3rd International Conference on Transportation Geotechnics

4-7 September 2016
4th September – School of Engineering of University of Minho, Guimarães and Auditorium Infante Dom Henrique, Avenida Antunes Guimarães, Leça da Palmeira
5th to 7th September – Vila Flor Cultural Centre, Guimarães, Portugal
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WELCOME

The Transportation Geotechnics International Conference series began under the auspices of ISSMGE-TC3 and was initiated in 2008 at the University of Nottingham, UK, as an International event designed to address the growing requirements of infrastructure for societies. The 2nd International Conference on Transportation Geotechnics took place in 2012, at Sapporo, Japan, under the ISSMGE-TC202, renamed TC202 on Transportation Geotechnics (2009-2013). To continue the success of these conferences and the output of ISSMGE-TC202, the 3rd was scheduled for 2016, at Guimarães, Portugal. Following the previous one, the challenges addressed by this conference will include a better understanding of the interactions of geotechnics on roads, rails, airports, harbours and other ground transportation infrastructure with the goal of providing safe, economic, environmental, reliable and sustainable infrastructures.

The 3rd ICTG will start in the first day with the first meeting of Young Transportation Geotechnics Engineers and 4 workshops. The other three days will include 2 honour lectures (Proctor lecture, the first honour lecture of the TC202, and Mercer lecture), 2 keynote lectures, 10 theme lectures, 13 special lectures and 85 oral presentations distributed by 12 technical sessions. Furthermore, 2 poster sessions will allow more 50 presentations. A technical exhibition is also available during these three days promoting interaction with industry. A special attention was paid to the publication of the 182 peer review papers that are available in open access from May in ScienceDirect (http://www.sciencedirect.com/science/journal/18777058/143).

On behalf of the Organising Committee, I wish you a fruitful and enjoyable stay in the City of Guimarães, UNESCO World Heritage, and an unforgettable 3rd ICTG (September 4-7, 2016).

António Gomes Correia (University of Minho, ISSMGE-TC202)
Chairman 3rd ICTG 2016
COMMITTEES

SPG – National Advisory Committee
José Luís Machado do Vale (President of the SPG)
Nuno Guerra (Vice-President of the SPG)
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Eduardo Fortunato, SPG nominated member

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José Campos e Matos (UMinho)
Manuel Parente (UMinho)
Miguel Azenha (UMinho)

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Ana Cristina Freire (LNEC)
António Gomes Correia (UMinho)
Eduardo Fortunato (LNEC)
José Neves (IST)
Sofia Costa Aguiar (SNCF)

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Stephanie Glendinning (UK)
Tatsuya Ishikawa (Japan)
Thierry Dubreucq (France)
Vikas Thakur (Norway)
Vincenzo Pane (Italy)
Woon-Hyung Kim (Korea)
Yoshitsugu Momoya (Japan)

Mario Manassero (Italy)
Mike Winter (UK)
Noel Huybrechts, Chair of ISSMGE Technical Committee TC211 (Belgium)
Roger Frank, President of the ISSMGE 2013-2017 (France)
Samuel, L. K. Ampadu (Ghana)
Seiichi Miura, Chair of the 2nd ICTG Organising Committee (Japan)
Seo Heil Nazarian (USA)
Tuncer Edil (USA)
William Powrie (UK)
Yunnin Chen (China)
Convenors

**Theme 01:** Optimized Geomaterial (including hydraulically bound materials and asphalt mixtures): Use, Reuse and Recycling.
*Convenors: T. Edil, A. Dawson, N. Consoli*

**Theme 02:** Unsaturated Soil Mechanics in Transportation Geotechnics.
*Convenors: D. Toll, E. Alonso, C. Zapata*

**Theme 03:** Foundations and Earth Structures.
*Convenors: A. Gomes Correia, H. Brandl, R. Hofmann*

**Theme 04:** Slope Stability, Stabilisation, and Asset Management.
*Convenors: S. Glendinning, P. Hughes*

**Theme 05:** Mechanistic-empirical Design (road, railways and airfields).
*Convenors: C. Schwartz, Erol Tutumler, D. Brill, S. Costa d’Aguiar*

**Theme 06:** Rail Track Substructures, including Transition Zones.
*Convenors: W. Powrie, M. Shahin*

**Theme 07:** Subsurface Sensing for Transportation Infrastructure.
*Convenors: S. Nazarian, A. Loizos*

**Theme 08:** Macro and Nanotechnology applied to Transportation Geotechnics.
*Convenors: M. Alves, J.M. Fleureau*

**Theme 09:** Sustainability in Transportation Geotechnics.
*Convenors: M. Winter, P. Hughes*

**Theme 10:** Case Histories
*Convenors: J. Koseki, J. Liu, J. Oliveira*

Reviewers


Workshops Committee

**Workshop 1:** Geosynthetics in Transportation Geotechnics
*Coordinators: F. Tatsuoka, J. Zornberg, J. Vale, J. Neves*

**Workshop 2:** Harbour Geotechnics
*Coordinators: Y. Kikuchi, J. Cerejeira, A. Pinto*

**Workshop 3:** Non Destructive Technologies
*Coordinators: S. Nazarian, D. Jansen, S. Fontul, E. Fortunato*

**Workshop 4:** Ground Improvement and Soil Stabilisation
*Coordinators: S. Varaksin, A. A. S. Correia, M. Azenha*

1st YTGE Meeting Committee

Young Transportation Geotechnics Engineers
*Coordinators: J. Tinoco, A. Paixão, C. Ribeiro*
PRACTICAL INFORMATION

Date
3rd ICTG 2016 will take place from Sunday 4th September to Wednesday 7th September 2016.

Venue
Workshops 1, 3, 4 & YTGE: 4th September – School of Engineering of University of Minho, Campus de Azurém, Guimarães, Portugal
Workshop 2: 4th September – Auditório Infante D. Henrique, Porto de Leixões, Matosinhos, Portugal
Conference: 5th - 7th September – Vila Flor Cultural Centre, Guimarães, Portugal

Addresses:
School of Engineering of University of Minho
Campus de Azurém
4800-058 Guimarães

Vila Flor Cultural Centre
Avenida D. Afonso Henriques, 701
4810-431 Guimarães

Auditorium Infante Dom Henrique
Avenida Antunes Guimarães, Leça da Palmeira
4450-718 Matosinhos

Paço dos Duques de Bragança
Rua. Conde Dom Henrique
4810-245 Guimarães

Pousada Mosteiro de Guimarães
Largo Domingos Leite de Castro, Lugar da Costa
4810-011 Guimarães

Contacts
3rd ICTG Secretariat
University of Minho
Civil Engineering Department
School of Engineering, Institute for Sustainability and Innovation in Structural Engineering
Campus Azurém
4800-058 Guimarães – PORTUGAL

Tel.: (+ 351) 253 510 750
Mobile Phone: (+351) 933 067 912
Fax: (+351) 253 510 217
Email: 3ictrgeo2016@civil.uminho.pt
Website: http://civil.uminho.pt/3rd-ICTG2016
Registration

Registration desk will open on Sunday 4th September from 16h00 till 18h00 at the hall of the School of Engineering of University of Minho, Campus de Azurém, Guimarães. The remaining days from 5th September to 7th September will be at Foyer Main Auditorium – First Floor at Vila Flor Cultural Centre, Guimarães. On 5th September registration start at 8h30.

Onsite Registration Fees

The access to all the General Assembly activities is subject to registration. All invoices will be processed in Euro, €.

<table>
<thead>
<tr>
<th>Registration Category</th>
<th>ISSMGE/SPG/IGS member</th>
<th>Non member</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration Rate</td>
<td>€465</td>
<td>€550</td>
<td>€200</td>
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<tr>
<td>Full Registration Rate *</td>
<td>€505</td>
<td>€590</td>
<td>€240</td>
</tr>
<tr>
<td>Workshops Participation</td>
<td>€125</td>
<td>€125</td>
<td>€70</td>
</tr>
</tbody>
</table>

Conference Dinner

* Only full registration includes conference dinner. Tickets for the conference dinner in the 1st day of registration can be purchased on site for the cost of €80, each. If you would like to bring a guest with you to the dinner you will have to purchase two tickets.

What is Included in your Registration

- Welcome Reception with Wine Taste in the Paço dos Duques de Bragança (05 September 2016);
- Attendance to all Scientific Sessions;
- All lunch and tea and coffee refreshments throughout the conference;
- Delegates bag and all conference materials;
- An electronic copy of the conference proceedings.

Speakers’ Presentation

Each conference room, Grand Auditorium, Small Auditorium and Meeting Room, is equipped with a projector and a laptop. Personal laptops are not allowed.

Speakers are requested to send their presentations to the organizing committee until Thursday, 1st September.

Poster Presentation

All posters will be exhibited during the conference from 5th September (16h30) to 7th September (15h45) at the Foyer Main Auditorium – Second Floor. Authors are required to be at the plenary session of their Theme Lecture and during the Poster Session of their theme. Posters should be printed and brought by each author to the conference and fix them in the poster floor. The poster dimension are 70 cm wide x 100 cm high. We will provide materials for attaching posters.

On site support by Manuel Parent (organizing committee member).

Notes for speakers

Be ware that presentations sent to the organizing committee can not be changed before the session since this facility will not be available.

Accompanying Persons

Arrangements will be organized on site.
Internet Access

Free internet access is available in all the places of the conference venue. The credentials at University of Minho are the following:

- **WI-FI name:** eduroam
- **Username:** ictg2016@guest
- **Password:** ictg!2016

Exhibition

The Exhibition will be located in the Foyer Main Auditorium - First Floor - and will open at 11h30 on 5th September and will close at 16h30 on 7th September. The exhibitors can install their booth on Sunday, 4th September from 14h30 to 18h00.

On site support by José Campos e Matos (organizing committee member).

Getting Conference Venue

Guimarães is located approximately 350 km from Lisbon, the Portuguese capital, and about 50 km from Porto, the country’s second largest city. The Porto or Oporto (in English) International Airport (OPO) has regular flights to the main international cities by several flag companies as well as low cost ones.

- **How to reach Guimarães from Porto**
  - **By bus from Porto airport** (recommended): There is a regular coach service between Porto airport and the Guimarães coach station. The journey takes 50 min. and has no stops. Further information about the schedule and prices can be found at [http://getbus.eu](http://getbus.eu). To ensure seat availability it is advisable to buy the ticket on-line.
  - **By train from Porto airport**: Take the Metro (subway) from Porto Airport to Campanhã Railway Station: 40 minutes (direct journey, line E, check the metro map). Cost of 1.85€ for a single journey (+0.5€ for a reusable card). At Campanhã follow the signs to railway station and get the train to Guimarães (see next). Detailed information about the schedule and prices can be found at [http://www.metrodoporto.pt/](http://www.metrodoporto.pt/).
  - **By train from Porto**: There are regular train services between "São Bento" and "Campanhã" stations and Guimarães (see schedule). The journey to Guimarães takes 75 minutes, and the average cost is 3.1€ for a commuter train (+0.5€ for a reusable card). There are also intercity services by a price of nearly 13€. Pay attention to the schedule as these trains are less frequent on weekends. Detailed information about the schedule and prices can be found at [http://cp.pt/passageiros/en](http://cp.pt/passageiros/en).
  - **By car from Porto airport**: 40 minutes by Highway (you can rent-a-car at the Airport, please ask for Via Verde – Green Way so that you don’t stop for tolls).
  - **By taxi from Porto airport**: 40 minutes, cost 60€ to 80€.

- **How to reach Guimarães from Lisbon**
  - **From Lisbon airport**: Take the Metro (subway) to Oriente (cost 1.25 € for a single journey + 0.50 € for a reusable card - more info here). Otherwise take bus number 208 or 744 to "Estação Oriente". There you can take a train (see next).
  - **By train** (recommended): You can catch trains at "Oriente" station. There is one single direct train from Lisbon to Guimarães per day, but there is roughly one train per hour to Porto - Campanhã. At Porto - Campanhã you can find a connection to Guimarães (see above). Pay attention to the schedule as these trains are less frequent on weekends. The total journey time is around four hours, and the minimum price of the ticket (which includes a reservation of seat - limited places) is around 25.00€. Detailed information about the schedule and prices can be found at [http://cp.pt/passageiros/en](http://cp.pt/passageiros/en).
  - **By car from Lisbon airport**: About 4 hours by Highway, you can rent-a-car at the Airport, please ask for Via Verde – Green Way so that you don’t stop for tolls.
Accommodation

A List of Hotels were booked with the special rates for the 3rd ICTG (See map below). Hotel reservation can still be requested to Viagens Abreu and on site registration. For other informations please contact:

VIAGENS ABREU SA
Mr. Nuno Pinto
Abreu PCO - Oporto Office
Av. dos Aliados, 207 4000-067 Porto Portugal
Tel.: +351 22 204 3570
E-Mail: nuno.pinto@abreu.pt
GENERAL INFORMATION

Emergency, Police, Fire Brigade and Ambulance
In case of emergency while you are in Guimarães or Porto, always dial 112. It is a free call which will connect you to National Emergency Service (SOS) in case of accident. A technician will forward your call to the service that can best serve, either the police, fire brigade or hospital. Speak slowly and distinctly, and state your telephone.

Bank, Currency, Exchange Rate, Credit Cards and Debit Card
Banks are open to the public between 8:30 am and 3:00 pm, Monday to Friday. The currency in Portugal is the Euro.
Exchange Rates: For your orientation only, visit e.g.: [http://www.oanda.com/currency/converter/](http://www.oanda.com/currency/converter/).
Visa and MasterCard credit cards are widely accepted. Other cards are also accepted, but there could be exceptions.
Debit cards associated with Maestro and Visa Electron multi-national debit card services are widely accepted.

Tourist information
English:  [https://www.tripadvisor.com/Tourism-g189174-Guimaraes_Braga_District_Northern_Portugal-Vacations.html](https://www.tripadvisor.com/Tourism-g189174-Guimaraes_Braga_District_Northern_Portugal-Vacations.html)

Climate
Mainland Portugal is defined as having a Mediterranean climate, while also being one of the warmest countries in Europe. In early September, the weather in Guimarães should be relatively hot and dry. The average daily temperature varies between 15ºC and 25ºC. Rainfall is highly unlikely during this particular period.

Electricity, Power Supply
220 volts AC, 50Hz. Continental two-pin plugs CEE7/4 Schuko are in use. Depending on your country, you may need an adapter.

Smoking
Smoking – cigarettes, cigars and pipes – is banned in indoor public places in Portugal (as of 1 January 2008). The ban prohibits smoking in all government buildings as well as work places, public transport, schools and sports facilities, hospitals, museums, food and beverage establishments, covered car parks, theatres, libraries, and bars and restaurants where smoking is only allowed in designated smoking areas or venues.

VAT
There are different rates of VAT (Value Added Tax, in Portugal: Imposto sobre o Valor Acrescentado – IVA) due for different goods and services. These rates are: IVA geral (general VAT): 23%; IVA intermedio (intermediate VAT): 13%; IVA reduzido (reduced VAT): 6%. Prices in shops and restaurants are inclusive IVA (VAT).

Units of Measurement
Metric (kg, g, l, m, km, ...)

Liability
The Organising Committees and/or Conference Organisers shall not be held liable for personal accidents or losses or damage to private property of registered delegates of the Conference. Delegates should make their own arrangements in respect of personal insurance.
HONOUR LECTURES

1st Proctor Lecture of ISSMGE: Railroad Performance with Special Reference to Ballast and Substructure Characteristics
Buddhima Indraratna
Centre for Geomechanics and Railway Engineering, School of Civil, Mining and Environmental Engineering, University of Wollongong, Wollongong City, Australia

Mercer Lecture: Stabilization of Pavements using Geosynthetics
Jorge Zornberg
Civil, Architectural and Environmental Engineering Department-GEO, The University of Texas at Austin, USA

KEYNOTE LECTURES

Rutting Prediction in Airport Pavement Granular Base/Subbase: A Stress History Based Approach
Erol Tutumluer
Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, USA

Advances in Ground Modification with Chemical Additives: From Theory to Practice
Anand Puppala
University of Texas (UTA) at Arlington, USA

THEME LECTURES

Optimized Geomaterial: Use, Reuse and Recycling
Tuncer Edil
University of Wisconsin-Madison, USA

Unsaturated Soil Mechanics in Transportation Geotechnics
David Toll
School of Engineering and Computing Sciences, Durham University, U.K.

Foundations and Earth Structures
A. Gomes Correia
ISISE, School of Engineering, University of Minho, Portugal
Slope Stability, Stabilisation, and Asset Management

S. Glendinning
Newcastle University, U.K.

Mechanistic-empirical Design (road, railways and airfields)

E. Tutumluer¹ and C. Schwartz²
¹Department of Civil and Environmental Engineering, University of Illinois at Urbana Champaign, USA
²Civil and Environmental Engineering, University of Maryland-College Park, USA

Rail Track Substructures, including Transition Zones

William Powrie
Faculty of Engineering & the Environment, University of Southampton, U.K.

Subsurface Sensing for Transportation Infrastructure

Andreas Loizos
NTUA Laboratory of Pavement Engineering, Greece

Macro and Nanotechnology applied to Transportation Geotechnics

Teresa Tavares
Centre of Biological Engineering, University of Minho, Portugal

Sustainability in Transportation Geotechnics

Mike Winter
Transport Research Laboratory (TRL), U.K.
University of Portsmouth, U.K.

Case Histories

J. Liu
School of Civil Engineering, Beijing Jiaotong University, China

SPECIAL LECTURES

Small Strain Behaviour of a Compacted Subgrade Soil

Ana Heitor
Lecturer, Centre for Geomechanics and Railway Engineering, Faculty of Engineering, Univ. of Wollongong, Australia

Effects of Principal Stress Axis Rotation on Unsaturated Rail Track Foundation Deterioration

Chaminda Gallage
Queensland University of Technology (QUT), Australia
Importance of Controlling the Degree of Saturation in Soil Compaction
Fumio Tatsuoka
Tokyo University of Science, Japan

Long-term Settlements/Creeping of (highway) Embankments on Very Soft Soil
Heinz Brandl
Vienna University of Technology, Institute for Soil Mechanics and Geotechnical Engineering, Austria

Development of an Evidence-based Geotechnical Asset Management Policy for Network Rail, Great Britain
Christopher Power
Mott MacDonald, U.K.

The Implications of Using Estimated Solar Radiation on the Derivation of Potential Evapotranspiration and Soil Moisture Deficit within an Embankment
Stephanie Glendinning
Newcastle University, U.K.

Soils and Aggregates: The Foundations of Pavement Performance
Charles W. Schwartz
Department of Civil and Environmental Engineering, University of Maryland, USA

Applying Modern Soil Mechanics Principles to the Design of Ballasted Railway Track
William Powrie
Faculty of Engineering and the Environment, University of Southampton, U.K.

Proving MEMS Technologies for Smarter Railway Infrastructure
David Milne
Faculty of Engineering and the Environment, University of Southampton, U.K.

Influences of Subgrade Form and Ground Stiffness on Dynamic Responses of Railway Subgrade under Train Loading: Field Testing Case Study
Yao Shan
Department of Urban Rail Transit and Railway Engineering, Tongji University, China
Key Laboratory of Road and Traffic Engineering of the Ministry of Education, Tongji University, China

Role of Sonic and Seismic Methods for Construction and Monitoring of Transportation Infrastructure
Soheil Nazarian
The University of Texas at El Paso, USA
Added Value of Transportation Geotechnics to the Sustainability (Design Approach)

Ivan Vanicek
The Czech Technical University in Prague, Czech Republic

The Economic Impact of Landslides and Floods on the Road Network

Mike Winter
Transport Research Laboratory (TRL), U.K.
University of Portsmouth, U.K.
PROGRAMME

Sunday, 4th September

Workshop 1 – Geosynthetics in Transportation Geotechnics

Coordinators: F. Tatsuoka, J. Zornberg, J. Vale, J. Neves

Venue: School of Engineering of University of Minho, Guimarães – Auditorium EE0.07

Opening Session

9h00 – 9h15

Keynote Lecture

9h15 – 09h55

Research and Construction of Geosynthetic-reinforced Soil Integral Bridges

Fumio Tatsuoka¹, Masaru Tateyama², Masayuki Koda³, Kenichi Kojima⁴, Toyoji Yonezawa⁵, Yoshinori Shindo⁶ and Shin-ichi Tamai⁷

¹Tokyo University of Science, Japan
² & ³Railway Technical Research Institute, Japan
⁴East Japan Railway Company, Japan
⁵, ⁶ & ⁷Japan Railway Construction, Transport and Technology Agency, Japan
Presentations
9h55 – 11h00

The First GRS Integral Bridge with FHR Facing in Europe – Experiences from Design and Construction
Stanislav Lenart
Slovenian National Building and Civil Engineering Institute (ZAG), Ljubljana, Slovenia

Modelling Geogrid-reinforced Railway Ballast using the Discrete Element Method
Ngoc Trung Ngo, Buddhima Indraratna and Cholachat Rujikiatkamjorn
University of Wollongong, New South Wales, Australia

Coffee Break
11h00 – 11h30

School of Engineering – Hall at the entrance of Auditorium

Presentations
11h30 – 12h45

Performance Improvement of Rail Track Structure using Artificial Inclusions - Experimental and Field Studies
Sinniah K. Navaratnarajah¹, Buddhima Indraratna¹ and Tim Neville²
¹University of Wollongong, Australia
²Australian Rail Track Corporation Ltd., Australia

Basal Reinforced Piled Embankments
Suzanne J.M. van Eekelen
Deltares, Netherlands

Lunch
12h45 – 14h15

Restaurant Florêncio
Geosynthetics with Enhanced Lateral Drainage Capabilities in Roadway Systems

Jorge G. Zornberg¹, Marcelo Azevedo¹, Mark Sikkema² and Brett Odgers²

¹University of Texas at Austin, USA
²TenCate Geosynthetics

Effect of Geogrid on Railroad Ballast Particle Movement

Hai Huang¹, Shushu Liu², Tong Qiu² and Jayhyun Kwon³

¹The Pennsylvania State University, Division of Business and Engineering, USA
²The Pennsylvania State University, Civil and Environmental Engineering, USA
³Tensar International Corporation, USA

Geosynthetic Subgrade Stabilization - Field Testing and Design Method Calibration

Eli Cuelho¹ and Steven Perkins²

¹Western Transportation Institute, Montana State University, USA
²Civil Engineering Department, Montana State University, USA

Coffee Break

16h00 – 16h30

School of Engineering – Hall at the entrance of Auditorium
Contact Pressure Distribution on Weak Subgrades due to Repeated Traffic on Geocell Reinforced Base Layers
Sireesh Saride¹, Vijay Kumar Rayabharapu² and Jorge G Zornberg²
¹Indian Institute of Technology Hyderabad, India
²University of Texas at Austin, USA

The Use of Geosynthetics in Water Conveyance Structures - The Panama Canal Expansion Project, Third Set of Locks Water Saving Basins
José Luís Machado do Vale
President of IGS, Portugal
Carpi Tech, Switzerland

The Use of Geosynthetics in the Construction and Rehabilitation of Transportation Infrastructures in Portugal
José Neves¹, Helena Lima² and Fernanda Rodrigues²
¹Instituto Superior Técnico, Universidade de Lisboa, Portugal
²Infraestruturas de Portugal, Portugal

Closure Session
17h45 – 18h00

Sponsors

Special acknowledgement to Tensar for providing the lanyards.
Workshop 2 – Harbour Geotechnics

Coordinators: Y. Kikuchi, J. Cerejeira, A. Pinto

Venue: Auditorium Infante D. Henrique, Porto de Leixões, Leça da Palmeira

Welcome Reception
8h30 – 9h00

Opening Session
9h00 – 9h15

Keynote Lecture
9h15 – 10h15

Sea Port Soft Clays Problems
Yoshiaki Kikuchi
Tokyo University of Science, Japan

Coffee Break
10h15 – 10h45

Auditorium Infante D. Henrique

Presentations
10h45 – 12h45

Offshore Vibro Replacement for Large Depths and Challenging Soil Conditions. Recent Cases from Europe and South America
Goran Vukotic
Keller, Portugal
Offshore Stone Columns to Improve Alluvial Soils for Caissons Quay Wall and Land Fill Foundations
Pedro Costa
Somague, Portugal

Ground Improvement at the Containers Terminal of La Guaira Harbour
Vasco Madeira
Teixeira Duarte, Portugal

Special Foundations Solutions at the Soyo Pier
Francisco Caimoto
Teixeira Duarte, Portugal

Lunch
12h45 – 14h00
Auditorium Infante D. Henrique

Keynote Lecture
14h00 – 14h45

On the Conception, Design and Contracting of Important Port Infrastructures. Some Examples
José Cerejeira
Proman, Portugal

Presentations
14h45 – 15h45

Sea Waves and Seabed Interaction. Partial Fluidification of Breakwaters Foundations
Alexandre Santos Ferreira
DGRM, Portugal

Coastal Geoscience Mapping for Harbour Geotechnics: Implications in Maritime Environments
Ana Pires
ISEP, Portugal
Coffee Break
15h45 – 16h15
Auditorium Infante D. Henrique

Presentations
16h15 – 17h45

Seismic Resistance of Port Facilities in Japan
Elji Kohama
Japan Port and Airport Research Institute, Japan
Punta Langosteira Harbour
Fernando Noya Arquero
Puerto de A Coruña, Espanha
Stability of Submerged Clay Masses. A case study in a Port
António Campos e Matos
GEG, Portugal

Closure Session
17h45 – 18h15

Blue Boat Trip at Douro River
18h30 – 20h00

Dinner
20h00 – 22h00
Leixões Cruise Terminal Building
Sponsors
Workshop 3 – Non Destructive Technologies

Coordinators: S. Nazarian, D. Jansen, S. Fontul, E. Fortunato

Venue: School of Engineering of University of Minho, Guimarães – Auditorium EE0.16

Opening Session
9h00 – 9h15

Keynote Lecture
9h15 – 10h15

Intelligent Compaction for Foundation Layers
David White & Cesare Sangiorgi
Ingio & University of Bologna, Italy

Presentations
10h15 – 11h00

Intelligent Compaction for Hot Mix Asphalt
George K. Chang
Transtec Group, USA

Coffee Break
11h00 – 11h30

School of Engineering – Hall at the entrance of Auditorium
Presentations
11h30 – 12h30

Evaluation of Pavement Layers with Seismic Methods
Soheil Nazarian
UTEP, USA

Evaluation of Pavement Layers with Ultrasonic Methods
Guido Kneib
MüllerBBM, Switzerland

Lunch
12h30 – 14h00
Restaurant Florêncio

Presentations
14h00 – 14h30

Non-Destructive Testing of Railways and Pipelines using Ultra-Sonic Methods
José Pedro Sousa
ISQ, Portugal

Keynote Lecture
14h30 – 15h30

Evaluation of Pavement Systems with GPR
Francisco Romero & Senén Sandoval Castaño
US (affiliated with Roadscanner) & Geofísica Consultores, Spain
Presentations
15h30 – 16h00

NDT for Structural Evaluation of Railway Track
Eduardo Fortunato & Simona Fontul
LNEC, Portugal

Coffee Break
16h00 – 16h15

School of Engineering – Hall at the entrance of Auditorium

Presentation
16h15 – 17h45

Evaluation of Pavement Layers with High Speed Deflection Devices
Gonçalo Rada¹, Markus Oeser² & Dirk Jansen³
¹ AMEC Foster Wheeler, U.K.
² University of Aachen (RWTH), Germany
³ BASt, Germany

Closure Session
17h45 – 18h00

Sponsors
Workshop 4 – Ground Improvement and Soil Stabilisation

Coordinators: S. Varaksin, A. A. S. Correia, M. Azenha

Venue: School of Engineering of University of Minho, Guimarães – Auditorium EE0.22

Opening Session

9h00 – 9h15

Keynote Lecture

9h15 – 10h00

Controlled Modulus Columns (CMC) Ground Improvement under the Future Embankment of the New Turcot Interchange

Jérôme Racinais, Adrien Viateau & Hubert Guimont
Menard, France & Geopac, Canada

Presentations

10h00 – 11h00

Basal Reinforced Piled Embankments: how to design, how to decide?
Arjan Venmans & Suzanne J.M. Van Eekelen
Deltares, Netherlands

Behaviour of a Compacted Subgrade Soil and the Influence of Planar Reinforcement in Track Substructure
Ana Heitor, Buddhima Indraratna & Cholachat Rujikiatkamjorn
Australia
Coffee Break
11h00 – 11h30
School of Engineering – Hall at the entrance of Auditorium

Presentations
11h30 – 12h30

Dynamics Rollers in Earthworks: Compaction and Continuous Compaction Control
Johannes Pistrol & Dietmar Adam
Austria

Characterisation and Modelling of Non-isothermal Soil Behaviour and Implications to Ground Improvement
David Taborda, Klementyna A. Gawecka, Wenjie Cui, David M. Potts, Lidija Zdravkovic & Aikaterini Tsiampousi
England

Discussion
12h30 – 12h45

Lunch
12h45 – 14h00
Restaurant Florêncio

Keynote Lecture
14h10 – 14h55

Performance of Test Embankment under Vacuum Consolidation
Márcio Almeida & Esther Marques
Brazil
Presentations
14h55 – 16h00

Alkali Activated Binders in Soil Stabilisation Applications
Tiago Miranda, Nuno Cristelo & Sara Rios
Portugal

Ground Improvement Solutions for Harbours
António Cristóvão, Alexandre Pinto & Rui Tomásio
JETsj, Portugal

Coffee Break
16h00 – 16h30

School of Engineering – Hall at the entrance of Auditorium

Presentations
16h30 – 17h30

The Advantages of the Use of Advanced Quality Control Methods during PVD Installation and Heavy Rapid Impact Compaction in Transportation Geotechnics
Jeröen Dykstra
Cofra, Netherlands

Rigid Inclusions a Ground Reinforcement Solution Rather than a Ground Improvement Solution
Baldomiro Xavier
Teixeira Duarte, Portugal

Discussion
17h30 – 17h50
Closure Session
17h50 – 18h00

Sponsor
1st YTGE Meeting
Coordinators: J. Tinoco, A. Paixão, C. Ribeiro

Venue: School of Science of University of Minho, Guimarães – Auditorium EC1.01

Opening Session
9h00 – 9h15

Joaquim Tinoco, Chair of the 1st YTGE Meeting
Roger Frank, President of ISSMGE
António Gomes Correia, Chair of the 3rd ICTG 2016

Inaugural Lecture
9h15 – 10h15

António Gomes Correia, Portugal – Chair

The Future of Geotechnical Engineering - Some Thoughts
Roger Frank
President of ISSMGE

Invited Lecture
10h15 – 11h00

António Gomes Correia, Portugal – Chair

Journal Publishing and the Basket of Metrics
Chris Greenwell
Elsevier Publishing Director for Engineering
Coffee Break
11h00 – 11h30
School of Engineering – Hall at the entrance of Auditorium

Presentations
11h30 – 12h45

Cristina Alves Ribeiro, Portugal – Chair
David Milne, England) & Takahisa Nakamura, Japan – Moderators

A Model Incorporating Large Strain and Nonlinear Soil Properties for PVD-assisted Consolidation
R. Zhong, B. Indraratna & C. Rujikiatkamjorn
University of Wollongong, Australia

Evaluation of Granular Material Degradation in Repeated Load Triaxial Test
C. Lima, C. Silva & L. Motta
Federal University of Rio de Janeiro, Brazil

Intelligent Earthworks Optimization System
M. Parente, A. Gomes Correia & P. Cortez
ISISE, School of Engineering, University of Minho, Portugal

Optimum Design of Unpaved Roads Reinforced with Geotextiles: Comparison of Internationally Published Methodologies
S. Karavasili¹, S. Tastani² & I. Markou²
¹Thrace Nonwovens and Geosynthetics, Greece
²Democritus University of Thrace, Greece

Soil-Transition Slab Interaction in Jointless Bridges
C. Fartaria¹, A. Pinto¹/² & D. Gama³
¹JETsj, Geotechnical Engineering, Portugal
²Instituto Superior Técnico, University of Lisbon, Portugal
³JSJ, Structural Engineering, Portugal

Lunch
12h45 – 14h00
Restaurant Florêncio
Presentations
14h00 – 16h00

André Paixão, Portugal – Chair
Johannes Pistrol, Austria) & Fabian Szymkiewicz France – Moderators

Testing Soil Compaction – High-speed Measurements of scaled Falling Weights
H. Pankrath, R. Atencio, A. Knut & R. Thiele
Leipzig University of Applied Sciences, G² Group Geotechnics, Germany

Effect of the Soil's Suction History on the Small Strain Behavior
A. Heitor, B. Indraratna & C. Rujikiatkamjorn
Centre for Geomechanics and Railway Engineering, Faculty of Engineering, University of Wollongong, Australia

Landslide Susceptibility of Geotechnical Assets on Transportation Networks: Irish Rail Case Study
K. Martinović1/2, K. Gavin1/3 & C. Reale2
1Gavin and Doherty Geosolutions (GDG), Republic of Ireland
2School of Civil Engineering, University College, Republic of Ireland
3Faculty of Civil Engineering and Geosciences, Netherlands

Modeling of Lateral Sleeper-Ballast Interaction on Rail Track
J. Barreto & J. Varandas
Universidade Nova de Lisboa-Faculdade de Ciências e Tecnologias, Portugal

Monitoring Track Defects on a Ballasted High Speed Railway
D. Milne
Faculty of Engineering and the Environment, University of Southampton, United Kingdom

Trend of Research for Transportation Geotechnics in Japan (TC202 Japanese Domestic Committee Activity)
T. Nakamura
Railway Technical Research Institute, Japan

Use of Data Mining Tools for Cut Soil Slope Condition State Identification
J. Tinoco1/2, A. Gomes Correia1, P. Cortez2 & D. Toll3
1ISISE, School of Engineering, University of Minho, Portugal
2ALGORITMI Research Centre/Department of Information Systems, University of Minho, Portugal
3School of Engineering and Computing Science, University of Durham, UK
Coffee Break
16h00 – 16h30
School of Engineering – Hall at the entrance of Auditorium

Presentations
16h30 – 17h30

André Paixão, Portugal – Chair
Ana Heitor (Australia) & Antti Kalliainen (Finland) – Moderators

Understanding Critical Velocity Effects on High Speed Railways
A. Duley, W. Powrie, D. Thompson & L. Pen
University of Southampton, UK

Assessment of the short and long term behaviour of the track at a railway transition zone
C. Ribeiro & R. Calçada
University of Porto, Portugal

Dynamic Nonlinear Finite Element Simulation of Light Falling Weight Deflectometer (LWD) Tests on Unsaturated Pavement Foundation Layers
Zhen Zhang & Liuxin Chen
Central South University, China

The use of Seismic Wave Velocities in the Evaluation of Stiffness, Damping and Anisotropy of Geomaterials in Routine Laboratory and Field Tests
C. Pereira¹, A. Gomes Correia¹, S. Nazarian² & C. Ferreira³
¹ISISE, School of Engineering, University of Minho, Portugal
²The University of Texas at El Paso, USA
³CEC, Department of Civil Engineering, University of Porto, Portugal
Closure Session
17h30 – 18h00

Joaquim Tinoco, Chair of the 1st YTGE Meeting
Adré Paixão, Co-chair of the 1st YTGE Meeting
Criatina Alve Ribeiro, Co-chair of the 1st YTGE Meeting
António Gomes correia, Chair of the 3rd ICTG 2016
Roger Frank, President of ISSMGE
Chairman next YTGE meeting

Sponsor
Monday, 5th September

Registration
8h30 – 9h20
Foyer Main Auditorium – First Floor

Opening Ceremony
9h20 – 10h00
Grand Auditorium

António M. Cunha - Rector of the University of Minho
Roger Frank – President of International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE)
G. P. Jayaprakash – Representative of the Transportation Research Board (TRB)
Erol Tutumluer – Chair of ISSMGE Technical Committee TC202
Domingos Bragança – President of the Guimarães Municipality
Manuel Matos Fernandes – President of the Portuguese Geotechnical Society
José Luís Machado Vale – Past President of the Portuguese Geotechnical Society
Guilherme A. B. Pereira – Vice-Dean of School of Engineering of University of Minho
António Gomes Correia – President of the 3rd International Conference on Transportation Geotechnics

1st Proctor Lecture
10h00 – 11h00
Grand Auditorium

Roger Frank, President of ISSMGE, Chair
A. Gomes Correia, School of Engineering of University of Minho – Introduction of the 1st Proctor Lecturer
Erol Tutumluer, University of Illinois at Urbana Champaign, USA – Vote of Thanks
1st Proctor Lecture of ISSMGE: Railroad Performance with Special Reference to Ballast and Substructure Characteristics
Buddhima Indraratna
Centre for Geomechanics and Railway Engineering, School of Civil, Mining and Environmental Engineering, University of Wollongong, Australia

Coffee Break
11h00 – 11h30
Foyer Main Auditorium (1st and 2nd Floor)

Opening of ICTG2016 Exhibition
11h30 – 12h00
Foyer Main Auditorium – 1st Floor

Roger Frank – President of International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE)
Erol Tutumluer – Chair of ISSMGE Technical Committee TC202
Manuel Matos Fernandes – President of the Portuguese Geotechnical Society
António Gomes Correia – President of the 3rd International Conference on Transportation Geotechnics
José Campos e Matos – Organizing Committee, School of Engineering, University of Minho

Theme Lectures
12h00 – 13h00
Grand Auditorium

Anand Puppala, University of Texas (UTA) at Arlington, USA - Chair

Optimized Geomaterial: Use, Reuse and Recycling
Tuncer Edil
University of Wisconsin-Madison, USA

Unsaturated Soil Mechanics in Transportation Geotechnics
David Toll
School of Engineering and Computing Sciences, Durham University, U.K.
Sustainability in Transportation Geotechnics

Mike Winter
Transport Research Laboratory (TRL), U.K.
University of Portsmouth, Portsmouth, U.K.

Lunch
13h00 – 14h30
Café Concerto & Vila Flor Restaurant

Theme Lecture
14h30 – 15h00
Grand Auditorium

Anand Puppala, University of Texas (UTA) at Arlington, USA - Chair

Macro and Nanotechnology applied to Transportation Geotechnics

Teresa Tavares
Centre of Biological Engineering, University of Minho, Portugal

Special Lectures
15h00 – 16h00
Grand Auditorium

David Toll, School of Engineering and Computing Sciences, Durham University, U.K. - Chair

Small Strain Behaviour of a Compacted Subgrade Soil

Ana Heitor
Lecturer, Centre for Geomechanics and Railway Engineering, Faculty of Engineering, University of Wollongong, Australia

Effects of Principal Stress Axis Rotation on Unsaturated Rail Track Foundation Deterioration

Chaminda Gallage
Queensland University of Technology (QUT), Australia

Added Value of Transportation Geotechnics to the Sustainability (Design Approach)

Ivan Vanicek
The Czech Technical University in Prague, Czech Republic
The Economic Impact of Landslides and Floods on the Road Network

Mike Winter
Transport Research Laboratory (TRL), U.K.
University of Portsmouth, U.K.

Coffee Break
16h00 – 16h30
Foyer Main Auditorium (1st and 2nd Floor)

Session T1: Optimized Geomaterial (including hydraulically bound materials and asphalt mixtures): Use, Reuse and Recycling
16h30 – 18h00
Grand Auditorium

Tuncer Edil, University of Wisconsin-Madison, USA – Chair
José Neves, IST, Universidade de Lisboa, Portugal

Organic-Mineral Aggregate for Sandy Subsoil Strengthening
Julia Gayda, Arkady Ayzenshtadt, Alexander Tutygin, Maria Frolova
Northern (Artic) Federal University named after M.V. Lomonosov (NArFU)

Effect of Grain Shape and Size on the Mechanical Behavior of Reinforced Sand
Ioannis Markou
Democritus University of Thrace, Greece

Damage Induced by Recycled Aggregates on the Short-Term Tensile Behaviour of a High-Strength Geotextile
Castorina Silva Vieira and Maria de Lurdes Lopes
University of Porto, CONSTRUCT-Geo, Civil Engineering Department, Portugal

Main Results of the Questionnaire for Portuguese Entities Potential Users of Construction and Demolition Recycled Materials (C&DRM)
Ana Cristina Freire¹, Isabel M. Martins¹, Cláudia Ferreira², Jorge Gonçalves³, António José Roque¹ and Isabel Pinto⁴

¹ National Laboratory of Civil Engineering, PORTUGAL
² OUZO, Engineering, PORTUGAL
³ LYNX, Engineering and Consulting, PORTUGAL
⁴ CEMUC, Department of Civil Engineering, University of Coimbra, PORTUGAL
Assessment of Environmental Hazardous of Construction and Demolition Recycled Materials (C&DRM) from Laboratory and Field Leaching Tests Application in Road Pavement Layers

A. J. Roque¹, I. M. Martins¹, A. C. Freire³, J. M. Neves², M. L. Antunes¹

¹ Laboratório Nacional de Engenharia Civil, PORTUGAL
² Instituto Superior Técnico-CESUR, University of Lisboa, PORTUGAL

Influence of Water Content in the UCS of Soil-Cement Mixtures for Different Cement Dosages

Daniel Ribeiro¹, Raquel Néri², and Rafaela Cardoso¹

¹CEris, ICIST, IST, Instituto Superior Técnico – Universidade de Lisboa, Portugal
²Instituto Superior Técnico – Universidade de Lisboa, Portugal

Long Term Cyclic Response of a Soil-Cement Mixture: Experimental Study and Modelling

Fabrizio Panico and António Viana da Fonseca

CONSTRUCT-GEO, Faculty of Engineering (FEUP), University of Porto, Portugal

Damage Behavior of Cement-Treated Base Material

Korakod Nusit¹ and Peerapong Jitsangiam¹²

¹Curtin University, Australia
²Chiang Mai University, Thailand

Session T2: Unsaturated Soil Mechanics in Transportation Geotechnics

16h30 – 18h00
Small Auditorium

David Toll, School of Engineering and Computing Sciences, Durham University, U.K. – Chair
Bernardo Caicedo, Universidad de los Andes, Colombia

Characterisation of Permanent Deformation of Silty Sand Subgrades from Multistage RLT Tests

Farhad Salour¹ and Sigurdur Erlingsson²,³

¹ Swedish Transport Administration, Trafikverket, Sweden
² Swedish National Road and Transport Research Institute, VTI, Sweden
³ Faculty of Civil and Environmental Engineering, University of Iceland, Iceland

Investigating Resilient Modulus Interdependence to Moisture for Reclaimed Asphalt Pavement Aggregates

Brad Cliatt¹, Christina Plati² and Andreas Loizos³

¹ National Technical University of Athens (NTUA) - Laboratory of Pavement Engineering, Greece
² NTUA Laboratory of Pavement Engineering, Greece
³ NTUA Department of Transportation Planning and Engineering, Greece
Effect of Compactness Degree on the Hydraulic Properties for Coarse Soils of High-Speed Railway Embankment
Renpeng Chen1,2, Shuai Qi1, Wei Cheng1, and Hanlin Wang1
1 Zhejiang University, China
2 Hunan University, China

Explanation of Dry Density Distribution Induced by Compaction through Soil/Water/Air Coupled Simulation
Katsuyuki Kawai1, Viradeth Phommachanh2, Takuya Kawakatsu3, and Atsushi Iizuka3
1 Dept. of Civil and Environmental Engineering, Kinki University, Japan
2 Oyo Corporation, Japan
3 Research Center for Safety and Security, Kobe University, Japan

Influence of Water Content on Shear Behavior of Unsaturated Fouled Ballast
Tatsuya Ishikawa1, Shinji Fuku1, Takahisa Nakamura2, Yoshitsugu Momoya2, and Tetsuya Tokoro3
1 Hokkaido University, Japan
2 Railway Technical Research Institute, Japan
3 Tomakomai National College of Technology, Japan
3 NTUA Department of Transportation Planning and Engineering, Greece

Soil Water Retention Behaviour of a Sandy Clay Fill Material
D.G. Toll1, J.D. Asquith1, P.N. Hughes1 and P. Osinski2
1 School of Engineering and Computing Sciences, Durham University, U.K.
2 Department of Geotechnical Engineering, Warsaw University of Life Sciences, Poland

Impact of Compaction Methods on Resilient Response of Unsaturated Granular Pavement Material
Ehsan Yaghoubi1, Mahdi M Disfani2, Arul Arulrajah3 and Jayantha Kodikara4
1&3 Swinburne University of Technology, Australia
2 The University of Melbourne, Australia
4 Monash University, Australia

Session T9: Sustainability in Transportation Geotechnics
16h30 – 18h00
Meeting Room

Mike Winter, University of Portsmouth, U.K. – Chair
Luís Lamas, LNEC, Portugal
Remediation of Expansive Soils Using Agricultural Waste Bagasse Ash

Hayder Hasan¹, Liet Dang¹, Hadi Khabbaz¹, Behzad Fatahi¹, and Sergei Terzaghi²

¹ University of Technology Sydney (UTS), Australia
² ARUP, Australasia Geotechnics, Australia

The Impact of the Type and Technical Condition of Road Surface on the Level of Traffic-Generated Vibrations Propagated to the Environment

Krzysztof Robert Czech

Bialystok University of Technology, Poland

On the Exploitation of Ground Heat Using Transportation Infrastructure

Peter Bourne-Webb¹ and Rui da Costa Gonçalves²

¹ CERIS, Instituto Superior Técnico, Universidade de Lisboa, Portugal
² RODBAU S.A., Instituto Superior Técnico, Portugal

Numerical Study of High Speed Railway Subgrade Settlement Induced by Underwater Lowering

Renpeng Chen¹,², Wei Cheng¹, Ruiyu Jia¹, Shuai Qi¹, Hanlin Wang¹

¹ Zhejiang University, China
² Hunan University, China

An Analytical Model of PVD-assisted Soft Ground Consolidation

Buddhima Indraratna, Ruí Zhong, and Cholachat Rujikiatkamjorn

Centre for Geomechanics and Railway Engineering, School of Civil, Mining and Environmental Engineering, University of Wollongong, Australia

Colombian Soil Stabilized with Geopolymers for Low Cost Roads

Sara Rios¹, Catarina Ramos¹, António Viana da Fonseca¹, Nuno Cruz² and Carlos Rodrigues³

¹ CONSTRUCT-GEO, Faculty of Engineering (FEUP), Portugal
² Mota-Engil – Engenharia e Construção, S.A., Portugal
³ Instituto Politécnico da Guarda, Portugal

Welcome Reception (Wine Tasting)

18h30 – 20h00

Paço dos Duques de Bragança, Guimarães

Courtesy of the Municipality of Guimarães
3rd ICTG 2016

Tuesday, 6th September

Keynote Lecture
09h00 – 09h45
Grand Auditorium

Charles W. Schwartz, University of Maryland, USA – Chair

Rutting Prediction in Airport Pavement Granular Base/Subbase: A Stress History Based Approach
Erol Tutumluer
Department of Civil and Environmental Engineering, University of Illinois at Urbana, Champaign, USA

Theme Lectures
09h45 – 11h00
Grand Auditorium

Mohamed A. Shahin, Curtin University, Australia – Chair

Foundations and Earth Structures
A. Gomes Correia
ISISE, School of Engineering, University of Minho, Portugal

Rail Track Substructures, including Transition Zones
William Powrie
Faculty of Engineering & the Environment, University of Southampton, U.K.

Subsurface Sensing for Transportation Infrastructure
Andreas Loizos
NTUA Laboratory of Pavement Engineering, Greece

Coffee Break
11h00 – 11h30
Foyer Main Auditorium (1st and 2nd Floor)
Special Lectures

11h30 – 13h00

Grand Auditorium

William Powrie, University of Southampton, U.K. – Chair

Importance of Controlling the Degree of Saturation in Soil Compaction
Fumio Tatsuoka
Tokyo University of Science, Japan

Long-term Settlements/Creeping of (highway) Embankments on Very Soft Soil
Heinz Brandl
Vienna University of Technology, Institute for Soil Mechanics and Geotechnical Engineering, Austria

Proving MEMS Technologies for Smarter Railway Infrastructure
David Milne
Faculty of Engineering and the Environment, University of Southampton, U.K.

Influences of Subgrade Form and Ground Stiffness on Dynamic Responses of Railway Subgrade under Train Loading: Field Testing Case Study
Yao Shan
Department of Urban Rail Transit and Railway Engineering, Tongji University, China
Key Laboratory of Road and Traffic Engineering of the Ministry of Education, Tongji University, China

Role of Sonic and Seismic Methods for Construction and Monitoring of Transportation Infrastructure
Soheil Nazarian
The University of Texas at El Paso, USA

Lunch

13h00 – 14h30

Café Concerto & Vila Flor Restaurant
A New Granulation Method with the Process of Crumbling Partially-cemented Liquid Muds and its Application to a Motocross Track – T1.1

Kimitoshi Hayano¹, Hiromoto Yamauchi², Naruki Wakuri² and Shunsuke Tomiyoshi³

¹ Institute of Urban Innovation, Yokohama National University, Japan
² JAIWAT Co., Ltd., Japan
³ Graduate School of Urban Innovation, Yokohama National University, Japan

An Application of Pulsed Power Technology and Subcritical Water to the Recycling of Asphalt Concrete – T1.2

Rétyce I.H.D.T. Amoussou¹, Mitsuru Sasaki² and Mitsuhiro Shigeishi¹

¹ Graduate School of Science and Technology, Kumamoto University, JAPAN
² Institute of Pulsed Power Science, Kumamoto University, JAPAN

Application of Earthwork Material of Coal Ash Mixed Materials in Japan – T1.3

K. Sato¹, S. Yokota², H. Sakanakura³, S. Inoba⁴ and T. Fujikawa⁵

¹ Department of Civil and Engineering, Fukuoka University, Japan
² DC Corporation, Japan
³ National Institute for Environmental Studies, Japan
⁴ Central Research Institute of Electric Power Industry, Japan
⁵ Department of Civil and Engineering, Japan
Geotechnical and Geoenvironmental Assessment of Recycled Construction and Demolition Waste for Road Embankments – T1.4
Nuno Cristelo¹, Castorina Silva Vieira² and Maria de Lurdes Lopes²
¹ University of Trás-os-Montes e Alto Douro, CQVR, Portugal
² University of Porto, Construct, Portugal

Recycling of CDW and Steel Slag in Drainage Layers of Transport Infrastructures – T1.5
A. J. Roque¹, P. F. da Silva²,³, G. Rodrigues³ and R. Almeida³
¹ Laboratório Nacional de Engenharia Civil, PORTUGAL
² GeoBioTec, University NOVA of Lisboa, PORTUGAL
³ Dept. Ciências da Terra da FCT, University NOVA of Lisboa, PORTUGAL

Study on Physicochemical Properties and its Effective Use of Asphalt Pavement Cutting Waste Water – T1.6
Kimitoshi Hayano¹ and Arisa Matsumoto²
¹ Institute of Urban Innovation, Yokohama National University, Japan
² Graduate School of Urban Innovation, Yokohama National University, Japan

Tensile Strength Properties of Sand-bentonite Mixtures Enhanced with Cement – T1.7
Anoosheh Iravanian¹ and Huriye Bilsel²
¹ Near East University, Turkey
² Cyprus International University, Turkey

Numerical Simulation of Coupled Water and Salt Transfer in Soil and a Case Study of the Expansion of Subgrade composed by Saline Soil – T2.1
Dongyang Wang¹, Jiankun Liu¹ and Xu Li¹,²
¹ School of Civil Engineering, Beijing Jiaotong University, China
² Qinghai Research and Observation Base, Key Laboratory of Highway Construction & Maintenance Technology in Permafrost Regions, Ministry of Transport, China

Slope Stability Analysis Using the Unsaturated Stress Analysis. Case Study – T2.2
Loretta Batali¹ and Carastoian Andreea²
¹ Technical University of Civil Engineering, Romania
² Technical University of Civil Engineering, Romania

A Data-driven Approach for qu Prediction of Laboratory Soil-cement Mixtures – T3.1
Joaquim Tinoco¹, António Alberto², Paulo da Venda², António Gomes Correia¹ and Luís Lemos²
¹ School of Engineering of University of Minho, Portugal
² University of Coimbra, Portugal

Behavior of Soil Reinforcements in Slopes – T3.2
M. Inanc Onur, Mustafa Tuncan, Burak Evirgen, Bertan Ozdemir and Ahmet Tuncan
Anadolu University, Eskisehir, TURKEY
Dimension Effect on P-y Model Used for Design of Laterally Loaded Piles – T3.3
Min Yang1, Bin Ge1, Weichao Li1, Bitang Zhu2
1 Department of Geotechnical Engineering, Tongji University, China
2 NOMA Consulting Pty Ltd, Australia

Embankment on Soft Soil Reinforced by CMC Semi-Rigid Inclusions for the High-speed Railway SEA – T3.4
Pierre Burtin and Jérôme Racinais
Menard, Nozay, FRANCE

Finite Difference Time Domain Simulations of Dynamic Response of Thin Multilayer Soil in Continuous Compaction Control – T3.5
Camilo Herrera and Bernardo Caicedo
Universidad de los Andes, Colombia

Modelling of Plastic Culvert and Road Embankment Interaction in 3D – T3.6
Pauli Koliosoja and Antti Kalliainen
Tampere University of Technology, Finland

Stiffness Estimation of the Soil Built-in Road Embankment on the Basis of Light Falling Weight Deflectometer Test – T3.7
Wojciech Gosk
Białystok University of Technology, Poland

Two-level Structure for Tram and Road Traffic in the Centre of City – Lodz in Poland – T3.8
Urszula Tomczak1 and Łukasz Mielczarek2
1 Warsaw University of Technology, Warsaw, Poland and Soletanche Polska Sp. z o.o., Poland
2 Lodz University of Technology, Łódź, Poland and Mosty-Łódź S.A., Poland

A Numerical Study on the Stress Changes in the Ballast Due to Train Passages – T6.1
José N. Varandas1, André Paixão2, Eduardo Fortunato2 and Paul Hölscher3
1 CERIS, ICIST, Department of Civil Engineering, Nova University of Lisbon, Portugal
2 National Laboratory for Civil Engineering (LNEC), Portugal
3 Geo-Engineering, Deltares, The Netherlands

Deformation Characteristics of Track Structures for Level Crossings Subjected to Heavy Forklift Load – T6.2
Yoshitsugu Momoya and Kazuki Ito
Railway Technical Research Institute, Japan

Dynamic Characterization of the Supporting Layers in Railway Tracks Using the Dynamic Penetrometer Panda 3® – T6.3
Esteban Escobar1, Miguel Benz Navarrete1, Roland Gourvès1, Younes Haddani1, Pierre Breul2 and Bastien Chevalier2
1 Sol Solution, Service Innovation et Diagnostique d’Ouvrages, France
2 Institut Pascal, Polytech’ Clermont Ferrand, Université Blaise Pascal, France
Problems with Railway Track Drainage in Finland – T6.4
Juha Latvala, Antti Nurmikolu and Heikki Luomala
Tampere University of Technology, Finland

Railway Ballast: Grain Shape Characterization to Study its Influence on the Mechanical Behaviour – T6.5
Noura Ouhbi1,2, Charles Voivret1, Guillaume Perrin3 and Jean-Noël Roux2
1 Innovation and Research Department, SNCF, France
2 Laboratoire Navier (UMR CNRS 820), CNRS, Ecole des Ponts et Chaussées, IFSTTAR Champs-sur-Marne, France
3 CEA/DAM/DIF, France

Remediation of Mud Pumping on a Ballasted Railway Track – T6.6
Andrew Hudson, Geoff Watson, Louis Le Pen and William Powrie
Faculty of Engineering & the Environment, University of Southampton, U.K.

Some Predictions of Deformations from Tram Track Construction in a Structure-Embankment Transition Zone – T6.7
Yao Shan1,2, Shunhua Zhou1,2, Quanmei Gong1,2, Junhua Xiao1,2, Changdan Wang1,2, Xiaohui Zhang1,2, Sihui Xu1,2 and Zheng Yu1,2
1 Department of Urban Rail Transit and Railway Engineering, Tongji University, China
2 Key Laboratory of Road and Traffic Engineering of the Ministry of Education, Tongji University, China

Soil Performance Evaluation of a Railway Line on the Relationship Stress versus Deformation from Field Trials and Laboratory – T7
Priscila Marques, Maria Esther Soares and Álvaro Vieira Marques
Instituto Militar de Engenharia –IME, Brazil

Biostabilization of a Sandy Soil Using Enzymatic Calcium Carbonate Precipitation – T8.1
João P.S.F. Carmona1, Paulo J. Venda Oliveira2 and Luís J.L. Lemos3
1,2 University of Coimbra, Portugal

Morphological Characterization of in-Service Railroad Ballast Sources and Field Monitoring of Degradation Trends – T8.2
Maziar Moaveni, Pengcheng Wang, Ilhan Cetin, Issam Qamhia and Erol Tutumluer
Department of Civil and Environmental Engineering, University of Illinois at Urbana Champaign, USA

Rutting Behavior of Geocell Reinforced Base Layer Overlying Weak Sand Subgrades – T9.1
Vinay Kumar V and Sireesh Saride
Department of Civil Engineering, IIT Hyderabad, India
Session T3: Foundations and Earth Structures
15h00 – 16h00
Grand Auditorium

Heinz Brandl, Institute for Soil Mechanics and Geotechnical Engineering, Austria – Chair
A. Gomes Correia, ISISE, School of Engineering, University of Minho

A Retrospective View of EMM-ARM: Application to Quality Control in Soil-improvement and Complementary Developments
Miguel Azenha, Jacinto Silva, José Granja, António Gomes-Correia
ISISE, School of Engineering, University of Minho, Portugal

Continuous Compaction Control (CCC) with Oscillating Rollers
Johannes Pistrol¹, Sebastian VilIwoc², Werner Völkel², Fritz Kopf³, and Dietmar Adam¹

¹ Vienna University of Technology, Austria
² HAMM AG, Germany
³ FCP - Fritsch, Chiari & Partner ZT GmbH, Austria

Metaheuristics, Data Mining and Geographic Information Systems for Earthworks Equipment Allocation
Manuel Parente¹, António Gomes Correia, Paulo Cortez²
¹ ISISE, Scholl of Engineering of University of Minho, Portugal
² ALGORITMI Research Centre, University of Minho, Portugal

Experimental Study on Damage Morphology and Critical State of Three-hinge Precast Arch Culvert through Shaking Table Tests
Yasuo Sawamura¹, Hiroyuki Ishihara², Kiyoshi Kishida³ and Makoto Kimura⁴

¹, 4 Kyoto University, Department of Civil and Earth Resources Engineering, Japan
² Kajima Corporation, Japan
³ Kyoto University, Department of Urban Management, Japan

Cyclic and Post-cyclic Shear Behaviour of a Granite Residual Soil – Geogrid Interface
Fernanda Ferreira, Castorina Vieira and Maria de Lurdes Lopes

CONSTRUCT-GEO, Faculty of Engineering, University of Porto, Portugal

Three-dimensional Finite Element Modelling of Soil Arching in Pile-supported Geogrid-reinforced Embankments
Wan-Huan Zhou¹, Jun-Yuan Lao¹, Yisheng Huang² and Renpeng Chen³

¹ University of Macau, China
² China Three Gorges University, China
³ Hunan University, China
Session **T6**: Rail Track Substructures, including Transition Zones

15h00 – 16h00

Meeting Room

Mohamed A. Shahin, Curtin University, Australia – Chair
Eduardo Fortunato, LNEC, Portugal

**Discrete Element Analysis of Railway Ballast under Cycling Loading**
Enad Mahmoud¹, A.T. Papagiannakis², David Rentería¹

¹ University of Texas Rio Grande Valley, United States
² University of Texas at San Antonio, United States

**Modeling Behaviour of Railway Ballast in Prismoidal Apparatus Using Discrete Element Method**
Gino Calderón Vizcarra³, Sanjay Nimbalkar³, and Michéle Casagrande²

³ Pontifical Catholic University of Rio de Janeiro, Brazil
² University of Wollongong, Australia

**Quantifying Degradation of Railway Ballast Using Numerical Simulations of Micro-deval Test and In-situ Conditions**
Ivan Deiros¹,², Charles Voivret¹, Gaël Combe² and Fabrice Emeriault²

¹ SNCF, France
² Université Grenoble Alpes, France

**A Review and Evaluation of Ballast Settlement Models using Results from the Southampton Railway Testing Facility (SRTF)**
Taufan Abadi, Louis Le Pen, Antonis Zervos and William Powrie
The University of Southampton, U.K.

Session **T7**: Subsurface Sensing for Transportation Infrastructure

15h00 – 16h00

Small Auditorium

Soheil Nazarian, The University of Texas at El Paso, USA – Chair
Andreas Loizos, NTUA, Greece
Rapid and Non-intrusive Measurements of Moisture in Road Constructions Using Passive Microwave Radiometry and GPR – Full Scale Test
Arjan A.M. Venmans1, Robbert van de Ven2 and Jan Kollen3
1 Deltares, Delft
2 Miramap, Houten
3 Sweco Nederland, De Bilt, Netherlands

Railways Track Characterization Using Ground Penetrating Radar
Simona Fontul1, Eduardo Fortunato1, Francesca De Chiara2, Rui Burrinha3 and Marco Baldeiras3
1 National Laboratory for Civil Engineering (LNEC), Portugal
2 Sapienza University of Rome, Italy
3 Infraestruturas de Portugal, Portugal

Development of Smart Braided Structures for Sensing of Geotechnical Structures
Sohel Rana1, Raul Fanguiero1 and António Gomes Correia2
1 Fibrous Materials Research Group, University of Minho, Portugal
2 ISISE, School of Engineering of University of Minho - Department of Civil Engineering, Portugal

A Condition Assessment Approach for Highway Filter Drains Using Ground Penetrating Radar
Theodoros Stylianides1, Matthew W. Frost1, Paul R. Fleming1, Mark Mageean2 and Andrew Huetson2
1 Loughborough University, U.K.
2 Balfour Beaty Investments, U.K.

Trackbed Mechanical and Physical Characterization using PANDA®/Geoendoscopy Coupling
Younes Haddani1, Pierre Breul2, Gilles Saussine3, Miguel Angel Benz Navarrete1, Fabien Ranvier1 and Roland Gourvès1
1 Sol Solution, France
2 Institut Pascal, France
3 SNCF, IP/LVE/CIR, France

Soil Formation Lithological Profiling Using Ground Penetrating Radar
Yuri A. Sukhobok, Viktor V. Pupatenko, Gennady M. Stoyanovich and Yulia V. Ponomarchuk
Far Eastern State Transport University, Russia

The Impact of Unfrozen Water Content on Ultrasonic Wave Velocity in Frozen Soils
Li Dongqing1, Huang Xing2, Ming Feng1, Zhang Yu1
1 State Key Laboratory of Frozen Soil Engineering, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences, China
2 College of Architecture and Urban-Rural Planning, Sichuan Agricultural University, China

Coffee Break
16h00 – 16h30
Foyer Main Auditorium (1st and 2nd Floor)
Session T1/T8: Optimized Geomaterial: Use, Reuse and Recycling/ Macro and Nanotechnology applied to Transportation Geotechnics

16h30 – 18h00

Small Auditorium

Tuncer Edil, University of Wisconsin-Madison, USA – Chair
Teresa Tavares, School of Engineering, University of Minho, Portugal

Hydrophobic Polymer Additive for Stabilization of Aggregates in Local Government Roads
Don Cameron, Cameron Hopkins and Mizanur Rahman
The University of South Australia, Australia

Relations between Linear ViscoElastic Behaviour of Bituminous Mixtures Containing Reclaimed Asphalt Pavement and Colloidal Structure of Corresponding Binder Blends
Salvatore Mangiafico¹, Hervé Di Benedetto¹, Cédric Sauzéat¹, François Olard², Simon Pouget² and Luc Planque³
¹ Université de Lyon/ENTPE/LTDS (CNRS UMR 5513), France
² EIFFAGE Infrastructures, France
³ BP France, France

Silty Sand Stabilized with Different Binders
Sara Rios, António Viana da Fonseca, Srikanth Sagar Bangaru
CONSTRUCT-GEO, Faculty of Engineering (FEUP), University of Porto, Portugal

Rheological Evaluation of Asphalt Cements Modified with ASA Polymer and Al2O3 Nanoparticles
Muhammad Mubaraki¹, Shaban Ismael Albrka Ali², Amiruddin Ismail² and Nur Izzii Md. Yusoff²
¹ Dept. of Civil Engineering, College of Engineering, Jazan University, Saudi Arabia
² Sustainable Urban Transport Research Centre (SUTRA), Universiti Kebangsaan Malaysia, Malaysia

Evaluation of Asphalt Binders Modified with Nanoclay and Nanosilica (Video Conference)
Helal Ezzat¹, Sherif El-Badawy¹, Ala'a Gabr¹, El-Saaid Ibrahim Zaki², Tamer Breakah³
¹ Mansoura University, Public Works Engineering Department, Egypt
² Housing and Building National Research Center, Institute of Strength and Testing Materials, Egypt
³ Department of Construction and Architectural Engineering, The American University in Cairo, Egypt
Full-scale Evaluation in a Fatigue Track of a Base Course Treated with Geopolymers

Javier Camacho-Tauta, Oscar Reyes-Ortiz, António Viana da Fonseca, Sara Rios, Nuno Cruz and Carlos Rodrigues

1 Universidad Militar Nueva Granada, Colombia
2 Universidade do Porto, Portugal
3 Mota-Engil, Portugal
4 Instituto Politécnico de Guarda, Portugal

Nanotechnology Applied to Chemical Soil Stabilization

António Alberto S. Correia and Maria Graça Rasteiro

CIEPQPF, University of Coimbra, Portugal

The Soil and Groundwater Remediation with Zero Valent Iron Nanoparticles

Jorge Rodrigues Gonçalves

Pro2Lynx, PORTUGAL

Dynamic Shakedown Analysis of Flexible Pavement under Traffic Moving Loading

Jiangu Qian, Yonggang Wang, Zhiqiu Lin, Yilin Liu, Tianming Su

1 Department of Geotechnical Engineering, Tongji University, China
2 Key Laboratory of Geotechnical and Underground Engineering of Ministry of Education, Tongji University, China
3 Research Institute of Highway Ministry of Communications, China

DEM Analysis of Railtrack Ballast Degradation under Monotonic and Cyclic Loading

Jiangu Qian, Jianbo Gu, Xiaojing Gu, Maosong Huang, Linlong Mu

1 Key Laboratory of Geotechnical and Underground Engineering of Ministry of Education, Tongji University, China
2 Department of Geotechnical Engineering, Tongji University, China

Session T3: Foundations and Earth Structures
16h30 – 18h00

Investigation of the Mechanical Behaviour of the Interface between Soil and Reinforcement, via Experimental and Numerical Modelling

Elena Kapogianni, Michael Sakellariou, Jan Laue and Sarah Springman

1 National Technical University of Athens, Greece
2 Luleå University of Technology, Sweden
3 ETH Zürich, Switzerland
Modelling a Highway Embankment on Peat Foundations Using Transparent Soil
Earl Marvin De Guzman and Marolo Alfaro
The University of Manitoba, Canada

Analysis of the Behaviour of Stone Column Stabilized Soft Ground Supporting Transport Infrastructure
Sudip Basack, Buddhima Indraratna and Cholachat Rujikiatkamjorn
Centre for Geomechanics and Railway Engineering University of Wollongong, Australia

Comparison of Coupled Flow-deformation and Drained Analyses for Road Embankments on CMC Improved Ground
Hamed Mahdavi, Behzad Fatahi and Hadi Khabbaz, Philippe Vincent, and Richard Kelly
1 School of Civil and Environmental Engineering, University of Technology Sydney (UTS)
2 General Manager, Menard Bachy, Australia
3 Chief Technical Principal – Geotechnical, SMEC - Australia & New Zealand Division

A New Combined Vacuum Preloading with Pneumatic Fracturing Method for Soft Ground Improvement
Liu Songyu, Zhang Dingwen, Du Guangyin and Han Wenjun
Institute of Geotechnical Engineering, Southeast University, China

Controlled Curved Drilling Technique in the Permeation Grouting Method for Improvement Works of an Airport in Operation
Seiki Takano, Kentaro Hayashi, Kouki Zen and Rouzbeh Rasouli
1 Ministry of Land, Infrastructure, Transport and Tourism, Japan
2 Penta-ocean Institute of Technology, Japan
3 Kyushu University, Japan

The 2016-update of the Dutch Design Guideline for Basal Reinforced Piled Embankments
Suzanne J.M. van Eekelen
Deltares, Netherlands

Piled Embankment or a Traditional Sand Construction: How to Decide? A Case Study
Suzanne J.M. van Eekelen and Arjan A.M. Venmans
Deltares, Netherlands

Session T6: Rail Track Substructures, including Transition Zones
16h30 – 18h00
Meeting Room

William Powrie, University of Southampton, U.K. – Chair
Rui Calçada, FEUP, University of Porto, Portugal
The Vibration Impact of Heavy Freight Train on the Roadbed
Andrei Petriaev
The Petersburg State Transport University (PSTU), Russia

Non-Linear Behaviour of Geomaterials in Railway Tracks under Different Loading Conditions
André Paixão¹, José N. Varandas², Eduardo Fortunato¹ and Rui Calçada³
¹ National Laboratory for Civil Engineering (LNEC), Portugal
² CERis, ICIST, Department of Civil Engineering, Nova University of Lisbon, Portugal
³ University of Porto - Faculty of Engineering (FEUP), Portugal

Investigation into Impact of Train Speed for Behavior of Ballasted Railway Track Foundations
Md. Abu Sayeed¹ and Mohamed A. Shahin¹
¹ Department of Civil Engineering, Curtin University, Australia

Application of Shock Mats in Rail Track Foundation Subjected to Dynamic Loads
Sinniah K. Navaratnarajah, Buddhima Indraratna and Sanjay Nimbalkar
Centre for Geomechanics and Railway Engineering, University of Wollongong, Australia

Shaking Table Test Using Full-scale Model for Lateral Resistance Force of Ballasted Tracks During Earthquake
Takahisa Nakamura¹, Yoshitsugu Momoya¹, Kiyonori Nomura¹ and Yabunaka Yoshihiko²
¹ Railway Technical Research Institute, Japan
² West Japan Railway Company, Japan

Dynamic Performance of Pile-supported Bridge-embankment Transition Zones under High-speed Train Moving Loads
Wei Li and Xuecheng Bian
Zhejiang University, China

Critical Velocity of High-speed Train Running on Soft Soil and Induced Dynamic Soil Response
Jing Hu¹, Xuecheng Bian¹ and Jianqun Jiang²
¹ Department of Civil Engineering, Key Laboratory of Soft Soils and Geoenvironmental Engineering, MOE, Zhejiang University, China
² Department of Civil Engineering, Institute of Hydraulic Structure and Water Environment, Zhejiang University, China
Inaugural Meeting of a New International Group for Intelligent Construction

18h15 – 18h45

Grand Auditorium

George K. Chang¹, António Gomes Correia², Soheil Nazarian³ and Xinzhou Yang⁴

¹ The Transtec Group, Inc., USA
² ISISE – School of Engineering of University of Minho, Portugal
³ The University of Texas at El Paso, USA
⁴ ChinaRoads, China

Gala Dinner

20h00 – 23h00

Pousada Mosteiro de Guimarães (Pousada de Santa Marinha)
Wednesday, 7th September

Keynote Lecture
09h00 – 09h45
Grand Auditorium

Tuncer Edil, University of Wisconsin-Madison, USA – Chair

Advances in Ground Modification with Chemical Additives: From Theory to Practice
Anand Puppala
University of Texas (UTA) at Arlington, USA

Theme Lectures
09h45 – 11h00
Grand Auditorium

Junichi Koseki, University of Tokyo, Japan – Chair

Slope Stability, Stabilisation, and Asset Management
S. Glendinning
Newcastle University, U.K.

Mechanistic-empirical Design (road, railways and airfields)
E. Tutumluer¹ & C. Schwartz²
¹Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, USA
²Civil and Environmental Engineering, University of Maryland-College Park

Case Histories
J. Liu
School of Civil Engineering, Beijing, Jiaotong University, China

Coffee Break
11h00 – 11h30
Foyer Main Auditorium (1st and 2nd Floor)
Special Lectures

11h30 – 12h30

Grand Auditorium

Junichi Koseki, University of Tokyo, Japan – Chair

Development of an Evidence-based Geotechnical Asset Management Policy for Network Rail, Great Britain
Christopher Power
Mott MacDonald, U.K.

The Implications of Using Estimated Solar Radiation on the Derivation of Potential Evapotranspiration and Soil Moisture Deficit within an Embankment
Glendinning, S.; Helm, P.; Stirling, R.
Newcastle University, U.K.

Soils and Aggregates: The Foundations of Pavement Performance
Charles W. Schwartz
Department of Civil and Environmental Engineering, University of Maryland, USA

Applying Modern Soil Mechanics Principles to the Design of Ballasted Railway Track
William Powrie
Faculty of Engineering and the Environment, University of Southampton, U.K.

Poster Session

12h30 – 13h00

Foyer Main Auditorium – Second Floor

S. Glendinning, Newcastle University, U.K. (T4)
C. Schwartz, Civil and Environmental Engineering, University of Maryland-College Park & E. Tutumluer, University of Illinois at UrbanaChampaign, USA (T5)
J. Koseki, University of Tokyo, Japan; J. Liu, School of Civil Engineering, Beijing, Jiaotong University, China & J. Oliveira, School of Engineering, University of Minho (T10)

2D Numerical Analysis of Shallow Foundation Rested Near Slope under Inclined Loading – T4.1
Messaoud Baazouzi, Djamel Benmeddour, Abdelhak Mabrouki and Mekki Mellas
The University of Mohamed kidder, Algeria
Application of the Upper and Lower-bound Theorems to Three-dimensional Stability of Slopes – T4.2

Nuno Deusdado, Armando N. Antão, Mário Vicente da Silva and Nuno Guerra
UNIC, Department of Civil Engineering, FCT, Universidade NOVA de Lisboa, Portugal

Behavior of Expansive Soils Stabilized with Hydrated Lime and Bagasse Fibres – T4.3

Liet Chi Dang, Behzad Fatahi, and Hadi Khabbaz
University of Technology Sydney (UTS), Australia

Importance of Soil Pulverization Level in Lime Stabilized Soil Performance – T4.4

Ilknur Bozbey1, Birol Demir2, Muhammet Komut2, Ahmet Saglik2, Senol Gomez2, Aykan Mert2
1 Istanbul University, Civil Engineering Department, Turkey
2 Republic of Turkey, General Directorate of Highways, Department of Research and Development, Turkey

Lomé Container Terminal – T4.5

R. Tomásio1, A. Pinto1, C. Cota1, P. Rosa2 and M. Figueres3
1 JETsj Geotecnia, Portugal
2 Somague Engenharia, Portugal
3 Ingeomar, Spain

Methodology for the Qualitative Analysis of Rockfall Risks in the Slovenian Road Network – T4.6

Suzana Svetličič1 Zdenka Popović2 Mišo Ribičič3, Rudi Korošec4
1 DRI Investment Management Ltd, Company for Development of Infrastructure Ltd, Ljubljana, Slovenia
2 TERRAS, Ljubljana, Slovenia
3 Former Professor at Faculty of Natural Sciences and Technology, Ljubljana, Slovenia
4 geo Ltd, Ljubljana, Slovenia

Multiobjective Optimization of Maintenance Scheduling: Application to Slopes and Retaining Walls – T4.7

Roman Denysiuk, José Campos e Matos, Joaquim Tinoco, Tiago Miranda and António Gomes Correia
Institute for Sustainability and Innovation in Structural Engineering, Department of Civil Engineering, University of Minho, Portugal

Slope Stabilisation at the National Road "EN115", close to Bucelas, Portugal – T4.8

Ana Pereira1, Bernardo Monteiro2 and Alexandre Pinto1
1 JETsj Geotecnia, Portugal
2 Estradas de Portugal, Portugal

Slope Stabilisation Solutions at the "Linha do Oeste" Railway Line, Portugal – T4.9

Alexandre Pinto1, António Prata2 e Jorge Diniz3
1 JETsj Geotecnia, Portugal
2 REFER, Portugal
3 Teixeira Duarte, Portugal

Slope Stabilization at São Marcos Road, Calhandriz, Portugal – T4.10

Alexandre Pinto and Rui Tomásio
JETsj Geotecnia, Portugal
Swell-shrink Cycles of Lime Stabilized Expansive Subgrade – T4.11
Asmaa Al-Taiea, Mahdi. M. Disfani, Robert Evans, Arul Arulrajah & Suksun Horpibulsuk
a Swinburne University of Technology, Australia
b Baghdad University, Iraq
c The University of Melbourne, Australia
d Suranaree University of Technology, Thailand

3D Finite Element Model as a Tool for Analyzing the Structural Behavior of a Railway Track – T5.1
Antti Kalliainen, Pauli Kolisoja and Antti Nurmikolu
Tampere University of Technology, Finland

A Numerical Study on the Implications of Subgrade Reinforcement with Geosynthetics in Pavement Design – T5.2
José Neves, Helena Lima and Margarida Gonçalves
1 Instituto Superior Técnico, Universidade de Lisboa, Portugal
2 Infraestruturas de Portugal, Portugal

Compaction Control of Clayey Soils Using Electrical Resistivity Charts – T5.3
Vikas Gingine, Ana Sofia Dias and Rafaela Cardoso
CERis, ICIST, Instituto Superior Técnico, University of Lisbon, Portugal

Correlating Nonlinear Parameters of Resilient Modulus Models for Unbound Geomaterials – T5.4
Mehran Mazari, Imad Abdallah, Jose Garibay and Soheil Nazarian
1 Savannah State University, Savannah, USA
2 The University of Texas at El Paso, USA

Design of Thin Surfaced Asphalt Pavements – T5.5
Sabine Leischner, Frohmut Wellner, Gustavo Canon Falla, Markus Oeser and Dawei Wang
1 Technische Universität Dresden, Germany
2 RWTH Aachen, Germany

Mechanical Stabilization of Unbound Layers to Increase Pavement Performance and Incorporation of Benefits into M-E analysis – T5.6
Tim Oliver, Mark Wayne and Jay Kwon
1 Tensar International Ltd, U.K.
2 The Tensar Corporation, USA

Microstructure Study on Intact Clay Behavior Subjected to Cyclic Principal Stress Rotation – T5.7
Lin Qinghui, Yan Jiajia, Zhou Jian, Cao Zhigang
1 Department of Architecture and Civil Engineering of Taizhou Vocational & Technical College, China
2 Research Center of Coastal and Urban Geotechnical Engineering of Zhejiang University, China

Study of Permanent Deformation and Granulometric Distribution of Graded Crushed Stone Pavement Material – T5.8
Caroline Lima and Laura Motta
Federal University of Rio de Janeiro, Brazil
Impact of Dual Gauge Railway Tracks on Traffic Load Induced Permanent Deformation of Low Embankments – T5.9

Aaron D. Mwanza¹, Peiwen Hao², Mundia Muya³ and Zhang Haiwei⁴

¹ China Civil Engineering Construction Corporation (CCECC), P.R. China
² Key Laboratory of Highway Engineering in Special Region of Ministry of Education, P.R. China.
³ University of Zambia (UNZA), Zambia
⁴ Highway College, Chang’an University, P.R. China

Problems with Landslide Stabilization of Dukat in the Road Vlora – Saranda – T10.1

Luljeta Bozo¹ and Kujtim Cela²

¹ Polis University, Albania
² Iliriada, Sh.p.k, Albania

Rehabilitation and Reinforcement of the Marina Expo Breakwaters, Lisbon, Portugal – T10.2

Rui Tomásio¹, Alexandre Pinto¹, José Pernão²

¹ JETs Geotecnia, Portugal
² PROMAN, Portugal

Lunch

13h00 – 14h30

Café Concerto & Vila Flor Restaurant

Mercer Lecture

14h30 – 15h15

Grand Auditorium

Fumio Tatsuoka, Tokyo University of Science, Japan – Chair

Stabilization of Pavements using Geosynthetics

Jorge Zornberg

Civil, Architectural and Environmental Engineering Department-GEO, The University of Texas at Austin, USA

Coffee Break

15h15 – 15h45

Foyer Main Auditorium (1st and 2nd Floor)
**Session T4: Slope Stability, Stabilisation, and Asset Management**

15h45 – 17h30

Small Auditorium

Stephanie Glendinning, Newcastle University, U.K. – Chair
Manuel Matos Fernandes, FEUP, University of Porto, Portugal

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**Landslide Hazard Assessment for National Rail Network**

Freeborough, K. A., 1, Diaz Doce, D., 1, Lethbridge, R., 2, Jessamy, G., 3, Dashwood, C., 1, Pennington, C., 1, and Reeves, H. J., 1

1 British Geological Survey, Keyworth, U.K.
2 Formerly of Network Rail, Milton Keynes, U.K.
3 Network Rail, Milton Keynes, U.K.

**A Strategic Approach to Debris Flow Risk Reduction on the Road Network**

Mike Winter, 1, 2

1 Transport Research Laboratory (TRL), U.K.
2 University of Portsmouth, U.K.

**The Impact of Freezing-thawing Process on Slope Stability of Earth Structure in Cold Climate**

Alexey A. Korshunov, Sergey P. Doroshenko and Alexander L. Nevzorov
Northern (Arctic) Federal University, Russia

**Using Remote Sensing Techniques to Identify the Landslide Hazard Prone Sections along the South Link Railway in Taiwan**

Chih-Hao Hsu, 1, Ting-Chi Tsao, 1, Chuen-Ming Huang, 1, Ching-Fang Lee, 1 and Yi-The Lee, 2

1 Disaster Prevention Technology Research Center, Sinotech Engineering Consultants, INC., Taiwan
2 Geotechnical Engineering Department, Sinotech Engineering Consultants, LTD., Taiwan

**Slope Stability Assessment and Evaluation of Remedial Measures Using Limit Equilibrium and Finite Element**

Manuel Neves, 1, Victor Cavaleiro, 2, Alexandre Pinto, 3

1 CH2M Hill, U.K.
2 UBI, Portugal
3 Jetsl, Portugal
Session T5: Mechanistic-empirical Design (road, railways and airfields)
15h45 – 17h30
Grand Auditorium

Charles W. Schwartz, University of Maryland, USA – Chair
Erol Tutumluer, University of Illinois at Urbana Champaign, USA

Preliminary Testing on High-speed Railway Substructure Due to Water Level Changes
Xuecheng Bian1, Hongguang Jiang1,2, Yunmin Chen1
1 Department of Civil Engineering, Key Laboratory of Soft Soils and Geoenvironmental Engineering, MOE, Zhejiang University
2 Department of Transportation Engineering, School of Civil Engineering, Shandong University, PR China

Modelling the Moisture Dependent Permanent Deformation Behavior of Unbound Granular Materials
Mohammad Shafiqur Rahman1 and Sigurdur Erlingsson1,2
1 Swedish National Road and Transport Research Institute (VTI), Sweden
2 University of Iceland, Iceland

Influence of Post Compaction on the Moisture Sensitive Resilient Modulus of Unbound Granular Materials
Mohammad Shafiqur Rahman1 and Sigurdur Erlingsson1,2
1 Swedish National Road and Transport Research Institute (VTI), Sweden
2 University of Iceland, Iceland

Performance Checks for Unbound Aggregate Base Permanent Deformation Prediction Models under Dynamic Stress States Induced by Moving Wheel Loading
Yuanjie Xiao1 and Erol Tutumluer2
1 Department of Geotechnical Engineering, School of Civil Engineering, National Engineering Laboratory for High-speed Railway Construction, Ministry of Education Key Laboratory for Heavyhaul Railway Engineering Structures, Central South University, China
2 Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, USA

A Framework to Utilize Shear Strength Properties for Evaluating Rutting Potentials of Unbound Aggregate Materials
Issam Qamhia1, Erol Tutumluer1, Liang Chern Chow2, and Debakanta Mishra3
1 Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, USA
2 American Engineering Testing, Inc., USA
3 Department of Civil Engineering, Boise State University, USA

Effects of Freeze-thaw History on Bearing Capacity of Granular Base Course Materials
Shinichiro Kawabata1, Tatsuya Ishikawa2 and Shuichi Kameyama1
1 Hokkaido University of Science, Japan
2 Hokkaido University, Japan
Laboratory Examination of Frost-heaving Properties of Road Unbound Mixtures Based on Fines Content and Plasticity Index

Cezary Kraszewski and Leszek Rafalski
Road and Bridge Research Institute, Poland

Deformation Modelling of Instrumented Flexible Pavement Structure

Thorbjorg Saevarsdottir¹ and Sigurdur Erlingsson²
¹ EFLA Consulting Engineers & The University of Iceland, Iceland
² VTI Linköping, Sweden & The University of Iceland, Iceland

A Double-layered Model for Highway Subgrade and its Dynamic Response due to Traffic Loads

Liaoyi Fu¹, Jian Zhou¹, Wentao Wang², and Jinchang Wang¹
¹ Zhejiang University, China
² Anhui Electric Power Design Institute, China

Nondestructive Deflection Testing based Mechanistic-empirical Overlay Thickness Design Approach for Low Volume Roads: Case Studies

Priyanka Sarker¹, Erol Tutumluer¹, and Scott Lackey²
¹ Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, USA
² Illinois Department of Transportation, IL, USA

A Comparison between a Shakedown Design Approach and the Analytical Design Approach in the UK for Flexible Road Pavements

Juan Wang¹ ², Shu Liu³ and Hai-Sui Yu³
¹ Ningbo Nottingham New Materials Institute, University of Nottingham, China
² State Key Laboratory for GeoMechanics and Deep Underground Engineering, China University of Mining & Technology, China
³ Nottingham Centre for Geomechanics, University of Nottingham, U.K.

An Elasto-plastic Method for Analysing the Deformation of the Railway Ballast

Qideng Sun, Buddhima Indraratna and Sanjay Nimbalkar (Speaker: Sinniah Navaratnarajah)
University of Wollongong, Australia

Session T10: Case Histories

15h45 – 17h30

Meeting Room

Junichi Koseki, University of Tokyo, Japan – Chair
Joel Oliveira, School of Engineering of University of Minho, Portugal

CDC Compaction at Berth 9 Quay Extension Felixstowe, UK

J.W. Vink, J.W. Dijkstra
Cofra, The Netherlands
Ground Improvement with Jet Grouting Solutions at the New Cruise Terminal in Lisbon, Portugal
Alexandre Pinto¹, Rui Tomásio¹, Gonçalo Marques²
¹ JETsj Geotecnia, Portugal
² SETH, Portugal

Case Study: Preliminary Field Testing as a Basis of Design for Ground Improvement Using Vibrocompaction at Lomé Container Terminal - Togo
António Cristóvão¹, Miguel Figueres², Alexandre Pinto¹ and Paulo Rosa³
¹ JETsj Geotecnia Lda, Portugal
² Ingeomar S.L.P, Spain
³ Somague, Portugal

The Performance of Road Embankments on Glacial Deposits in Ireland
Fintan Buggy and Paul Kissane
Roughan & O’Donovan, Ireland

Analysis of the Vibration Propagation Induced by Pulling out of Sheet Pile Wall in a Close Neighbourhood of Existing Buildings
Krzysztof Czech and Wojciech Gosk
Bialystok University of Technology, Poland

Closing Ceremony
17h30 – 18h00

Grand Auditorium

Roger Frank – President of International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE)
Erol Tutumluer – Chair of ISSMGE Technical Committee TC202
Manuel Matos Fernandes – President of the Portuguese Geotechnical Society
António Gomes Correia – President of the 3rd International Conference on Transportation Geotechnics
SOCIAL PROGRAMME

Welcome Reception (Wine Tasting)

The Welcome Reception will take place at the “Paço dos Duques de Bragança” (see Guimarães map), under the courtesy of the Municipality of Guimarães.

Venue: Paço dos Duques de Bragança
Date: Monday, 5th September 2016
Time: 18:30 – 20:00
Dress code: Business attire is recommended.

The Ducal Palace of Bragança in Guimarães was ordered to be built in the 15th Century by Afonso - an illegitimate son of king João I and Inês Pires Esteves - which was the 1st Duke of the House of Bragança and the 8th Count of Barcelos. He had it built at the time of his second marriage with Constança of Noronha (daughter of Afonso, Count of Gijón and Noronha and Isabel, Lady of Viseu).

The Palace was only inhabited permanently during the 15th Century and in the following centuries a progressive abandonment and consequent ruin settled. This condition was only altered when - in the 19th century - what was left of the Palace was reused so a military barracks could be installed in its premises and, in the 20th century, due to political motivations, it was fully rebuilt.

Between 1937 and 1959 a complex reconstruction was carried out based on a project by the architect Rogério de Azevedo. At the same time, a Commission was created to gather a group of objects, dating mostly from the 17th and 18th centuries, in order to assemble the interiors.

The Ducal Palace of Bragança was classified as a National Monument in 1910 - even before its reconstruction - and is currently a dependency of the Direção Regional de Cultura do Norte. Inside there is a Museum (1st floor), a wing for the Presidency of the Republic (main facade, 2nd floor) and a vast area dedicated to several cultural initiatives (on the ground floor).

The Ducal Palace of Bragança is one of the most visited Museums in Portugal both by Portuguese as well as foreigners.

Gala Dinner

The Gala Dinner will take place on the Pousada Mosteiro de Guimarães (Pousada de Santa Marinha) (see Guimarães map below). This event is open only to conference delegates and accompanying persons that have registered for the dinner (please bring the invitation you received when you did registration). Bus for the Gala Dinner will be available in "Largo do Toural" (in front of the water fountain) as well as in "Hotel Guimarães". Bus stops are labeled as 3rd ICTG 2016 bus stop; see map below.

Venue: Pousada Mosteiro de Guimarães
Date: Tuesday, 6th September 2016
Time: 20:00 – 23:00
Dress code: Business attire is recommended.

Near the historical centre of Guimarães, set on a hill overlooking the city, we find the majestic Pousada de Guimarães Santa Marinha, a former XII Century Augustin Monastery, which after being rebuilt and restored, received the National Architectural Prize in 1985.

This historic luxury hotel has unique charming points, like the superb gardens; to be counted among the best Portuguese’s gardens, a magnificent stone staircase and an artificial lake can be found among the trees.

The rich Portuguese glazed tiles, the cloisters, the terraces over the city will, together with the magnificent cuisine and wines, make you wish to stay for a very long time.
CONFERENCE MAP
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WELCOME RECEPTION SPONSOR
EXHIBITION FLOORPLAN

First floor
Foyer main auditorium

Second floor
Foyer main auditorium

Legend:
1 - Sol Solution
2 - MAPEI
3 - MENARD
4 - COFRA B.V.
5 - ISQ
6 - JETq
7 - GEG
8 - TPF PLANEGE CENOR
9 - APAGEO
10 - LHOIST
11 - BBF

Posters