

IGS NEWS



NEWSLETTER OF THE INTERNATIONAL GEOSYNTHETICS SOCIETY

Dedicated to the scientific and engineering development of geotextiles, geomembranes, related products, and associated technologies

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General Information for IGS Members

Summary of 2015 IGS Chapter Activities



Chungsik Yoo,
IGS Vice
President

The IGS has been using the standard reporting form for chapter reports that allows IGS to understand the activities being carried out at local, regional and international level. The results have been compiled and presented here to show the technical activities by our chapters for the year 2015. Of the chapters requested to submit a report, 85% of the chapters (7% increase from 2014)) successfully submitted by 6 April 2016.

Shown in Figure 1 is the total number of technical activities conducted in 2015 by chapters as a lead organization or as a collaborating organization. The numbers for each activity have shown some increases from those of the year 2014 with 37 technical conferences, 10 workshops, 23

short courses, 21 main lectures, and 27 other activities. These impressive number of technical activities were supported by a significant number, over 221, of board/committee meetings including in-person and conference calls, were held by the chapter officers and members.

In order to make quantitative assessment for each chapter's technical activities, IGS has developed an index, Activity Index, defined as a weighted average of the self-reported technical activities. It should be noted that the weighting system considers impact of each activity by assigning more weights on, for example, conferences and events organized by chapters, etc. The purpose of the assessment is not only to recognize chapters with

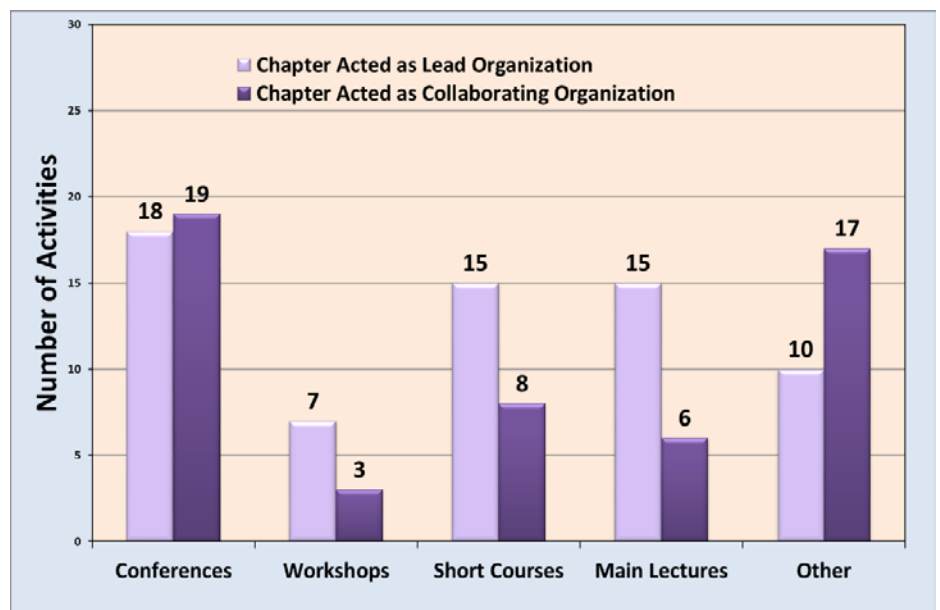


Figure 1: Number of activities conducted in 2015 by IGS Chapters

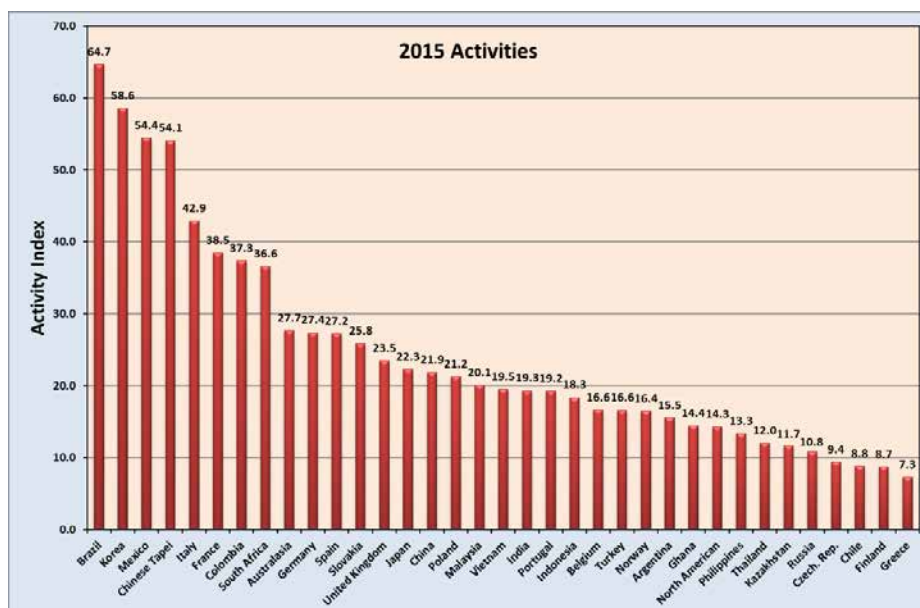


Figure 2: Activity Index for 2015 based on chapter reports submitted

strong activities but also to identify chapters in need of support from IGS. Figure 2 which show Activity Index values based on the numbers reported by the chapters. Although these values may include some degree of subjectivity, these data certainly help identify chapters in need of support in coordinating future technical activities. As shown, Brazil, Korea, Mexico, Chinese Taipei, and Italy have been identified as more active chapters with high Activity Index values.

Figure 3 shows planned activities for 2016. As shown, 34 conferences, 25 workshops, 28 short courses, and 30 main lectures are planned. These numbers are slightly higher than those for 2015, suggesting that the chap-

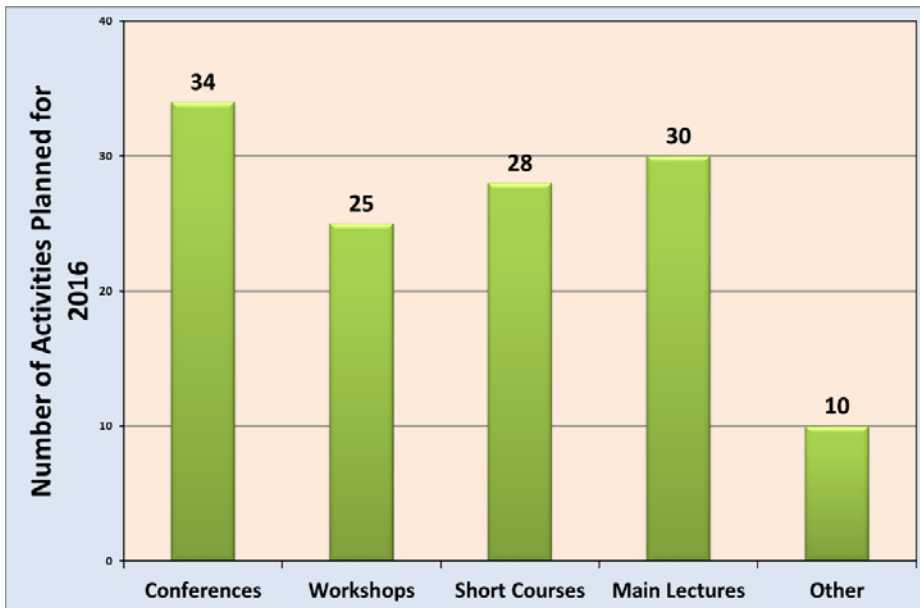


Figure 3: Planned activities for 2016 by IGS Chapters

ters are getting more active in terms of technical activities. When considering the 5 non-reporting chapters, these numbers are likely to increase.

As reported above, the chapters of IGS have shown health numbers in terms of technical activities, which is of paramount importance for a learned scientific and engineering society. Still, the number 124, planned activities for 2016, is quite high but I hope to see more activities than planned in the next year's chapter reports.

As a final note, there are a number of chapters in formation in such countries as Tunisia, Egypt, Austria, Switzerland, Myanmar, Nigeria, and Slovenia. It is hoped that I will have a chance to officially

announce the formation of these chapters in the next chapter activities report for 2016.

Conference Reports

A Capsule Summary of GeoAmericas 2016

10 – 13 April 2016, Miami Beach, Florida, USA



The GeoAmericas 2016 Conference held April 10-13, 2016 at the Loews International Hotel in Miami Beach, FL., attracted over 1100 participants from all areas of the world, 80 exhibitors, along with several related association exhibits and upcoming geo-conferences exhibits.

Prior to the opening keynote address on Sunday afternoon, four full day, and nine half day short courses, with a full range of subjects covered, were offered.

The conference was officially opened on Sunday afternoon with the keynote address by Prof. Neil Dixon and Dr. Gary Fowmes from Loughborough University in the UK. Their subject was "Global Challenges, Geosynthetic Solutions and Counting Carbon. Following the keynote address an opening reception signaled the opening of the Exhibit Hall. Traffic through the exhibits appeared to be steady throughout the entire conference.

Monday kicked off with the keynote address by Dr. Robert Koerner, GSI, US, titled "Lifetime Predictions of Exposed Geotextiles and Geomembranes." Following the lecture, the remainder of the day was filled with four 90 minute technical sessions. Each of the four sessions had 7 concurrent activities including paper presentations, panel discussions, or training lectures. The day closed out with a beach volleyball tournament hosted by the young professionals.

The keynote address on Tuesday titled, "Call to Action - The Urgency to Protect our Coastal Communities," was given by Dale Morris, Senior Advisor at the Royal Netherlands Embassy in Washington, DC, and Nathalie Olijslager-Jaarsma, Consul General of the Kingdom of Netherlands in Miami. As on Monday, the remainder of the day was filled with 90 min technical sessions. The day closed with the "Havana Night" reception held outside. As part of this activity a "Bon Voyage" celebration was held wishing Dr. J.P Giroud and his wife, Genevieve well as they move back to France. Several of Dr. Giraud's friends and associates shared some "fond memories" of their association with him over the years. In his remarks Dr. Giroud indicated that he promised his wife that he would not be working full time. He said this meant "12 hours a day instead of 24."

Following a final series of technical sessions on Wednesday morning, Dr. Jorge Zornberg, University of Texas, Austin, gave the closing keynote address. The presentation, "Stabilization of Paved Roads Using Geosynthetics," was the 2015/2016 Mercer Lecture.

Following the Mercer Lecture, expressions of appreciation were given to the organizing committee members, and particularly to Elizabeth Peggs and her staff for all their efforts in making the conference the huge success that it was.

There were several awards given out during the Conference:

Chapter Service Awards

- Boyd Ramsey – IGS-North America – For outstanding leadership efforts and energy as Chair for “Educate the Educator.”
- Marcos R. Darqui – Argentina – For outstanding dedication to the Argentinian Chapter of the IGS.

Student Awards

- Paula Vettorelo – Argentina – “Geosynthetic Reinforcement of Buried Flexible Pipes”
- Jose Orlando Avesani Neto – Brazil – “Design of a Calculation Method for Geocell-Reinforced Soils and Verification Through Bearing Capacity Laboratory Experiments”
- Edwin Fernando Ruiz – Columbia – “Geosynthetic-Reinforced Embankments on Soft Soils: Numerical Analysis of the Strain Mobilization in Reinforcement During Consolidation Process”
- Lucia Isabel Davila Cardona – Honduras – “Study of Flow Through Mechanical Damages in PVC Geomembranes Under High Hydraulic Heads”
- Daniel Jones – North America – of Geosynthetic Clay Liners for Use in Antarctica”

20 Year Corporate Member Award

- Presto Geosystems

30 Year Corporate Member Award

- Geosynthetic Materials Association

It was announced at the Conference that NAGS will be doing business as IGS-North America as a result of membership approval earlier in the year.

For those that did not have a full registration, or were unable to attend the conference, the proceedings are available for \$75 for the three volumes. Go to www.geoamericas2016.org and click on the “Proceedings” tab at the top of the page.

Reported by

David Suits, Executive Director of IGS-North America

Announcement of the International Conference of IGS

11th ICG International Conference on Geosynthetics Geosynthetics : Innovative Solutions for Sustainable Development Seoul, Korea, 16 – 21 September 2018



On behalf of the Organizing Committee, it is my great honor and pleasure to invite you to the 11th International Conference on Geosynthetics (11ICG), which will be held in Seoul, Korea from September 16 to 21, 2018.

The Korean Geosynthetics Society (KGSS) will have the privilege of hosting 11ICG in Korea, and plans to go to great lengths to ensure the conference surpasses all expectations. The 11ICG will provide all participants a firm platform for a meaningful academic, professional, social and cultural experience. The theme of the 11ICG is “Geosynthetics: Innovative Solutions for Sustainable Development,” and will cover diverse disciplines of geosynthetics from fundamentals to applications.

With the vision of making a multidisciplinary conference for the geosynthetics industry and engineers, we plan to

offer special events as well as a very dynamic and stimulating array of scientific and practical engineering programs. At 11ICG, academia and industry will gather in force to not only show their best, but to share valuable ideas and develop new friendships.

11ICG will provide a comprehensive overview of the most recent developments in the field of geosynthetics, the latest technologies and applications, and a unique and extensive technical exhibition. With fascinating ancient traditions and ultramodern lifestyle, the city of Seoul will surely be the center of many unforgettable moments.

We look forward to welcoming you in Seoul, Korea!

Sincerely yours,



Prof. Chungsik Yoo
 Chair, Organizing Committee of 11ICG
 Vice President, International Geosynthetics Society
 President, Korean Geosynthetics Society

Preliminary Program

	Sep.16 (Sun)	Sep.17 (Mon)	Sep.18(Tue)	Sep.19 (Wed)	Sep.20 (Thu)	Sep.21(Fri)
08:00						
09:00		Opening Ceremony				
10:00		Plenary Lecture	Plenary Lecture	Plenary Lecture	Plenary Lecture	Technical Visit
11:00		Break	Break	Break	Break	
12:00		Plenary Lecture	Parallel Sessions	Parallel Sessions	Parallel Sessions	
13:00		Lunch	Lunch	Lunch	Lunch	
14:00		Parallel Sessions	Parallel Sessions	Parallel Sessions	Parallel Sessions	
15:00		Registration & Exhibition	Registration & Exhibition	Registration & Exhibition	Registration & Exhibition	
16:00		Break	Break	Break	Closing Ceremony	
17:00		Parallel Sessions	Parallel Sessions	General Assembly		
18:00	Welcome Reception	Happy Hour	Special Event	Conference Dinner	IGS Council Dinner	
19:00						
20:00						

Important dates:

- 31 March 2017 Abstract Acceptance Notice
- 29 September 2017 Paper Submission Deadline
- 29 December 2017 Paper Acceptance Notice
- 30 March 2018 Final Paper Submission Deadline
- 30 March 2018 Early Registration Deadline

EuroGeo6

6th European Regional Conference on Geosynthetics

Relocated to Ljubljana, Slovenia, 25 – 28 September 2016



HOSTED BY



TURKISH CHAPTER

We would like to inform you about an important change regarding the the 6th EuroGeo Conference (EuroGeo6), originally planned to take place in Istanbul, Turkey. Due to unforeseeable circumstances, the Turkish Chapter of IGS is pleased to announce that the 6th EuroGeo Conference (EuroGeo6) will take place on September 25 - 28, 2016 in the Gospodarsko Razstavišče Ljubljana Exhibition and Convention Centre, Ljubljana, Slovenia. This proposal has been officially approved by the Local Organizing Committee of EuroGeo6 on 29 June 2016.

We are convinced that Ljubljana is an excellent alternative and very attractive destination for everyone planning to attend the 6th EuroGeo Conference (EuroGeo6). The dates remain the same - from 25 September to 28 September 2016 - to not further interfere with your planning. Of course, the Turkish Chapter of IGS and the existing Organizing Committee will continue to resume full responsibility. We are excited to offer same Exhibition possibilities, registration fees, the scientific and cultural feast of a lifetime to one of the most refined crowd in the profession, in one the most welcoming, imitably exciting venues of the world and the essence of warm Turkish hospitality.

Congress Venue will be the Gospodarsko Razstavišče – Ljubljana Exhibition and Convention Centre, located in a central region. Ljubljana is situated in a location that international airlines may easily reach. For more information visit <http://www.ljubljanafair.com/> and <https://www.visitljubljana.com/en/visitors/>.

Naturally, the main excitement of the Conference will be in its technical contributions. Undoubtedly, the time period between since the last great events and this conference in 2016 will bring new materials and reforms to the geosynthetics industry; all of these developments will be well reflected in the scientific program of the EuroGeo6 conference.

We are looking forward to seeing academicians, manufacturers, practitioners and designers in the geosynthetics field at EuroGeo6. We want to extend a special invitation to engineers in general contracting firms, who will widely benefit from the Conference by learning more about the extraordinary financial and technical advantages geosynthetics provide. In an environment where the number of “Design-Build” and “Build-Operate-Transfer” types of contracts all around the world is multiplying, passing on such information to general contractors becomes of great importance.

As the months leading up to the Conference unfold, you will be provided with more information. We can still guarantee that the EuroGeo6 Conference in 2016 will be an opportunity for all who attend to experience a valuable technical program, a magnificent city, and warm Turkish hospitality.

Important dates

17 July 2016:	Notification of paper acceptance, review comments provided
08 August 2016:	Early registration closes
	Deadline for registration of at least one of the authors for a paper to be published
29 August 2016:	Deadline for revised paper submission
25 September 2016:	Congress opens

Proposed Sessions for EuroGeo6

- Agricultural Applications
- Coastal Protection
- Direct and Life-Cycle Cost Savings
- Drainage and Filtration
- Durability
- Embankments on Soft Soils
- Environmental Benefits
- Geosynthetics as Formwork
- Hydraulic Applications
- Innovations and New Developments
- Landfills
- Lightweight Construction
- Mining
- Monitoring
- Pavements
- Physical and Numerical Models
- Polymeric and Clay Geosynthetic Barriers
- Properties and Testing

- Quality Control and Quality Assurance
- Reinforced Walls and Slopes
- Roads, Railroads and Other Transportation Applications
- Seismic Applications
- Sustainability
- Unpaved Roads
- Wastewater and Fresh Water Storage



Daniele Cazzuffi

A new lecture series has been accepted by IGS to be delivered at each Regional European Geosynthetics Conference. The lecture series has been named as L.M.N.S. lecture after E. Leflaive (Chairman, France), A. McGown (United Kingdom), J. Nieuwenhuis (Netherlands) and M. Sotton (France) who were the four-members of the organizing committee of the first International Conference of Geosynthetics which took place in Paris, France, in April 1977. The first L.M.N.S. Lecture will be delivered by Dr. Daniele Cazzuffi.

L.M.N.S. Lecture: Evolution in design of geotextile filters

The keynote lecturers and their topics are also fixed.



Philippe Delmas

The Behaviour of "Alive" Earthworks with Geosynthetics after Several Decades



Jean-Pierre Gourc



Nicola Moraci

Geosynthetics Interface Properties under Static and Dynamic Loads



Chungsik Yoo

Geosynthetics in Underground Constructions



Martin Ziegler

Geosynthetic Reinforcement Applications

At the EuroGeo6 conference several "Specialty Session"s are organized. These sessions consist of invited lectures and the information given in these presentations will reflect the scientific level the industry has reached in this area. Experts who are world known in their fields will organize each session.

Organizers of the Specialty Sessions:

Geosynthetic Barriers

Geosynthetics in Dam Construction

Geosynthetic Reinforcement Applications



Kent von Maubeuge



Dr. Nathalie Touze-Foltz



Dr. Eng. Alberto Scuero



Gerhard Bräu

Geosynthetics in Road Construction



Professor Erol Tutumluer

Surface Erosion Control and Drainage



Pietro Rimoldi

Geosynthetics Under Earthquake Shaking



Professor George Athanasopoulos

Wrinkles, Bridging, and Ballasting Geomembrane During Liner Installation



Dr. Ian Peggs

For more information

Please consult the conference website, <http://www.eurogeo6.org/en/> for the latest announcements.

Contact info@eurogeo6.org with questions.

GeoAsia6 6th Asian Regional Conference on Geosynthetics New Delhi, India, 8 – 11 November 2016



6th Asian Regional Conference on Geosynthetics
Geosynthetics for Infrastructure Development
8-11 November 2016, New Delhi [India]

India is a fast developing economy requiring large scale infrastructures. Liberalization of the economy has further facilitated planning and execution of many large scale infrastructures, including roads, railways, power and water resources, which will further promote applications of Geosynthetics for infrastructural works. Spending in XII Plan (2012 - 17) in infrastructure is estimated to be USD 01 Trillion, which is expected to grow for infrastructure activities for the XIII Plan (2017 - 2022).

6th Asian Regional Conference would be a step towards providing opportunity for exchange of experiences, practices and collaborations to facilitate flow of appropriate technology to enable successful implementation of infrastructure projects. It will be organized by the Indian IGS Chapter under the auspices of the IGS. Twelve different Indian Government organizations and ministries have taken keen interest in the conference topics and will be supporting the conference.

Main Theme of the Conference

Geosynthetics for Infrastructure Development

Sub-Themes

- Roads and Railways
- Hydraulic Applications
- Ground Improvement
- Reinforced Application
- Coastal and River Bank Erosion
- Environmental Applications
- Underground Structures (Tunnels, Excavations, etc.)
- Natural Fibre Geotextiles
- Geosynthetic Testing

Venue - Manekshaw Centre, Delhi

Manekshaw Centre, in the Cantonment area of Delhi, is a multi-utility, state of art Expo & Convention Centre, spread over 25 acres of landscaped area. The elegant interior décor of the building showcases the rich ethos and

glorious traditions of the Indian Army and also reflects the diverse and remarkable cultural heritage of India.

The exhibition hall is a 15000 sq ft air conditioned area comprising of two floors and is ideal for exhibitions. Exhibition Ground covering an additional area of 20000 sq ft is an open air exhibition space and can accommodate large displays in conjunction with the exhibition hall. The complex has been named in honour of Field Marshal SHFJ Manekshaw, Padma Vibhushan, Padma Bhushan and the first Field Marshal of the Indian Army

Mercer Lecture

Prof. Jorge G. Zornberg, Professor and W. J. Murray, Jr. Fellow in Engineering at The University of Texas at Austin Civil, Architectural and Environmental Engineering Department and Immediate Past-President, International Geosynthetics Society, will be delivering the lecture during the Conference.

Workshops/Short Courses

IGS Training Courses and Workshops on the relevant issues of interest are planned for the days of the meetings of IGS Council and IGS Committees Meetings, preceding the conference.

Keynote and invited speakers (international speakers):

- Dr. Dimiter A. **Alexiew**, HUSKER Synthetic GmbH & Co., Germany
- Mr. Mohammad Reza **Ashgbousi**, Iran
- Dr. Daniele **Cazzuffi**, Past President of IGS, Italy
- Mr. John **Cowland**, Hong Kong
- Prof. Jie **Han**, Professor, Department of Civil, Environmental & Architectural Engineering, The University of Kansas, USA
- Dr. Tri **Hariato**, Department of Civil Engineering, Hasanuddin University, Indonesia
- Prof. Chiwan **Hsieh**, National Pingtung University of Science & Technology, Taiwan
- Dr. Abdul Jabbar **Khan**, Bangladesh University of Engineering & Technology
- Dr. Huabei **Liu**, Wuhan University, China
- Dr. Kenji **Watanabe**, Railway Technical Research Institute, Tokyo, Japan
- Mr. Yee Tack **Weng**, TenCate, Malaysia
- Dr. Chao **Xu**, Tongji University, China
- Dr. Chungsik **Yoo**, Sungkyunkwan University, Korea
- Dr. Yanfeng **Zhuang**, Wuhan University, China

Keynote and invited speakers (from India):

- Dr. Dali Naidu **Arnepalli**, Department of Civil Engineering, Indian Institute of Technology Madras
- Dr. K. **Balan**, Dean (Research & PG), Rajdhani Institute of Engineering & Technology, Trivandrum
- Dr. R. **Chitra**, Central Soil and Materials Research Station
- Dr. Ashok N. **Desai**, Former Director, Bombay Textile Research Association
- Mr. Vivek **Kapadia**, Managing Director, Gujarat Water Resources Development Corporation Ltd.
- Mr. P.S. **Prasad**, Senior Scientist, Central Road Research Institute
- Dr. K. **Rajagopal**, Department of Civil Engineering, Indian Institute of Technology Madras
- Dr. U.S. **Sarma**, Director, Indian Jute Industries' Research Association
- Dr. G. L. **Sivakumar Babu**, Professor, Department of Civil Engineering, Indian Institute of Science
- Dr. Jimmy **Thomas**, Professor, Department of Civil Engineering, Albertian Institute of Science and Technology, Kerala
- Mr. M. **Venkataraman**, Geotechnical and Geosynthetic Consultant

Special session on coastal protection: the state of the art

(Organized by IGS Technical Committee on Hydraulics)

Meetings/Special Sessions

are being planned by other Technical Committees of IGS.

Exhibition

Name of Company	Country
Anhui Huifeng New Synthetic Materials Co.,Ltd.	China
Atarfil S.L.	UAE
Bonar	France
Charankattu Coir Mfg. Co. (P) Ltd.	India
Daeyoun Geotech Co., Ltd.	Korea
Feicheng Lianyi Engineering Plastics Co., Ltd	China
Flexituff International Ltd.	India

Name of Company	Country
Garware Wall Ropes Ltd.	India
Geocellular Synthetics Co., Ltd.	China
Geosynthetic Testing Services Pvt Ltd	India
Haining Jihua Composite Material CO.,LTD.	China
HOCK Technology Co.,Ltd	China
Hong Xiang New Geo-Material Co., Ltd	China
Huesker	Germany
Laviosa Chimica Mineraria SpA	Italy
Maccaferri Environmental Solutions Pvt. Ltd.	India
Manas Geo Tech India Pvt. Ltd.	India
Megaplast (I) Pvt. Ltd	India
National Jute Board	India
NewGrids Ltd.	UK
Shandong Haoyang New Engineering Material Co.,Ltd.	China
Solmax International	Malaysia
Sotrafa SA	Spain
Strata Geosystems (India) Pvt Ltd,	India
Te.Ma Technology and Materials Srl	Italy
TechFab India Industries Ltd.	India
Tencate	India
Tensar International Limited	Indonesia
Terre Armee/Reinforced Earth	France
The Best Project Material Co.,Ltd	China
Thrace Nonwovens & Geosynthetics S.A.	Greece
TMP Geosynthetics	China

Tentative program

Monday, 07 November 2016

08:00-18:00 Registration and Workshop on Coastal Protection (proposed by Mr. Rimoldi)

Tuesday, 08 November 2016

08:00-13:00 Registration

10:00-11:00 Inaugural Session

11:30-13:00 Common Session – I:
Mercer Lecture – Prof. Jorge G. Zornberg, Immediate Past-President, IGS

14:00-15:30 PARALLEL TECHNICAL SESSIONS

16:00-17:30 PARALLEL TECHNICAL SESSIONS

Wednesday, 09 November 2016

09:00-11:00 Common Session – II: Keynote Lectures

11:30-13:00 PARALLEL TECHNICAL SESSIONS

14:00-15:30 PARALLEL TECHNICAL SESSIONS

16:00-18:00 Common Session – III: Keynote Lectures

Thursday, 10 November 2016

09:00-11:00 Common Session – I : Keynote Lectures

11:30-13:00 PARALLEL TECHNICAL SESSIONS

14:00-16:00 Common Session – V: Keynote Lectures

16:30-17:30 Valedictory Session

Friday, 11 November 2016 – Post Conference Tours (On payment basis)

Registration fee (including 15% service tax)**On or Before 15th July 2016**

IGS Individual Members	USD 550
IGS Corporate Members (up to 05 representatives)	USD 550
Non-members	USD 600
Students	USD 300

After 15th July 2016

IGS Individual Members	USD 600
IGS Corporate Members (up to 05 representatives)	USD 600
Non-members	USD 650
Students	USD 325

For full conference information please visit the conference website:

www.geosyntheticsasia.in

Announcements of Conferences under the Auspices of IGS

3rd International Conference on Transportation Geotechnics (3rd ICTG 2016)

Guimarães, Portugal, 04 - 07 September 2016

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](#) that follows the TC3 activities for the period 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 be composed of workshops and several types of sessions (including one dedicated to Young Transportations Geotechnics Engineers), as well as a technical exhibition, for a better dissemination of findings and best practices. A special attention will be paid to the publication of all the peer review papers that will be submitted to be indexed by Scopus and ISI Thomson Reuters Conference Proceedings Citation Index. On behalf of the organizing committee I am honoured to invite you to the 3rd ICTG in the City of Guimarães, UNESCO World Heritage (September 4-7, 2016).

Main lectures will be the **Proctor Lecture (ISSMGE – TC202)** given by Prof. Buddhima Indraratna (Australia) and the **Mercer Lecture (Tensar, IGS)** given by Prof. Jorge Zornberg (USA)

The conference themes are:

- Optimized geomaterial (including hydraulically bound materials and asphalt mixtures) use, reuse and recycling - T. Edil, N. Consoli, A. Dawson
- Unsaturated soil mechanics in transportation geotechnics – D. Toll, E. Alonso
- Foundations and earth structures – A. Gomes Correia, H. Brandl
- Slope stability, stabilisation, and asset management – S. Glendinning
- Mechanistic-empirical design (road, railways and airfields) – C. Schwartz, D. Brill, S. Costa d'Aguiar
- Rail track substructures, including transition zones. – W. Powrie, M. Shahim
- Subsurface sensing for transportation infrastructure – S. Nazarian, A. Loizos
- Macro and Nanotechnology applied to transportation geotechnics – M. Alves, J.M. Fleureau
- Sustainability in transportation geotechnics – I. AliQadi, M. Winter
- Case histories – J. Koseki, J. Oliveira, J. Liu

Further information

is available at the following webpage: <http://www.civil.uminho.pt/3rd-ICTG2016/index.php>

Reported by

António Gomes Correia (University of Minho, ISSMGE-TC202), Chairman of the conference (taken from webpage)

Geotechnical Frontiers 2017

Orlando, Florida, USA, 12 - 15 March 2017

Geotechnical Frontiers 2017 is a conference and trade show for the geotechnical, civil, and geo-professional communities. This specialty conference held every six years (GeoFrontiers 2005 in Austin, Texas and 2011 in Dallas) is a partnership with IFAI's biennial Geosynthetics conference and the annual GeoCongress of ASCE's Geo-Institute.

This event is where the industry unites to share developments in geotechnical engineering and technologies. The four-day event is organized by the Industrial Fabrics Association International's Geosynthetic Materials Association and the American Society of Civil Engineer's [Geo-Institute](#). It is supported by the North American Geosynthetics Society under the auspices of the International Geosynthetics Society.

For more information please contact:

Barbara Connett, Secretary General: bjconnett@ifai.com

EurAsian Geotextiles Symposium (EAGS)

Beijing, 07 - 08 June 2017



Held under the auspices of 

ORGANISED BY

 CNITA

 edana

Organised under the auspices of IGS, the EurAsian Geotextiles Symposium (EAGS) will take place in Beijing on 7 - 8 June 2017. The first event of its kind, the EAGS is a two-day conference and exhibition covering markets, products and technology for geotextiles. Featuring a conference and an exhibition, the EAGS is designed to cover both nonwoven and woven geotextiles and to encompass the entire value chain, from raw materials to buyers and users of geotextiles, in Greater Europe and Asia.

The Symposium's programme will include the following themes:

- Best practice in specifications of geotextiles
- Improved understanding of the market for geotextiles
- Identification of new opportunities for growth

Abstracts including a proposed title, 3 - 4 bullet points summarising the presentation and the full contact details of the speaker should be sent to eva.fabbri@edana.org by 30 September 2016.

This event will be co-organised by CNITA, the China Nonwovens & Industrial Textiles Association, and EDANA, the leading global association serving the nonwovens and related industries. The Symposium is focussed on geotextiles in Eurasia and aimed at supporting the growth of the geotextiles market in China and in Asia as a whole and helping companies access this dynamic market.

The EAGS is designed to offer extensive networking opportunities, attracting leading decision makers from across the geotextiles supply chain. Top level speakers will give presentations on recent and upcoming developments of 2 relevance for geotextiles markets in Europe and Asia and the table top exhibition will provide a unique opportunity for companies to meet new and existing business partners and promote their products and services.

Further information

Is available at: <http://www.edana.org/educationevents/conferences-and-symposia/event-detail/eurasia-geotextiles-symposium-2017>

Reported by

Pierre Conrath, Edana

Iranian Chapter of IGS Report of the 1st Board for the 2013 - 2016

Iranian Chapter of IGS (ICIGS) started its activities about 4 years ago and is considered one of the youngest registered IGS chapters. Although a recently emerged chapter, ICIGS showed to be quite active during this short period of time; having organized 3 national seminars, 10 workshops, 5 training course sessions and 2 educational GeoWall competitions are indications of an active commencement. The chapter also volunteered for hosting a regional seminar. It is worth to mention that ICIGS is closely affiliated and cooperative with Iranian Geosynthetics Society (IRGES). They both coordinate their activities and programs together.

ICIGS has three main committees (Technical Committee, Development Committee and Local Manufacturers Committee). A special committee for younger members has also emerged lately. The Technical and Development Committees are having well-defined tasks and duties.



Technical Committee and Board Meetings

A summary of activities of the chapter and committees are presented as follows:

A. On-day Seminars:

These seminars are mainly held to more widely convey some of the specific applications of Geosynthetics and to address the technical issues and queries of users. Participants attend from different sectors including government organizations, consultants, universities, contractors and other Geosynthetics professionals. A brief summary of the three most highlighted seminars are presented below:



Attendees photo: Geosynthetics; Applications, Design and Construction (February 2013)

A.1. Geosynthetics: Applications, Design and Construction: (Feb. 2013)

Nearly 150 persons attended this seminar. It was in fact the first national event in Geosynthetics. Six expert speakers covered topics like general introduction and applications, reinforced soil, coastal erosion protection, tunnel and basement waterproofing, highway applications, and cost analysis procedures and methods.

A.2. Reinforced Soil Retaining Walls (Oct. 2015)

This seminar was jointly organized by "Iranian Geotechnical Society" and provided a platform for discussing, debating, and enacting ideas about reinforced soil walls with emphasis on Geosynthetics applications. Different aspects of design, reinforcement materials, various facing methods/materials, specifications, material testing



Reinforced Soil Retaining Walls Seminar (October 2015)

techniques and QC/QA, construction process and methodologies and case studies were presented and discussed during the seminar. Over 400 people attended this seminar, considered to be a great turnout! The difficult task of lecturing on "Successful" and "Unsuccessful" reinforced walls was assigned to the president of IIGS, Dr. Fakharian! Case histories were collected from across the world and some from Iran. Dr. George R. Koerner should be

acknowledged for forwarding some valuable classified case histories. The different causes of reinforced wall global and local failures were addressed. The most important failure causes were introduced as lack of adequate design, water infiltration, facing poor design/construction (in particular the segmental blocks), and poor QC/QA.



Speakers of Application of Reinforced Soil Walls in Highway Construction (January 2015)

A.3. Waterproofing of Excavations in High-rise Buildings using Geosynthetics (March 2016)

The market for basement waterproofing techniques, particularly in deep excavations, is quite big in Iran with different methods generally developed by local contractors. In metropolitan cities like Tehran, the highrise developers are required to provide sufficient number of parking spots by the City officials; therefore, excavations in the ranges of 20 to 50 m deep are becoming a norm. Not only the stabilization of such deep vertical excavations are involving big challenges, but also the temporary and permanent waterproofing are among the big issues in such projects. The objective of the seminar was to initiate steps for standardization of available methods, and also exchange information and knowledge about available waterproofing systems nationally and internationally. About 250 people attended the seminar with different topics presented by 10 speakers. The main topics presented included the necessity of waterproofing, drainage versus waterproofing, different techniques (main focus on GCL and geomembrane applications), rehabilitative waterproofing, different codes and standards in basement waterproofing, QC/QA and finally, a challenging presentation on some case histories. One of our past professors (late Ahmad Hami) used to say "Water is the best Engineer", as it leaks right after or even during construction! No further delays or whatsoever; it is not like earthquake that may or may not occur during the lifetime of the project. It reveals the weak point(s) of design/construction right after!



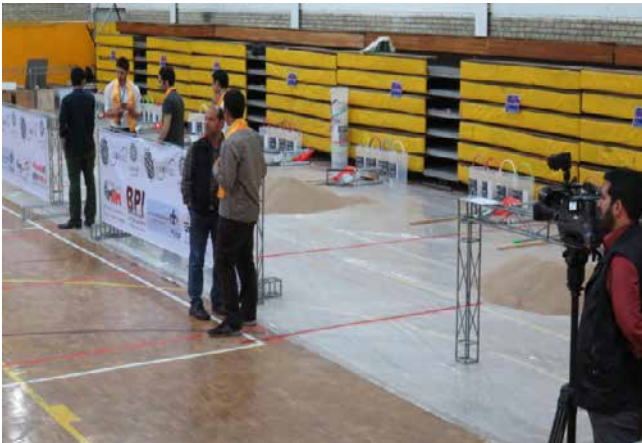
Waterproofing of Excavations in High-rise Buildings using Geosynthetics, Opening Ceremony (March 2016)



Waterproofing of Excavations in High-rise Buildings using Geosynthetics, Executive Committee (March 2016)

B. Geowall Competition (2 occasions so far)

Geowall is an educational/young engineer competition starting May 2015 by Iranian Geotechnical Society, with cooperation of IIGS and Iranian Geosynthetic Society. University students build a reinforced soil model wall using plastic reinforcing strips and backfill sand. Vertical and lateral load combinations are applied and the model walls with the highest stability and lowest amount of reinforcement gets the highest point.





Geowall Student Competition (May 2016)

There are elaborative rules and conditions drafted for the competition that both attendees and referees are already introduced with them. Each 4-member student team is headed by a university professor and some teams are having sponsors from industry too! This is a very interesting and attractive event for students to spark their scientific enthusiasm. The event has been organized two times so far (May 2015 and May 2016). The number of attending teams in 2016 was 30, and the rankings were announced for the first 6 teams.



Geowall Student Competition: Final Ceremony (May 2016)

C. Training Courses

Since last year, ICGS has started presenting half-day training courses on different fields of profession targeted mainly youngsters who are interested in Geosynthetics. Different topics like geogrid wall design, coastal erosion control, QC in Geosynthetics, applications in pavements and landfills have already been covered in these training courses. The number of attendees in the training courses is generally 30-40, but the trend of attendance especially among university students is increasing.

D. Contribution to Literature

ICGS technical committee has cooperated closely in preparation or revisions of codes, standards and specifications in the fields of Geosynthetics with Iranian bureaus and organizations in charge of publishing codes, specifica-

tions and standards in the fields of civil engineering design/construction. A few samples are highlighted here:

D.1. Revision and Updating Technical Specifications

The most recent work was the revisions made to the Geosynthetics section of the “Road General Technical Specification, No.101”. This was carried out with coordination of “Office of Deputy for Strategic Supervision, Department of Technical Affairs, Management and Planning Organization”.

D.2. National Unit Price List for Construction Works

Due to the fact that many infrastructure projects are financed directly by the government, unit price lists for construction works are published annually by the government to be used by consultants and contractors. For years, the sections related to Geosynthetics items were either missing or incomplete. As a result of the task undertaken by ICIGS, a set of 30 items were included under a new section added specifically for Geosynthetics in the list. The Technical Committee of ICIGC prepared the descriptions of items and also proposed some items to be included in the upcoming years.

D.3. Preparation of National Standards

ICIGS started cooperation with “Iranian National Standard Organization” (INSO) two years ago and concluded five specifications for using Geosynthetic barriers in the following fields:

- Landfills
- Dams and Reservoirs
- Tunnels
- Canals
- Roads

Current vice president of ICIGS, Dr. Hossein Ghiasinjead was elected as the vice president of the technical committee in charge of Geosynthetics Standards in INSO.

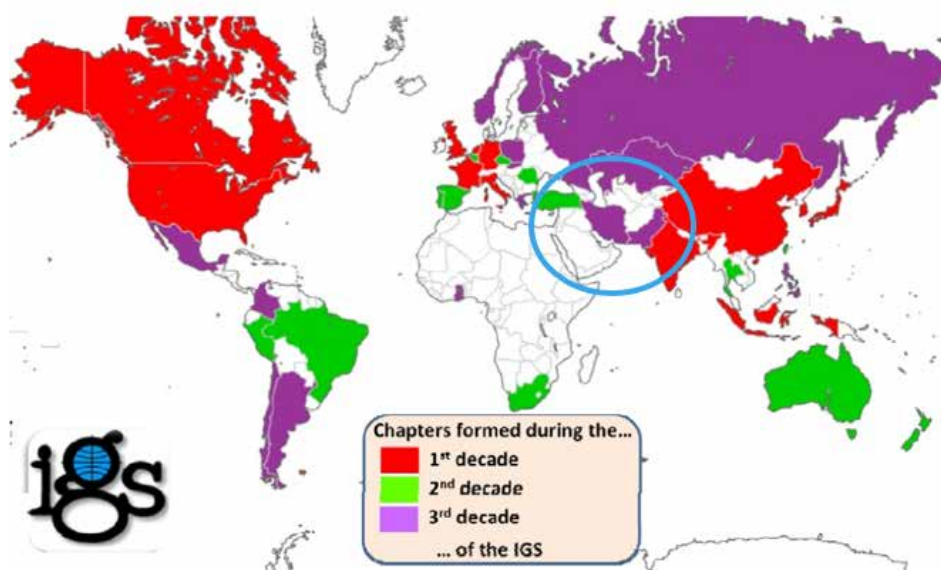
E. Newsletter

During the course of action, the 1st board of ICIGS published 3 newsletters in form of a magazine in Persian (Farsi). The published newsletters cover some articles introducing Geosynthetics applications from soil reinforcement to drainage, containments and barriers. Quite a few IGS documents are translated to Persian available on ICIGS website. Most of the presentations and texts prepared for ICIGS seminars and training courses are available through the chapter website (www.iranigs.ir).

F. International/Regional Cooperation/Presence

An Iranian delegation accompanied by Dr. Kazem Fakharian, the former president of the chapter attended the Berlin 2014 conference and met with IGS representatives. They had fruitful negotiations and discussions on different aspects of a recently established chapter and how IGS and the Asian branch can support ICIGS for its activities. Ten papers from Iranian members and scholars were presented in this conference.

Another challenging move by ICIGS was volunteering to host GeoAsia 2020! The competition took place in June 2015 in Seoul. The other bidder was Taiwan Chapter. This competition was voted equally by Asian colleagues and then it had to be repeated on behalf of the international IGS members during which the vote was for Taiwan. While I would like to congratulate our Taiwan Chapter colleagues for hosting GeoAsia 2020, the main message of ICIGS to our Asian colleagues as well as officers and board members from other chapters was



IGS Chapters formation progress during the past decades; white countries are not formed yet

that in Asia, all the past 5 conferences as well as the 6th in 2016 have taken place in Far East. It is perhaps the time to shift GeoAsia events a little bit further towards Middle East. The white color of countries in Middle East and Western Asia on the map below shows that more attention would be required to be paid on this region by IGS. The

big potential of Iran market for Geosynthetics products and the enthusiastic and educated young population of Iran are great potentials to be looked after.

The colleagues from both Asia and other continents expressed their sympathies towards attempting to support for arranging an international event in Iran in the upcoming years.

ICIGS is planning to have an active participation in both GeoAsia and EuroGeo6 2016.

G. Formation of Young Members Committee

Due to great interest demonstrated by university students and young members for ICIGS activities, the chapter started forming the Young Members Committee with following tasks:

- Acting as a bridge between universities and industry to prepare a data bank of local researchers as well as industry requirements and demands, to boost R&D activities in Geosynthetics.
- To organize site visits for young people interested in Geosynthetics applications.
- To provide a data bank of related documents, reports, and Geosynthetics literature through translation or literature review to be published in ICIGS Newsletter and uploaded on ICIGS website.
- To cooperate on organizing seminars and workshops.



Meeting of Iranian delegation with IGS board, 11-ICG, Berlin: Sep 2014

H. New Board

Finally, I am glad to introduce the new executive board members of ICIGS. The election was held in May. Total Votes were 27 (22 Individuals and 1 Corporate). Here are the new board members:



President:
Dr. Hossein Ghiassian



Vice President:
Dr. Hossein Ghiasi Nejad



Treasurer:
Mr. Armin Reza



Secretary:
Mr. Mohammad Reza Ashgoubi

We are still a beginner; I would like to congratulate our new board members for being elected and at the same time addressing the many tasks still remain to be followed up with such a fresh and motivated board! Here are a few examples:

- More plans and attempts to increase individual and corporate members; also, attempting to bring members from neighboring countries who have not formed a chapter yet.
- Inviting and getting in touch with other Chapters, both from Asian and other chapters worldwide; inviting international experts as ambassadors to our meetings, seminars, workshops, ...
- Improving and upgrading the chapter website, in particular the English part.
- Increasing the frequency of our newsletters



Participants in 2nd ICIGS Election (May 15, 2016)

- More active participation and involvement of our young members in international events such as paper presentation competitions, etc.
- Continuing on contributions to publishing standards, specifications and other related literature.

On behalf of other colleagues from 1st board (Dr. Nader Hataf, Mr. Farzad Farshid, Dr. Hossein Ghiasi Nejad), I would like to thank IGS present and past board members, for their sincere support during our term; in particular, I would really appreciate the supports and feedbacks from Prof. Jorge Zornberg, Dr. Russel Jones, Diana Davis and Elizabeth Peggs during the establishment of Iran Chapter as well as during the 1st board session.

Reported by

Kazem Fakharian, Past President (2013-2016) of Iranian Chapter of IGS (ICIGS)

Prof. Dennes T. Bergado honored as Professor Emeritus at the Asian Institute of Technology



Dennes T. Bergado

Prof. Dennes T. Bergado, current IGS Council Member, will be conferred the title of Professor Emeritus at the annual graduation ceremony of the Asian Institute of Technology (AIT) on 19 May 2016. So far, there are now 10 AIT Professor Emeritus since its establishment in 1959.

Professor DT Bergado worked at AIT for more than 30 years and successfully graduated 17 doctoral and 160 master graduates in the field of ground improvement and geosynthetics which he pioneered and initiated. He established the Asian Center for Soil Improvement and Geosynthetics (ACSIG), a research center credited with 34 research projects worth more than 3M USD. In addition he published 2 books, 7 chapters in books, 150 journal articles, 300 conference papers with 2329 SCOPUS science citations with H-index of

27 as of 2015. He also organized and edited 24 conference proceedings and delivered 73 invited/keynote lectures worldwide. He developed the field of soil improvement and geosynthetics at AIT and pioneered the successful utilization of the prefabricated vertical drain (PVD) leading to its application at the Suvarnabhumi Airport, ring roads, expressways and motorways in Bangkok. Prof. Bergado also founded the International Geosynthetics Society (IGS) – Thailand Chapter.

Hellenic Geosynthetics Society (HGS)

The Regular Electoral General Assembly of the members of the Hellenic Geosynthetics Society took place in Athens on 31 March 2016 and the following subjects were discussed:

A general description of the activities of the HGS for the term 2012-2015 was presented by the past president Mr D. Atmatzidis.

The financial review control of results concerning the budgets for the term 2012-2015 by the Controlling committee was presented and approved.

The procedure of elections was followed according to the HGS by-laws. Seven members were elected for the new Council plus one running-up member (in case a replacement is necessary) and three members were elected for the new Controlling Committee.

The first Council Meeting was afterwards held in Athens (16/5/2016) and the new Council Composition for the term 2016-2019 is actually the following:

- President: Mr Anastasios KOLLIOS (akollios@edafomichaniki.gr)
- Vice-President: Mr Ioannis FIKIRIS (ifikiris@edafos.gr)
- Treasurer: Mr Nikolaos TSATSOS (ntsatsos@geognosi.gr)
- Secretary: Mrs Elena KAPOGIANNI (elkapogianni@gmail.com)
- Regular Members: Mr Apostolos RITSOS (aritsos@edafomichaniki.gr)
 - § Mr Christos STRATAKOS (stratakos@namanet.gr)
 - § Mr Dimitrios ZEKOS (zekkos@umichumich.edu)
- Replacement Member: Mr Ioannis MARKOU (imarkou@civil.duth.gr)

The new controlling committee has the following members:

- Mr Michalis PACHAKIS (mpax46@otenet.gr)
- Mr Alexandros TSITOPoulos (atsitopoulos@yahoo.gr)
- Mr Konstantinos GIALIDIS (cgialidis@polykem.gr)

Reported by

A. Kollios, President of the Greek IGS Chapter

Viennese Tradition – Austrian Chapter of IGS is established

On June 10th the foundation of the Austrian Chapter of IGS took place in the festivity hall of the Austrian Society of Engineers and Architects (ÖIAV). The president and “host” Prof Heinz Brandl gave a warm welcome to almost 200 participants and opened the seminar to which 9 lecturers in the areas of research, design, execution and manufacturing had been invited.



Prof. Ziegler forwarding the certificate to Prof. Brandl

On behalf of IGS, Prof. Dr.-Ing. Martin Ziegler, professor at the Institute for Geotechnics at the University of Technology in Aachen, submitted the certificate of formation to Prof. Brandl and welcomed the Austrian chapter as the 44th National Member Society of IGS. He mentioned especially Austria's tradition and its pioneering role. The 3rd World Congress of Geotextiles in Vienna in 1986 is considered as a milestone in IGS's history. Already then Prof Brandl was deeply involved in the organization of this event (conference chairman).

The conference on June 10th took place just in that festivity hall of ÖIAV where Prof Karl Terzaghi had prevented for the first time his theory of consolidation of clays, and where Dr J-P. Giroud and Prof R. Koerner had delivered their “Vienna Terzaghi-Lecture” at the Austrian Geotechnical Conferences in 1999 and 2005, respectively.

A keynote lecture was given by Prof. G. Heerten, the honorary president of the German society of Geotechnics (DGGT) and former managing director of Naue



The lecturers: H. Schuller, M. Uebigau, C. Lackner, G. Heerten, H. Brandl, M. Ziegler, S. Gamel, G. Mannsbart, G. Pühringer

Fasertechnik. Heerten reported about more than 40 successful years of practical experience in geosynthetics, especially about the new filter design rules of the German association for water management (DWA) and waterproofing systems in hydraulic engineering and geotextiles used in dams.

Subsequently Prof. H. Brandl gave an impressive overview of the development of geosynthetics in Austria: „From non-woven geotextiles to structural elements “. Today geosynthetics are applied in road and railway engineering, tunnelling, hydro-engineering and flood protection, for retaining structures, for waste deposits, and for many special purposes (e.g. barriers against rockfall and avalanches, foundations). They continuously offer new fields of innovation, technical developments and economical optimization said Brandl.

The second part of the seminar was dedicated to application-oriented lectures, among which the following deserve special interest:

Dipl.-Ing. S. Gamel, from the technical track department of the Austrian Federal Railways (ÖBB) informed about the requirements for non-woven geotextiles in new construction and in rehabilitation („railmounted installation“) as well as about requirements for geotextiles in filtration. The whole width of the practical use in railroad engineering was highlighted and presented by means of examples.

Dr Chr. Lackner, team-leader of the central technical department of STRABAG in Vienna presented a system of pre-stressed reinforced soil, which had been designed based upon tests and finite-element studies. Practical information about execution and on-site application completed this presentation.

Ing. G. Pühringer (Fontana International GmH, Linz) presented current developments in quality standards giving a special focus on quality requirements which are stated in the coming edition of the Austrian standard specification RVS.

In his presentation Dipl.-Ing. M. Uebigau from AGRU explained the topic of Tunnel-lining systems and their installation. In this context he mentioned electrically controlled lining systems as well as welding procedures by inductive rolls and high-temperature resistant geosynthetic liners.

Based on four examples, Dipl.-Ing. G. Mannsbart, product-manager at TenCate-Polyfelt in Linz presented the interdependency of laboratory testing, successful practical use and specification. By the use of numerous tests and studies application and innovation of geosynthetics has been decisively promoted. This methodology was a perfect approach especially in the areas of avalanche and rock fall protection walls, filter-geotextiles, erosion protection and asphalt interlayer systems.

Finally, Dr H. Schuller from Insitu Geotechnik consulting engineers in Graz gave his view as a design engineer on geosynthetics. Schuller presented a number of reinforced soil structures, their geotechnical design and important aspects of execution and job-site supervision.

The Austrian chapter of IGS is dedicated to widen the fields of application of geosynthetics, to intensify knowledge and know-how on geosynthetics and to stimulate research, development and teaching. With these goals the board of the Austrian chapter is starting its work.

President: Em. O. Univ.-Prof. Dipl.-Ing. Dr. techn. Dr. h.c. mult. Heinz Brandl

Secretary: Dipl.-Ing. Gernot Mannsbart

Treasurer: Ing. Gerhard Pühringer



From left to right: G. Mannsbart, Prof Brandl, G. Pühringer

Reported by

Gernot Mannsbart, correspondent of Austrian IGS-Chapter

Honduran IGS Chapter Students Award at GeoAmericas 2016

After being nominated by Honduran Chapter of IGS and sponsored by IGS, Lucía Dávila made a presentation in the GeoAmericas 2016 during Young Members Program as the Honduran representative in this section. In her own words: "I received one of the IGS Student Awards and presented my paper: "A study of some Factors Affecting leakage through mechanical damages subjected to high hydraulic heads"

With her participation Honduras remarks his compromise with the involvement of Young Members into IGS goals. Also, our Chapter wants to thank IGS for his continuous support to our chapter.



Presentation of Lucia Dávila and Student Award Winners at GeoAmericas 2016

*Reported by
Alex Galindo, Honduran IGS Chapter Correspondant*

11th Slovak Seminar on Geosynthetics Bratislava, Slovakia, March 9, 2016

The Slovak University of Technology in Bratislava, the Slovak IGS Chapter, the Slovak Geosynthetics Society, the Slovak Chamber of Civil Engineers and the Slovak Road Association organized the 11th Slovak Seminar on Geosynthetics, on 9 March 2016 at the Slovak University of Technology in Bratislava. More than 65 delegates participated in the event. The participants included graduates, designers, manufacturers, suppliers and end users.

The Scientific Committee set up a new form of seminar. Three sessions took place over the duration of the seminar and included traditional a first session with presentations on selected topics, a special session with introductory presentations connected with discussion on actual problems and a third session with company presentations.

Special attention was paid to the second seminar session, which is called "Questions and Answers". A 4-member Scientific Committee included Prof. P.Turcek, Dr. R.Baslik, RNDr. B.Prelovsky and Mgr. J.Hasenovic collected and evaluated practical problems a few weeks before the seminar. Based on the survey of professionals interesting in geosynthetics there were established 13 current topics:

- terminology (the new names),
- national regulations (for individual construction sectors),
- filter function of geotextiles (design and practical problems),
- drainage geocomposites (special applications),
- durability (comparison of geosynthetics made of origin polymers and made of other recycled material),
- clay geosynthetic barriers (characteristics and applications),
- unbound granular layers (stabilized by non-reinforcing hexagonal stiff geogrids, reinforced by biaxial stiff geogrids and layers with other geosynthetics like flexible geogrids, woven geotextiles or geocomposites),
- reinforced embankments on soft soils,
- design of reinforced walls,
- slope erosion control products and their performance,
- products for asphalt pavements (offer and suitable product selection),
- control on site (the role of supervisor),
- education (regular training for all professionals interested in geosynthetics).

Some topics were discussed in detail. The result of discussion, especially on regulations and education, was included in the conclusions, which were sent to all state institutions and authorities. We believe that seminar was successful, but the real success will be when the results of the seminar are being implemented in practice.

The next 12th Slovak National Seminar on Geosynthetics named "Geosynthetics 2017" will be held on February 2017 at University of Zilina.

*Reported by
Radovan Baslik, Slovak IGS Chapter President*

“The Third Youth of Flood Defence”

Workshop Dutch Chapter: Playing with Geosynthetics V: Geosynthetics in levee improvement

Dr. Suzanne van Eekelen; Chair Dutch Chapter of the IGS Commission: Innovation and Knowledge Transfer, Deltares

Piet van Duijnen; Member the Dutch Chapter of the IGS Commission: Innovation and Knowledge Transfer, GeoTec Solutions

Erik Kwast; Member the Dutch Chapter of the IGS Commission: Innovation and Knowledge Transfer, Chair of the Dutch Chapter of the IGS Commission: Kwast Consult

Wim Voskamp; Voskamp Business Consultancy

Dr. Vera van Beek; Deltares

Prof. Dr. Adam Bezuijen; University of Ghent and Deltares

Bas Effing; Dutch Water Authority Rivierenland

Summary

“We’ve just started the third youth of geosynthetics in flood defences”, Wim Voskamp. “After 1953, we developed of fascine mattresses with geosynthetics. Twenty years ago, we continued with geosynthetics filters in levees. And now, we geosynthetics became an option for making the levees robust against backward erosion piping!”

To share knowledge of geosynthetics in levees, the Dutch chapter of the IGS (NGO) organised her fifth creative session on a beautiful, sunny day in April. Fifty creative souls from principles, contractors, engineering offices and knowledge institutes searched for measures for cost-effective flood protection using geosynthetics for levees with a piping risk. After four speakers had provided some theoretical background, the creative souls, operating in five mixed teams, carried out experiments and brainstormed about renewed solutions for backward erosion piping (which is seen nowadays as the largest thread for the safety of the Dutch dikes).

The NGO organised a session with a similar theme as four years ago. Then, it was concluded that levee improvement can be designed smarter with geosynthetics. Back then, there were also many possibilities known to take advantage of the use of geotextiles in levee construction. However, in practice, geosynthetics were mostly used in calamities and dangerous situations. So how are things now? Do we now use geosynthetics permanently in levees? Are there any new applications?

Chair of the day Wim Voskamp took off by taking us along eight different fail mechanisms in levees. Adam Bezuijen continued by discussing filter constructions under stone revetments of levees and geosystems (sandbags, tubes or containers).

Adam explained how the technique from applying geosynthetics in these situations has hardly changed in the past decennia. However, there has recently been a change in the Dutch design regulations for geotextiles under stone revetments (CUR 205). To confirm these regulations, there’s currently a program in Ghent researching damage done to geotextile filters by revetment stones. Adam Bezuijen emphasized the importance of this research with pictures taken in Dubai. Another significant development is the application of piping screens, a subject that speakers Vera van Beek and Bas Effing discussed later.

Adam Bezuijen also stated that different design procedures have not been sufficiently developed yet. He warned for too little attention for the design phase. Geosystems are sometimes offered as a ‘cheap’ solution, after which

there are cuts in design costs. One can guess the results.

Vera van Beek discussed the theory of piping, and how to reduce the risk of piping. Vera van Beek recently received her PhD on this subject. The traditional solution is applying an earth berm against piping, at the landside of the levee. However, there are many more possible solutions, all of these come down to one of the following measures: (1) extension of the horizontal or vertical seepage length, (2) minimising the gradient or (3) controlled drainage of water and thereby preventing that sand is washed away.

Bas Effing (36 years old) fought the



Figure 1 Piping experiments

idea that the Dutch water authorities, responsible for levee construction and maintenance, are entirely composed of sulking old men who are stuck in the past. However, people weren't stupid either in the past and some traditions just happen to continue, because they have proven to be effective time and again. The water authorities of 2016 are in for something new though. Piping, for instance, has become a hot item since the guidelines on flood prevention were changed. Many levees were proven to be much more piping-sensitive than was thought: "We calculate everything to pieces". Therefore, Bas Effing explained how Water Authority 'Rivierenland' had started two projects. They have followed an entire process in these projects, in which, firstly, the idea was tested on a small scale, after which it has been constructed on larger scales. More aspects than just the technical ones have been considered in this process. This has ultimately led to the solution, in which a vertical, sand proof geotextile is installed. The market had been asked if they can develop machines for this purpose. Contractor Van den Herik has developed the "ground cutter" for this, in which a geotextile is installed at the same time. Boskalis chose for pushing steel cassettes into the soil, on which a geotextile has been attached.

Creative measures against piping

Writing down solutions for piping is one thing, the practical application quite another. The 5 teams were challenged to take measures to decrease the risk of piping under a model-levée. For this purpose, Piet van Duijnen had put together five test boxes, advised by Vera van Beek. The teams had to buy their building materials, such as sheet pile walls and geosynthetics with special NGO-euros: The more CO₂ emission, the more expensive the building materials. The cheapest model that would be approved by the jury and that wouldn't show any piping under a gradient of 2m would be the winner.

In all experiments, the sand layer could retain an unusual high gradient. This can't be entirely due to the measures, as can be concluded from recent piping experiments at the same scale (Förster, 2013), in which much lower critical gradients were found. The degree of saturation of the sand layer probably plays an important role: the permeability decreases a lot with a decreasing degree of saturation. Therefore, the participants unintentionally applied an extra measure: Decreasing permeability by applying air!

Despite their preventive measures against piping, the applied gradient resulted in piping in the models of two of the five teams, see figure 4. Both teams had used a vertical geotextile. One team had done that under the centre of the levee, the other team had done it more downstream of the levee. The latter is smarter as the pipe than only starts at the exit point downstream of the levee. That way, the pipe has less chance to grow.

Three models didn't show any piping. The last of these three had taken one of Vera's solutions very literally: they had put a plug in the tube. As a result of which the gradient couldn't be applied over the sand layer. The ultimate creativeness. Or is this better described by the word 'cheating'? The jury of two years ago had been confronted by the same dilemma. This time, the jury wouldn't turn a blind eye and the team was disqualified. The team repeated the experiment without the plug to see what would happen. Surprisingly, it worked out the model did quite well. Furthermore, the team also had the solution that was the cheapest by far: they had compacted the sand really well, and had not used a single material that had costed anything.



Figure 2 There's water in the bucket that has been connected to the model. Because of this, there is a gradient of about 2 metres under de 'levee'. That 'levee' is composed of a glass plate, possibly with anti-piping features. The development of piping is visible through the glass plate.

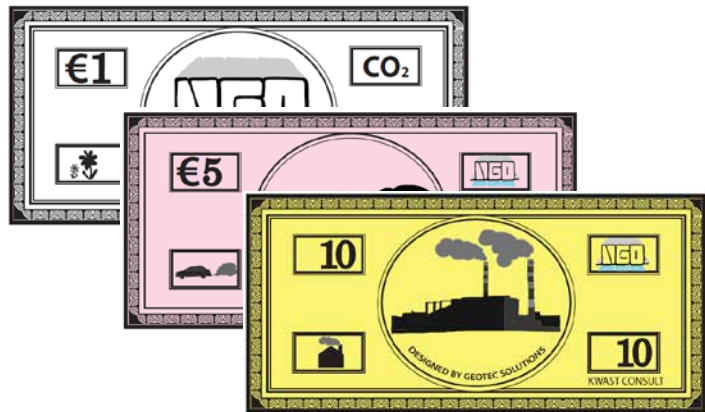


Figure 3 Sand boil that takes along sand. Beneath the glass, you can see the green-coloured “geotextile” beneath the middle of the levee. On the right: NGO-euros.

The second of the three teams without any piping, had not installed 1, but 2 vertical piping screens. Theoretically, the application of two screens does not work any better than the application of 1 screen. Therefore, money was wasted here, but the set-up did comply.

The last team had come up with a very original solution. They did not follow one of the standard solutions, but applied a horizontal drain, made from geotextile, underneath the levee. This way, a controlled sort of short circuit was created, so that the water could go through the ‘safe’ drain, without taking along any sand. In practice, an artificial pipe like that would be attached to the seepage ditch. This idea was the most creative one without a shred of doubt, but in practice there are a number of objections. Leakage could occur along the drain. Or the drain could start to leak, which would result in local high water tables which could ultimately result in possible macro stability-problems. And all of that isn’t even taking into account that there is a hole in the levee.



Figure 4 The winners

The jury was unfazed in the face of these details, though. The solution was creative, the cheapest of the qualified solutions without piping. Because of this, the jury declared this team the winner of the day. Congratulations to team 5: Arthur Roodbol (TerreArmee), Ed Berendse (Dutch Ministry of Public Works), Ilse Mariek Molenaar (Sweco), Jeroen Buijs (FL Liebrechts), Joost

Verschuure (Province South-Holland), Joris van den Berg (Bonar), Raoul Broekens (GeoBest), Tim de Bruin (Ten-Cate) and Vincent Bosch (BAM)!

More had to be done than just playing with sand, water and reinforcement. After lunch and when the experiments

had been completed, the five teams started discussing 3 realistic cases extensively. The cases were ultimately discussed with the entire group, led by the chair of the day Wim Voskamp.

Case 1 Levee with piping problems

The four mentioned solution directions (increasing the seepage length, decreasing the gradient, preventing sand transport and creating a short circuit for the water) were presented in several variations.

Two solutions increased the seepage length: a plastic sheet pile wall or a horizontal leak proof membrane at the river side of the levee. The gradient over the levee was decreased by putting water at the polder side of the levee during high water, for example by creating an inland lake.

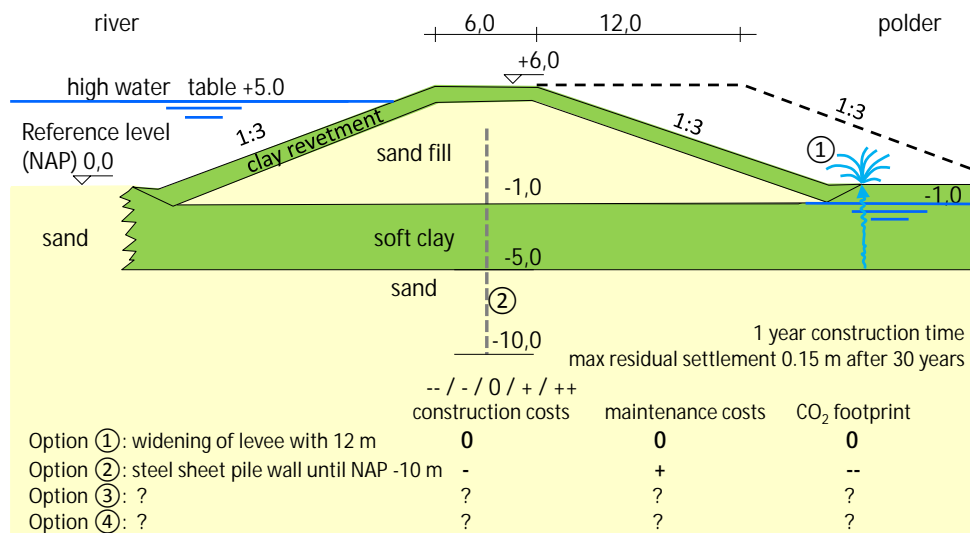


Figure 5 Case 1: levee with piping problems

Preventing sand transport by installing a vertical permeable screen had different faces: a porous plastic, a geosynthetic or even a complete expansion filter mattress that could be installed with the method comparable with the one of Van der Herik. Some teams thought that installing a screen vertically is too complicated and chose for a horizontal, covered screen at the polder side of the levee. A sufficient thick layer of soil prevents uplifting and behind this, an extra levee may be installed.

Creating a short cut had two faces: a pipe through the levee, or installing a vertical tube at the polder side of the levee. Objections against a short cut were listed earlier in this paper.

Case 2 A Levee with insufficient inward macro stability close to buildings

This case just asked for rather playful solutions. For instance, one team decided that the house is beautiful, but uninhabited. In that case, the house can be filled with concrete. The result is a nice-looking flood defence that costs a bit more, and results in a larger CO₂-footprint, but stands solid!

Others proposed to jack up the building.

The levee can be widened by constructing a vertical retaining wall of reinforced soil, nailing the inner slope of the levee, or using geotubes.

Claiming space for the levee is also an option, by shifting the levee closer to the river. With compensation for the lost flow capacity, of course. Lastly, geotextile encased sand columns depressurizes the deep sand layer.

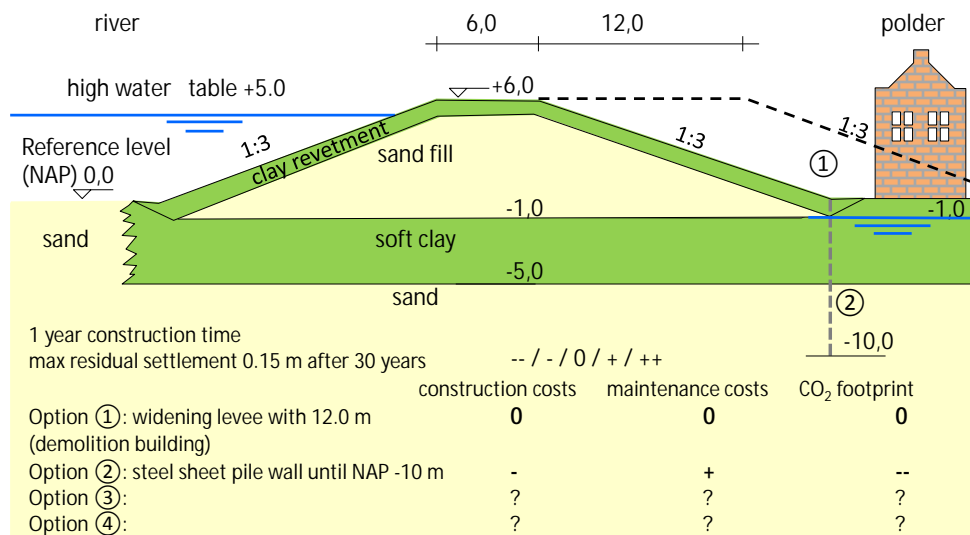


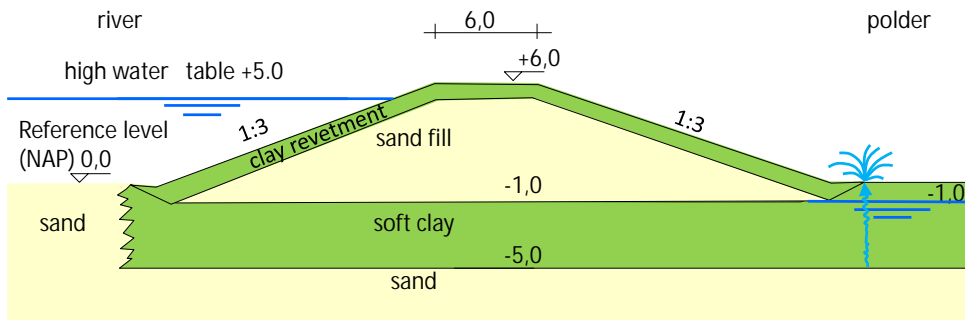
Figure 6 Case 2: Levee with insufficient macro stability at the polder side, close to buildings

Case 3 Levee with piping problems - calamity

It's night, the weather is bad, the wind is blowing, it's cold, it's hailing and it's raining. Several sand boils are found at the terrain of a farmer. Fortunately for the farmer, there is a waterproof geotube ready. The fire fighters have a key, and pump water into the geotube. This results in a half circle around the weak spots. An emergency solution to create an inland lake.

If a sand boil is sighted, it has to be maintained, not sealed. With a temporary ring, the water table is increased

locally, resulting in a lower gradient over the levee. This ring around a sand boil can be constructed with sand bags, although some participants have also come up with creative solutions, like inflatable rings (doughnuts), a synthetic pipe that is pushed into the sand boil, plastic emergency dams and big bags.



Figuur 7 Case 3: Levee with piping problems – a calamity situation

Word of thanks

The board members of the Dutch Chapter of IGS want to thank Piet van Duijnen of GeoTec Solutions and Voets Gewapende Grond for customising and providing five wooden moulds, and taking care of their transport. And Ferry Schenkeveld of Deltares for providing his 'piping bucket' with which the test set-ups could be tested.

Reference

U. Förster, M.P. Harkes, V.M. van Beek, W. J. Post, B.J. van den Kolk, R.J. Termaat (2013): Onderzoek naar de werking van geotextielen als pipingremmende maatregel (Main report). Deltares report 1206806-000-GEO-0014 (in Dutch).

Reported by

Suzanne van Eekelen, Dutch Chapter IGS and Chair committee 'Design Guideline Basal Reinforced Piled Embankments'

International Course on Basal Reinforced Piled Embankments

Delft, Netherlands, 15 – 16 November 2016

The Dutch Chapter is pleased to inform you that PAOTM is organizing an [international course](#) on Basal Reinforced Piled Embankments at 15 and 16 November 2016. The course will take place in the beautiful historical city Delft in the Netherlands.

In the course the state-of-the-art knowledge on geosynthetic-reinforced piled embankments will be presented. The design guideline is based on the results of Dutch research, which was conducted in cooperation with many researchers from different countries.

In the course, the load distribution and load-deformation mechanisms of a basal reinforced piled embankment will be fully explained. You will have the possibility to practice design with a calculation program and numerical calculations will be introduced. All aspects of design and construction will be explained, and many tips will be given. The course is based on the [new Design Guideline Basal Reinforced Piled Embankments](#) which will be provided for free in the course. I warmly invite you to join this course!

If you are interested to learn more about the content of this course or would like to subscribe, go to [International course on Basal Reinforced Piled Embankments](#), where you can find more detailed information about the course curriculum.

Reported by

Suzanne van Eekelen, Dutch Chapter IGS and Chair committee 'Design Guideline Basal Reinforced Piled Embankments'

Just Published:

Design Guideline Basal Reinforced Piled Embankments

By Suzanne J.M. van Eekelen, Marijn H.A. Brugman

Summary

A basal reinforced piled embankment consists of a reinforced embankment on a pile foundation. The reinforcement consists of one or more horizontal layers of geosynthetic reinforcement installed at the base of the embankment.

A basal reinforced piled embankment can be used for the construction of a road or a railway when a traditional construction method would require too much construction time, affect vulnerable objects nearby or give too much residual settlement, making frequent maintenance necessary.

This publication is a guideline (CUR226) for the design of basal reinforced piled embankments. The guideline covers the following subjects: a survey of the requirements and the basic principles for the structure as a whole; some instructions for the pile foundation and the pile caps; design rules for the embankment with the basal geosynthetic reinforcement; extensive calculation examples; finite element calculations; construction details and management and maintenance of the piled embankment. The guideline includes many practical tips. The design guideline is based on state-of-the-art Dutch research, which was conducted in cooperation with many researchers from different countries.

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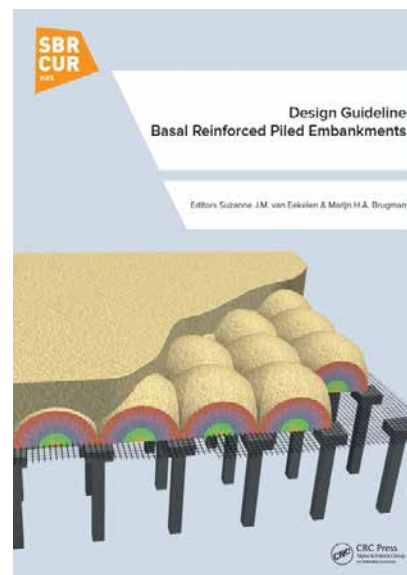
- Preface
- Nomenclature
- Chapter 1 Introduction
- Chapter 2 Requirements and initial details of reinforced embankments
- Chapter 3 Requirements and initial details for the piles and pile caps
- Chapter 4 Design of the reinforced embankment
- Chapter 5 Calculation examples for the design of reinforced embankments
- Chapter 6 Numerical modelling
- Chapter 7 Transition zones
- Chapter 8 Construction details
- Chapter 9 Management and maintenance
- Appendix A Traffic load tables
- References

Customers in The Netherlands, Belgium and Luxembourg:

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New handbook by Bob Koerner: “Geotextiles: From Design to Applications”

The Textile Institute was incorporated in England by a Royal Charter in 1925. It currently has individual and corporate members in 90-countries. The aim the Institute is to facilitate learning, recognize achievement, reward excellence and disseminate information within the global textiles, clothing and footwear industries. To that end, The Textile Institute has published numerous books of interest to its members and the textile industry. To date, they have published 175-titles, the most recent being “Geotextiles: From Design to Applications”. This hardbound book of 617-pages was edited by Robert M. Koerner. It consists of the following main parts:

- Geotextile development and manufacture
 - Properties, behavior and testing
 - Primary functions of geotextiles 237
 - Specific applications of geotextiles
 - Common attributes of geotextiles
- A great number of well known geosynthetics specials contributed to this book:

S. R. Allen, T. Bauters, D. Bérubé and P. Saunier, D. Cazzuffi, M.C. Mandaglio and N. Moraci, J. C. Chai, B.R.

Christopher, A. N. Desai and Ravi Kant, O. Detert, H. Hangen, A. A. Lavasan and L. R. Schimmel, N. Dixon, J. Raja, G. Fowmes and M. Frost, A. Filshill, M. Heibaum, C.W. Hsieh, Y. G. Hsuan, N. Ivy and B. Garner, H.-Y. Jeon, R.M. Koerner, G.R. Koerner and W. Huang, C.R. Lawson, D. Narejo, P. Rimoldi, C.J. Sprague and J.E. Sprague, L. David Suits, G. T. Torosian and Ashley MacMillan, H. Zanzinger

For more information: <http://store.elsevier.com/Geotextiles/Robert-Koerner/isbn-9780081002216/>

Reported by

Robert Koerner, IGS member and Director Emeritus of Drexel University

Conference in Honour of Michele Maugeri Catania, Italy, 1 July 2016



Prof. Michele Maugeri (middle) with Jorge Zornberg (left) and Daniele Cazzuffi at the IGS General Assembly in Berlin 2014

The Italian Geotechnical Society AGI organized on July 1st, at the University of Catania (Italy) a special conference in honour of Michele Maugeri, Full Professor of Geotechnical Engineering, IGS Council Member from 2002 to 2010 and President of the Italian Chapter AGI-IGS from 2003 to 2007.

The one-day conference was held under the auspices of ISSMGE and IGS in his University in Catania exactly on the day of his birthday.

The event highlighted the personality of Michele Maugeri as teacher, researcher and professional engineer, as well as one of the pioneers both at national and international levels in the field of Earthquake Geotechnical Engineering and associated items, in-

cluding the behavior of Earth Structures Reinforced with Geosynthetics in Seismic Areas.

Some of his past students, now professors, and also some friends all around the world, reminded his inexhaustible intellectual curiosity that lead him also to join different fields of expertise in Geotechnical and Geosynthetics Engineering.

He also actively contributed to the life and activities of the Italian Geotechnical Society, for which he acted as a Member of the AGI Board as well as of the AGI-IGS Chapter Board for several years.

Technical lectures were delivered by prominent foreign colleagues on the most recent scientific findings in a variety of research areas he was particularly devoted to such as Soil Dynamics, Seismic Hazard Zonation, Performance-Based Design and Geosynthetics Reinforced Structures.

The one-day conference was opened by a number of authorities including

Nicola Moraci, President of the AGI, Erol Guler, delegate of IGS Council, Daniele Cazzuffi, President of AGI-IGS, and Kyriazis Pitilakis, past president of ISSMGE TC 203 on Earthquake Geotechnical Engineering. The conference was then closed by Nicola Moraci and Roger Frank, President of ISSMGE.



S. Cascone, E. Foti, D. Cazzuffi, E. Güler, K. Pitilakis, N. Moraci (from left to right). Opening session.



E. Motta, N. Moraci, K. Pitilakis, P. Seco e Pinto, M. Jamiolkowski, Giovanna Maugeri, R. Frank, F. Castelli, D. Cazzuffi, E. Güler, F. Silvestri, J. Koseki (from left to right). Speakers of the conference during the closing ceremony, together with Giovanna, the wife of Michele Maugeri.

The event registered more than 100 national and international participants coming from different sectors (Universities, public Institutions, Enterprises and Contractors) gathered together to honour the memory of Michele Maugeri, a great person and an outstanding scientist.

*Reported by
Laura Carbone, Co-Chair of IGS Young Member Committee*

12th International Symposium on Landslides (ISL)

Napoli, Italy, 12-18 June 2016

The 12th International Symposium on Landslides (ISL) was held in Naples, on 12 - 18 June 2016. As for the previous editions, in Banff (Canada) in 2012 and in 'Xian (Cina) in 2008, the event aimed to gather scholars and professionals of the various fields of Geotechnical Engineering, Geology and Engineering Geology.

The Symposium was hosted by the Italian Geotechnical Society (AGI), with the support of the International Association of Engineering Geology (AIGA), under the auspices of ISSMGE, IGS, ISRM, FedIGS, EnGeol, JTC1, and was organized by University of Naples Federico II, Second University of Naples, University of Naples Parthenope, Technical University of Turin and University of Salerno.

The interest of the Symposium was related to the increasing landslide risk in the last decades, mainly because of the great rise of the exposure due to the growth of the population and, in many Countries, to the spreading on the land of civil and industrial settlements, infrastructure and lifelines. Related to landslides, in some areas, other natural hazards, such as storms, earthquakes and volcanism, may act as triggers. Thus, the improvement of the understanding of the mechanics of landslides, accounting for the relevant soil and rock properties and the observed behaviour in well documented case histories, is necessary for risk analysis and management. And, this was the main goal of the initiative.

All of these topics were discussed moving from experience to theory and vice versa to understand the phenomena and focus on the factors playing the major role, also referring to modern mathematical approaches useful to predict future events.

Excellent state-of-art lessons and general reports were delivered by outstanding experts, and the participants were about 300 coming from 33 different countries.

During the event, two intermediate technical visits were successfully organized to discuss in the field about examples of (i) extremely rapid flow-like landslides in coarse-grained soils and (ii) slow-moving landslides in clayey soils.



Memories of ISL 2016, Naples (Italy)

Reported by
 Sabatino Cuomo, AGI-IGS Board member and IGS member

Meeting of ISO/TC 221 'Geosynthetics' Milano, Italy 15-17 March 2016

The International Organization for Standardization (ISO) Technical Committee on Geosynthetics (ISO/TC 221) organised its annual meeting this year in Milan, at the kind invitation of the Italian National Standards Body, Ente Nazionale Italiano di Unificazione (UNI).



Participants of the ISO/TC 221 meeting

Meetings were held for an ISO/TC 221 Plenary meeting with experts from 10 countries in attendance and for Working Groups 2, 3, 4, and 6.

- WG 6 meeting held on 15 March 2017
 - Five WG6 Project Group meetings (PG3, 4, 5, 6 and 10) took place. Good progress was made on the new ten-part Technical Report ISO/TR 18228 'Design using Geosynthetics -'
 - Part 1: General
 - Part 2: Separation
 - Part 3: Filtration
 - Part 4: Drainage

- Part 5: Stabilisation
- Part 6: Protection
- Part 7: Reinforcement
- Part 8: Surface Erosion Control
- Part 9: Barriers
- Part 10: Stress Relief in Asphalt Overlays
- Parts 1, 2, 3, 4 and 9 were completed, or close to completion, and these would now be passed to professional editors and subsequent voting to approve to publish.
- WG 2, WG3 and WG4 meetings held on 16 March 2017
 - In the WG2 meeting there was further extensive discussion about the proposed definition for 'Stabilisation'. The group finally agreed a slightly modified/improved definition for further processing. In both the WG3 and WG4 meetings, the experts started work on three revisions of published standards.
- At the Plenary meeting on 17 March 2016 there was participation by delegations from Canada, Czech Republic, Egypt, France, Germany, Italy, Republic of Korea, Luxembourg, UK and US. The meeting was chaired by Steve Corbet.
- The ISO Technical Programme Manager Anna Caterina Rossi participated, giving an update on the ISO Directives and news from ISO Central Secretariat.
- The CEN/TC 189 Secretary, Karin Eufinger, participated giving an update on developments in CEN/TC 189, together with CEN/TC 189 Chairman Daniele Cazzuffi.
- Natacha Defeche, an observer from EDANA, participated and presented the next edition of INDEX17, that will be organised in Geneva from 4 to 7 April 2017.
- The meeting mainly dealt with procedural issues associated with its collection of 35 published standards and 23 standards development projects currently underway.

Daniele Cazzuffi and Maurizio Beltramini organised a memorable social event which included a tour of the Basilica of Sant'Ambrogio in the evening of 16 March 2016. The participants benefited from an outstanding guided tour by Don Jacopo De Vecchi and this was followed by an excellent four course dinner. Participants formally thanked the organisers and sponsors of the dinner in two formal 'Acclamations' at the plenary meeting.

The next meeting of ISO/TC 221 will be held in Seoul, Republic of Korea, in September 2017 alongside the 19th ICSMGE by kind invitation of KATS and FITI Testing & Research Institute.



ISO/TC 221 visit to the St. Ambrose Basilica

Reported by

David Hyde, Secretary of ISO/TC 221

News from the Portuguese IGS Chapter

15th Portuguese Congress on Geotechnics / 8th Luso-Brazilian Congress on Geotechnics

Porto, Portugal, 19-23 June 2016

The fifteenth edition of the Portuguese Congress on Geotechnics (15CNG), organized by the Portuguese Geotechnical Society (SPG) and the University of Porto (UPorto) was held in Porto, the second largest city in Portugal, from June 19th to June 23rd, 2016. The eighth edition of the Luso-Brazilian Congress on Geotechnics, jointly organized by the Portuguese Geotechnical Society (SPG) and the Brazilian Association of Soil Mechanics and Geotechnical Engineering (ABMS), took place in June 21st at the same venue. During these joint events, the fifth Victor de Mello Lecture was delivered by Dr. Jean Pierre Giroud on the theme "Leakage Control using Geomembranes Liners".

The events were attended by 443 participants, 112 of them coming from Brazil. The technical exhibition had 14 exhibitors including TenCate, Huesker and Maccaferri.



J.P. Giroud delivering the Victor de Mello Lecture. J. Machado do Vale, R. Frank, A.S. Cardoso, A. Assis and L.G. de Mello (from left to right).



J.P. Giroud and J. Machado do Vale (President of Portuguese IGS Chapter) among other colleagues listening to Fado (Portuguese Traditional Music) at the end of Gala Dinner.

A Thematic Session on “Geosynthetics” was organized by the Portuguese IGS Chapter (IGS-Portugal). This Session took place on the afternoon of June 21st and included seven presentations on different topics: Sand-Filled Geosystems in Coastal Protection; Bridge Approach Embankments; Monitoring and Numerical Modelling of Mechanically Stabilised Earth Walls; Geosynthetics in Road Infrastructures; Recycled Construction and Demolition Wastes in Geogrid Reinforced Embankments; Embankment Dams with Geomembrane Sealing System; Ageing of HDPE Geomembranes Exposed to Climate Conditions.

The event was a great success to the Portuguese and Brazilian Geotechnical Communities and an opportunity to consolidate knowledge and promote geosynthetics application on geotechnical projects.



Audience during the presentation of M.L. Lopes



Speakers, Chairman and Moderator at the end of the Thematic Session

*Reported by
Castorina Silva Vieira, Portuguese IGS News Chapter Correspondent*

IGS Objectives embraced at ICOLD 2016

Geosynthetics Workshop at ICOLD Congress, 16 – 20 May 2016, Sandton, South Africa

During the International Commission on Large Dams (ICOLD) Congress held in Sandton, RSA from 16 to 20 May 2016, geosynthetic materials were considered in Technical Committees, proceedings as well as during a dedicated workshop on the subject. The workshop was addressed by two keynote speakers on geotextiles as filters in dams by Professor Jonathan Fannin of Canada and on barrier systems for tailings storage facilities and pollution control dams by Mr Kent von Maubeuge of Germany. The workshop participants, ably informed of the state of the art by the prominent keynote speakers were able to share and question ideas. It was acknowledged that there has been significant advancement in polymer technology over recent decades and thus the concern of geosynthetic durability was put in perspective, noting the limits to durability of granular filters and clay liners. It was thus concluded that the question is no longer whether a geotextile should be used, but rather why should a geotextile not be used as an adjunct to internal granular filters of large embankment dams. In a similar vein the value of geomembranes and

geosynthetic clay liners in restricting or preventing contaminant migration and contributing towards water conservation was recognised. The extensive knowledge base is evident with some caution expressed about the use of polymer modified materials whose long term performance has not been demonstrated. These advancements were made possible by the valued contribution of leaders in the International Geosynthetics Society which is gratefully acknowledged.

Reported by

Kelvin Legge, Chair of IGS TC Filtration

Report on Workshop C2: The use of geo-synthetics in dam engineering

Held in the Bill Gallagher Room on Friday 20 May 2016 from 8:30 until 12:30 at ICOLD 2016, Sandton.

Facilitators: Garth James and Keith Mnisi Reporter: Charles MacRobert

Over 60 participants from various countries.

1. Introduction and overview of Geotextiles by Garth James

Geo-synthetics have been used for over 30 years in South Africa as filter separation layers for toe drains, chimney drains, blanket drains and beneath riprap in embankment dams. They have been used for drainage in tailings dams, ash dams and coal stockyards. Whilst they have generally performed well lessons have been learnt where they can be affected by high hydraulic gradients, biological clogging and chemical precipitates.

2. Geotextiles as filters in dam engineering by Jonathan Fannin

With over 90 years of formal experience with granular filters, practice is still largely based on empirical filter criteria. Whilst the empirical criteria are perceived to work well, recent questions have been raised about the potential for segregation of materials during placement to impact the long-term performance of granular filters. The question of whether sufficient quality control can be achieved during construction, considering the large quantities of granular material used in dams, was raised and illustrated with reference to experience reported during sourcing, processing and placement of granular filters at the WAC Bennett Dam. The need for a mechanics-based understanding of the potential for seepage-induced internal erosion was identified. This challenge for granular filters was contrasted with the greater quality control that is achieved with production of geotextiles in a factory. Testing of geotextiles has also received greater efforts in standardisation compared with granular filters. Although geotextiles have been used in filtration applications for over 50 years, their long-term durability has yet to be demonstrated unequivocally with reference to a science-based framework. Given these circumstances, there appears merit in using a geotextile filter as an adjunct to granular filter.

3. Discussion

Question:

- Are geosynthetics durable over the long-term? (Herb Hawson – Canada).

Discussion:

- Whilst there is considerable anecdotal evidence of geo-synthetics performing well for over 50 years, a rigorous scientific documentation of this needs to be undertaken with reference to civil engineering applications, including case studies representative of filters in dams. The need was reiterated to advance beyond empirically-based measures of durability to a mechanism-based assessment, taking into account the physical-chemical-biological properties of the materials. (Jonathan Fannin – Canada, Kent von Maubeuge – Germany)
- Photo-oxidation and temperature are the main agents of change in material properties. Guidance on degradation is available from well-documented research determining degradation half-lives. However, as geosynthetics are buried in dams these sources of degradation are unlikely to be a significant issue. Oxidation and hydrolysis may still be an issue where elevated temperatures are experienced. Accelerated testing of geosynthetics to determine life-time durability at elevated temperatures are being carried out in autoclaves at high oxygen pressures. (Jonathan Fannin – Canada, Kelvin Legge – South Africa, Garth James – South Africa).
- Whilst it was felt that geotextiles should not be used in isolation as primary critical filter components, until more evidence regarding long-term performance is available, it was pointed out that geo-synthetics have been largely adopted in composite liners and drainage systems in the waste industry. It was generally accepted that geotextiles should be used as an adjunct to granular filters. The question of why we are not using geotextiles as an adjunct was posed. (Jonathan Fannin – Canada, Kelvin Legge – South Africa)

Question:

- The question of damage to fabrics due to installation difficulties was raised and contrasted with the potential for self-healing of granular filters. This is a particular problem when large areas of geosynthetics need to be placed. (Herb Hawson – Canada, Thabo Hloele – South Africa)

Discussion:

- Whilst placement of geo-synthetics may require more stringent attention in construction practices so as to avoid inadvertent damage, this is fundamentally no different to what is required for granular filters. It is easier to identify and repair construction damage caused to geo-synthetics than to granular filters. The strength properties of geo-synthetics (i.e. they have a tensile component) needs to be taken into account during construction.
- A cautionary note was made, given recognition within the dam engineering community for the long-term performance of granular filters which can segregate, clog and undergo internal erosion. Participants were reminded that ICOLD Bulletin 164 should be consulted when using granular filters. (Jonathan Fannin – Canada, Rodney Bridle - UK)

Question:

- Is the thickness of geo-synthetics used a problem considering the width of granular filters? (David Brett – Australia)

Discussion:

- The main question, when considering the thickness of geo-synthetic, should be the hydraulic pressures that the geo-synthetic may be subjected too. The “stress-strain” behaviour of geo-synthetics can be easily measured and these should be checked with the anticipated design loads. In general, non-woven textiles of a higher mass per unit area perform better when large deformations are expected. (Kelvin Legge – South Africa, Jonathan Fannin - Canada)

General comments:

- Participants were reminded to look at the GSI White Paper 44 on geo-synthetic durability and comment on the January 2016 redraft of ICOLD Bulletin 55 on geosynthetics (Kelvin Legge – South Africa)
- Interface shear needs to be considered correctly in design especially if fabrics are subject to heat and when using woven tape type fabrics. (Kelvin Legge – South Africa)
- A differentiation needs to be made about the term “critical component” as it can signify either an inaccessible component or a component whose failure would cause failure of the dam. (Kelvin Legge – South Africa).
- Granular filters are predominantly designed against piping erosion whereas geo-synthetics are designed to prevent clogging. Consequently, geo-synthetics are more likely to become clogged which can lead to increases in pore pressure. These potential increases in pore pressure need to be taken into account in design. (Kelvin Legge – South Africa, Brian Spottiswoode – South Africa).

4. Introduction and overview of barrier systems in tailings dams and pollution control dams by Keith Mnisi

South Africa’s water resources are scarce and must be conserved. Appropriate barrier systems should be used to prevent seepage from hazardous tailings. Pollution control or return water dams should also be suitably lined. With all barrier systems, construction quality control is paramount.

5. Geomembrane and geo-synthetic clay liner components of pollution control barrier systems in dam engineering – Kent von Maubeuge

Historically clay liners have been used for pollution control barriers. However, significant quantities of clay are needed along with water for compaction. They also need to remain hydrated to prevent cracking. Geo-synthetic clay liners (GCL) are easier to transport. Although GCLs can also crack (desiccate), they need less water to remain hydrated. Mass of bentonite per unit area, orientation of GCL, subgrade and confining stress need to be addressed during design and construction. GCLs can be part of a multi-component barrier system. Laminated and coated GCLs have also been introduced.

6. Case study of tailings dams in Peru – Mario Baccheli

An interesting case study detailing the use of a Carpi Tech PVC geomembrane to line the upstream face of a rock fill tailings dam embankment at the Las Bambas project in Peru was presented.

7. Discussion

Question:

- The question of compatibility of using various geo-synthetic barrier systems was raised, particularly concerning interface shear. (Michelle Blaeser – South Africa)
- What guidance can be given regarding ion exchange when using GCL's in low pH and high salinity tailings? (David Brett – Australia)
- Can you comment on the unconsolidated undrained strength behaviour of GCLs? (Kelvin Legge – South Africa)
- What is the maximum head that can be placed on a GCL? (Nico Strydom – South Africa)

Answers (all by Kent von Maubeuge):

- Guidance on the computability of different geo-synthetics is available in the literature. It is usual not to cover membranes as this can result in interface friction concerns and prevent future access.
- The chemistry of the retained medium needs to be assessed to determine whether ion exchange in the bentonite can occur. Exchange of Na ions for Ca ions reduces the swell potential of bentonite. Ion exchange is a greater concern at lower confining stress. For confining stresses greater than 200 kPa, ion exchange has a smaller impact on permeability. Polymer modified bentonites are largely untested for long-term performance and should be avoided at present.
- At high confining stresses (>200 kPa) fibre reinforced GCLs need to be considered. Hydrated bentonite has a very low friction angle (8 °). Creep can cause fibre reinforcements to break.
- The maximum head on a GCL is largely dependent on the subgrade. For coarse gravel subgrades, the maximum head is roughly 4 m of water. For well-graded silty subgrades, evidence suggests the maximum head is between 30 – 40 m but may be as high as 90 m of water.

The workshop was closed and all participants thanked for their input.



Speakers and audience at Workshop C2: The use of geo-synthetics in dam engineering (Pictures courtesy of ICOLD)

*Reported by
Kent von Maubeuge, IGS Council Member*

MAXConference held the 1st International Conference “Geosynthetics in Road Construction” Moscow, May 24, 2016.

Over 80 delegates from Russia, Germany, Italy, Czech Republic, and Belarus shared their knowledge on the use of geosynthetics in road construction. Among the attendees there were representatives of road construction companies, design bureaus, customers, manufacturers, regulators, researchers, and test labs.

The conference was opened by Igor Astakhov, Deputy Head of the Federal Road Agency. In his speech, he highlighted the activities FRA performs to improve the demand for geosynthetic materials applied in road construction, enhance production growth and geosynthetic consumption, optimize and innovate state purchasing procedures practiced by FRA and lower organizations. The expert noted that Russian design companies, contractors and customers are getting more and more interested in geosynthetic materials, from a practical standpoint. Mr Astakhov invited domestic manufacturers of geosynthetic materials to take part in FRA activities on the improvement of methods for material quality control and regulatory compliance in road construction.

The audience was highly stirred by the presentation delivered by Daniele Cazzuffi, Chairman of CEN TC 189 who was talking about the procedure for standardization of geosynthetics application regulatory requirements. According to him, 6 special technical groups work on the development and harmonization of standards in Europe, and the committee operations are supervised by ISO. Every single one of the 33 member states can only apply specifications that comply with European standards.



Presentation of the opening lecture by Daniele Cazzuffi



Speaker in the first session, including Yuri Aliver, Daniele Cazzuffi and Igor Astakhov



Simultaneous translation was ensured in both languages English and Russian



Discussion in the afternoon session in the prestigious Hilton Leningradskaya Hotel

However, the proposal on creation of a similar national committee for geosynthetic material standardization in Russia, voiced by the manufacturing companies' representatives, has got a cold shoulder of the authorities. Nikolay Bystrov, Chairman of Technical Committee 418 on Road Construction stated that, according to the committee and Federal Road Agency's position, particular road structures must not be standardized in Russia. 'Formation of a national committee will result in straightforward lobbying of the geosynthetics manufacturers' interests', said Mr Bystrov.

Close attention was paid to upcoming trends and design solutions regarding geosynthetics application in road construction. There was a special session dedicated to such issues as the application of geosynthetics accounting for the specifics of compatibility between flexible and asphalt-concrete pavements in hot summer season, use of geosynthetics for weak base embankment reinforcing, geogrid performance assessment methods, etc.

Experts from Maccaferri, Miacom, Tensar, Huesker, Karl Mayer, and Terre Armee introduced innovative geosynthetics applications for road construction and new manufacturing equipment.

Representatives of research centers and labs talked about the methods and equipment they use to test geosynthetic materials; they also highlighted the issue of testing-related expenses and the problem of quality test results difference resulting from the use of different equipment types; they also discussed the prospects of independent test labs.

MAXConference extends its gratitude to speakers and experts from the following companies and organizations: TC 418 'Road Construction', Federal Road Agency, European Committee for Standardization (CEN), VTM Dorproekt, OPYTNOYE regional certification center, Maccaferri, Sibadi research center, VNIIGS Testing Center, ABZ-Dorstroy, TSK Research & Development Institute, VAD, KALUGADORZAKAZCHIK state public institution, Megateh Engineering, Stroyproekt institute, Soyuzdorproekt Institute for the design and survey of highways, Miacom, Tensar, HUESKER, Glavnaya Doroga, State Technical University of Saratov, Mashteximpex, Karl Mayer Technische Textilien, Terre Armée, GEXA.

*Reported by
Maria Zabralova, Russia*

Geosynthetic Institute Announces 2016 – 2017 Fellowships



Geosynthetic Institute

The Geosynthetic Institute (GSI) has announced the winners of the 2016 – 2017 GSI Fellowships. The annually awarded research grants are giving out, in consultation with the GSI Board of Directors, to master's and doctoral level applicants studying geosynthetics.

GSI's program issues numerous awards, each of USD \$5,000, during the fellowship awards cycle. Candidates with a vision of longer-term research may apply for successive year awards.

This year's fellowship winners include nine recipients from different universities.

- Aiyoub Abbaspour, George Mason University. "Clogging evaluation of drainage geotextiles using recycled concrete aggregate." GSI Award

1-16. Advisor: Burak Tanyu.

- Anil Ekici, Middle East Technical University. "Interaction of marginal fills and geogrids for walls and slopes." GSI Award 2-16. Advisor: Nejan Huvaj.
- Jun Guo, University of Kansas. "Soil column tests to evaluate wicking geotextiles to remove water." GSI Award 3-16. Advisor: Jie Han.
- Henry Haselton, Montana State University. "Biaxial response of geosynthetics." GSI Award 4-16. Advisor: Steve Perkins.
- Behnoud Kermani, Penn State University. "Geotextile separation preventing particle movement into pavements due to cyclic loading." GSI Award 5-16. Advisor: Ming Xiao.
- Layal Maddah, Texas A&M University. "MSE Walls subjected to vehicle impact on roadside barrier systems." GSI Award 6-16. Advisor: Jean-Louis Briaud.
- Amr Morsy, University of Texas at Austin. "Composite behavior of geosynthetic reinforced structures." GSI Award 7-16. Advisor: Jorge Zornberg.
- Mehmet Yilmaz, University of Wisconsin. "Co-extruded EVOH geomembrane covers to avoid landfill gas emissions." GSI Award 8-16. Advisors: James Tinjum and Craig Benson.

For more information on any of the fellowships noted here, or for information on the next GSI Fellowship awards cycle, please contact Jamie Koerner (Special Projects Coordinator) at the Geosynthetic Institute: jrkoerner@verizon.net.

Reported by

Chris Kelsey, *geosynthetica.net* and member of IGS Editorial Board

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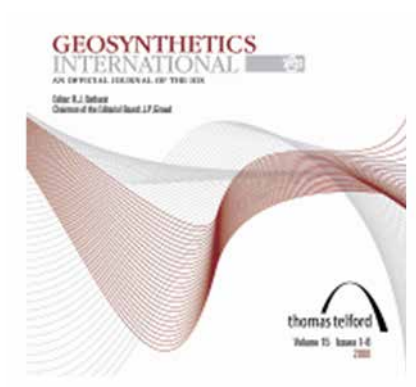
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Content of Volume: 23, Issue: 2 (April 2016)

- [Laboratory study on the use of EPS-block geofabric for embankment widening](#), A. T. Özer
[Water vapour adsorption and desorption in GCLs](#), M. A. Rouf, A. Bouazza, R. M. Singh, W. P. Gates, R. K. Rowe
[Effects of geogrid encasement on lateral and vertical deformations of stone columns in model tests](#), M. Gu, M. Zhao, L. Zhang, J. Han
[Shear-induced changes in smooth geomembrane surface topography at different ambient temperatures](#), J. D. Frost, T. Karademir
[Cyclic and post-cyclic behaviour from sand–geogrid interface large-scale direct shear tests](#), F.-Y. Liu, P. Wang, X. Geng, J. Wang, X. Lin
[Scaled model tests on influence factors of full geosynthetic-reinforced pile-supported embankments](#), C. Xu, S. Song, J. Han

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Content of Volume: 23, Issue: 3 (June 2016)

- [Service-state behavior of reinforced soil walls supporting spread footings: a parametric study using finite-element analysis](#)
S. Ambauen, B. Leshchinsky, Y. Xie, D. Rayamajhi
[Effect of fibre type on the compressive and tensile strength of a soft soil chemically stabilised](#)
P. J. Venda Oliveira, A. A. S. Correia, J. M. N. P. C. Teles, D. G. Custódio
[Mechanical response of flexible pavements enhanced with geogrid-reinforced asphalt overlays](#)
N. S. Correia, J. G. Zornberg
[Geogrid pullout behaviour according to the experimental evaluation of the active length](#)
G. Cardile, N. Moraci, L. S. Calvarano
[Effects of coir fibres modified with Ca\(OH\)₂ and Mg\(OH\)₂ nanoparticles on mechanical properties of lime-treated marine clay](#)
V. Anggraini, A. Asadi, N. Farzadnia, H. Jahangirian, B. B. K. Huat
[Modelling deformation during the construction of wrapped geogrid-reinforced structures](#)
I. Scotland, N. Dixon, M. Frost, G. Fowmes, G. Horgan

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Content of Volume: 23, Issue: 4 (August 2016)

- [Model tests and parametric studies of two-layer geomembrane tubes](#), W. Guo, J. Chu
[Settlement of footings at the crest of reinforced slopes subjected to toe unloading](#), C. C. Huang
[Effect of geomembrane colour and cover soil on solar-driven down-slope bentonite erosion from a GCL](#), A. K. Rentz, W. A. Take, R. W. I. Brachman, R. K. Rowe
[Geogrid pullout load–strain behaviour and modelling using a transparent granular soil](#), R. J. Bathurst, F. M. Ezzein
[Numerical investigation of earth pressure reduction on buried pipes using EPS geofabric compressible inclusions](#), A. F. Witthoef, H. Kim
[Reliability analysis of geosynthetic-reinforced steep slopes](#), F. B. Ferreira, A. Topa Gomes, C. S. Vieira, M. L. Lopes

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Geotextiles and Geomembranes: Best papers in 2015

Following the Editorial Board meeting held in Yokohama in September 2006 it was decided that it would be desirable to recognise some of the best papers published in *Geotextiles and Geomembranes*. We started with Volume 23 and have selected the Best paper in each subsequent year. This year the Editorial Board were charged with selecting what they considered to be the "Best Paper" published in *Geotextiles and Geomembranes* in 2015. Papers were considered for their contribution to the discipline in terms of providing significant new insights and/or of being of high potential impact on the discipline. All Technical Articles, except those co-authored by the Editor, were eligible. The selection of winning papers was decided based on a vote of the Editorial Board members (excluding the Editor).

Following a rigorous review of the papers I am pleased announce that the winner for the Best Paper for 2015 was:

Lessons learned from geotextile filter failures under challenging field conditions by R.M. Koerner and G.R. Koerner, *Geotextiles and Geomembranes*, 43(3):272-281.

Two papers were selected for Honourable Mention

Validation of analytical models for the design of basal reinforced piled embankments by S.J.M. van Eekelen, A. Bezuijen, & A.F. van Tol, *Geotextiles and Geomembranes*, 43(1):56-81

and

MSE walls as bridge abutments: Optimal reinforcement density by Y. Xie & B. Leshchinsky, *Geotextiles and Geomembranes*, 43(2):128-138.

as runners-up and hence being judged to be amongst the three best papers published in *Geotextiles and Geomembranes* in 2015. Congratulations to all of the authors for their very significant contribution to the geosynthetics discipline.

Reported by

R. Kerry Rowe, *Editor Geotextiles and Geomembranes*

Content of Volume 44, issue 3 (Juni 2016)

[Performance of a geogrid reinforced soil wall on PVD drained multilayer soft soils](#), Jian-Feng Chen, Ali Tolooyan, Jian-Feng Xue, Zhen-Ming Shi

[Experimental and DEM investigation of geogrid–soil interaction under pullout loads](#), Zhijie Wang, Felix Jacobs, Martin Ziegler

[Analysis of geomembrane failure due to liquid flow through composite liner](#), Wei Guo, Jian Chu, Bo Zhou, Liqiang Sun

[Effect of particle size of sand and surface asperities of reinforcement on their interface shear behaviour](#), Prashanth Vangla, Madhavi Latha Gali

[Laboratory analysis of encased stone columns](#), Marina Miranda, Almudena Da Costa

[Assessment of friction properties at geotextile encapsulated-sand systems' interfaces used for coastal protection](#), Andreia Moreira, Castorina Silva Vieira, Luciana das Neves, Maria Lurdes Lopes

[Evaluation of the combined effect of toe resistance and facing inclination on the behavior of GRS walls](#), S.H. Mirmoradi, M. Ehrlich, C. Dieguez

[A three-dimensional finite element approach for modeling biaxial geogrid with application to geogrid-reinforced soils](#), M.G. Hussein, M.A. Meguid

[Material point modelling of releasing geocontainers from a barge](#), Fursan Hamad, Dieter Stolle, Christian Moormann

[Electrokinetic strengthening of slopes – Case history](#), J. Lamont-Black, C.J.F.P. Jones, D. Alder

[Modified unit cell approach for modelling geosynthetic-reinforced column-supported embankments](#), Yan Yu, Richard J. Bathurst, Ivan P. Damians

[Reinforcement and mud-pumping benefits of geosynthetics in railway tracks: Numerical analysis](#), Sowmiya Chawla, J.T. Shahu

[Geosynthetic-reinforced soil structures with concave facing profile](#), Farshid Vahedifard, Shahriar Shahrokhbadi, Dov Leshchinsky

[Reinforcement and mud-pumping benefits of geosynthetics in railway tracks: Model tests](#), Sowmiya Chawla, J.T. Shahu

[Load transfer mechanisms in geotextile-reinforced embankments overlying voids: Numerical approach and design](#), Pascal Villard, Audrey Huckert, Laurent Briançon

[Direct shear tests on geosynthetic-encased granular columns](#), Sunil Ranjan Mohapatra, K. Rajagopal, Jitendra Sharma

[Imperial smelting furnace \(zinc\) slag as a structural fill in reinforced soil structures](#), P.S. Prasad, G.V. Ramana

[Mechanistic-empirical approach to characterizing permanent deformation of reinforced soft soil subgrade](#), Xiaochao Tang, Shelley M. Stoffels, Angelica M. Palomino

[Load transfer mechanisms in geotextile-reinforced embankments overlying voids: Experimental and analytical approaches](#), Audrey Huckert, Laurent Briançon, Pascal Villard, Patrick Garcin

[Performance of the new reinforcement system in the increase of shear strength of typical geogrid interface with soil](#), M. Mosallanezhad, M.C. Alfaro, N. Hataf, S.H. Sadat Taghavi

[Discussion of Palmeira, E. and Totto, J. \(2015\). "Behaviour of geotextile filters in armoured slopes subjected to the action of waves." *Geotextiles and Geomembranes*, 10.1016/j.geotextmem.2014.11.003, 46–55](#), Xuguang Chen

[Reply from authors Palmeira, E. and Totto, J. \(2015\). "Behaviour of geotextile filters in armoured slopes subjected to the action of waves." *Geotextiles and Geomembranes*, 10.1016/j.geotextmem.2014.11.003, 46–55: To Discussion of Chen \(G&G2875\)](#)

[Behavior of cement-stabilized fiber-reinforced pond ash, rice husk ash–soil mixtures](#), Arvind Kumar, Deepak Gupta

[Pullout resistance of bearing reinforcement embedded in marginal lateritic soil at molding water contents](#), Kampant Sukmak, Patimapon Sukmak, Suksun Horpibulsuk, Avirut Chinkulkijniwat, Arul Arulrajah, Shui-Long Shen

[Geotextiles and Geomembranes: Best papers in 2014](#), R. Kerry Rowe

[Discussion of "Stress–strain behavior of a silty soil reinforced with polyethylene terephthalate \(PET\)" by E. Botero, A. Ossa, G. Sherwell and E. Ovando-Shelley, *Geotextiles and Geomembranes* 43 \(2015\) 363–369](#), Lei Gao, Guohui Hu

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Content of Volume 44, issue 4 (August 2016)

[Modelling of geocell-reinforced subballast subjected to cyclic loading](#), M. Mahdi Biabani, Buddhima Indraratna, Ngoc Trung Ngo

[Limit analysis of reinforced embankments on soft soil](#), Colin C. Smith, Alireza Tatari

[Performance of geotextile filters after 18 years' service in drainage trenches](#), Guillaume Veylon, Guillaume Stoltz, Patrice Mériaux, Yves-Henri Faure, Nathalie Touze-Foltz

[The characteristic flow equation: A tool for engineers and scientists](#), Rich Lacey

[Impact resistance and evaluation of retained strength on geotextiles](#), C. Cheah, C. Gallage, L. Dawes, P. Kendall

[Application design of concrete canvas \(CC\) in soil reinforced structure](#), Hui Li, Huisu Chen, Lin Liu, Fangyuan Zhang, Fangyu Han, Tao Lv, Wulong Zhang, Yujie Yang

[Behaviour of model footing resting on sand bed reinforced with multi-directional reinforcing elements](#), M. Hari Kumar, N. Sankar, S. Chandrakaran

[Performance evaluation of railway subballast stabilised with geocell based on pull-out testing](#), M. Mahdi Biabani, Ngoc Trung Ngo, Buddhima Indraratna

[Shear behavior of sand-smooth geomembrane interfaces through micro-topographical analysis](#), Prashanth Vangla, Madhavi Latha Gali

[Seismic evaluation of reinforced-soil segmental retaining walls](#), Feifan Ren, Feng Zhang, Chao Xu, Guan Wang

[Experimental study on the improvement of marine clay slurry by electroosmosis-vacuum preloading](#), Jun Wang, Jianjun Ma, Feiyu Liu, Wei Mi, Yuanqiang Cai, Hongtao Fu, Peng Wang

[Feasibility study of copper slag as a structural fill in reinforced soil structures](#), P.S. Prasad, G.V. Ramana

[Deformations of geosynthetic reinforced soil under bridge service loads](#), Jennifer E. Nicks, Danial Esmaili, Michael T. Adams

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The IGS owes a considerable amount of its stability and success to its strong corporate membership. We are proud that more than 160 companies are part of our society. Many of these companies have sustained their corporate member level of support without interruption for decades.

Tonight, it is my honor as Chair of the Corporate Committee to recognize on behalf of the IGS two corporate members which have reached exceptional milestones of support.

PRESTO GEOSYSTEMS has the distinction of having helped bring a now-standard type of geosynthetic into the field: geocells. In the late 1970s, the company began working with the US Army Corps of Engineers. Presto brought polymeric materials engineering expertise to the Corps' ideas on three-dimensional confinement. Geocells were born. But it was in 1996 that Presto Geosystems truly made its presence in the profession known: it joined IGS as a corporate member!

On behalf of the IGS, we thank you for 20 years of continuing support, and we look forward to more innovations from your team.

We also want to recognize the support of the **GEOSYNTHETIC MATERIALS ASSOCIATION**. GMA is part of the Industrial Fabrics Association International, which in 1982 managed the Las Vegas conference now regarded as

the 2nd International Conference on Geosynthetics. That event led to the official founding of the IGS in 1983 in Paris. The Geosynthetic Materials Association became a corporate member almost immediately, joining IGS in 1985. It was one of the earliest corporate supporters. Since then, we have watched its own membership grow alongside the IGS as GMA has transformed itself into a powerful voice in American infrastructure discussions. For example, GMA's work is a major reason why the coal ash storage sector in the United States is finally required to use geosynthetics for responsible operation and cell closure.

On behalf of the IGS, we thank GMA for its 30 years of continuous support of the International Geosynthetics Society.

"Finally, as a professional society we must keep in mind that we are, without question, stronger together. Thank you to all of our corporate members. With your continuing support and the sharing of ideas and activities with your colleagues and competitors, you make our field and the IGS better each day. Thank you."

Finally, as a professional society we must keep in mind the old phrase: A rising tide lifts all boats. Thank you to all of our corporate members for joining with your colleagues and competitors. Your shared commitment makes our field and the IGS stronger. Thank you.

*Speech at GeoAmericas 2016 by
Kent von Maubeuge, Chairman of the IGS Corporate Members Committee*

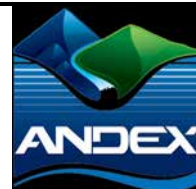
Case studies – use the chance!

All corporate members are invited to announce a case study at any time. For each issue 3 to 4 case studies are planned to be placed in (up to 1 page with pictures). Usually if there are more announcements we will place them on a list and will use them on a "first come, first serve" basis. For this issue we have no "Profiles" therefore we expand the case studies section. A corporate member may have a second case study published if the list is finished with corporate members not been considered yet. As we know that some of our corporate members are very hard-working on such a type of publication, please be aware that the only possibility to prevent a publication series by one company is to send in your own case study!

With a distribution of more than 3000 samples/downloads of IGS News this is a good promotion of the geosynthetics technique and your company. We would be happy if this chance is used frequently.

*Reported by
Gerhard Bräu, IGS News Editor*

Rock Fall Protection System (SCCP) on the Slopes of critical Highways, Costa Verde, Lima-Peru



THE PROBLEM

The Costa Verde beach road is located along the coast of the city and passes through seven districts of Lima. It is formed by a chain of steep cliffs composed of conglomerate material, with heights ranging from 40 to 65 m (130 – 210 ft.) approximately. These slopes are highly eroded due to the climatic exposure and the wind erosion conform rills, gullies and irregular shapes. Stones of different sizes that break loose from slopes, roll down the slopes at dangerous speeds and into the paths of the road resulting several costly accidents. That is the reason why Costa Verde road circuit is considered to be one of the most dangerous roads in Lima due to frequent rock and stone slides.

THE SOLUTION

We recommended the use of protection grids, resistant to deformation and rupture as well as to corrosion resistant which is a main issue in the area due to its location adjacent



Costa Verde Slopes without protection, a potential danger along an important road.

and facing the ocean. We considered a geosynthetic biaxial polyester grid system to be the best solution as it is capable of supporting greater deformation without loss of its tensile strength; moreover it prevents chemical corrosion as the geosynthetic material is made from polymers that have a *low level of reaction*.

The purpose of the Rock Fall Protection System (SCCP from the abbreviation of its Spanish name - Sistema de Control de Caída de Piedras) is to control the release of rock material and mitigate erosion caused by external agents such as wind. This technique allows controlling and redirecting kinetic particle trajectories to discrete and static ranges. The system involves creating between the slope and the geogrid a series of obstructions for the particle, in order to cause gradual falls and at different times and therefore to dissipate the initial potential energy of the rock particles, leading to manageable energy levels at the toe of the slope and thus minimal risk for continual displacement into the roadway.



Operation mechanism of the Rock Fall Protection System

night time in order not to interfere with heavy day time traffic. All through the installation process, safety measures proper to high risk work were applied.

Further information

For more information visit www.andex.com.pe

Beneficial Reuse: From Landfill to a Country Park



The seaside town of Grimsby is located in the northeast of England, situated on the south side of the Humber Estuary. Grimsby is famous for its fishing heritage and remains today an important fish and food processing centre. The town also boasts a thriving chemical and gas power industry.

In 2013, the North East Lincolnshire Planning Committee approved the application by landowner Millennium Park to decontaminate a 23.7 hectare former landfill site and convert it into an exemplary, beneficial reuse project: a country park.

The development, located in the centrally located West Marsh area of Grimsby, promised 23 hectares of parks, wild life zones, fountains, children's play areas, and open spaces.

Due to the end use being a recreational area, it was important to make sure the capping system was robust, flexible, self-sealing and a proven gas barrier and low permeability barrier to infiltration of water. Also, the beneficial reuse of the site and the enhanced protections that came with that approval meant that multiple types of geosynthetic clay liners (GCLs), also known as bentonite mats, were specified. Each type was selected according to the specific zone's design and functional needs.

For 6.5 hectares of the site, a GCL was installed to secure the land on which the main recreation facilities would be constructed. The GCL contains high-swelling, high-quality powdered sodium bentonite and is manufactured with needlepunch and Thermal Lock (enhanced shear strength) technologies; the BFG 5000 type was specified and used for the recreational facility area for its complete impregnation of bentonite in the nonwoven cover geotextile to self-sealing overlaps to ensure a continuous barrier, and its independent BBA Certification for waterproofing and methane/radon barrier performance under confining pressure.

For 16.5 hectares, Bentofix® X2 NSP 4900, was used as the low permeability capping system. This GCL with a special polymeric coating installed facing up, was specifically chosen for this application due its heightened performance against desiccation (which enable a smaller soil depth of 450 mm), its protection against ion exchange, its root barrier performance, and its higher gas barrier characteristics. An additional benefit of the polymeric coating is that it is extruded directly onto the GCL and bonds directly to the needle-punched fibres, so there is no risk of the critical polymer layer delaminating. This was an important advantage for the Grimsby site. It offered extra assurance for the environmental protection plan.

The Bentofix® GCL capping work has been fully completed, the country park continues to take shape in Grimsby's city centre.



Unrolling and Overlapping of Bentofix® X2 NSP 4900 – a GCL with an additional polymeric coating barrier



Soil placement on top of GCL

Further information

For more information visit www.naue.com or www.bentofix.com

Potash Mining - High Temperature Liners Withstand the Elevated Temperatures of Mine Processing Operations



Background

The southern part of the Canadian province Saskatchewan experienced a boost to its local economy with the construction of the first new potash mine in this region in over 40 years. This mine is important to the economic development of the region, as well as the global business strategy for the mine owner. As part of the solution mining process, the site was constructed with a series of brine ponds and oil separation ponds for the primary containment of heated liquids. Due to the chemical constituents present in the mining solutions, the liner needed to withstand degradation from brine, used oil, diesel, distillate, and ultraviolet exposure. In addition, during the 25-year service life of the ponds, fluid temperatures were expected to fluctuate between extreme highs and lows, soaring up to 83°C in storage facilities or sinking to -20°C or below when exposed to the typical climate in the Canadian plains. Environmental stewardship was a critical success factor from the owner's perspective, and any liner that could not maintain its integrity against both the chemicals and elevated temperatures of stored liquids would be unacceptable.



Solution

GSE collaborated with the project design team to find a pond liner that would meet all the criteria. Everyone was in agreement that HDPE geomembrane would protect well against the chemical components of the brine; however, they were concerned about the ability of industry standard liners to hold up to the elevated temperatures. GSE recommended High Temperature Liner, a high density polyethylene geomembrane specially formulated to maintain

its properties in sustained elevated temperatures of up to 1000C.

The construction schedule was extremely tight, with installation starting in September 2014 and finishing before the winter ended. GSE was able to supply GSE High Temperature Liner with only one month's notice. Unforeseen site conditions, such as a high groundwater table and slow earthworks due to frozen ground, caused delays and required GSE to deliver the liner to the site within a very precise construction window. GSE supplied truckload shipments to keep the installation crew on schedule, and they were able to begin production for the remaining ponds as the High Temperature Liner was being deployed and welded. As with all high density polyethylene geomembranes, GSE High Temperature Liner was successfully welded in cold weather, which can be a difficult task with alternative high temperature grade geomembrane materials.



All photographs courtesy of Wolseley Canada

The Result

In total, 8 solution ponds were constructed and lined with nearly 700,000 square feet of 80 mil thick geomembrane. The High Temperature Liner was installed over a 12 oz nonwoven geotextile cushion to create a liner system. Two of the well pads have been in service and receiving hot brine liquid above 70°C. The construction manager and geomembrane installer noted how easily High Temperature Liner installed, even during the harsh Canadian winter.

Further information

GSEworld.com, or call 800.435.2008

Economical Solution to Kusile Ash Dump



Kaytech has played a major economical and environmental role at Kusile Power Station in the Nkangala District of Mpumalanga, South Africa, by supplying huge quantities of its Neoweb and EnviroFix. Kusile is considered to be South Africa's power utility, Eskom's most advanced coal-fired power plant project to date and once completed, is expected to be one of the largest coal-fired power stations in the world.

Besides generating electricity, Kusile will also generate tons of coal ash, a bi-product that will need discarding in an ash dump with enough storage capacity to last 50 to 60 years. Since coal ash is considered a pollutant to ground water, the Department of Water and Sanitation (DWS) does not allow storage of this bi-product without ensuring the area is protected against contaminated water seepage into the environment. Therefore, ESKOM, in collaboration with Knight Piesold and various other Consulting Engineers, designed a durable composite liner system that will ensure the safety of the surrounding ground water for many years to come.

Installed by contractor, WBHO, the multi-tiered composite liner system for the ash dump consisted of seven layers (top down);

- 2mm double-textured HDPE lining
- 750gsm nonwoven geotextile protection layer
- 100mm sand layer into which, in certain sections, Neoweb was placed
- layer of EnviroFix X1000 Geosynthetic Clay Liner (GCL)
- second layer of 2mm double-textured HDPE lining
- second layer of 750gsm nonwoven geotextile protection layer and finally
- 300mm selected G5 drainage layer.

Neoweb, a high quality, sustainable and durable reinforcement solution, is a cellular confinement system manufactured from an HDPE alloy. When filled with soil, its honeycomb structure forms a composite system that stabilises soft soils and reinforces pavement structures. In order to create an access road, Neoweb was installed within the 100mm sand layer around most of the perimeter of the ash dump. The cellular confinement properties of Neoweb will prevent movement of the sand layer during continuous trafficking of heavy vehicles.

In this particular linings system, **EnviroFix** will act as a secondary lining taking the place of at least 300mm of compacted clay as in conventional composite linings systems. A proudly South African manufactured product, EnviroFix is produced by needlepunching a uniform layer of sodium bentonite between two durable outer layers of geotextile. Sodium bentonite is a naturally occurring clay mineral that swells considerably upon contact with mois-

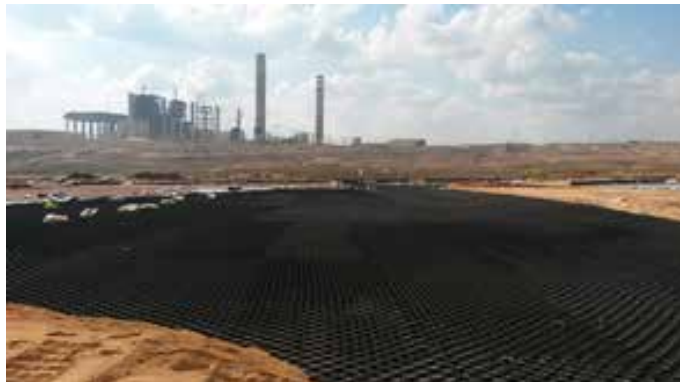
ture and, when this occurs under confinement, as in EnviroFix, a lining of very low permeability is produced. A proprietary heat-treating process (Thermal Lock) in the manufacture of EnviroFix, results in a GCL with increased internal shear resistance and long-term creep resistance.

By completion of the ash dump over a million square metres of EnviroFix X1000 GCL and 280 000m² of Neoweb 50mm were supplied. The installation of Neoweb, (in place of reinforced concrete), and EnviroFix, (in place of a compacted clay liner), has saved Eskom millions of Rands in time, construction expenses and costly transportation of imported materials.

Situated on a 1,355 hectare site between Bronkhorstspruit and Emalaheni, once fully operational, Kusile is expected to generate 4800MW of electricity, which will go a long way in alleviating the pressure on the South African power grid.



EnviroFix X1000 GCL will contain any potential leakage through the upper layers



Neoweb placed in sand layer to support added load of vehicles

Further information

For more information visit www.kaytech.co.za

Emergency Slope Stabilisation, Savièse, Switzerland

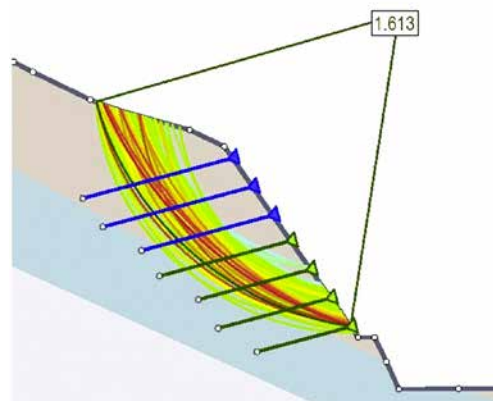


PROJECT SPECIFICATION

Soon after this 14m high slope had been excavated for a new building, a section of the slope failed due to unforeseen ground conditions leading to the immediate closure of the site. Before construction could continue an urgent solution was required to secure the entire slope. Platipus Anchors were proposed (through their Swiss distribution partner, Anteq Sarl) and were chosen due to a number of key factors: suitable granular material, easy installation in extremely limited space & immediate availability of products.



Failure of the slope after construction had started



Design showing anchor installation to stabilise slope

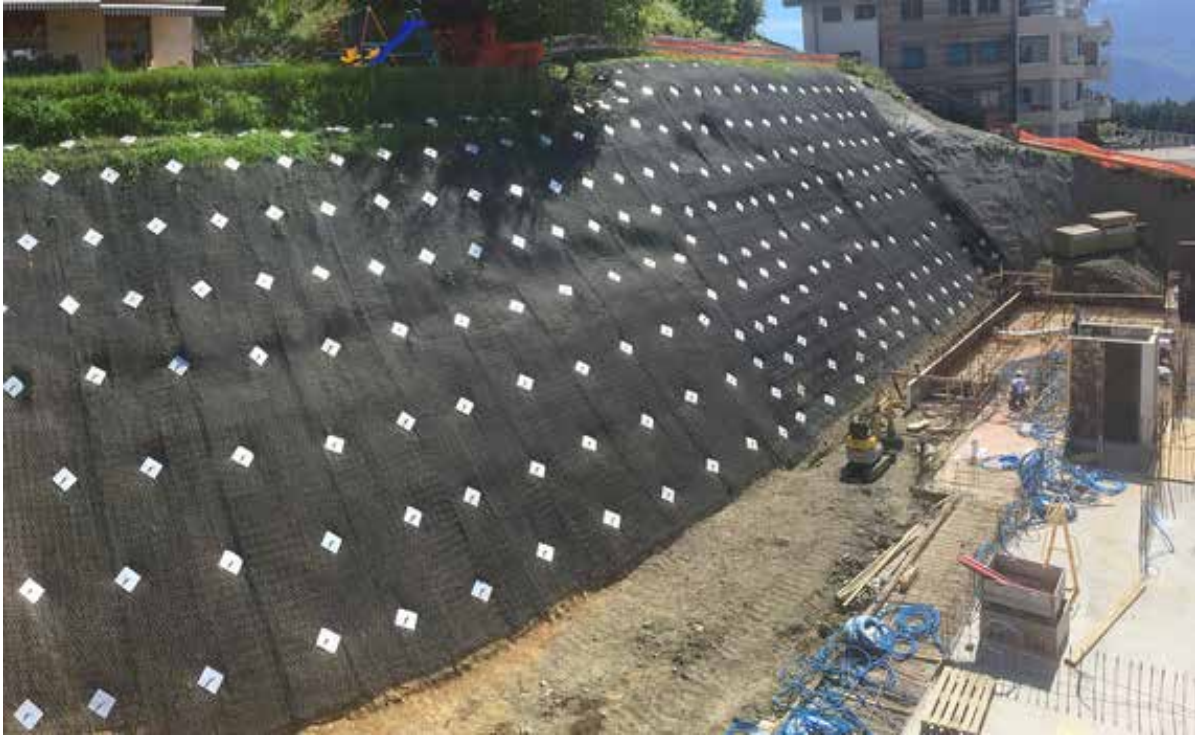
SOLUTION

The 500 m² slope was safely secured in two steps:

- 1) Lower half: 4 rows of B4 anchors with 16mm threaded rod driven to a depth of 9m, installed using a ‘spider’ excavator and proof tested to 90kN each.
- 2) Upper half: 5 rows of the smaller S6 anchor installed using handheld equipment from a mobile platform to a

depth of 4m and proof tested to 30kN.

All 240 anchor systems secured Maccaferri MacMat R Geomat to the reprofiled surface.



The safely secured slope

Further information

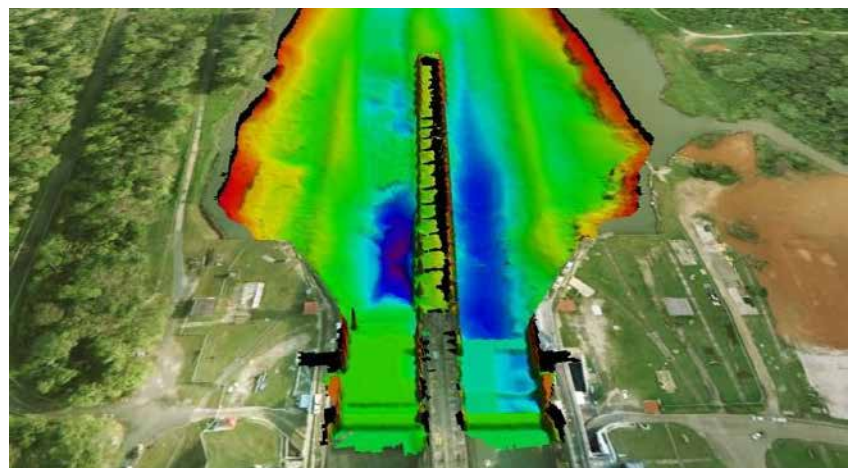
For more information visit: <http://www.platipus-anchors.com>. Or send email to info@platipus-anchors.com

Geobag® Cofferdam Structure for the Panama Canal



THE CHALLENGE

The Panama Canal has been in continuous operation for more than 100 years. Since 1999, the ACP (Panama Canal Authority) has operated and maintained the Canal. For the past ten years, the ACP engineering and maintenance division routinely conducted hydrographic studies. These studies have discovered scour erosion under the lock's approach slabs and dividing wall foundations caused by the more powerful tugs now being used to position the ships entering and exiting the locks. The location with the most serious scour erosion was under the Gatun Locks on the Caribbean side of the Canal. The challenge was how to find a solution to protect the locks and to perform the work with minimal disruption of the operations of the Canal.



Hydrographic Study Details Scour Erosion at Bottom of Canal



50 m³ Geobag® Unit Lifting Test

THE DESIGN

The ACP engineering group proposed pumping concrete under the approach slab and dividing wall to fill the voids due to the scour erosion. There would need to be an underwater form to hold the concrete in place and to insure that the voids are completely filled. Installation of traditional sheet piles or concrete forms were ruled out because of the time required for installation. Therefore, the ACP engineers contacted TenCate to discuss the installation of Geotube® units to be installed at a depth of more than –16 meters of water to form a coffer dam that would function as a concrete form. Because of the 12 hours that the ACP engineers would allow for the closing of the one side of the Gatun Locks, TenCate engineers proposed using prefilled 50 m³ Geobag® containers fabricated from GT1000M that could be lifted and placed with a TenCate designed lifting harness fabricated from TenCate 24XT geogrid. The concept was tested successfully in full scale at an offsite facility

THE CONSTRUCTION

The ACP engineering and maintenance group scheduled the east side locks of the Gatun Locks to be closed for 12 hours for the installation of the 50 m³ GT1000M Geobag® containers. The Geobag® containers were filled at a location adjacent to the Canal. The filling methodology required placement of the 24XT geogrid lifting harness within a steel frame followed by placing the unfilled Geobag® container and filling with sand. After filling and closing all 12 Geobag® containers they were lifted with a crane and placed on a barge, and transported to the Gatun Locks. There the crane lifted and placed all of the 50 m³ Geobag® units at –16m depth to form the 40m wide by 4m high coffer dam.

THE PERFORMANCE

The Geobag® coffer dam was completed within the 12 hour window allowing the concrete to be pumped on schedule eliminating the erosion problem. Because of the success of this project, the ACP has adopted this Geobag® technology for other Canal bottom erosion problems.



Filling the container



Placement of 50 m³ Geobag® unit



Geogrid Lifting harness

Further information

For more information visit: www.geotube.com

45 m high reinforced soil slope in award winning Shillong Bypass Project, Meghalaya



Challenges Faced

Shillong bypass was a project connecting NH40 to NH44. This bypass was passing through hilly terrain with lot of cuttings & filling resulting in slope stabilization issues. The main intension was to get more space on the top of the hill which would be able to sustain heavy traffic.

Solutions Suggested

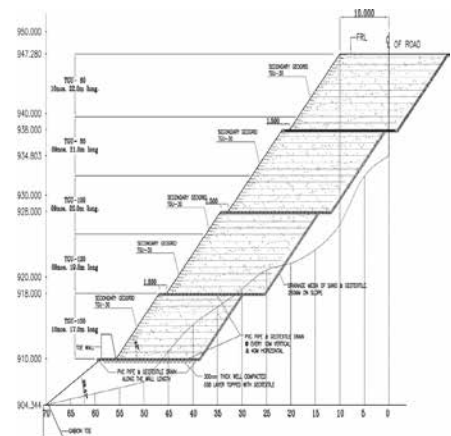
Slope stabilization was to be done with touch of green aesthetic, design and architecture. Construction of Reinforced soil slope was the option at a particular stretch with TechGrid Geogrid, to reinforce the soil.

Based on the submissions from M/s Best Geotechnics, state of art Technical solutions were adopted using advanced and latest technical methods such as Reinforced soil slope along with Gabion retaining toe wall in order to execute the embankment to retain the huge slope.

Keeping the above perspective, the scope work of **Techfab** was to meet: Supply of Techgrid Geogrids, Metal Gabions and Nonwoven Geotextile.

Construction

Construction for the Reinforced Soil Slope was carried out as per the plan, profile and level provided in approved drawings. Gabion toe wall was proposed and laid. A batter of 6° was provided to gabion and a provision of nonwoven Geotextile was placed for stability and serviceability criteria.



Installation of TechGrid Geogrid



Gabion toe wall



RSS after construction with Green fascia

"This road now goes a long way in reducing the frequent traffic cramming in the state capital of Shillong".

Further information

Client: Shillong Expressway
 Contractor : G.R Infra Projects
 Manufacturer: TechFab India Industries Ltd.
 Design Concept: M/s Best Geosynthetics Pvt Ltd.
 Approach Height : Height from 28 m to 45 m
 Facing: Wrap around system with Geotextile bags filled with Sand reinforced with Geogrid facing for slope and Techfab Metal Gabion as Toe wall.

For more information visit: www.techfabindia.com, or contact email anant@techfabindia.com



CITYRINGEN – NEW METRO LINE IN COPENHAGEN

Cityringen is a completely new section of Copenhagen's underground railway, a ring rail line being constructed in the very centre of the Danish capital city. The entire project includes 17 new train stations, the total length of tunnels (drilled with 4 TBMs) will reach approx. 30 km (15 km in each direction). The whole project is scheduled to be finalized and put into operation in 2018.

As both the bored tunnel tubes and the train stations are situated beneath the level of underground water, all structures must be reliably protected against pressure water. The insulation of tunnel tubes will be provided by the prefab segments with sealed joints, the railway stations will be lined with a waterproofing membrane.

The surfaces of the underlying structures (mostly made from shotcrete) are not smooth, hence it is important to shield the waterproofing membrane against potential damages both during the period of construction works and during the designed lifespan of the structure itself. This protection function will be fulfilled by a polypropylene non-woven geotextile **geoNETEX ZTV/RIL** with area weight of 1000 g/m², quantity of 150.000 m², supplied by a Czech manufacturer JUTA a.s., and certified in accordance with the respective German regulations for tunnel constructions.



OURKISS DAM – UPSTREAM FACE LINING

Ourkliss dam is situated in Algerian province of Oum El Bouaghi, approx. 25 km south of Ain Fakroun city. This structure is a part of an ambitious water-treatment project that is being realized in the north-eastern part of the country, aiming at upgrading the present system of long-distance distribution of water to the areas suffering from shortage of this precious natural resource.

From the construction perspective, the dike of Ourkiss reservoir is an earth-fill dam. After a detailed research of subsoil and the materials intended to be used for the dam construction, a decision was made to modify the project design and to add a synthetic insulation layer on the side of the dam's upstream face. The lining material's function is being fulfilled by **JUNIFOL PEHD** geomembrane 2,5 mm thick (475.000 m²), with both surfaces protected by a non-woven geotextile. Further layer placed on the upper side of the membrane is an aggregate backfill, while the final top layer is represented by a rock fill of boulders.



The dam is 107 m long at the crown and 8 m wide (with max. 261 m at the pit base), reaching 40 m in height. The capacity of the reservoir is 65 mil. m³ of water; one part of it is used for irrigation purposes and another part saturates the needs of population of Oum El Bouaghi, Ain Beida, Ain Kercha, Ain M'lila a Ain Fakroun cities.

AUGHINISH ALUMINA – RESIDUE DISPOSAL SITE

Aughinish Alumina is the largest European refinery plant manufacturing aluminium oxide (the basic raw material required for aluminium production). It is located on South-East coast of Ireland, in the vicinity of Shannon river estuary; it was built within the period from 1978 to 1983, projected production capacity being at the level of 800.000 tons per annum. Over the years, the volume of production has been gradually increased and nowadays, the annual output is more than 1.800.000 tons of aluminium oxide.

The compound of aluminium oxide is being obtained in a demanding manufacturing process directly from bauxite delivered to the refinery by sea transport. After the extraction of aluminium oxide, the residue left from bauxite pro-



cessing is being transferred to a sludge bed located nearby the manufacturing plant. The originally planned storage capacity was fully used up, extension works had to be carried out at the site with the goal of acquiring an additional disposal space. Considering very strict environment protection regulations in the area (Shannon river disemboguing into the Atlantic ocean), it was essential to install a high-quality impermeable insulation layer in order to provide a reliable, long-term separation of the bauxite processing residue deposited at the site from the surrounding environment. After a lengthy and demanding tendering procedure for one of the largest waste disposal projects in Europe, JUTA managed to win the tender with a high-density polyethylene geomembrane **JUNIFOL PEHD** (roll width 8,0 m) in volume of 800.000 m².

Further information

For more information visit <http://www.juta.cz/>

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- to improve communication and understanding regarding geotextiles, geomembranes, related products, and associated technologies, as well as their applications;
- to promote advancement of the state of the art of geotextiles, geomembranes, related products, and associated technologies; and
- to encourage, through its Members, the harmonization of test methods, and equipment and criteria for geotextiles, geomembranes, related products, and associated technologies.

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Calendar of Events

Event	Location	Date	E-Mail, Website
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5 th African Young Geotechnical Engineering Conference	Kumasi, Ghana	10 - 12 Aug 2016	5aygec16@gmail.com
1 st International Conference on Energy Geotechnics ICEGT 2016	Kiel, Germany	29 - 31 Aug 2016	secretary@icegt-2016.de http://www.icegt-2016.de/
3 rd ICTG International Conference on Transportation Geotechnics	Guimaraes, Portugal	04 - 07 Sep 2016	agc@civil.uminho.pt www.webforum.com/tc3
Fifth International Conference on Geotechnical and Geophysical Site Characterisation (ISC'5)	Gold Coast, QLD, Australia	05 - 09 Sep 2016	hannah@laevents.com.au www.isc5.com.au
3 rd European Conference on Unsaturated Soils - Paris 2016	Paris, France	12 - 14 Sep 2016	severine.beaunier@enpc.fr http://eunsat2016.sciencesconf.org/
8 th International Conference on Scour and Erosion	Oxford, UK	12.- 15 Sep 2016	icse2016@hrwallingford.com www.icse2016.com/
13 th Baltic States Geotechnical Conference	Vilnius, Lithuania	22 - 24 Sep 2016	danute.slizyte@vgtu.lt www.13bsqc.lt
International Geotechnical Engineering Conference and Related Urban Issues	Mumbai, India	23 - 24 Sep 2016	igsmbai@gmail.com www.igsmbaichapter.in
EuroGeo 6 – European Regional Conference on Geosynthetics	Istanbul, Turkey; relocated to Ljubljana, Slovenia!!!	25 – 29 Sep 2016	info@eurogeo6.org www.eurogeo6.org
69 th Annual Canadian Geotechnical Conference - GeoVancouver2016	Vancouver, British Columbia, Canada	02 - 05 Oct 2016	mzergoun@thurber.ca http://www.geovancouver2016.com
GEO-EXPO 2016 Scientific and Expert Conference	Banj Luka, Bosnia and Herzegovina	07 - 08 Oct 2016	geotehnika@geotehnika.ba info@geotehnika.ba http://www.geotehnika.ba
9 th All-Ukrainian Scientific-Technical Conference "Soil Mechanics, Geotechnics and Foundation Engineering": "Geotechnical Innovations and Implementation of Eurocodes in Ukraine"	Dnipropetrovsk, Ukraine	11 - 13 Oct 2016	iepi@pgasa.dp.ua www.niisc.com
XVIII Brazilian Conference on Soil Mechanics and Geotechnical Engineering - COBRAMSEG 2016	Belo Horizonte, MG, Brazil	19 - 22 Oct 2016	contato@cobramseg2016.com.br http://www.cobramseg2016.com.br/
SFGE 2016 – Shaping the Future of Geotechnical Education – International Conference on Geo-Engineering Education	Belo Horizonte, MG, Brazil	20 - 22 Oct 2016	sfge2016@cobramseg2016.com.br michele.calvella@gmail.com http://cobramseg2016.com.br/index.php/sfge-sobre/?lang=en
V South American Young Geotechnical Engineers Conference - SAYGEC/GEOJOVEM 2016	Belo Horizonte, MG, Brazil	20 - 22 Oct 2016	geojovem@cobramseg2016.com.br http://www.cobramseg2016.com.br
11th ANZ Young Geotechnical Professionals Conference (11YGPC)	Queenstown, New Zealand	25 – 28 Oct 2016	www.nzgs.org/resources/pdfs/YGP_11Queens2016formsv1.pdf 1yGPC@gmail.com
6th Asian Regional Conference on Geosynthetics	New Delhi, India	08 - 11 Nov 2016	uday@cbip.org www.geosyntheticsasia.in
5 th International Conference on Geotechnical Engineering and Soil Mechanics	Tehran, Iran	14 - 16 Nov 2016	info@igs.ir www.igs.ir
Geotec Hanoi 2016	Hanoi, Vietnam	24 – 25 Nov 2016	secretariat@geotechn.vn www.geotechn.vn
IX Chilean Congress of Geotechnics	Valdivia, Chile	05 – 07 Dec 2016	directorio@sochige.cl www.congresosochige.cl
International Conference on Forensic Geotechnical Engineering	Bangalore, India	08 - 10 Dec 2016	anbu@civil.iisc.ernet.in
Advances in Laboratory Testing and Modelling of Soils and Shales	Villars-sur-Ollon, Switzerland	18 – 20 Jan 2017	valentina.favero@epfl.ch http://atmss.epfl.ch/
International Conference on New Challenges In Geotechnical Engineering, ICNCGE-2017	Lahore, Pakistan	23 Jan 2017	icncge2017@gmail.com http://www.pges-pak.org/home/icncge-2017

Event	Location	Date	E-Mail, Website
Geotechnical Frontiers	Orlando, Florida, USA	12 – 15 Mar 2017	bjconnett@ifai.com
GEOS PERÚ 2017 - IV National Conference on Geosynthetics	Lima, Peru	Mar 2017 (data not yet fixed)	presidencia@igsperu.org ; asistepresidencia@igsperu.org
9 th International Symposium on Geotechnical Aspects of Underground Construction in Soft Ground, IS - São Paulo 2017	São Paulo, Brazil	04 – 06 April 2017	atendimento@mci-group.com http://www.is-saopaulo.com/
EurAsia Geotextiles Symposium (EAGS)	Beijing, China (People's Republic)	07 – 08 Jun 2017	http://www.edana.org/education-events/conferences-and-symposia/event-detail/eurasia-geotextiles-symposium-2017
BCRRA 2017 - Tenth International Conference on the Bearing Capacity of Roads, Railways and Airfields.	Athens, Greece	28 - 30 Jun 2017	aloizos@central.ntua.gr http://www.bcrra2017.com/
GeoMEast 2017	Sharm El-Sheikh, Egypt	15 - 19 Jul 2017	hanyfarouk808@gmail.com http://www.geomeast2017.org/
PBD-III Vancouver 2017 - The 3rd International Conference on Performance Based Design in Earthquake Geotechnical Engineering	Vancouver, British Columbia, Canada	16 - 19 Jul 2017	http://pbdiivancouver.com/
ICSMGE 2017 - 19 th International Conference on Soil Mechanics and Geotechnical Engineering	Seoul, Korea	17 - 21 Sep 2017	secretariat@icsmge2017.org http://www.icsmge2017.org
4 th International Symposium on Cone Penetration Testing (CPT'18)	Delft, The Netherlands	21 – 22 Jun 2018	info@cpt18.org http://www.cpt18.org/
The 7 th International Conference on Unsaturated Soils (UNSAT2018)	Hong Kong, China	03 - 05 Aug 2018	unsat2018@ust.hk http://www.unsat2018.org
11th International Conference on Geosynthetics (11ICG)	Seoul South Korea	16 - 20 Sep 2018	csyoo@skku.edu
ISDCG 2019 – 7 th International Symposium on Deformation Characteristics of Geomaterials	Glasgow, UK	26 – 28 Jun 2019	
ECSMGE 2019 – XVII European Conference on Soil Mechanics and Geotechnical Engineering	Reykjavik, Iceland	01 - 06 Sep 2019	has@road.is http://www.ecsmge-2019.com

Note:

The conference announcements are shown with different graphics due to their priority for IGS:

IGS Conference

Conference organized under the auspices of the IGS

Conference under the auspices or with the support of an IGS Chapter