

# XV DANUBE-EUROPEAN CONFERENCE ON GEOTECHNICAL ENGINEERING

DONAU-EUROPÄISCHE KONFERENZ FÜR GEOTECHNIK

50<sup>th</sup>  
Anniversary  
50-jähriges Jubiläum  
1964 - 2014



9 - 11 September 2014, Vienna  
Vienna University of Technology  
Technische Universität Wien



## Conference Proceedings Volume 1 & 2 *Konferenzband*

## Geotechnics of Roads and Railways *Geotechnik im Straßen- und Eisenbahnbau*



Editors  
*Herausgeber*  
Heinz Brandl  
Dietmar Adam



Austrian Society of Engineers and Architects, ÖIAV  
*Österreichischer Ingenieur- und Architekten-Verein*



Proceedings of the 15<sup>th</sup> Danube - European Conference on Geotechnical Engineering  
9-11 September 2014, Vienna, Austria

# Geotechnics of Roads and Railways

Editors

*Heinz Brandl*

President of the Austrian Society of Engineers and Architects, ÖIAV

*Dietmar Adam*

Head of Institute of Geotechnics, Chair in Ground Engineering, Soil and Rock Mechanics,  
Faculty of Civil Engineering, Vienna University of Technology

---

Tagungsband der 15. Donau – Europäischen Konferenz für Geotechnik  
9.-11. September 2014, Wien, Österreich

# Geotechnik im Straßen- und Eisenbahnbau

Herausgeber

*Heinz Brandl*

Präsident des Österreichischen Ingenieur- und Architekten - Vereins, ÖIAV

*Dietmar Adam*

Vorstand des Instituts für Geotechnik, Forschungsbereich für Grundbau, Boden- und  
Felsmechanik, Fakultät für Bauingenieurwesen, Technische Universität Wien

© 2014 ÖIAV - Österreichischer Ingenieur- und Architekten-Verein, Wien

All rights reserved. No part of this publication or the information contained herein may be reproduced, stored in a retrieval system, or transmitted in any form or by means, electronic, mechanical, by photocopying, recording otherwise, without written prior permission from the publishers.

Alle Rechte, insbesondere das Recht der Vervielfältigung, Verbreitung, sowie der Übersetzung vorbehalten. Kein Teil des Werkes darf in irgendeiner Form (durch Fotografie, Mikrofilm oder ein anderes Verfahren) ohne schriftliche Genehmigung des Medieninhabers reproduziert oder unter Verwendung elektronischer Systeme gespeichert, verarbeitet, vervielfältigt oder verbreitet werden.

Published by:

Österreichischer Ingenieur- und Architekten-Verein  
A-1010 Wien, Eschenbachgasse 9  
Tel.: +43-1-5873536, Fax: +43-1-370 580 6 - 333  
Email: [office@oiav.at](mailto:office@oiav.at) URL: <http://www.oiav.at>

Printed by: Novographic Druck GmbH, 1230 Vienna, Austria

Cover: Vienna Aerial View by Foto Julius / Map of Europe with the Danube River Basin by ICPDR

Einband: Luftbild von Wien von Foto Julius / Europakarte mit dem Einzugsgebiet der Donau von IKSD

ISBN 978-3-902593-01-6

## TABLE OF CONTENTS

|  |             |
|--|-------------|
| Conference Committees / Konferenz Komitees.....  | <i>XVI</i>  |
| Vorwort / Preface                                |             |
| <i>H. Brandl</i> .....                           | <i>XVII</i> |
| A Historical Review / Ein Historischer Rückblick |             |
| <i>H. Brandl</i> .....                           | <i>XIX</i>  |

## VOLUME 1

### KEYNOTE LECTURES

|   |    |
|---|----|
| Earth and rock fill embankments for roads and railways: what was learned and where to go                                  |    |
| <i>A. Gomes Correia, J. P. Magnan, H. Brandl</i> .....  | 3  |
| Use of marginal geomaterials and industrial by-products as fill for embankments: past experiences and future perspectives |    |
| <i>A. Petkovšek</i> .....   | 5  |
| Application of geosynthetics in the construction of roads and railways: yesterday - today - tomorrow                      |    |
| <i>M. Ziegler</i> .....   | 33 |

### GEOTECHNICS OF ROAD, AIRFIELD AND RAILTRACK STRUCTURES

#### GEOTECHNIK IM STRASSEN- UND EISENBAHNBAU SOWIE BEI FLUGBETRIEBSFLÄCHEN

|  |    |
|--|----|
| Geotechnische Herausforderungen beim Autobahnbau in Ungarn (2000-2012) mit Schwerpunkt Dammgründung auf ungünstigem Untergrund / Geotechnical challenges of motorway construction in Hungary (2000-2012) with focus on embankment foundation on unfavourable soft ground |    |
| <i>R. Szepesházi</i> .....   | 57 |
| Glassfoam aggregates for pavements on highly compressive soil. The Fiumicino airport case history  |    |
| <i>A. Marradi</i> .....  | 71 |
| Untersuchungen am Hochschallgedämmten Wiener Straßenbahn-Oberbau – die Konsolidationstheorie in dynamischer Anwendung  |    |
| <i>F. Kopf, A. Oberhauser, D. Pichler</i> .....  | 77 |
| DSV-Platten- und Tiefgründung mit Mikropfahlverstärkung für den neuen Bahnhof Wien Mitte   |    |
| <i>L. Martak</i> .....   | 83 |
| A Case Study on Stability of Skidway Foundation and Quay Wall during Loadout Operation of an Offshore Structure  |    |
| <i>J. H. Lee, S. Y. Hwang, J. T. Park, J. J. Jung, W. S. Sim</i> .....   | 89 |
| Revitalization of access embankments to bridges for section of Corridor 10 in R. Macedonia   |    |
| <i>J. B. Papić, J. Josifovski, S. Gjorgjevski, B. Susinov</i> .....  | 95 |

|   |     |
|---|-----|
| Effect of Footing Rigidity and Soil Model on Modulus of Subgrade Reaction<br><i>H. F. Shehata, M. F. Shehata</i> .....  | 101 |
| The influence of dynamic loading on road pavement constructions and associate road structures<br><i>W. Sas, K. Gabrys, A. Gluchowski, A. Szymanski</i> .....                              | 107 |
| A discussion for the possible effects of low humidity levels on the geotechnical aspects of high speed railway substructures<br><i>N. Ö. Bezgin, M. Karasahin</i> .....                   | 113 |
| Development of structural reinforcement of existing underground lifeline for mitigation of liquefaction damage<br><i>M. Otsubo, I. Towhata, D. Taeseri, B. Cauvin, T. Hayashida</i> ..... | 119 |
| "PPP" R1 Nitra – Tekovské Nemce and Banská Bystrica – Northern Bypass From the View of Independent Engineer<br><i>V. Janták, P. Mušec</i> .....   | 125 |
| Economic design of thicknesses of granular subbases<br><i>J. C. Gress</i> .....   | 131 |
| Untersuchungen zur Tragschichtvergütung im Bahnbau im Zuge einer Probebaustelle<br><i>A. Hausenberger, B. Brandner, H. Ramsbacher, S. Blovsky, D. Adam</i> .....                          | 137 |
| Short piles in civil engineering – limitations in calculations and engineering applications<br><i>K. Gwizdata, P. Więcławski</i> .....  | 143 |
| The effect of ballast fouling on the hydraulic conductivity of the rail track substructure<br><i>W. O. Danquah, G. S. Ghataora, M. P. N. Burrow</i> .....                                 | 149 |
| Principles of Sustainable Development Approach in Transport Geotechnical Engineering<br><i>I. Vaníček</i> .....   | 155 |
| Geotechnical assessment of embankment stability on soft clay soils<br><i>R. E. Dashko, A. V. Shidlovskaya</i> .....   | 161 |
| Untersuchung und Ertüchtigung der Fundierung eines Wiener Gründerzeithauses<br><i>D. Stefanoudakis</i> .....  | 167 |
| Consolidation and Permeability properties of Alluvial deposits along the Sava river by laboratory and field Investigation<br><i>N. Grubic, A. Skejic, A. Balic</i> .....                  | 173 |
| <b>COMPACTION OF SOIL AND OTHER GRANULAR MATERIALS</b>  |     |
| <b>VERDICHTUNG VON BÖDEN UND ANDEREN KORNGEMISCHEN</b>  |     |
| The effect of large particles on the applicability of compaction tests<br><i>M. G. Winter</i> .....   | 183 |
| Variation of undrained shear strength due to suction changes<br><i>M. Maček, J. Smolar, A. Petkovšek</i> .....  | 189 |

|   |     |
|---|-----|
| Tragfähige Idee gesucht – numerische Simulationen von Bodenverdichtung als Entwicklungsbaustein<br>innovativer Geräteansätze    |     |
| <i>H. Pankrath, M. Barthel, A. Knut, M. Bracciale, R. Thiele</i> .....  | 195 |
| Roller Compaction - Impact of Dynamic Drums in Comparison   |     |
| <i>J. Pistrol, S. Villwock, W. Völk, F. Kopf, D. Adam</i> .....   | 201 |
| Erschütterungsüberwachung bei Bauarbeiten in bebauten Gebieten  |     |
| <i>W. Völk, S. Villwock</i> .....   | 207 |
| The specification and use of soils with large particles in earthworks   |     |
| <i>M. G. Winter</i> .....   | 213 |
| Perspectives of Rocket Drive Hammers Used for Earth Consolidation on Land and Under Water                                       |     |
| <i>P. Bodurov, V. Genchev</i> .....   | 219 |
| Study on the shear strength of sand at dynamic loading  |     |
| <i>M. Hamova, M. Perikliyska, H. Zayakova</i> .....   | 225 |
| Effect of compaction on uplift capacity of shallow foundations in granular materials  |     |
| <i>I. Tomovski, J. Josifovski</i> .....   | 231 |
| Micromechanical DEM model of dynamic clay compaction  |     |
| <i>C. Jakob, H. Konietzky</i> .....   | 237 |
| Numerical simulation of dynamic soil compaction with vibratory compaction equipment   |     |
| <i>P. Erdmann, D. Adam</i> .....  | 243 |
| Boom-mounted vibratory plates: Machine Parameters and modeling of dynamic compaction of cohesive soils                          |     |
| <i>U. Nohlen, H. Konietzky</i> .....  | 249 |
| Embankment Compaction Control by Nuclear Densimeter and Sand Cone Test  |     |
| <i>A. Santos-Ferreira, C. Santos, C. Rocha, L. Blanco, L. Ribeiro</i> .....   | 255 |
| The effect of vibrated ballast columns used for improvement of difficult foundation soils                                       |     |
| <i>A. Nicuță, A. Ilaș, A. A. Găină, A. M. Nicuță</i> .....  | 259 |
| Prospective movable operating elements (rolls) for vibrating rollers  |     |
| <i>S. V. Saveliev</i> .....   | 265 |
| Influence of relative compaction on the compressibility of silty sands in Kuwait  |     |
| <i>N. F. Ismael, A. Al-Othman</i> .....   | 271 |
| Unterwegs mit TERRA-MIX entlang der Donau von Leipheim bei Ulm bis Constanta am Schwarzen Meer im Dienste der Bodenverbesserung |     |
| <i>M. Bijßmann</i> .....  | 277 |
| Numerical simulation of soil compaction with oscillatory rollers  |     |
| <i>C. Capraru, J. Pistrol, S. Villwock, W. Völk, F. Kopf, D. Adam</i> .....   | 283 |

## DEEP SOIL IMPROVEMENT

### TIEFREICHENDE BODENVERBESSERUNG

Prevention of soil liquefaction using stone or concrete columns

*J. Hleibieh, I. Herle* ..... 291

Long-term observation and numerical assessment of an embankment built on stone-column improved ground

*B. Pulko, J. Logar* ..... 297

Die Anwendungsmöglichkeiten der tiefreichenden Bodenstabilisierung im Eisenbahnbau

*E. Koch, R. Szepesházi* ..... 303

Geotechnische Maßnahmen entlang der Donau - Fallstudien zu Hochwasserschutz und Dammabdichtungen

*C. Sigmund, C. Kummerer* ..... 309

Stand der Technik beim Trockenmischverfahren – Grundlagen und Fallbeispiel

*P. Quasthoff* ..... 315

Triaxial tension test of cement-treated soil

*T. Namikawa, S. Hiyama* ..... 329

Ground improvement methods for the construction of the federal road B 176 on a new elevated dump in the brown coal region of MIBRAG

*J. Kirsten, C. Ahner, S. Uhlemann, P. Uhlich, K. Röder* ..... 335

Numerical Modelling of Soft Soils Reinforced by Rigid Inclusions on the Basis of the Small Scale Experiments Performed in the European Program SERIES

*I. V. Neagoie, L. Batali* ..... 341

1g model tests of conventional and encased stone columns in soft soils

*N. K. S. AL-Saoudi, M. R. Al-Qayssi, Z. W. Abbawi* ..... 347

The influence of rammed stone column formation process on mechanical parameters of the surrounding weak soil

*J. Sękowski, S. Kwiecień, P. Kanty* ..... 353

Cost effective solution for construction adjacent to waterfront structures

*R. Ciortan, S. Manea, G. Tsitsas, M. Dumitru* ..... 359

## SLOPE STABILITY PROBLEMS

### STANDSICHERHEIT VON BÖSCHUNGEN

Comparison of Finite Element Limit Analysis and Strength Reduction Techniques

*F. Tschuchnigg, H. F. Schweiger* ..... 367

Trans-disciplinary Concept of Geotechnical Slope Stability Design

*M. Gwóźdż-Lasoń* ..... 373

Determination of failure probability of an infinite slope in granular soil

*A. Takács, L. Nagy, A. Mahler* ..... 383

|  |     |
|--|-----|
| Highly Slide-Sensitive Slope in the Area of the Western Portal of the Sieberg Tunnel (High Performance Railway Line Vienna - Salzburg) |     |
| <i>P. Waibel, J. Kümmel</i> .....  | 391 |
| Problems of D1 highway construction through landslide areas in Slovakia  |     |
| <i>M. Kopecký, M. Ondrášik</i> .....   | 397 |
| Slope failures on road cut slopes of the R1 expressway (Nitra - Tekovské Nemce) in the Slovak Republic                                 |     |
| <i>F. Baliak, M. Ondrášik, M. Brček, V. Janták, P. Mušec</i> .....   | 403 |
| Hangsicherungen entlang der Bahnstrecke Campina – Predeal  |     |
| <i>A. Brandner, R. Gutsche</i> .....   | 409 |
| Case study: “Umka-Duboko” Landslide  |     |
| <i>B. Jelisavac, Z. Zugic</i> .....  | 417 |
| Deterioration process of a main road, and on the elimination of the problem  |     |
| <i>J. Mecsi</i> .....  | 423 |
| Determination of shallow earthquake geotechnical profile using microtremor array method with semi-circular layout                      |     |
| <i>M. Esfahanizadeh, M. Musivand, R. Yazarloo, H. Mohamadi</i> .....   | 429 |
| Investigation of the possibility for reinforcing of the potentially dangerous slopes in Greek - Bulgarian border region                |     |
| <i>M. Hamova, G. Frangov, H. Zayakova</i> .....  | 435 |
| Structural control of the landslides in the NW Transylvania, Romania   |     |
| <i>E. Dragan, L. Dragan</i> .....  | 441 |
| Effect of axial stiffness on soil nail forces  |     |
| <i>A. Y. Chmoulian</i> .....   | 447 |
| Spideranchor Netting - From life-size experiments to a prototype application   |     |
| <i>G. Supp, R. Marte</i> .....   | 453 |
| Numerical and analytical analysis of road stabilizing pile retaining walls   |     |
| <i>O. Usluogullari, A. Temugan, B. Turkoglu</i> .....  | 459 |
| Monitoring of landslides with a novel device for measuring earth pressures – Inclinodeformeter   |     |
| <i>R. Marte, G. Ausweger</i> .....   | 465 |
| Spezialtiefbaumaßnahmen für den Straßenbau im alpinen Raum   |     |
| <i>C. Kummerer, W. Hippacher, C. Deporta</i> .....   | 471 |
| Stabilization of landslide shifts on the basis of reliability and risk   |     |
| <i>S. Matsiy, E. Bezuglova, M. Kolomiets</i> .....   | 477 |
| Degradations of the roads from the North-East of Romania and the rehabilitation solutions  |     |
| <i>A. Stanciu, I. Lungu, O. Laicu, B. I. Teodoru</i> .....   | 483 |
| Static liquefaction of loose coal ash  |     |
| <i>J. Yan, S. R. Lo, M. M. Rahman, J. Zhang</i> .....  | 489 |

|   |     |
|---|-----|
| Strength characteristics and stability analysis of a road damaged by landslides<br><i>R. M. Chirila, D. E. Grigore, D. Carastoian, N. Boțu</i> .....  | 495 |
| Investigation of a landslide that affect a national road in Romania<br><i>N. Boțu, D. E. Grigore, R. M. Chirilă, G. B. Cazacu</i> .....   | 501 |
| Monitoring consolidation works executed on a road by inclinometer measurements<br><i>D. E. Grigore, V. Mușat, R. M. Chirilă, D. Carastoian</i> .....  | 507 |
| The use of geosynthetics to consolidate an access road<br><i>N. Boțu, R. M. Chirilă, D. E. Grigore, G. B. Cazacu</i> .....  | 515 |
| Using the results from inclinometer measurements for choosing road consolidation solution<br><i>D. E. Grigore, R. M. Chirilă, V. Mușat, N. Boțu</i> .....                                   | 523 |
| Modeling and stability calculations for transport infrastructure by numerical methods<br><i>R. M. Chirila, D. E. Grigore, V. Musat</i> .....  | 529 |
| Trench strengthening in the restrained conditions of urban development with allowance for the magnitude 8 seismic loads<br><i>Iu. Kaluikh, V. Senatorov, K. Khavkin, K. Silchenko</i> ..... | 535 |
| Numerical Simulation of Layered Rock Masses Movement<br><i>A. K. Alzo'ubi</i> .....   | 541 |
| Bio-engineering erosion control systems on engineered slopes of road embankments<br><i>E. Koda, P. Osiński</i> .....  | 547 |
| Slopes stabilization works for motorways that are under construction in Romania<br><i>A. Ungureanu, G. Alexandru, C. Stanciu, S. Manea</i> .....  | 553 |
| Slope stability in relation to urban and environmental planning<br><i>M. Guri, L. Bozo, S. Allkja</i> .....   | 559 |
| Examples of Drainage by Siphon Drains in Austria<br><i>O. Mrvík, R. Stump, M. Glück, S. Bomont, B. Vrábel</i> .....   | 565 |
| Damage to road excavation slopes due to groundwater flow<br><i>Z. Lechowicz, K. Garbulewski, P. Król, W. Matusiewi</i> .....  | 571 |
| <b>FREEZING-THAWING PROBLEMS OF ROADS, RAILWAYS</b>   |     |
| <b>FROST-TAUWECHSELBEANSPRUCHUNGEN IM STRASSEN- UND<br/>EISENBAHNBAU</b>  |     |
| Energy saving potential of artificial ground freezing applications<br><i>R. Schüller, M. Ziegler</i> .....  | 579 |
| Die Wechselwirkung Wasser-Mineralkorn und seine Bedeutung für das Frost-Tau-Verhalten von ungebundenen Tragschichten<br><i>O. Leibniz</i> .....   | 585 |
| Effect of moulding water content on freezing-thawing behavior of compacted two clayey soils<br><i>F. IşıkI, S. Arasan, A. S. Zaimoğlu, R. K. Akbulut</i> .....                              | 591 |

## VOLUME 2

### SOIL STABILIZATION WITH LIME, CEMENT, ETC.

### BODENSTABILISIERUNG MIT KALK, ZEMENT ETC.

Pond ash as a low strength flowable fill

*K. L. Dev, R. G. Robinson*.....599

Variations of liquefaction strength induced by the different injection processes in the permeation grouting method

*K. Zen, K. Hayashi, H. Yamazaki, M. Hirasawa*.....605

Microstructure and Physicochemical Study on Cement Treated Chennai Marine Clay

*P. Subramaniam, S. Banerjee*.....615

Strength and Durability Performance Evaluation of Selected Cement-Stabilized Philippine Soils for Road Pavement Purposes

*J. A. S. Victor*.....621

Pozzolana-cement stabilisation of a black cotton soil from Ghana

*S. S. R. Gidigasu, S. K. Y. Gawu* .....629

Study of sand behaviour improvement using biogrouting

*V. Fărcaş, I. C. Molnar, M. I. Máté, Zs. Kaltenbacher, L. Kopenetz*.....635

The effect of freeze-thaw cycles on the lime-stabilized active clays

*A. Hotineanu, A. Stanciu, I. Lungu*.....641

The influence of the swelling-shrinkage cycles on the stabilized Bahlui clay with eco-cement

*M. Aniculăesi, I. Lungu, A. Stanciu*.....647

Design of a municipal solid waste landfill in difficult geotechnical conditions: slope area and expansive clays. Case study from Romania

*E. Olinic, S. Manea, T. Ivasuc*.....653

Verifications of results of numerical modelling of real scale permeation grouting

*M. B. Demchuk, O. G. Nakonechnyi* .....659

Stabilization of high plasticity clay with quick and hydrated lime

*A. Kavak, M. M. Kızılçelik, G. Bilgen* .....665

The effectiveness of forest road strengthening with catalytic-physical technology

*A. Sióderek, J. Sękowski, M. Grygierek*.....673

Theoretical and field studies of soft ground for improvement with reinforced pad

*Ch. Kolev, L. Mihova* .....679

Verfahren zur Ermittlung der rheologischen Eigenschaften zementbasierter Injektionssuspensionen

*A. Kainrath, D. Adam, H. Krenn*.....685

## EARTHWORKS, MAINLY EMBANKMENTS

### ERDARBEITEN, DÄMME IM STRASSEN- UND EISENBAHNBKAU

|  |     |
|--|-----|
| Centrifuge modelling of compacted clay embankments subject to seasonal moisture changes<br><i>P. Hudacsek</i> .....  | 693 |
| Analysis of the Influence of Embankment Widening on Layered Foundation Soils<br><i>Z. Akbay Arama, S. F. Çinicioglu</i> .....  | 701 |
| Comparative analysis of settlements of an embankment on Pappadai clay<br><i>N. Jurecic, G. Vilhar, V. Jovicic</i> .....  | 711 |
| Grading entropy and degradation of sands<br><i>J. Lőrincz, P. Q. Trang, E. Imre, M. Juhász, G. Telekes, V. P. Singh, S. Fityus</i> .....                                       | 717 |
| Role of Probabilistic Methods in Sustainable Geotechnical Earthen Embankment Overtopping Analysis<br><i>H. Hamedifar, R. G. Bea, J. M. Pestana-Nascimento, E. M. Roe</i> ..... | 723 |
| Resistibility of fine-grained soils to water infiltration through road embankment<br><i>A. Lada, K. Garbulewski, M. Kruk</i> .....   | 729 |
| Permeability of well graded soils<br><i>L. Nagy, A. Mahler</i> .....   | 735 |
| Plastic Stability Approach for the Collapse Mechanism of Embankments<br><i>C. Öser, S. F. Çinicioglu</i> .....   | 743 |
| Constanta Port Northern Breakwater Extension<br><i>C. Martincu, V. Dumitrescu, A. Galbinasu</i> .....  | 751 |
| Geotechnical challenges during design and construction of a ski resort in Azerbaijan<br><i>A. Kirsch, W. Felber, Th. Marcher, W. Fuchs</i> .....                               | 757 |
| Optimiertes Datenmanagement, Steuerung und die hohe Kunst der Kommunikation bei Großprojekten<br><i>I. Reichl, U. Michels, C. Spang</i> .....                                  | 763 |
| Failure of highway embankment as a result of inadequate subsoil identification<br><i>L. A. Kumor, M. K. Kumor, Z. Mlynarek</i> .....   | 769 |
| Levee erosion and scour potential due to floodwall overtopping<br><i>A. Osouli, M. Karimpour, S. Zamiran, D. Ruholl, B. Behrends, E. Stendback, K. Galle</i> .....             | 775 |
| Vergleichende Untersuchungen zur Reduktion der Strömungskräfte bei Hochwasserschutzdeichen<br><i>M. Seidl, R. A. Herrmann, M. Löwen</i> .....                                  | 781 |

## USE OF WASTE MATERIAL AND INDUSTRIAL BYPRODUCTS

### VERWENDUNG VON RECYCLINGMATERIALIEN UND INDUSTRIELLEN NEBENPRODUKTEN

|  |     |
|--|-----|
| Investigations of unburnt coal shale modified by activated fly ash as material for road embankments<br><i>C. Kraszewski, L. Rafalski, J. Wilczek</i> ..... | 789 |
|--|-----|

|   |     |
|---|-----|
| Compression behaviour of cement-solidified marine soils under surcharge load<br><i>D. Wang, L. Korkiala-Tanttu, N. E. Abriak</i> .....  | 795 |
| The undersized crushed stone material from mining for railway subgrade reinforcing<br><i>A. A. Zaytsev, V. V. Naumov, M. G. Rumin, D. V. Larina</i> .....   | 801 |
| A case study for the potential uses of the construction and demolition waste for roadway and railway infrastructures: The Turkish transportation and urban regeneration experience<br><i>N. Ö. Bezgin, S. C. Tanrıverdi, M. Karasahin</i> ..... | 805 |
| <b>BRIDGE FOUNDATIONS</b>   |     |
| <b>FUNDIERUNG VON BRÜCKEN</b>   |     |
| Combined static and dynamic pile load test programme on the Hungarian M6-M60 motorway project<br><i>P. Schell, R. Szepesházi, L. Szilvágyi, Á. Wolf</i> .....   | 813 |
| Der Ausbau der S 33 Kremser Schnellstraße als Teil des Regionenrings - Spezialtiefbau südlich und nördlich der neuen Donaubrücke Traismauer<br><i>M. Fross</i> .....  | 819 |
| Piling Foundations on Challenging Ground Conditions in Kazakhstan<br><i>A. Zh. Zhussupbekov, Ye. B. Uteporov, I. O. Morev</i> .....   | 825 |
| Settlement of bridge pier – assumptions and facts<br><i>P. Turček, J. Frankovská</i> .....  | 831 |
| Kolkschaden an einem Brückenpfeiler und (geo-)technische Maßnahmen zur Rückdrehung und Sicherung des Pfeilers<br><i>F. Rathmair, J. Zauner, R. Marte</i> .....  | 837 |
| Kleine Brücke – große Schwierigkeiten<br>ÖBB Klammsteinbrücke: Unterschiedliche Gründungskonzepte für die Widerlager und Ausführungsprobleme<br><i>M. Premstaller</i> .....   | 843 |
| Rehabilitation techniques of bridge foundations in Romania<br><i>C. C. Comisu, A. Stanciu, I. Lungu, G. Boaca</i> .....   | 849 |
| Parametric study regarding the interaction between direct foundations for bridge piers and foundation soil<br><i>I. B. Teodoru, V. Mușat, A. Stanciu, I. Lungu</i> .....  | 855 |
| The initial critical pressure for bridge foundations<br><i>F. Bejan, A. Stanciu, I. Lungu</i> .....   | 861 |
| Load test of large diameter piles for the bridge across Danube river in Belgrade<br><i>D. Rakić, N. Šušić, I. Basarić, K. Doković, D. Berisavljević</i> .....   | 867 |
| Application of geotechnical technologies at elimination of failure of overhead road structures<br><i>V. Shokarev, V. Grechko, I. Moskalina</i> .....  | 873 |
| Analysis of instrumented load tests of bored piles embedded in fissured rock overlaid by loess<br><i>I. Răileanu, S. Drăghici, T. Saidel</i> .....  | 879 |

|  |     |
|--|-----|
| Research into time effect influence on pile bearing capacity<br><i>A. B. Ponomaryov, A. V. Zakharov, M. A. Bezgodov</i> .....  | 885 |
| Case History on Determination of old Bridge Foundation Depths using Parallel Seismic Method<br><i>I. Tomac, A. Salković, D. Pešt</i> .....   | 893 |
| <b>RETAINING STRUCTURES</b>  |     |
| <b>STÜTZKONSTRUKTIONEN</b>   |     |
| Hydraulic heave – new design formula for the embedded length<br><i>B. Aulbach, M. Ziegler</i> .....  | 901 |
| Deformations of soil in deep excavations: comparing calculation results with in-situ measurements<br><i>V. M. Ulitsky, A. G. Shashkin, K. G. Shashkin, M. B. Lisyuk, V. A. Vasenin</i> ..... | 907 |
| Numerical modelling of 16 m deep underground structure<br><i>J. Josifovski, S. Gjorgjevski, B. Susinov</i> .....   | 915 |
| Designing and analyzing lightweight cementitious fills for retaining structures<br><i>R. P. Ray</i> .....  | 923 |
| Initiative on Improving the Practicability of Technical Rules for Building Construction - Results for Eurocode 7<br><i>B. Schuppener, Th. Richter, F. Ruppert, M. Ziegler</i> .....          | 929 |
| Rehabilitation of retaining wall on state road A3, section Trojaci - Farish<br><i>Lj. Dimitrievski, D. Ilievski, D. Dimitrievski, B. Bogoevski, A. Strasheski</i> .....                      | 935 |
| Mechanically stabilized earth wall - a case history<br><i>P. Kvasnička, L. Sorić, K. Gradiški, M. Marohnić</i> .....   | 941 |
| Semmering-Basistunnel neu – geotechnische Herausforderungen bei Planung und Bau der Deponie Longsgraben<br><i>G. Nipitsch, H. Schuller, T. Schachinger</i> .....                             | 947 |
| Besonderheiten und Erfahrungen mit geogitterbewehrten Stützwänden bei der Ringstraße von Sofia, Bulgarien<br><i>D. Alexiew, S. Jossifowa</i> .....   | 953 |
| Geotechnical solutions for landslide instability in quasi-horizontal terrains on an auto-route in eastern Romania<br><i>M. Stanescu, S. Manea, M. Munteanu, E. Oltean</i> .....              | 959 |
| Deep excavation support system inside the Centennial Hall in Wrocław<br><i>O. Puła, J. Krążlewski</i> .....  | 965 |
| Preliminary study on finite element modelling of earth retaining wall anchored by deadman anchorage<br><i>K. S. Chai, S. H. Chan</i> .....   | 971 |
| Finite Element Analysis for the Retaining Wall with Relief Shelves<br><i>H. F. Shehata</i> .....   | 977 |

|   |      |
|---|------|
| Particularities in the calculation of active earth pressure on retaining walls imposed by the plane strain condition                          |      |
| <i>S. Cioara, A. Stanciu, I. Lungu</i> .....  | 985  |
| Dynamic analysis of a cantilever retaining wall including soil-structure interaction  |      |
| <i>T. Cakir</i> .....   | 991  |
| Influences of backfill properties and stress state on ultimate earth pressure coefficients  |      |
| <i>A. Altunbas, A. T. Gezgin, B. Soltanbeigi, O. Cinicioglu</i> .....   | 997  |
| Finite element based investigation of backfill effects on seismic behaviour of a cantilever wall  |      |
| <i>T. Cakir</i> .....   | 1003 |
| The Observational Method in the rehabilitation of south road access to Ericeira harbour (Portugal)  |      |
| <i>M. Cabral, A. Santos-Ferreira, A. P. F. da Silva, F. M. Ferreira, R. Silva</i> .....   | 1009 |
| Monitoring of a deep excavation from Bucharest sustained by anchored diaphragm walls  |      |
| <i>A. Ene, D. Marcu, H. Popa</i> .....  | 1015 |
| Testing of ground anchorages for a deep excavation retaining system in Bucharest  |      |
| <i>A. Ene, D. Marcu, H. Popa</i> .....  | 1021 |
| Numerical study of the influence of dilatancy angle on bearing capacity and rotation of a gravity retaining wall                              |      |
| <i>M. Kowalska</i> .....  | 1027 |
| Numerical Modeling of the Screw-Pile Behavior under Tensile Loading in Cohesionless soil  |      |
| <i>L. Salhi, O. Nait-Rabah, C. Deyrat, C. Roos</i> .....  | 1033 |
| Deep excavation in difficult conditions – design of retaining structure, challenges and solutions   |      |
| <i>A. Szerzo</i> .....  | 1039 |
| Earth Pressures of Clayey Backfilled Retaining Walls Under Seismic Loading  |      |
| <i>S. Zamiran, A. Osouli</i> .....  | 1045 |
| <br>GEOSYNTHETICS IN ROAD AND RAILWAY ENGINEERING   |      |
| GEOKUNSTSTOFFE IM STRASSEN- UND EISENBAHNBKAU   |      |
| Prestressed reinforced soil for infrastructure projects – a microscopic research  |      |
| <i>C. Lackner, R. Marte, D. T. Bergado, S. Semprich</i> .....   | 1055 |
| Influence of geosynthetics into base course on a weak segment of runway   |      |
| <i>S. Widodo, N. Tamascovics, H. Klapperich</i> .....   | 1061 |
| Piled embankments in soft estuary clay - Experience from design and field measurements for redevelopment of harbour areas in Northern Germany |      |
| <i>L. Vollmert</i> .....  | 1069 |
| Design of steep motorway bridge approach embankment reinforced by geosynthetics   |      |
| <i>M. Vaníček</i> .....   | 1077 |

|   |      |
|---|------|
| Wire mesh reinforced soil structures in railway applications: experiences and feedbacks<br><i>M. Vicari, P. Di Pietro</i> .....   | 1083 |
| Stabilization of a road embankment on sabkha soil using geosynthetics<br><i>B. Moussai</i> .....  | 1089 |
| Working mechanism of geocell systems<br><i>A. Emersleben</i> .....  | 1095 |
| Behavior of volcanic slag reinforced with randomly distributed fibers and cement additive<br><i>M. Hilmi Acar, G. Budak, A. N. Akçal, A. U. Uzer, M. Olgun, Z. Maraşlı</i> .....                          | 1101 |
| Safety Barriers along High Speed Railway Lines<br><i>P. Di Pietro</i> .....   | 1107 |
| Case study for rehabilitation and reconstruction works of the existing asphalt roads in R.Macedonia<br><i>Lj. Dimitrievski, D. Ilievski, D. Dimitrievski, Z. Ivanoski</i> .....                           | 1117 |
| Selected criteria determining alluvial deposits for earthen structures<br><i>Z. Młynarek, K. Stefaniak, J. Wierzbicki</i> .....   | 1123 |
| Bearing capacity and deformation of reinforced soil foundations under cyclic loading<br><i>T. Ilizar, Mirsayapov, V. Irina1, Koroleva</i> .....   | 1129 |
| <b>TUNNELLING</b>   |      |
| <b>TUNNELBAU</b>  |      |
| Geotechnical interaction between traffic infrastructure, existing structures and groundwater<br><i>R. Katzenbach, C. Bergmann, S. Leppla, T. Ruppert, A. Weidle</i> .....                                 | 1137 |
| Erfolgsfaktoren für eine gelungene Injektion am Beispiel der Vergütung von verkarstetem Gebirge in einem Hochgeschwindigkeitseisenbahntunnel<br><i>I. Reichl, J. Seegers, M. Lotter, M. Prosser</i> ..... | 1143 |
| Linie U1 Wien, Baulos U1/10 „Troststraße“ – Geotechnische Planung der Stationsschächte und -tunnel<br><i>C. Suchmann, T. Herzfeld, A. Leitner, I. Gartner</i> .....                                       | 1149 |
| Geotechnische Aspekte bei der Planung des S1 Tunnels Donau-Lobau<br><i>T. Schröfelbauer, B. Schreitl, P. Drucker</i> .....  | 1155 |
| New methods of design and construction of tunnels, subways in the ground arrays of tectonic disturbances<br><i>G. Rozenvasser, S. Malikov, A. Duvanskiy</i> .....   | 1163 |
| Undrained behavior of chalk marl under different stress paths simulating tunneling process<br><i>N. M. Al-Mohamadi</i> .....  | 1169 |
| TBM performance prediction in mixed ground<br><i>Á. Tóth</i> .....  | 1175 |
| Der Semmering-Basistunnel neu – das Projekt im Überblick<br><i>G. Gobiet</i> .....  | 1183 |

|  |      |
|--|------|
| Die Schachtbauwerke des Semmering-Basistunnel neu - Geotechnische und baubetriebliche Gesichtspunkte   |      |
| <i>P. Erdmann, O. K. Wagner, M. Rupnig, J. Daller</i> .....  | 1189 |
| Geotchnical Aspects of Safety Assurance for Long-Used Engineering Infrastructure Facilities in Large Cities in Complicated Ground Conditions |      |
| <i>N. A. Perminov</i> .....  | 1195 |
| Modern solutions to perform urban underground constructions for transportation infrastructures in Romania                                    |      |
| <i>C. C. Comisu, A. Stanciu, I. Lungu, G. Boaca</i> .....  | 1201 |
| Comparison of predicted and actual conditions of the rock mass in the tunnel Crna Brda   |      |
| <i>K. Ravnjak, G. Grget, M. S. Kovačević</i> .....   | 1207 |
| Research of technology of construction of horizontal impervious screen under the existing structures.  |      |
| <i>A. Galinskiy</i> .....  | 1213 |
| On the magnitude and direction of displacements during tunnelling in foliated rock mass  |      |
| <i>J. Klopčič, J. Logar</i> .....  | 1221 |

# 50th Anniversary of Danube-European Conferences on Geotechnical Engineering

50-jähriges Jubiläum der Donau-Europäischen Konferenzen für Geotechnik

1964 - 2014

