013 ISSMGE Young Member award for academic achievements and outstanding contributions to the field of geotechnical engineering. He recently secured an early Career Researcher Award through the ARC Centre of Excellence in Geotechnical Science and Engineering with a grant of \$680k for 3 years. His key areas of expertise include ground improvement for transport infrastructure and soft soil engineering. He has published over 140 articles in international journals and conferences. While maintaining a strong focus on quality teaching, to date, he has secured over \$2 Million in research funding, mostly from external sources. He is currently a CI of two ARC-DP projects, 3 ARC-LP projects and a CRC-Rail project. He is currently the supervisor/co-supervisor of 10 HDR students and 4 Research Associates.

GEOTECHNICAL ENGINEERING

March 2014: Geotechnics for Advancing Transport Infrastructure

Editors: Prof. Buddhima Indraratna & Dr. Chalachat Rujikiatkamjorn

TABLE OF CONTENTS

<u>List of Papers</u>	<u>Page</u>
Main Papers:	
Geosynthetic-Reinforced Soil Structures for Railways: Twenty Five Year Experiences in Japan.....01 by F. Tatsuoka, M. Tateyama, J. Koseki and T. Yonezawa *** Please click here to download full paper	
Enhancement of Rail Track Performance through Utilisation of Geosynthetic Inclusions17 by Buddhima Indraratna, Sanjay Nimbalkar, and Chalachat Rujikiatkamjorn *** Please click here to download full paper	
Railway Track Transition Dynamics and Reinforcement Using Polyurethane GeoComposites.....28 by P. Woodward, O. Laghrouche and A. El-Kacimi *** Please click here to download full paper	
How to Overcome Geotechnical Challenges in Implementing High Speed Rail Systems in Australia39 by H. Khabbaz and B. Fatahi *** Please click here to download full paper	
Maintenance Model for Railway Substructure48 by Ali Ebrahimi, James M. Tinjum, and Tuncer B. Edil *** Please click here to download full paper	
Dynamic Behaviour of Railway Ballasted Track Structures in Shaking Table Tests and Seismic Resistant Performance Evaluation in Japan56 by T. Ishikawa, S. Miura and E. Sekine *** Please click here to download full paper	
Mechanical Properties of Polyurethane-Stabilized Ballast.....67 by A. Keene, J.M. Tinjum, and T.B. Edil *** Please click here to download full paper	
Dependency of Cyclic Plastic Deformation Characteristics of Unsaturated Recycled Base Course Material on Principal Stress Axis Rotation.....74 by A. Inam, T. Ishikawa, and S. Miura *** Please click here to download full paper	
Quickness Test Approach for Assessment of Flow Slide Potentials85 by V. Thakur and S. A. Degago *** Please click here to download full paper	
Cement Stabilization for Pavement Material in Thailand95 by S. Horpibulsuk, A. Chinkulkijniwat, A. Suddepong, and A. Neramitkornburee *** Please click here to download full paper	
Stone Columns Field Test: Monitoring Data and Numerical Analyses103 by Marcio Almeida, Bruno Lima, Mario Riccio, Holger Jud, Maria Cascão, Felipe Roza *** Please click here to download full paper	
Technical Note:	
Numerical Analysis of Response of Geocell Confined Flexible Pavement113 by G. L. Sivakumar Babu and Ram Babu *** Please click here to download full paper	

Cover Photographs:

- High Speed Rail Track Performances (after Indraratna *et al.*, 2014)
- GRS in High Speed Rail (after Tatsuoka *et al.*, 2014)

GEOTECHNICAL ENGINEERING

PAPER CONTRIBUTIONS

SEAGS & AGSSEA encourage the submission of scholarly and practice-oriented articles to its journal. The journal is published quarterly. Before you submit an article, please review the guidelines stated herein for the manuscript preparation and submission procedures. Both sponsors of the journal, the Southeast Asian Geotechnical Society and the Association of Geotechnical Societies in Southeast Asia, promote the ideals and goals of the International Society of Soil Mechanics and Geotechnical Engineering in fostering communications, developing insights and enabling the advancement of the geotechnical engineering discipline. Thus the publishing ethics followed is similar to other leading geotechnical journals. Standard ethical behaviour of the authors, the editor and his editorial panel, the reviewers and the publishers is followed.

Geotechnical Engineering Journal accepts submissions via electronic or postal mail (by sending a CD). The manuscript file (text, tables and figures) in both words and pdf format together with the submission letter should be submitted to the Secretariat and copied to the Editor-in-Chief, Geotechnical Engineering Journal, c/o School of Engineering and Technology, Asian Institute of Technology, Room no. 211, AIT Library, Asian Institute of Technology, P.O. Box 4, Klong Luang, Pathumthani 12120, Thailand. Email: seags@ait.ac.th. Papers under review, accepted for publication or published elsewhere are not accepted. The guidelines for author are as follows:-

1. The manuscript including abstract of not more than 150 words and references must be typed in Times New Roman 9 on one side of A4 paper with a margin of 25 mm on each side. The abstract should be written clearly stating the purpose, scope of work and procedure adopted together with the major findings including a summary of the conclusions.
2. The paper title must not exceed 70 characters including spaces.
3. The maximum length of papers in the print format of the Journal is 12 two-column pages in single-spaced in Times New Roman 9 including figures and tables. A Journal page contains approximately 1,040 words. Authors can approximate manuscript length by counting the number of words on a typical manuscript page and multiplying that by the number of total pages (except for tables and figures). Add word-equivalents for figures and tables by estimating the portion of the journal page each will occupy when reduced to fit on a 160 mm x 240 mm journal page. A figure reduced to one-quarter of a page would be 260 word-equivalents. When reduced, the figure must be legible and its type size no smaller than 6 point font (after reduction).
4. Figures: Line art should be submitted in black ink or laser printed; halftones and color should be original glossy art. Figures should be submitted at final width i.e. 90 mm for one column and 185 mm for two columns. The font of the legends should be in Times New Roman and should use capital letters for the first letter of the first word only and use lower case for the rest of the words. Background screening and grids are not acceptable.
5. Each table must be typed on one side of a single sheet of paper.
6. All mathematics must be typewritten and special symbols identified. Letter symbols should be defined when they first appear.
7. The paper must an introduction and end with a set of conclusions.
8. Practical applications should be included, if appropriate.
9. If experimental data and/or relations fitted to measurements are presented, the uncertainty of the results must be stated. The uncertainty must include both systematic (bias) errors and imprecisions.
10. Authors need not be Society members. Each author's full name, Society membership grade (if applicable), present title and affiliation and complete mailing address must appear as a footnote at the bottom of the first page of the paper.
11. Journal papers submitted are subject to peer review before acceptance for publication.
12. Each author must use SI (International System) units and units acceptable in SI. Other units may be given in parentheses or in an appendix.
13. Maximum of five keywords should be given.

14. REFERENCES

- American Petroleum Institute (API) (1993). Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms – Working Stress Design, API Recommended Practice 2AWS (RP 2A-WSD), 20th edition, 1993, p191
- Earth, J.B., and Geo, W.P. (2011) "Asian Geotechnical amongst Authors of Conference Publications", Proceedings of Int. Conference on Asian Geotechnical, publisher, city, pp 133-137.
- Finn WDL and Fujita N. (2002) "Piles in liquefiable soils: seismic analysis and design issues," Soil Dynamics and Earthquake Engineering, 22, Issues 9-12, pp731-742
15. Discussions on a published paper shall be made in the same format and submitted within six months of its appearance and closing discussion will be published within twelve months.

For additional information, please write to:

***The Secretariat, SEAGS
Room 211, AIT Library
Asian Institute of Technology
P.O. Box 4, Klong Luang
Pathumthani 12120, THAILAND
Email: seags@ait.ac.th
Website: <http://www.seags.ait.ac.th>***

***Ir. Kenny Yee
Hon. Secretary General
Association of Geotechnical Societies in Southeast Asia
E-mail: kenny.yeeks@gmail.com
Website: <http://www.agssea.org>***

***IEM Training Centre Sdn. Bhd.
No. 33-1A, Jalan SS 52/18
P.O. Box 224 (Jalan Sultan)
46200 Petaling Jaya, Selangor Darul Ehsan, MALAYSIA
Tel: (60) 03 7958 6851
Fax: (60) 03 79582851
E-mail: choy.iemtc@gmail.com
Website: <http://www.iemtc.com>***