



12 ICG

12th International
Conference
on Geosynthetics

**Geosynthetics:
leading the way
to a resilient planet**

September 17-21, 2023
Auditorium Parco della Musica
Roma, Italy

PROGRAMME BOOK

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12 ICG

September 17-21, 2023
Auditorium Parco della Musica,
Roma - Italy

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12th International Conference on Geosynthetics

It is a great pleasure and an honour to extend to you a warm welcome to the 12th International Conference on Geosynthetics (12 ICG) in Roma, Italy, 17-21 September 2023.

Years after the successful EuroGeo 2, which was held in Bologna (Italy) in October 2000, the geosynthetics and geotechnical engineering community has reached full awareness over the last two decades, and the whole geosynthetics industry has focused on the sustainable use of geosynthetics in a variety of innovative as well as consolidated applications.

After the sustainability implications in the correct use of geosynthetics, the ability to overcome the natural events effects, often related to the climate change, and to adequately afford the human activities (as the increase of pollution) forced to refer to a new keyword: Resiliency.

Hence the 12 ICG intends to become the base for the next step therefore the conference theme is "Geosynthetics, Leading the Way to a Resilient Planet".

As in the previous editions of ICG, the conference topics will address, through general and parallel sessions, invited and keynote lectures, the most recent developments in geosynthetic engineering, stimulating fruitful technical and scientific interaction among academicians, professionals, manufacturers and students.

We believe that the 12 ICG will provide an excellent opportunity to present recent experiences and developments to an audience of engineers, geologists and consultants, public and private contractors, local national and international authorities, and to all those involved in research and practice related to geosynthetics. Moreover, the conference provides a unique and fruitful forum for the exchange of new ideas and discussion on key issues within the largest gathering of world's experts, academics and non-academics, working in the broad, innovative and dynamic area of geosynthetics.

Last but not least, the 'Eternal City' of Roma is one of the most attractive and emblematic locations in the world, thanks to its impressive cultural heritage, the pleasant weather and its extraordinary social life, not to mention the taste of the Italian food.

The Eternal City will offer you a wonderful journey through Science and History!

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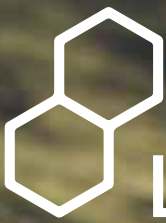


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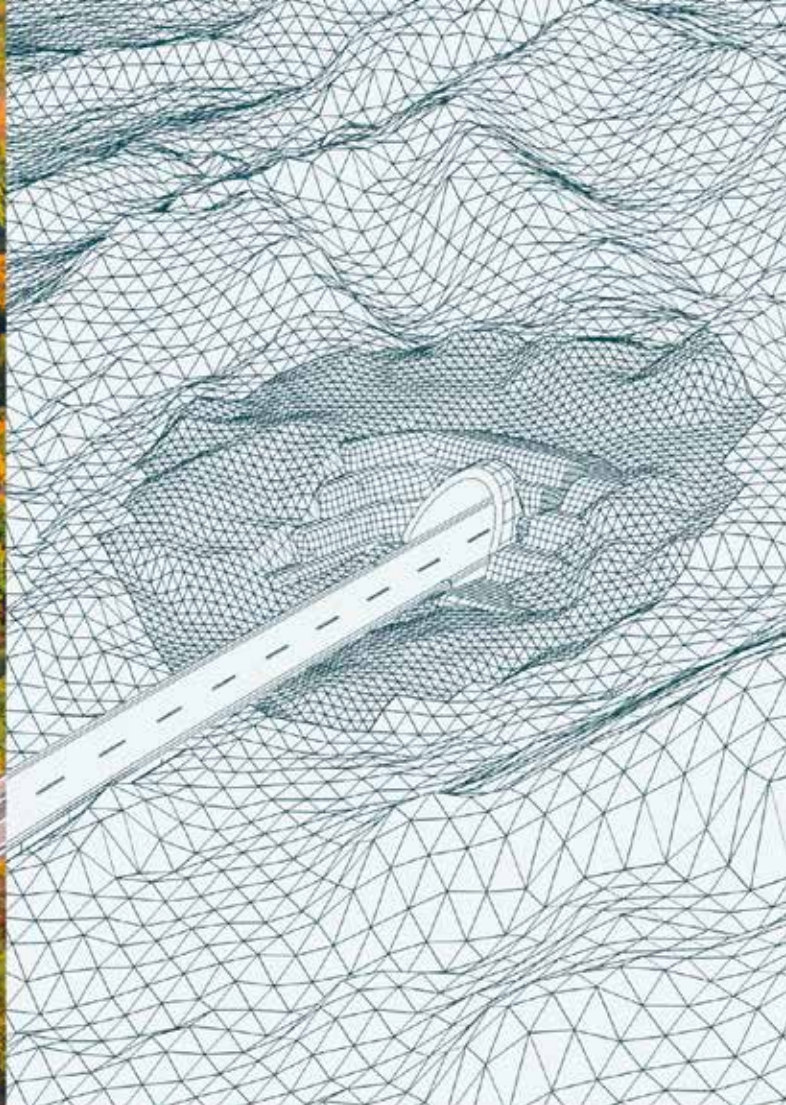
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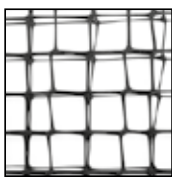
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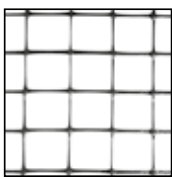
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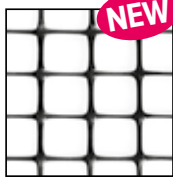
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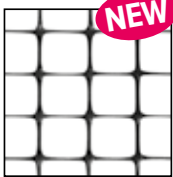
TENAX 3D GRID MS



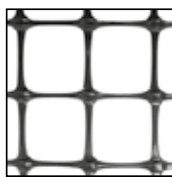
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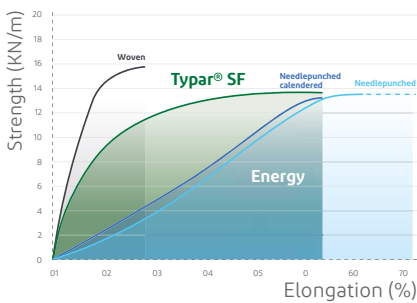


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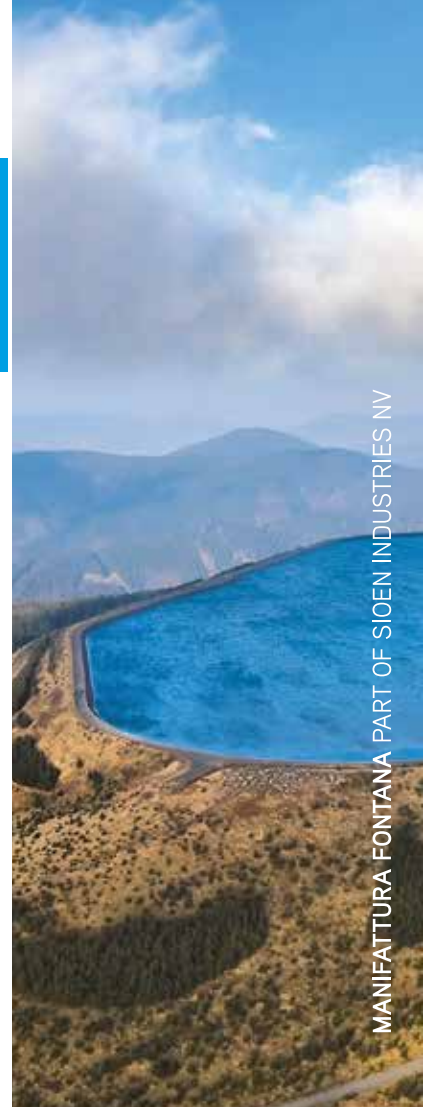
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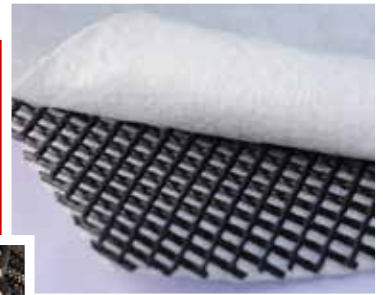
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Exhibition area – Plan view



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	BOSTD Geosynthetics Ltd.	#25, #26
	Edilfloor	#67, #68
	Hubei Nete Geosynthetics Ltd.	#83, #84
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	Istanbul Teknik Insaat	#58
	Manifattura Fontana SpA	#72
	RENOLIT ALKORPLAN Geomembranes	#54
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EXHIBITORS

Exhibitor Level	Company Name	Booth No.
STANDARD	Donghae Engineering & Consultants co. Ltd	#43
	DS Filberlink NV	#14
	Ecoweb Geocellular Synthetics Co. Ltd	#21
	Elis Technologies Ltd	#01
	Eurobent Sp. z o.o.	#34
	Fibertex Nonwovens A/S	#16
	Fortis Technical Textiles Doo	#04
	Freudenberg Performance Materials	#38
	G&G Partners Srl	#17
	Geo&Tex 2000 SpA	#79
	Geo Source	#13
	Geomas Geosynthetic	#47
	Gripple Europe	#31
	Haining Gerun Composite Material Co.,Ltd	#80
	Hock Technology Co. Ltd	#24
	Huikwang Corporation (HUITEX)	#48
	Intermas	#02
	Internationale Geotextil GmbH	#82
	Jinseed Geosynthetics Solution Pte. Ltd.	#12
	Juta a.s.	#33
	Kun Shan Geogrid Manufacture Ltd	#11
	Megaplast India Pvt. Ltd.	#15
	National Jute Board	#81
	Naue Group	#40
	Ovattificio Alpino	#23
	Platipus Anchors Ltd	#36
	Rowad International Geosynthetics	#05
	Sageos	#19
	Shandong Sunshine New Material Technology Co. Ltd	#03
	Shri Ambica Polymer Private Limited	#18
	Sineco International Srl	#49
	SKZ-Testing GmbH	#32
	Strata Geosystems	#35
	Suntech Geotextile Private Limited	#85
	Taian Nuolian Engineering Materials Co. Ltd	#41
	Tema Technologies and Materials Srl	#22
	Terre Armée	#42
	The Best Project Material Co., Ltd	#39
	TMP Geosynthetics	#06
	Thrace Group	#51
	Viganò Pavitex SpA	#29
	IGS	#60

12 ICG

September 17-21, 2023
Auditorium Parco della Musica,
Roma - Italy

12th **International
Conference
on Geosynthetics**

EXHIBITION LOTTERY

Geosynthetics: leading the way
to a resilient planet



12 ICG Exhibition Lottery

The 12 ICG runs an exhibition lottery to win exciting prizes!

You may enter the exhibition lottery by visiting at least 60 booths, at least once, before 2.00 pm of Thursday 21st September 2023.

The participants will need to sign up on the conference app and is deemed to have read, understood and accepted terms and conditions of the Exhibition Lottery. The participants will be able to use the Conference App to scan the QR Code of each of the Exhibitors.

Participation is reserved exclusively for the **12 ICG full conference registered participants** (full registered attendees, full registered student attendees).

The Exhibition Lottery will take place on Thursday during the Closing Ceremony (4.00 pm - 5.00 pm) in the Plenary Room of Auditorium Parco della Musica and the winners announced. Winners need to be present to collect Prizes.

FIRST PRIZE



Luxury Brand Watch

AGI reserves the right to substitute the Prize with another of comparable value. The picture is by way of example rather than a final choice.

SECOND PRIZE



iPad Pro

Display 12,9" - Display Liquid Retina XDR - 512GB - Wi-Fi + Cellular

THIRD PRIZE



iPhone 14 Pro

Display 6,1" - 256GB

12 ICG

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on Geosynthetics**

CONFERENCE VENUE

Geosynthetics: leading the way
to a resilient planet



Auditorium Parco della Musica

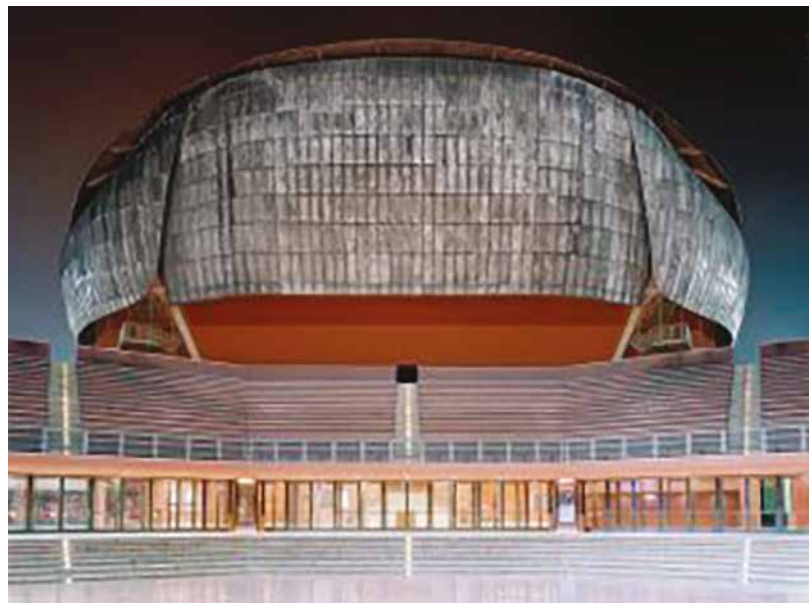
Auditorium Parco della Musica is situated in Rome, at the heart of a budding cultural quarter, which includes Zaha Hadid's new contemporary art gallery the MAXXI Centre.

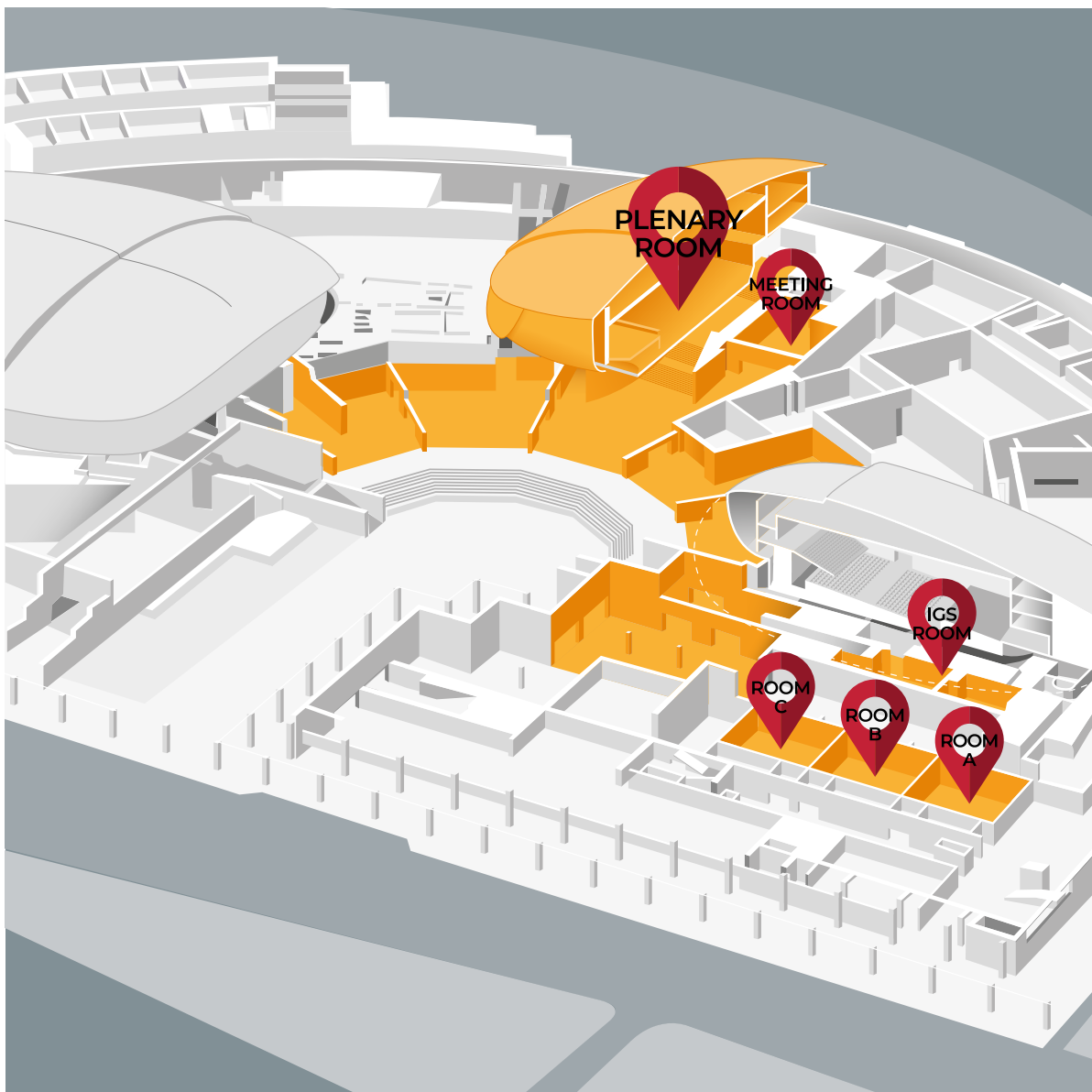
Auditorium was designed by the iconic Italian architect Renzo Piano, and it has been a success story since it opened to the public.

With a plethora of new arts establishments cropping up all over the capital, Rome is flourishing in the grip of a new renaissance of the arts. Italy's largest multi-arts centre has put Rome on the map, repositioning it alongside the great artistic capitals such as Paris, New York and London.

The Auditorium is the biggest multifunctional complex in Europe and the second "cultural factory" of the world after the Lincoln Center of NY. In 10 years Auditorium is the leading cultural institution in Europe. The Auditorium hosts an ancient Villa dated 300 bC and a Museum making the Auditorium a real archeological site.

Viale Pietro de Coubertin 30 · 00196 Roma.





Plenary Room: Invited & keynote lectures and plenary and parallel sessions
Room A, Room B and Room C: short courses and parallel sessions

12 ICG

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Conference
on Geosynthetics**

PROGRAMME AT A GLANCE

Geosynthetics: leading the way
to a resilient planet



Sep 17 Sunday	Sep 18 Monday	Sep 19 Tuesday	Sep 20 Wednesday	Sep 21 Thursday	Sep 22 Friday											
Short Courses 09:00 - 17:00	Registration 09:00 - 17:30		Registration 09:00 - 17:30		Technical Visits 09:00 - 18:00											
	Registration 08:00 - 18:00	Registration 08:00 - 18:00	Registration 08:00 - 18:00	Registration 08:00 - 18:00	Registration 08:00 - 18:00											
	Opening Ceremony 08:45 - 9:30	IGS Diversity Breakfast 08:00 - 8:45	Bathurst Lecture Yoshihisa Miyata (JP) 08:45 - 9:30	Rowe Lecture Richard Thiel (USA) 8:45 - 9:30	Keynote Lecture 3 Ben Leshchinsky (USA) 09:00 - 9:45											
				GI and G&G - Best Paper Award 09:30 - 9:45												
	Giroud Lecture Ennio Palmeira (BR) 09:30 - 10:30	Jamiokowski Lifetime Achievement Medal 09:30 - 9:45	Keynote Lecture 2 Russell Jones (UK) 09:45 - 10:30	Keynote Lecture 4 Seyed Naser Moghad- das Tafreshi (IR) 09:45 - 10:30												
	IGS Foundation & Exhibition Opening 10:30 - 11:00	Keynote Lecture 1 Giuseppe Cardile (IT) 09:45 - 10:30														
	Coffee Break 11:00 - 11:30	Coffee Break 10:30 - 11:00	Coffee Break 10:30 - 11:00	Coffee Break 10:30 - 11:00	Coffee Break 10:30 - 11:00											
	Parallel Sessions 11:30 - 13:00		Parallel Sessions 11:00 - 13:00		Parallel Sessions 11:00 - 13:00											
	P	A	B	C	P	A	B	C	P	A	B	C				
	S01	S02	S03	S04	S11	S12	S13	S14	S21	S22	S23	S24	S28	S29	S30	S31
	Lunch 13:00 - 14:00		Lunch 13:00 - 14:00		Lunch 13:00 - 14:00		Lunch 13:00 - 14:00		Lunch 13:00 - 14:00		Lunch 13:00 - 14:00		Lunch 13:00 - 14:00			
	Parallel Sessions 14:00 - 16:00		Parallel Sessions 14:00 - 16:00		Parallel Sessions 14:00 - 16:00		Parallel Sessions 14:00 - 16:00		Parallel Sessions 14:00 - 16:00		Parallel Sessions 14:00 - 16:00		Parallel Sessions 14:00 - 16:00			
	P	A	B		P	A	B		P	A	B	C	P	A	B	
	S05	S06	S07		S15	S16	S17		S25	S26	S27	CSC	S32	S33	S34	
	Coffee Break 16:00 - 16:30		Coffee Break 16:00 - 16:30		Coffee Break 16:00 - 16:30		Coffee Break 16:00 - 16:30		Coffee Break 16:00 - 16:30		Coffee Break 16:00 - 16:30		Coffee Break 16:00 - 16:30			
Parallel Sessions 16:30 - 18:30		Parallel Sessions 16:30 - 18:30		Parallel Sessions 16:30 - 18:30		Plenary Sessions 16:30 - 18:40		Plenary Sessions 16:30 - 18:40		Plenary Sessions 16:30 - 18:40		Plenary Sessions 16:30 - 18:40				
P	A	B		P	A	B	C	IGS General Assembly IGS Awards 16:30 - 18:10		IGS General Assembly IGS Awards 16:30 - 18:10		Closing Ceremony with Exhibition Lottery 16:00 - 17:00				
S08	S09	S10		S18	S19	S20	CSS	Young Member Winner Session 18:10 - 18:40		Young Member Winner Session 18:10 - 18:40		Young Member Winner Session 18:10 - 18:40				
Welcome Concert & Reception 18:00 - 20:30	IGS Corporate Event invitation only 19:00 - 22:00	Football Match and Special Event 19:00 - 23:00		Gala Dinner 20:00 - 23:00		Gala Dinner 20:00 - 23:00		Gala Dinner 20:00 - 23:00		Gala Dinner 20:00 - 23:00		Gala Dinner 20:00 - 23:00				

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DAILY PROGRAMME

Geosynthetics: leading the way
to a resilient planet



Sunday, 17 September

09:00 - 17:30	Registration	Registration Desk
09:00 - 12:30	Short Courses	
	Introduction to Geosynthetic Engineering (first part) Speaker: Sanjay Kumar Shukla (AU)	Room A
	Geosynthetic Reinforced Wall Structures including Seismic Aspects Speaker: Richard J. Bathurst (CA)	Room B
	Geomembranes and composite liners in landfills and mining: Moving forward Speaker: Kerry Rowe (CA)	Room C
13:30 - 17:00	Short Courses	
	Introduction to Geosynthetic Engineering (second part) Speaker: Sanjay Kumar Shukla (AU)	Room A
	Filtration and Drainage in Geosynthetic Engineering: Principles, Practices, and Sustainability Speaker: Barry R. Christopher (US)	Room B
	Geosynthetic Clay Liners: from Insights to Outsights Speaker: A. Malek Bouazza (AU)	Room C
18:00 - 20:30	Welcome Concert & Reception	Plenary Room

Monday, 18 September

08:00 - 18:00	Registration	Registration Desk
08:45 - 09:30	Opening Ceremony	Plenary Room
09:30 - 10:30	Giroud Lecture Chair: J. P. Gourc (FR) Geotextile filters: From idealization to real behaviour Ennio M. Palmeira (University of Brasilia, Brazil - BR)	Plenary Room
10:30 - 11:00	IGS Foundation presentation and Exhibition Opening	
11:00 - 11:30	Coffee Break / Exhibition Opening	Exhibition area
11:30 - 13:00	Parallel Sessions	
	S01 Sustainability with Geosynthetics Chairs: George Koerner (US), Kasia Zamara (UK)	Plenary Room
	S02 Filtration and Drainage Chairs: Adam Bezuijen (NL), Eric Blond (CA)	Room A
	S03 Durability Chairs: Samuel Allen (US), Anne-Laure Backes (LU)	Room B
	S04 Innovative materials and technologies Chairs: Jacek Kawalec (PL), Edoardo Zannoni (ZA)	Room C
13:00 - 14:00	Lunch Time	Exhibition area
14:00 - 16:00	Parallel Sessions	
	S05 Reinforced Walls and Slopes Chairs: Ben Adam Leshchinsky (US), Marilene Pisano (IT)	Plenary Room
	S06 Geosynthetics Properties and Testing Chairs: Kazem Fakharian (IR), Maria Graça Lopes (PT)	Room A
	S07 Unpaved and paved roads, railways and other transportation applications Chairs: Jiro Kuwano (JP), Margarida Pinho-Lopes (PT)	Room B
16:00 - 16:30	Coffee Break	Exhibition area
16:30 - 18:30	Parallel Sessions	
	S08 Filtration and Drainage - Hydraulic applications: canals, reservoirs and dam Chairs: Daniele Cazzuffi (IT), Graham Fairhead (AU)	Plenary Room
	S09 Soil-Geosynthetic Interaction Chairs: Jonathan Fannin (CA), Chungsik Yoo (KR)	Room A
	S10 Innovative materials Chairs: Abdelmalek Bouazza (AU), Helmut Zanzinger (DE)	Room B
18:30 - 20:30	IGS Corporate Event invitation only	

Tuesday, 19 September

08:00 – 18:00	Registration	Registration Desk
08:00 – 08:45	IGS Diversity Breakfast	Room C
08:45 - 09:30	Bathurst Lecture Chair: Richard J. Bathurst (CA)	Plenary Room
	Research and practice on geosynthetic MSE walls: past, present and future Yoshihisa Miyata (National Defense Academy of Japan, Japan - JP)	
09:30 - 09:45	Jamiokowski Lifetime Achievement Medal	Plenary Room
09:45 - 10:30	Keynote Lecture 1 Chair: Ennio M. Palmeira (BR)	Plenary Room
	The Road to Resilience: Advanced Soil-Geosynthetic Interface Characterization and Its Role in Reinforcing Soil Structures for Sustainability Giuseppe Cardile (University of Reggio Calabria, IT)	
10:30 - 11:00	Coffee Break	Exhibition area
11:00 - 13:00	Parallel Sessions	
	S11 TC Reinforcement Special Session on “Design methods for basal reinforcement of embankments” Chairs: Pietro Rimoldi (IT), Ivan Puig Damians (SP)	Plenary Room
	S12 Reinforced walls and slopes Chairs: Chaido Doulala-Rigby (UK), Abdelaziz Khattari (MA)	Room A
	S13 Case histories Chairs: John Walter Cowland (HK), Delma Vidal (BR)	Room B
	S14 Design approaches and other applications Chairs: Ömer Bilgin (US), Russel Jones (UK)	Room C
13:00 - 14:00	Lunch Time	Exhibition area
14:00 - 16:00	Parallel Sessions	
	S15 Soil-Geosynthetic Interaction Chairs: Patricia Guerra-Escobar (UK), Nicola Moraci (IT)	Plenary Room
	S16 Sustainability with Geosynthetics Chairs: Philippe Delmas (FR), Francesco Fontana (IT)	Room A
	S17 Unpaved and paved roads, railways and other transportation applications Chairs: Piergiorgio Recalcati (IT), Amir Shahkolahi (AU)	Room B
16:00 - 16:30	Coffee Break	Exhibition area
16:30 - 18:30	Parallel Sessions	
	S18 Basal reinforced Embankments, GEC, piles and shallow foundations Chairs: Claudio di Prisco (IT), Patrick Naughton (IE)	Plenary Room

Tuesday, 19 September

- | | |
|---|---------------|
| S19 Geosynthetics Properties and Testing
Chairs: Han Yong Jeon (KR), Jorge Zornberg (US) | Room A |
| S20 Unpaved and paved roads, railways and other transportation applications
Chairs: Muthukumar Mayakrishnan (IN), Erol Tutumluer (US) | Room B |
| CSS Special Sessions - Development and current state of the geosynthetic industry in China
Chairs: Jie Han (US), Huabei Liu (CN) | Room C |

19:00 - 23:00 **Football Match and Special Event**

Wednesday, 20 September

08:00 – 18:00	Registration	Registration Desk
08:45 - 09:30	Rowe Lecture Chair: Kerry Rowe (CA) Selection of long-term shear strength parameters for geosynthetic interfaces Richard Thiel (Thiel Engineering, United States of America - US)	Plenary Room
09:30 - 09:45	GI and G&G - Best Paper Award	Plenary Room
09:45 - 10:30	Keynote Lecture 2 Chair: Nathalie Touze (FR) Sustainable Development: UK Perspective on the Role of Geosynthetics Russell Jones (WSP UK Limited, United Kingdom - UK)	Plenary Room
10:30 - 11:00	Coffee Break	Exhibition area
11:00 - 13:00	Parallel Sessions	
	S21 Young Member Contest Chairs: Fernanda Bessa Ferreira (PT), David Hercules Marx (US)	Plenary Room
	S22 Reinforced Walls and Slopes Chairs: Radoslaw L Michalowski (US), Arnstein Watn (NO)	Room A
	S23 Basal reinforced Embankments, GEC, piles and shallow foundations Chairs: Oliver Detert (DE), Suzanne J.M. van Eekelen (NL)	Room B
	S24 - Design approaches and other applications Chairs: Jie Han (US), Richard Thiel (US)	Room C
13:00 - 14:00	Lunch Time	Exhibition area
14:00 - 16:00	Parallel Sessions	
	S25 TC barriers Special Session Chairs: Jonathan Richard Shamrock (NZ), Boyd Ramsey (US)	Plenary Room
	S26 Sustainability with Geosynthetics Chairs: Giuseppe Cardile (IT), Véronique Heili (FR)	Room A
	S27 Landfills and remediation of contaminated sites Chairs: Andrea Dominijanni (IT), Charles Shackelford (US)	Room B
	CSC - Case Studies Contest Chair: Francesco Fontana (IT)	Room C
16:00 - 16:30	Coffee Break	Exhibition area
16:30 - 18:10	IGS Assembly-IGS Awards	
18:10 - 18:40	Young Member Winner session	Plenary Room
20:00 - 23:00	Gala Dinner	

Thursday, 21 September

08:00 – 18:00	Registration	Registration Desk
09:00 - 09:45	Keynote Lecture 3 Chair: Giovanni Biondi (IT) Insight towards the stability of complex geosynthetic reinforced soil structures Ben A. Leshchinsky (Oregon State University, United States of America - US)	Plenary Room
09:45 - 10:30	Keynote Lecture 4 Chair: Yoshihisa Miyata (JP) Geosynthetic Reinforced Foundation Seyed Naser Moghaddas Tafreshi (K.N.Toosi University of Technology, Iran - IR)	Plenary Room
10:30 - 11:00	Coffee Break	Exhibition area
11:00 - 13:00	Parallel Sessions	
	S28 Landfills and remediation of contaminated sites Chairs: Evelina Fratolocchi (IT), Chew Soon Hoe (SG)	Plenary Room
	S29 Filtration and Drainage - Hydraulic applications: canals, reservoirs and dams Chairs: Barry Christopher (US), Maria Clorinda Mandaglio (IT)	Room A
	S30 Seismic Design with Geosynthetics Chairs: Erol Guler (TR), Seyed Naser Moghaddas Tafreshi (IR)	Room B
	S31 Case histories Chairs: Nicolas Freitag (FR), Giulia Lugli (IT)	Room C
13:00 - 14:00	Lunch Time	Exhibition area
14:00 - 16:00	Parallel Sessions	
	S32 Case histories Chairs: Sabatino Cuomo (IT), Chao Xu (CN)	Plenary Room
	S33 Durability and Long Term Performance Chairs: Domenico Giofrè (IT), Sanjay Kumar Shukla (AU)	Room A
	S34 Geosynthetics Properties and Testing Chairs: Peter Stuart Atchison (UK), Warren Peter Hornsey (AU)	Room B
16:00 - 17:00	Closing Ceremony with Exhibition Lottery	Plenary Room

12 ICG

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INVITED LECTURES

Geosynthetics: leading the way
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Giroud Lecture

The Giroud Lecture was established by the IGS in 1994 in recognition of the invaluable contributions of Dr. J.P. Giroud to the technical advancement of the geosynthetics discipline and his central role in the development of the IGS.



J.P. GIROUD
Paris (France - FR)

**IGS Past President
(1986-1990)**
Inventor of the names
"geotextile"
and "geomembrane"

There have been six speakers since the inaugural lecture: Robert Koerner (1998), Kerry Rowe (2002), Chris Lawson (2006), Heinz Brandl (2010), Richard Bathurst (2014) and Nathalie Touze (2018).

At 12 ICG the 7 th Giroud Lecturer is **Ennio M. Palmeira** University of Brasilia (Brazil).



ENNIO MARQUES PALMEIRA
University of Brasília (Brazil - BR)

SEP 18 (MON)
09:30 - 10:30
Plenary room

Geotextile filters: From idealization to real behaviour

Ennio Marques Palmeira

Geotextile filters have been used as filters in geotechnical and geoenvironmental works for decades. Despite their broad utilization, these filters still find obstacles to the expansion of their usage in larger projects and under complex soil and flow conditions. On the other hand, environmental issues are increasingly pressing for a greater use of geotextile filters in substitution to natural granular materials. Even though many important studies in the literature have clarified some points related to soil-water-geotextile filter interaction, some issues still require thorough investigation aimed at a better understanding of the behaviour of geotextile filters and the development of better design methodologies. This is particularly so for filters in contact with complex materials, such as internally unstable soils, tailings, or when subjected to conditions prone to favour biological or chemical clogging. This lecture discusses concerns regarding the use of geotextile filters under severe and critical conditions and how these conditions can be properly dealt with in the light of recent advances on the study of synthetic filters and observation of case-histories. A critical examination of the current practice for the specification of geotextile filters is presented and the importance of more realistic testing and design methods is highlighted. The advances in materials science, how they may mould future geotextiles products and applications and reduce filter behaviour uncertainties are also discussed.

Bathurst Lecture

The IGS has created keynote lectures in honour of some of the industry's most pioneering engineers. Among others, Richard Bathurst and Kerry Rowe have been recognized in new named lectures on February 2022.

The **Richard Bathurst Lecture**, to be given at the IGS Technical Committee on Soil Reinforcement session at every International Conference on Geosynthetics (ICG).

At 12 ICG the Lecturer is **Yoshihisa Miyata** – National Defense Academy of Japan (Japan).



YOSHIHISA MIYATA

National Defense Academy of Japan (Japan - JP)

SEP 19 (TUE)

08:45 - 09:30

Plenary room

Research and practice on geosynthetic MSE walls: past, present and future

Yoshihisa Miyata

Although technology on geosynthetic mechanically stabilized earth (MSE) walls can help solve classical geotechnical earth retaining wall problems, it also contributes to achieving new required performance for these infrastructures. To further develop this technology, it is essential to analyze the history of its progress. This study summarizes the state-of-the-art on the mechanical and soil interaction properties of geosynthetics, physical modeling and in-situ measurements, analytical and numerical modeling, and reliability analyses by reviewing approximately 700 papers published in well-known international journals in this field and some notable conference paper contributions. The latest analytical methods, such as risk-based life cycle cost and CO2 emission assessments and damage/failure predictions, are introduced to evaluate the resilience and sustainability performance of geosynthetic MSE walls. Finally, prospects of a seismic isolation technique with new types of geosynthetics and life cycle management with a long-life sensor for geosynthetic MSE walls are discussed.

Rowe Lecture

The IGS has created keynote lectures in honour of some of the industry's most pioneering engineers. Among others, Richard Bathurst and Kerry Rowe have been recognized in new named lectures on February 2022.

The Kerry Rowe Lecture, given at the IGS Technical Committee on Barrier Systems' session at every International Conference on Geosynthetics (ICG).

At 12 ICG the Lecturer is **Richard Thiel** – Thiel Engineering (USA).



RICHARD THIEL

Thiel Engineering (United States of America - USA)

SEP 20 (WED)

08:45 - 09:30

Plenary room

Selection of long-term shear strength parameters for geosynthetic interfaces

Richard Thiel

The complexity of strain-softening interfaces that can lead to progressive failures along geosynthetic interfaces in lined containment facilities has been a source of confusion for performing slope stability evaluations for over 30 years. The present paper provides a review of the relevant historical literature on this subject, examines significant mining and landfill stability failures that occurred over a period spanning 25 years that are symptomatic of this issue, and presents new quantifications of shear strength variability that can be caused by manufacturing, installation and construction practices that may increase the tendency towards progressive failure mechanisms. Practical guidance and recommendations are given, applicable to numerical as well as limit-equilibrium approaches, that are intended to lend confidence to practitioners tasked with selecting appropriately conservative geosynthetic shear strength parameters for waste containment and mining facilities.

Keynote Lecture 1



GIUSEPPE CARDILE
University of Reggio Calabria (Italy - IT)

SEP 19 (TUE)
09:45 - 10:30
Plenary room

The Road to Resilience: Advanced Soil-Geosynthetic Interface Characterization and Its Role in Reinforcing Soil Structures for Sustainability

Giuseppe Cardile

Geotechnical Engineering, as a scientific discipline, plays a crucial role in advancing sustainable development and enhancing resilience to natural hazards. The concepts of resilience and sustainability are closely linked: resilience pertains to the ability of a system to withstand and recover from disturbances (such as seismic events, landslides, and floods), while sustainability focuses on the long-term well-being of society and the environment. The augmentation of resilience cannot be limited to a single action but instead demands an ongoing process of adaptation and enhancement as conditions change and new insights emerge. The design and implementation of geotechnical projects must address immediate societal needs and consider the long-term environmental impacts and potential for future disasters. For these reasons, assessing the resilience and sustainability of geotechnical systems requires considering both technical performances and environmental-social-economic factors.

Geosynthetics within civil and environmental engineering structures can enhance safety and serviceability, minimising ecological impact. Specifically, geosynthetics used as reinforcement have gained wide recognition as an efficient approach to enhance the resilience of earthworks. Their effectiveness is particularly notable in their ability to withstand deformation and failure under various loading scenarios. However, a comprehensive understanding of the mechanical behaviour of the geosynthetic-soil interface and the mechanisms of load transfer is crucial for designing and constructing geosynthetic-reinforced structures (GRS), as they govern their performance. In this paper, the author will conduct a comprehensive analysis of experimental data to delve into the intricacies of the geosynthetic-soil interface by examining the effects of different pullout-loading conditions on design parameters and highlighting recent advancements in the field.

Keynote Lecture 2

**RUSSELL JONES***WSP UK Limited (United Kingdom - UK)***SEP 20 (WED)****09:45 - 10:30**

Plenary room

Sustainable Development: UK Perspective on the Role of Geosynthetics

D.R.V. Jones, N. Dixon, G. Fowmes, P Guerra Escobar, G Horgan, D Shercliff & K Zamara

There is a growing realisation that the current model of development is unsustainable. In other words, we are living beyond our means. Climate change is the defining crisis of our time, and it is happening even more quickly than we feared. Rising temperatures are fuelling environmental degradation, natural disasters, weather extremes, food and water insecurity, economic disruption, conflict, and terrorism. Sea levels are rising, the Arctic is melting, coral reefs are dying, oceans are acidifying, and forests are burning. The goal of sustainable development is to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life, without compromising the quality of life of future generations. This paper will provide a perspective from the UK on how geosynthetics can support the global cause of limiting climate change. Examples of sustainable geosynthetic solutions will be given from a team of UK researchers and practitioners.

Keynote Lecture 3



BEN A. LESHCHINSKY

Oregon State University (United States of America - USA)

SEP 21 (THU)

09:00 - 09:45

Plenary room

Insight towards the stability of complex geosynthetic reinforced soil structures

Ben A. Leshchinsky

Evaluating the internal and external stability of geosynthetic-reinforced soil structures (GRSS) requires balancing a variety of design variables. For GRSS that diverge from simple conditions (e.g. supporting loads, built on sloping ground, subject to seismicity), stability evaluations can become exceedingly complex. Advancements in evaluating the internal and external stability of these structures under complex conditions are explored. Insight towards improved consideration of complex design conditions are described for a variety of complex, but common scenarios.

Keynote Lecture 4



SEYED NASER MOGHADDAS TAFRESHI
K. N. Toosi University of Technology (Iran - IR)

SEP 21 (THU)
09:45 - 10:30
Plenary room

Geosynthetic Reinforced Foundation

Seyed Naser Moghaddas Tafreshi

Generally, construction on soft foundations is a major challenge for geotechnical engineers due to the insufficient bearing capacity of the foundation, which is associated with an excessive settlement under construction loads. Therefore, improving soil strength and bearing capacity under imposed loads is a key challenge in geotechnical projects. A variety of ground improvement techniques, including preloading with vertical drains, replacement using competent soils, grouting, piling, geosynthetic reinforcement, etc. can be commonly employed to improve the bearing capacity of soft soils. Among the others, geosynthetic reinforcement takes the center stage in basal reinforcement due to its technical efficiency, rapid construction, durability and environmental-friendly solution. The employment of geosynthetic layers inside a granular foundation bed can improve the shear strength of the system and provides an ideal structure with high bearing capacity and low settlement. The type of geosynthetic reinforcement (e.g., geotextile, geogrid, and geocell) can influence both failure modes and stress distribution in the soil medium depending on the geometrical properties of reinforcements, number of layers and the nature of passive or shear resistance developed between soil and reinforcement interface or within the reinforcement's body (e.g., internal cells of reinforcement elements). Planar reinforcement commonly contributes to the load-carrying mechanism by virtue of frictional resistance mobilized at its interface with surrounding soil (e.g., geotextile) or by interlocking between the ribs of the reinforcement and soil particles (e.g., geogrid). Furthermore, three-dimensional reinforcements such as geocells, besides these mechanisms, can provide confinement or passive forces against pull-out forces, causing more improvement in shear strength or stiffness of the soil-reinforcement composite. So far, increasing the technical knowledge about geosynthetic reinforcement engenders hope in the society of civil engineering, bringing about spreading the applications of these materials in different aspects, including stabilization and reinforcement for footings, pavements, buried pipes and underground utilities, railway and road embankments, slopes and retaining walls. This lecture describes recent scientific achievements encompassing new concepts, mechanisms and design methods for the application of geosynthetics as protection measures in geotechnical sub-structures.



SANJAY KUMAR SHUKLA
 (Australia - AU)

SEP 17 (SUN)
09:00 - 12:30/13:30 - 17:00
 Room A

Introduction to Geosynthetic Engineering

Geosynthetics are being used extensively worldwide as they offer cost-effective, environmentally friendly and energy-efficient solutions to many civil, mining, agricultural and aquacultural engineering problems in a sustainable manner. Rational design methods, based on sound concepts and standardised test techniques for determining the technical properties of geosynthetics, are now available, thus placing the geosynthetics on a firm base. This interactive course provides a comprehensive introduction to geosynthetics and their field applications, called the geosynthetic engineering.

Learning objectives

Upon completion of the course, the participants will be able to:

- differentiate between types of geosynthetics
- analyse the functions of geosynthetics for their use in field applications
- select the correct geosynthetics for a specific application
- recommend the type of test on geosynthetics required in a specific field application
- develop the general guidelines for geosynthetic installation, and
- locate the references and resources on geosynthetics and their applications.

Who should attend?

This course is ideal for those involved in the specification, analysis, design, construction, and/or study of geosynthetic-related projects. The participants may include the following from the areas of civil, mining, agricultural and aquacultural engineering:

- Senior undergraduate and postgraduate students
- Research candidates
- Practising engineers
- Specialised contractors
- Project managers
- Land developers

Course outline

Session #1 (9:30 am - 11:00 am): Basic description of geosynthetics, including their types, basic characteristics, raw materials and manufacturing processes, and functions of geosynthetics, namely reinforcement, separation, filtration, drainage, fluid barrier and protection

Session #2 (11:00 am -12:30 pm): Properties of geosynthetics, namely physical properties, mechanical properties, hydraulic properties, and endurance and degradation properties, and their evaluation

Session #3 (1:30 pm -3:00 pm): Selection of geosynthetics, basic design concepts and application areas

Session #4 (3:00 pm - 4:30 pm): General field application guidelines and case studies



RICHARD J. BATHURST
(Canada - CA)

SEP 17 (SUN)
09:00 - 12:30
Room B

Geosynthetic Reinforced Wall Structures including Seismic Aspects

This course will be of interest to attendees who are not familiar with geosynthetic reinforced soil (GRS) walls, and those who wish to be updated on recent developments in the design of these systems for both static and earthquake loading conditions. The short course will be presented in three sections:

1. Overview of geosynthetic reinforced soil walls. The history of GRS walls is briefly reviewed including important new construction methods and materials. The basic components of these systems are explained. The relatively higher sustainability of these systems over conventional earth retaining wall systems is highlighted.
2. Design and analysis of GRS walls. External, global and internal design limit states are presented. The characterization of the mechanical properties of geosynthetic reinforcement materials is discussed and how these properties are determined from physical testing and used in internal stability design and analysis is demonstrated. The new stiffness method recently adopted in the US and Canada is explained. The essential features of emerging probabilistic methods of analysis are introduced.
3. Seismic design: GRS walls have most often performed well during earthquake. Examples of their performance under seismic loading are given. The reasons for their good performance are explained and the design methods used to quantify the additional seismic-induced external and internal loading are discussed.



BARRY R. CHRISTOPHER
 (United States of America - USA)

SEP 17 (SUN)
13:30-17:00
 Room B

Filtration and Drainage in Geosynthetic Engineering: Principles, Practices, and Sustainability

Geosynthetics have been traditionally used as drains and filters for decades. As any construction material they must be properly specified based on sound design procedures in order to provide effective solutions in geotechnical and geoenvironmental projects. Geosynthetics can be easily and quickly installed and can avoid or minimize the utilization of natural drainage materials. This short-course will present the typical geosynthetic products that can be used as filters and drains, the basis for design and specification, a review of geosynthetics applications drainage systems, hard erosion control applications, roadways, reinforced soil embankments, slopes and retaining walls. Case histories demonstrating long-term performance and an evaluation of sustainability versus conventional graded granular filters will also be reviewed.

Course outcomes include:

- Identifying the types of geosynthetics for drainage and filtration.
- Recognizing applications in Geotechnical and Geoenvironmental engineering problems.
- Recalling basic definitions, primary and secondary functions, and filtration concepts.
- Understanding the principles of filtration and drainage design criteria and locating design methods.
- Identifying factors affecting the performance of geosynthetics in drainage and filtration.
- Explaining construction principles for effective geosynthetic installation for different geosynthetic drainage and filtration applications.
- Reviewing case-histories of successful long-term drainage and filtration performance.
- Identify four potential cost savings in using geosynthetics including improved performance and sustainability.

This workshop will enable participants to:

- Gain theoretical and practical knowledge on the use and selection of geosynthetics for drainage and filtration.
- Develop an appreciation of activities outside your own specialty.

Who should attend:

- Design specialists, civil and environmental engineers and senior construction engineers.
- Consulting engineers, industrial technical representative and academic who specialize in use of geosynthetics in construction.
- Contractors associated with the construction of earth works.
- Forensic engineers.



R. KERRY ROWE
(Canada - CA)

SEP 17 (SUN)
09:00 - 12:30
Room C

Geomembranes and composite liners in landfills and mining: Moving forward

The short course addresses two fundamental questions asked about liners: “how much will they leak?” and “How long will they last”.

Leakage: Beginning with the basic concepts, this short course examines six simple equations for calculating leakage and discusses the areas of applications and limitations of the various equations. Worked examples illustrate that while the equations are simple, careful thought must be given to the selection of the appropriate equation and the evaluation of appropriate parameters. For example, consideration is given to wrinkles and the very different consequences of wrinkles with respect to leakage in landfills and tailings storage facilities are discussed. Consideration is also given to how differential settlement may affect leakage through cover systems.

Service life: Again, the course begins with an introduction of basic concepts and techniques for evaluating the time to antioxidant depletion as well as estimating the remainder of the time to nominal failure. The approaches are illustrated by examples. The way the chemical interactions between a geomembrane and the fluid it is intending to contain and the length of time a test is conducted may affect the interpretation of antioxidant depletion and the length of time and the implications are illustrated. The evaluation of the time to nominal failure and the factors affecting the ultimate service life of a geomembrane is discussed both for the design of new geomembrane liners the assessment of remaining service life existing liners.

The course finishes with a discussion of how contaminants of emerging concern such as Per and Poly fluoroalkyl substances (PFASs) and how this changes what represents an acceptable leakage, how long the barrier system may need to last (the contaminating lifespan of a landfill), and the service life of the geomembrane.



A. (MALEK) BOUAZZA
(Australia - AU)

SEP 17 (SUN)
13:30-17:00
Room C

Geosynthetic Clay Liners: from Insights to Outrights

This short course is designed to provide the most recent findings from research and the state-of-practice to experts and novices on geosynthetic clay liners in waste containment barrier systems. Following an overall introduction, the course then focuses on providing insight into bentonite properties, GCL unsaturated properties, hydration processes, and heat effects. Emphasis is also given to the need to consider the interaction of both geosynthetic and soil components of the overall barrier system to ensure adequate performance. Finally, geosynthetic clay liners (GCLs) interaction with fluids typically encountered in landfills, mining and brine ponds will be discussed, including interactions with emerging contaminants such as Per and Poly fluoroalkyl substances (PFASs).

12 ICG

September 17-21, 2023
Auditorium Parco della Musica,
Roma - Italy

12th **International
Conference
on Geosynthetics**

SPECIAL SESSIONS

Geosynthetics: leading the way
to a resilient planet



Tuesday, 19 September

SESSION S11

11:00-13:00 PLENARY ROOM

TC REINFORCEMENT SPECIAL SESSION ON DESIGN METHODS FOR BASAL REINFORCEMENT OF EMBANKMENTS

Chairs: **Pietro Rimoldi (IT), Ivan Puig Damians (SP)**

The IGS Technical Committee on Reinforcement (TC-R) has organized a Special Session, addressing the topic “Design methods for basal reinforcement of embankments”.

Basal reinforcement is one of the fundamental applications of the “reinforcement” function, defined in the norm ISO 10318-1.

Design for basal reinforcement is addressed in the standard ISO TR 18228-7, where basal reinforcement is intended as reinforcement elements placed at the base of embankments or below foundations of buildings to provide additional resistance to avoid foundation failure, control of settlements, to increase the amount of load transfer onto rigid inclusions or spanning over voided zones.

The new Eurocode 7 EN 1997-3 includes specific sections dedicated to basal reinforcement for embankments.

Moreover, several National guidelines address the design of basal reinforcement on soft soils, over piles and over areas prone to subsidence.

The TC-R Special Section aims to stimulate the discussion on the design for basal reinforcement through the presentation of the guidelines, design methods and case study from different Countries.

The TC-R Special Session will be chaired by Pietro Rimoldi (Italy) and co-chaired by Ivan Puig Damians (Spain), and will include four presentations delivered by Pat Naughton (Ireland), Fabrizia Trovato (Italy), Dimiter Alexiew (Germany) and Yoshihisa Miyata (Japan).

- | | |
|--------------|---|
| 11:00 | Basal reinforcement on piles and on voids according to EBGeo
Alexiew, Dimiter |
| 11:25 | A case study of geosynthetic basal reinforcement techniques in Japan
Miyata, Yoshihisa; Hironaka, Junichi |
| 11:50 | The design of embankment on soft soils, over piles and over areas prone to subsidence to BS 8006
Naughton, Patrick |
| 12:15 | Design of basal reinforced embankments on soft soils at short and long term
Rimoldi, Pietro; Trovato, Fabrizia; Lugli, Giulia |
| 13:00 | Closing |

CHINESE SPECIAL SESSION (CSS)**16:30-18:30 ROOM C****DEVELOPMENT AND CURRENT STATE OF THE GEOSYNTHETIC INDUSTRY IN CHINA**Chairs: **Jie Han (US), Huabei Liu (CN)**

- 16:30** **Introduction of the attending IGS officers and CTAG officers**
Opening speech by Chao Xu, CCIIGS chair
- 16:40** **Development and current state of geosynthetic industry in China**
Shiguang, Zhou; Guangqing, Yang
- 17:10** **Application of geosynthetics in environmental protection in China**
Liangtong, Zhan; Haijian, Xie; Ning, Liu; Shiping, Xie; Shengli, Zhen
- 17:30** **Application of geosynthetics in water conservancy and hydropower projects in China**
Haimin, Wu; Weilie, Zou; Zhong, Han; Jungao, Zhu
- 17:50** **Application of geosynthetics in transportation in China**
Shiguang, Zhou; Guangqing, Yang; Chao, Xu; Zongling, Yan; Aimin, Liu;
Weichao, Liu; Zhijie, Wang; He, Wang; Peng, Xu
- 18:10** **Q&A**
- 18:25** **Concluding remarks by Shiguang Zhou, CTAG president**
- 18:30** **Closing**

Wednesday, 20 September

SESSION S21

11:00-13:00 PLENARY ROOM

YOUNG MEMBER CONTEST

Chairs: **Fernanda Bessa Ferreira (PT)**, **David Hercules Marx (US)**

The IGS Young members committee, with the support of the IGS Italian Chapter, have facilitated and organized the IGS Young Members Contest. This technical panel session is dedicated to the ten best technical papers prepared by the young members of the IGS. IGS Young Members attending the 12 ICG were invited to submit their papers to the contest. A total of thirty-seven papers were received from nineteen different countries. The entries were reviewed by a panel of international judges to select the top ten papers that will be presented in this session.

A jury of esteemed geosynthetics professionals will judge the technical content and the quality of the presentations to select the winner of the contest. The selected young member winner will be announced at the General Assembly of IGS on Sep. 20 (18.10-18.40) and will be invited to present his/her lecture to a full audience. As well as receiving a Best Paper certificate, the winner will get \$1,000 and be featured on the IGS website. Second prize is \$600 and third prize \$300.

Selected Papers for the Session

- 11:00** **A micromechanical model of a PVC geomembrane**
Akel, Nesrin Omar; Stoltz, Guillaume; Wautier, Antoine; Touze, Nathalie; Nicot, Francois
- 11:10** **Numerical Modelling of a Reinforced Embankment in Cold Regions Environment**
De Guzman, Earl Marvin; Alfaro, Marolo; Arenson, Lukas; Doré, Guy
- 11:20** **Laboratory device to evaluate connection loads in segmental geosynthetic-reinforced soil walls**
Figueiredo, Paulo Victor de Carvalho; Portelinha, Fernando Henrique Martins; Zornberg, Jorge Gabriel
- 11:30** **Evaluation of Geosynthetic-Asphalt Interface Characteristics using Leutner Shear Tester**
Kumar, V. Vinay; Roodi, Gholam H.; Zornberg, Jorge G.
- 11:40** **Hyperbolic models to represent the effect of mechanical damage and abrasion on the short-term tensile response of a geocomposite**
Lombardi, Giovanni; Pinho-Lopes, Margarida; Paula, António Miguel; Bastos, António
- 11:50** **Basal reinforced earth embankments on piled foundations: the role of embankment construction process**
Mangraviti, Viviana; Flessati, Luca; di Prisco, Claudio
- 12:00** **Topology optimization of a junction in a biaxial geogrid under in-isolation tensile loading**
Paiva, Lucas; Pinho-Lopes, Margarida; Valente, Robertt; Paula, António Miguel
- 12:10** **Predicted Performance of Geogrid-stabilized Unbound Aggregate Layers Using Confined Soil-Geosynthetic Composite Stiffness**
S, Subramanian; Zornberg, Jorge G.

- 12:20** | **GCL hydration by lateritic soils under isothermal conditions and simulated daily thermal cycles**
Silva, José Wilson Batista da; Correia, Natalia de Souza; Portelinha, Fernando Henrique Martins
- 12:30** | **Interface shear bond analysis of different geosynthetic paving interlayers**
Silva, Matheus Pena da Silva e; Santos, Karolina Maria dos; Correia, Natália de Souza
- 13:00** | **Closing**

Young Paper Award Finalists

First line: **Earl Marvin De Guzman, Giovani Lombardi, Viviana Mangraviti, V. Vinay Kumar.**

Middle line: **Matheus Pena da Silva, José Wilson Batista da Silva, Lucas Paiva, Nesrin Omar Akel.**

Last line: **Subramanian S., Paulo Victor de Carvalho Figueiredo.**



Wednesday, 20 September

SESSION S25

14:00-16:00 PLENARY ROOM

**TC BARRIER SPECIAL SESSION ON GEOSYNTHETIC BARRIER QUALITY ASSURANCE,
QUALITY CONTROL AND INSTALLATION**

Chair: **Jonathan Richard Shamrock (NZ)**

- 14:00** **Introduction**
Jonathan Shamrock
- 14:05** **To do and not to do during geomembrane installation**
Boyd Ramsey
- 14:20** **To do and not to do during GCL installation**
Bruno Herlin
- 14:35** **Panel discussion with action items for TC-B – Moderator: Kent von Maubeuge (DE)**
Eddie Weiser, Bruno Herlin, Boyd Ramsey, Amir Shahkolahi

Chair: **Boyd Ramsey (US)**

- 14:55** **Importance and suggestions for QC and QA of Geomembranes and GCLs**
Sam Allen
- 15:15** **Interpretation of geosynthetic barriers test results during QA**
George Koerner
- 15:35** **Panel discussion with action items for TC-B – Moderator: Amir Shahkolahi (AU)**
Sam Allen, George Koerner, Jonathan Shamrock, Kent von Maubeuge
- 15:55** **Closing remarks**
Jonathan Shamrock
- 16:00** **Closure of session**

SPECIAL SESSION (CSC)

14:00-16:00 ROOM C

CASE STUDIES CONTEST

Chair: **Francesco Fontana (IT)**

During the last four regional IGS conferences, the IGS Corporate Committee organized contests where Corporate Members were invited to share significant projects illustrating the environmental benefits of geosynthetic applications. Many case studies were submitted showing the wide popularity and effectiveness of geosynthetics across all continents. The winning presentations from each regional phase now compete in this final, global contest.

This competition was created to emphasize and give visibility to the commitment of geosynthetic manufacturers and engineering companies. The themes included in the final competition cover coastal protection, noise mitigation, anti-seismic construction, and roads in extreme conditions. All applications share the common characteristics of matching the needs of development with the need to minimize environmental impacts and maximize sustainability, in terms of safety and durability.

- | | |
|--------------|--|
| 14:00 | <p>Application of geosynthetics solutions in the construction of 'El Salitre' artificial beach - Chile
 Huesker
 GeoAmerica contest winner</p> |
| 14:30 | <p>Sustainable geosynthetic design for a shooting sports club noise barrier with recycled construction material, Germany
 Naue
 EuroGeo contest winner</p> |
| 15:00 | <p>Reinforced Earth Containment Structure For Abutment Seismic Protection – Taiwan
 ACE
 GeoAsia contest winner</p> |
| 15:30 | <p>Second River Niger Bridge in Onitsha, Nigeria – Use of geosynthetic encased granular columns for soil improvement
 Huesker
 GeoAfrica contest winner</p> |
| 16:00 | <p>Closure of session</p> |

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PARALLEL SESSIONS

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Monday 18 September

SESSION S01

11:30-13:00 PLENARY ROOM

SUSTAINABILITY WITH GEOSYNTHETICS

Chairs: **George Koerner (US), Kasia Zamara (UK)**

- 11:30** **Displacement-based design method to increase sustainability of Pile-Supported embankments: practical application**
Mangraviti, Viviana
- 11:40** **How the use of cementitious geocomposite in tunnel will reduce our impact on the planet?**
Guinard, Paul
- 11:50** **Reducing carbon footprint by using HDPE Geomembrane**
Muñoz Gomez, Jose Miguel
- 12:00** **The Sustainable approach to design a Noise Bund**
Rathod, Luckeet
- 12:10** **Analysis of the generation of plastic debris and microplastics from geosynthetics**
Rimoldi, Pietro; Fontana, Francesco; Scotto, Moreno; Vicari, Marco
- 12:20** **Life Cycle Analysis of an innovative reinforcement geosynthetic coupled with a detection and monitoring warning system**
Riot Verdier, Mathilde; Monnet, Thomas; Delmas, Philippe
- 12:30** **Polyolefinic geosynthetics as key components in future energy systems - a case study and perspective**
Wetzel, Hendrik; Peham, Lukas; Sørensen, Per Alex; Wallner, Gernot M.
- 12:40** **Discussion**
- 13:00** **Closure of session**

SESSION S02**11:30-13:00 ROOM A****FILTRATION AND DRAINAGE**Chairs: **Adam Bezuijen (NL), Eric Blond (CA)**

- 11:30** **Hydraulic performance and degradation of geotextile tube in sediment dewatering: a remediation study**
Aparicio-Ardila, Maria Alejandra; Sabogal-Paz, Lyda Patricia; Lins da Silva, Jefferson
- 11:40** **Consolidation of clay slurry fill using horizontal drain enhanced geotextile sheet**
Chen, Hao; Chu, Jian; Wu, Shifan; Guo, Wei
- 11:50** **Thermal prefabricated vertical drain for vacuum consolidation of Hong Kong marine deposits with temperature changes**
Chen, Ze-Jian; Yin, Jian-Hua
- 12:00** **Effect of installation under Nordic conditions on drainage geosynthetics: ROUGH project**
Ehrenberg, Henning; Recker, C.; Delmas, Ph.
- 12:10** **Radial and axial analyze of the dewatering performance in geotextile tubes by bench-scale dewatering tests**
Kamakura, Gustavo Kenji; Aparicio-Ardila, Maria Alejandra; Valentin, Clever Aparecido; Lins da Silva, Jefferson
- 12:20** **Water treatment plant sludge dewatering process with geotextile bags: comparison between bags without and with lateral restraints**
Müller, Matheus; Oliveira, Gabriel; Vidal, Delma
- 12:30** **Pefabricated board drains: applications, developments, and problems**
Zheng, Airong
- 12:40** **Discussion**
- 13:00** **Closure of session**

Monday 18 September

SESSION S03

11:30-13:00 ROOM B

DURABILITY

Chairs: **Samuel Allen (US), Anne-Laure Backes (LU)**

- 11:30** **Effect of Aged Geomembrane extrusion welding on antioxidant depletion rate**
Ali, Mahmoud M.; Rowe, R. Kerry
- 11:40** **Comparison between the environmental stress-crack resistance of unaged and aged HDPE and LLDPE geomembranes**
Silva, Rodrigo; Morsy, Mohamed S.; Abdelaal, Fady B.; Rowe, R. Kerry
- 11:50** **White Polyethylene Geomembrane: forensic and laboratory evidence for superior durability**
Ramsey, Boyd
- 12:00** **Resiliency of PVC Coated Polyester Geogrid in High pH Conditions**
Spencer, Laura; Lostumbo, John
- 12:10** **Investigations on degradability of cotton samples buried in different soil conditions (case study)**
Tavakoli Mehrjardi, Gholamhosein ; Fuentes, Raul; Heins, Kira; Gries, Thomas
- 12:20** **Geotextiles subjected to cyclic fatigue tests**
Urashima, Denise de Carvalho; Guimarães, Mag Geisielly Alves;
De Oliveira, Pedro Victor Garcia; Pereira, Eleonardo Lucas;
Urashima, Beatriz Mydori Carvalho
- 12:30** **Durability of HDPE geomembranes under different and challenging exposure conditions**
Webb, Darren; Phillips, Gareth; Gassner, Fred
- 12:40** **Discussion**
- 13:00** **Closure of session**

SESSION S04**11:30-13:00 ROOM C****INNOVATIVE MATERIALS AND TECHNOLOGIES**Chairs: **Jacek Kawalec (PL), Edoardo Zannoni (ZA)**

- 11:30** **Geosynthetics Wrapped Tire Derived Materials as Drains for Liquefaction Mitigation**
Hu, Yutao; Hazarika, Hemanta; Madabhushi, Gopal Santana Phani; Haigh, Stuart Kenneth
- 11:40** **Invention of a new geosynthetic drainage sheet to optimise hydraulic and mechanical performance for extreme geotechnical applications**
Kroh, Robin; Zanzinger, Helmut; Lotz, Florian
- 11:50** **The Innovative Usage of waste EPS granules as Column Material for Controlling the Swell-shrink Behaviour of Expansive Soil**
S, Selvakumar; B, Soundara; P, Kulanthaivel
- 12:00** **Experimental investigation on a novel graphene-based geotextile under mechanical loading**
Senadheera, Harini Thisara; Bouazza, Abdelmalek; Kodikara, Jayantha; Gibbs, Daniel
- 12:10** **New GCL Composite Vertical Anti-seepage Technology and Its Application**
Xie, Shiping; He, Shunhui; Zhang, Jiang; Zheng, Yongya
- 12:20** **Discussion**
- 13:00** **Closure of session**

Monday 18 September

SESSION S05

14:00-16:00 PLENARY ROOM

REINFORCED WALLS AND SLOPES

Chairs: **Ben Adam Leshchinsky (US), Marilene Pisano (IT)**

- 14:00** **Probabilistic back analysis of a high geosynthetic-reinforced slope failure**
Chen, Jianfeng; Sun, Rui; Peng, Ming; Bao, Ning
- 14:10** **Lateral earth pressure against Geosynthetic Reinforced Soil-Integrated Bridge Abutment Block Wall**
El Refai, Bahia; Naughton, Patrick
- 14:20** **Short-term thermo-mechanical numerical modelling of reinforced soil walls with polyester strap reinforcements**
Moncada, Anibal; Puig Damians, Ivan; Olivella, Sebastià; Bathurst, Richard
- 14:30** **Impact of geogrid arrangement on the deformational response of geosynthetic reinforced soil – integral bridge systems**
Naughton, Daniel; Naughton, Patrick
- 14:40** **Design and construction of the largest reinforced soil walls project in cyprus**
Rimoldi, Pietro; Lugli, Giulia; Trovato, Fabrizia; Nicolaou, Iacovos
- 14:50** **Monitoring and warning system including a double stiffness geosynthetic for the reinforcement of cohesive soil on cavities**
Riot Verdier, Mathilde; Briancon, Laurent; Delmas, Philippe; Monnet, Thomas
- 15:00** **The role of rainwater infiltration on the tensile load in unsaturated geosynthetic reinforced soil layer**
Santos, Matheus Cardoso dos; Portelinha, Fernando Henrique Martins
- 15:10** **Field Instrumentation and Preliminary Evaluation of a Mechanically Stabilized Earth (MSE) Wall with Embedded Bridge-Supporting Piles**
Wang, Qingming; Xu, Chao; Shen, Panpan; Li, Haoyu; Meng, Ya; Zhao, Chongxi
- 15:20** **Mechanical and deformation behavior of geogrid reinforced soil retaining walls using discrete element modeling**
Wang, Zhijie; Shi, Mengyuan; Yang, Guangqing; Wang, He
- 15:30** **Design and Construction of Hybrid Reinforced Soil Structures**
Woods, Dave; Seddon, Chris; Deeley, Sam; Ramsauer, Andreas; Horgan, Graham
- 15:40** **Discussion**
- 16:00** **Closure of session**

SESSION S06

14:00-16:00 ROOM A

GEOSYNTHETICS PROPERTIES AND TESTING

Chairs: **Kazem Fakharian (IR), Maria Graça Lopes (PT)**

- 14:00** **PVC geomembrane seams: influence of the test testing speed on shear test results**
Barroso, Madalena; Lopes, Maria da Graça
- 14:10** **Performance of various techniques used to increase the interface shear-strength properties of polyethylene geomembranes**
Blond, Eric; Tarnowski, Catrin
- 14:20** **Designing with Geosynthetic Cementitious Composite Mats - The importance of managing risk by using ASTM D8364-21 'Standard Specification for GCC Materials**
Church, Lee; Brusa, Nicola
- 14:30** **A review of geomembrane integrity surveys and their contribution to high quality installation outcomes**
Fairhead, Graham; Bouazza, Malek
- 14:40** **Specimen preparation and the effects on OIT results for Polyethylene Geomembranes**
Fairhead, Graham; Hornsey, Warren
- 14:50** **Measurement uncertainty in testing bentonite index properties**
Kovačević Zelić, Biljana; Dobrilović, Ivana; Kosić, Danijela; Vrbaški, Anja
- 15:00** **Chemico-osmotic efficiency of Geosynthetic Clay Liners: testing apparatus and preliminary results**
Mazzieri, Francesco; Bernardo, Davide; Domizi, Jonathan; Fratolocchi, Evelina
- 15:10** **Effect of UV Radiation Exposure on HDPE Geomembrane Properties**
R K, Anjana; S, Keerthana; DN, Arnepalli
- 15:20** **Effect of welding quality from dual track wedge welding on post-weld geomembrane oxidative induction time**
Silva, José Wilson Batista; Kerry Rowe, Ronald
- 15:30** **Chemical characterization of geomembranes by mass spectrometry**
Valentin, Leonardo Antonio; Valentin, Clever Aparecido; Kobelnik, Marcelo; Da Silva, Jefferson Lins
- 15:40** **Discussion**
- 16:00** **Closure of session**

Monday 18 September

SESSION S07

14:00-16:00 ROOM B

UNPAVED AND PAVED ROADS, RAILWAYS AND OTHER TRANSPORTATION APPLICATIONS

Chairs: **Jiro Kuwano (JP), Margarida Pinho-Lopes (PT)**

- 14:00 Bituminous Geomembranes (BGM) used for waterproofing in various transport applications**
Daly, Natalie; Aguirre, Ted; Breul, Bertrand
- 14:10 Reducing the settlement of railway ballast by random fibre reinforcement**
Ferro, Edgar; Le Pen, Louis; Zervos, Antonis; Powrie, William
- 14:20 Effectiveness of geogrid stabilization of airfield pavements investigated using embedded sensors**
Kang, Mingu; Qamhia, Issam I.A.; Wang, Han; Tutumluer, Erol; Garg, Navneet; Villafane, Wilfredo
- 14:30 Evaluation of Multi-Functional Composite Geotextile's Contribution To Railway Track Stabilization Through Laboratory Research**
Liu, Gang; Jiang, Xin; Jong, Ching Joo; Yee, Tack Weng; Lin, Qiang; Teh, Stephen It Seen
- 14:40 Geosynthetics coated with pure polyurea to create a waterproofing membrane for railways bridge decks**
Longoni, Cristina Paola; De Ambri, Emanuele
- 14:50 Investigating the effects of installation in Nordic conditions on geosynthetics for reinforcement/stabilization: ROUGH project**
Oliver, Tim; Lavasan, Arash; Klompaker, Jörg; Recker, Christian; Delmas, Philippe
- 15:00 Influence of Geosynthetics in the Structural Layers on the Railway Track Geometry**
Petriaev, Andrei
- 15:10 Performance Evaluation of Three-Dimensional Geogrid for Base Stabilization in Transportation Applications**
Recalcati, Piergiorgio; Cuelho, Eli; Crippa, Alberto; Marelli, Stefano
- 15:20 Reinforced embankments for the Perranporth to Newquay Cycleway project at Newlyn Halt Rail**
Saeed, Rozhan
- 15:30 Review of the German geotextile robustness classes (GRK) for separation layers with nonwoven geotextiles using large-scale field tests**
Zanzinger, Helmut; Retzlaff, Jan; Kroh, Robin
- 15:40 Discussion**
- 16:00 Closure of session**

SESSION S08

16:30-18:30 PLENARY ROOM

FILTRATION AND DRAINAGE - HYDRAULIC APPLICATIONS: CANALS, RESERVOIRS AND DAMS

Chairs: **Daniele Cazzuffi (IT), Graham Fairhead (AU)**

- 16:30** **Bituminous geomembranes (BGM) to reduce water losses in irrigation canals**
Aguirre, Ted; Misar, Ivan; Moeglen, Jacques; Daly, Natalie
- 16:40** **Field tests on the impact of stones on geotextile compared with theory**
Bezuijen, Adam
- 16:50** **Qualitative and bathymetric evaluation of erosion control Techniques
in Reservoir Margins with geosynthetics**
da Luz, Marta Pereira; Aparicio-Ardila, Maria Alejandra;
Valentin, Clever Aparecido; Lins da Silva, Jefferson
- 17:00** **Site testing to assess the performance of filtration/separation geotextiles
in cold climate: ROUGH project**
De Wolf, Kenny; Bugiel, Andreas; Møller, Mikael; Delmas, Philippe; Recker, Christian
- 17:10** **Performance of concrete filled geotextile mattresses**
Ebbert, Simon; Derksen, Jan; Harnisch, Joerg
- 17:20** **An innovative “Geo-carpet” system as a countermeasure against local scour
at bridge piers: small-scale test results**
Galli, Andrea; Radice, Alessio
- 17:30** **Clogging behaviour of nonwoven geotextiles with internally unstable soil**
Markiewicz, Anna; Koda, Eugeniusz
- 17:40** **Behaviour of geotextile filters in contact with internally unstable cohesionless soils**
Moraci, Nicola; Mandaglio, Maria Clorinda; Bilardi, Stefania
- 17:50** **Evaluation of biofilm adhesion and development in nonwoven geotextile
in contact with wastewater**
Morais, Maria Vitoria; Marchiori, Leonardo; Sátiro, Josivaldo;
Albuquerque, Antonio; Cavaleiro, Victor
- 18:00** **Research for defining the design parameters for a family of reinforced geomats
for erosion control on river/channel banks**
Rimoldi, Pietro; Bianchini, Paolo; Trovato, Fabrizia; Scotto, Moreno
- 18:10** **Evaluation of the hydraulic behavior of hydrophilic and hydrophobic
geotextiles under hydrostatic pressure test**
Rodrigues, Lilia Carla; Vidal, Delma de Mattos
- 18:20** **Discussion**
- 18:30** **Closure of session**

Monday 18 September

SESSION S09

16:30-18:30 ROOM A

SOIL-GEOSYNTHETIC INTERACTION

Chairs: **Jonathan Fannin (CA), Chungsik Yoo (KR)**

- 16:30** **Modeling temperature dependent behavior of soil-polyethylene contact surfaces**
Bilgin, Ömer; Shah, Bhavikkumar
- 16:40** **Use of double stiffness geosynthetics for the reinforcement of cohesive backfill on cavities**
Delli Carpini, Maria; Emeriault, Fabrice; Villard, Pascal; Riot, Mathilde; Briancon, Laurent;
Delmas, Philippe; Al Heib, Marwan
- 16:50** **Laboratory testing of geosynthetics-reinforced soils under freeze-thaw cycles
and mechanical plate loading**
Huang, Mian; Lin, Cheng; Pokharel, Sanat
- 17:00** **Investigation of one-dimensional compression behavior of rubber chips mixed soil:
Calculation of volumetric compression amount in the densest particle arrangement**
Kimata, Takashi; Kobayashi, Noriyuki
- 17:10** **Numerical Modeling and Evaluation of Passive Grout-Anchors in Geotextile Bags**
Stathas, Dionysios; Glover, James; Braun-Badertscher, Seraina; Lifa, Imad
- 17:20** **Micromechanical investigation of geogrid-reinforced granular soil**
Stocco, Giovanni; Pol, Antonio; Detert, Oliver; Carbone, Laura; Lackner, Christian;
Gabrieli, Fabio
- 17:30** **Development of Stability analysis of reinforced soil by rigid-plastic finite element method**
Yamakuri, Yuki; Sakon, Ena; Kobayashi, Shun-ichi
- 17:40** **Effect of backfill gradation on bearing capacity of a geosynthetic-reinforced soil (GRS) mass**
Zhang, Zhen; Itthiwongkul, Wijit; Chen, Yunlong; Ye, Guanbao; Xu, Chao; Han, Jie
- 17:50** **Discussion**
- 18:30** **Closure of session**

SESSION S10

16:30-18:30 ROOM B

INNOVATIVE MATERIALS

Chairs: **Abdelmalek Bouazza (AU), Helmut Zanzinger (DE)**

- 16:30** **An experimental way of the quantification of the confinement effect in the mechanically stabilized layer by measuring horizontal pressures generated by static load**
 Horníček, Leoš; Rakowski, Zikmund; Kawalec, Jacek; Zamara, Kasia
- 16:40** **A Study on the Electrical Properties of Copper-Functionalized Graphene Oxide in Concrete**
 Kim, Jin; Lee, Jong-Young; Han, Jung-Geun
- 16:50** **Numerical Modeling of Embankment on Soft Ground Improved by Prefabricated Vertical Drains and Deep Cement Mixing Columns**
 Nguyen, Ba-Phu; Kim, Yun-Tae
- 17:00** **Performance of nonwoven geotextile tubes in a water treatment plant**
 Paranhos, Samira Tessarolli de Souza; Aparicio-Ardila, Maria Alejandra; Lins da Silva, Jefferson
- 17:10** **Innovative Installation Method of Geotextile Tubes in Deep Water**
 Soh, Jun Ming; Chew, Soon Hoe; Tan, Yeow Chong; Yim Hor Mun, Audrey; Quek Jia Wei, Abel; Lim, Dao Jing; Kee, Shanyin
- 17:20** **A study on the feasibility of geosynthetic oil absorbent liner to organic contaminated groundwater by selective oil absorbing and self-swelling behavior**
 Yuu, Jungjo; Kim, Ki-Sung; Kim, Hong-Kwan; Jeong, Yeon-Eim
- 17:30** **Engineered Turf Cover: An Innovative Solution for Landfill Closure and Renewable Solar Energy Development**
 Zhu, Ming; Ayers, Michael; Orzech, Thomas; Scholl, Bryan; Eichelberger, Chris; Dortland, Gerrit
- 17:40** **Electrokinetic Geosynthetics, Electro-osmosis Constitutive Model and Numerical Modelling**
 Zhuang, Yan-fengJie
- 17:50** **Discussion**
- 18:30** **Closure of session**

Tuesday 19 September

SESSION S11

11:00-13:00 PLENARY ROOM

TC REINFORCEMENT SPECIAL SESSION ON “DESIGN METHODS FOR BASAL REINFORCEMENT OF EMBANKMENTS”

Chairs: **Pietro Rimoldi (IT), Ivan Puig Damians (SP)**

- 11:00** **Basal reinforcement on piles and on voids according to EBGeo**
Alexiew, Dimiter
- 11:25** **A case study of geosynthetic basal reinforcement techniques in Japan**
Miyata, Yoshihisa; Hironaka, Junichi
- 11:50** **The design of embankment on soft soils, over piles and over areas prone to subsidence to BS 8006**
Naughton, Patrick
- 12:15** **Design of basal reinforced embankments on soft soils at short and long term**
Rimoldi, Pietro; Trovato, Fabrizia; Lugli, Giulia
- 13:00** **Closure of session**

SESSION S12

11:00-13:00 ROOM A

REINFORCED WALLS AND SLOPES

Chairs: **Chaido Doulala-Rigby (UK), Abdelaziz Khattari (MA)**

- 11:00** **Large-scale tests on bearing capacity failure of geogrid-reinforced walls**
 Derksen, Jan; Fuentes, Raul; Ziegler, Martin; Detert, Oliver; Hangen, Hartmut
- 11:10** **A study on the behavior of reinforced soil retaining walls using a single camera system-based on CNN and feature matching**
 Ha, Yong-Soo; Pham, Minh-Vuong; Kim, Yun-tae
- 11:20** **Bearing capacity and stability analysis of geocell-reinforced slopes subjected to the footing loading**
 Harirsaz, Mohammadreza; Ghanbari, Ali; Tavakoli Mehrjardi, Gholamhossein
- 11:30** **Numerical Analysis Using FEM on the Behavior of Reinforced Fill Structure Having Geogrid and Steel Wire Mesh as a Reinforcing Element**
 Khan, Ahsan Rehman; Di Emidio, Gemmina
- 11:40** **The use of polyester geotextiles in civil engineering**
 Peronski, Mariusz; Radziemski, Pawel
- 11:50** **Design and construction of reinforced soil walls for a new highway in Montenegro**
 Rimoldi, Pietro; Han, Yaming; Zhengjie, Dai; Chen, Lili; Ricciuti, Angelo; Wrigley, Nigel
- 12:00** **Gabion Faced Reinforced Slope with Composite Reinforcement Geotextile, Kandy, Sri Lanka**
 Tan, Gerald Yii Ta; Jong, Ching Joo; Tan, Jun Yuen
- 12:10** **Case Study. Application of geotextile materials for reinforcement of technogenic coastal slopes in the area of Prymorskyi (Crimea)**
 Trofymchuk, Oleksandr; Kaliukh, Iurii
- 12:20** **Comparison experiments on geosynthetic-reinforced soil and geogrid-anchored sheet pile walls subjected to strip footing surcharge loads**
 Wittekoek, Britt; Ahmadi, Hamzeh; van Eekelen, Suzanne; Bezuijen, Adam
- 12:30** **Discussion**
- 13:00** **Closure of session**

Tuesday 19 September

SESSION S13

11:00-13:00 ROOM B

CASE HISTORIES

Chairs: **John Walter Cowland (HK), Delma Vidal (BR)**

- 11:00** **Rehabilitation project of two reservoirs in Italy**
Gatto, Gianluca; Bisci, Federico
- 11:10** **Five Decades of Combined Knowledge on Geosynthetic Clay Liners**
Herlin, Bruno; Maubeuge, Kent von
- 11:20** **Repairs of dam components subjected to dynamic loads with application of geosynthetics: case studies from india**
Kapadia, Vivek Purushottamdas
- 11:30** **Alpine protective structures with geosynthetic reinforcement**
Mannsbart, Gernot; Illmer, Daniel; Uebigau, Michael
- 11:40** **Multiple functions in landfill capping system, case study from feasibility until execution**
Marton, Csongor; Kádár, István; Tamaro, Erica
- 11:50** **Combination of geosynthetics used as riverbank slope normalization in cimanggis residential area, west java, indonesia**
Nurjannah, Dhinta Ayundya; Anindita, Nadya Ayu; Widhiastuti, Fajar; Sri Harninto, Dandung
- 12:00** **Novel landscaping applications of geosynthetics in 'Museum of the Future' project in Dubai**
Puthiya Veettil, Jayakrishnan; Mottadelli, Luca; Halasa, Marwan
- 12:10** **Properties of HDPE geomembrane installed in covers used for mine site reclamation after 13 and 20 years of service**
Rarison, Faneva; Mbonimpa, Mamert; Bussi ere, Bruno; Turcotte, Sophie; Pouliot, Sandra
- 12:20** **The use of geosynthetics in the protection of cultural heritage: the case history of the moat embankment of Angkor Wat – kingdom of Cambodia**
Santoro, Valter Maria; Gallinaro, Vittorio
- 12:30** **Bituminous geomembrane (bgm): successful alternative of distressed concrete lining for waterproofing of canals over expansive clays – a case study**
Singh, Manish; Jangid, Om; Llinas, Pau; Breul, Bertrand
- 12:40** **Discussion**
- 13:00** **Closure of session**

SESSION S14**11:00-13:00 ROOM C****DESIGN APPROACHES AND OTHER APPLICATIONS**Chairs: **Ömer Bilgin (US), Russel Jones (UK)**

- 11:00** **Reliability based analysis of novel helical soil nailed wall using the Monte-Carlo Simulation**
Agarwal, Ekansh; Sharma, Mahesh; Pain, Anindya
- 11:10** **Migrating to probabilistic internal stability analysis and design of reinforced soil walls**
Bathurst, Richard J
- 11:20** **Simplified approach to analyze global stability of reinforced soil walls**
Cañas, Abercio; Moncada, Anibal; Puig Damians, Ivan; Olivella, Sebastià; Bathurst, Richard
- 11:30** **Stabilizing green steep slope around tunnel portal using polymeric alloy geocell**
Chatterjee, Arghya; Pokharel, Sanat; Breault, Marc
- 11:40** **Towards the use of sustainable protection structures against flow-like movements**
Cuomo, Sabatino; Di Perna, Angela; Martinelli, Mario; Frigo, Lorenzo
- 11:50** **ROUGH- RecOmmendations for the Use of GeosyntHetics in Nordic conditions**
Delmas, Philippe; Watn, Arnstein; Uotinen, Veli-Matti; Vaslestad, Jan; Griwell, Fredrik; Recker, Christian
- 12:00** **A simplified displacement-based hybrid approach for the design of geosynthetic-reinforced earth walls**
Galli, Andrea
- 12:10** **Kinetic energy-based assessment and design of rockfall protection embankments**
Kundu, Saroj; Bhowmik, Riya
- 12:20** **Design method for rockfall protection embankments reinforced with geosynthetics**
Rimoldi, Pietro; Brusa, Nicola
- 12:30** **Discussion**
- 13:00** **Closure of session**

Tuesday 19 September

SESSION S15

14:00-16:00 PLENARY ROOM

SOIL-GEOSYNTHETIC INTERACTION

Chairs: **Patricia Guerra-Escobar (UK), Nicola Moraci (IT)**

- 14:00** **Influence of the surface roughness on the interface shear strength**
Araujo, Gregorio Luis Silva; Palmeira, Ennio Marques; Sanchez, Nelson Pradron
- 14:10** **Experimental evaluation of the pullout resistance of geostrips within sands and recycled construction and demolition waste (CDW)**
González Corrales, Luis Alonso; Silva Araújo, Gregório Luís
- 14:20** **Experimental and numerical investigations on the pullout behaviour of coir geotextile**
Kumar, Nitish; S Narayanan, Megha; Thasneem, Shabna; Kandasami, Ramesh Kannan
- 14:30** **Confinement effects of geocell under direct shear conditions**
Miyamoto, Shintaro; Miyata, Yoshihisa
- 14:40** **Modelling of Single & Multi-layer Soil-Geosynthetic Interface Behaviour from Large Direct Shear Tests**
Muluti, Shade Sitwala; Kalumba, Denis; Aza-Gnandji, Cocou Davis Ruben; Sobhee-Beetul, Laxmee
- 14:50** **Pullout performance of anchored earth systems**
Nell, Keith; Naughton, Patrick
- 15:00** **Long-term pullout tests to analyse the soil-geogrid interaction**
Pisano, Marilene; Cardile, Giuseppe; Recalcati, Piergiorgio; Moraci, Nicola
- 15:10** **Machine learning for soil-geosynthetics interface shear strength analysis**
Tanga, Abenezer Tefera; Araújo, Gregório Luís Silva; Junior, Francisco Evangelista; Gomes, Raisla Martins da Silva
- 15:20** **A Study on the Interface Charactersitc of Geogrid Multi-Angle Reinforced Sand in Direct Shear Test**
Zhang, Mengxi; Zhu, Hao; Li, Cen
- 15:30** **Discussion**
- 16:00** **Closure of session**

SESSION S16**14:00-16:00 ROOM A****SUSTAINABILITY WITH GEOSYNTHETICS**Chairs: **Philippe Delmas (FR), Francesco Fontana (IT)**

- 14:00** **Stress-strain responses of reinforced construction and demolition material**
 Ahirwar, Sunil Kumar; Mandal, Jnanendra Nath
- 14:10** **Improving the Resistance of Pavements against Fatigue Cracking with an Interlayer (Review Paper)**
 Ghadi, Hossein; Ghollasimood, Ashkan; Pakniyat, Homeyra; Khansari, Hooman; Eskandari, Hooman
- 14:20** **Replacement for Stress Cracking Test Surfactant**
 Koerner, George Robert
- 14:30** **Geosynthetic damage due to installation stresses in ultra-light weight foamed glass versus conventional aggregates**
 Koerner, George Robert; Filshill, Archie
- 14:40** **GRS retaining structure with paper industry waste as backfill material**
 Lenart, Stanislav; Fifer Bizjak, Karmen; Likar, Barbara
- 14:50** **Comparative life cycle assessment of geosynthetics versus conventional construction materials in infrastructure, filter function in a river construction, a study on behalf of the EAGM**
 Ehrenberg, Henning
- 15:00** **Geosynthetics in Mechanically-Stabilized Tire Derived Aggregate Walls**
 McCartney, John
- 15:10** **Sand-rubber mixtures: compressibility**
 Ozkan, Sabriye; Ibraim, Erdin; Diambra, Andrea
- 15:20** **Study of the damage induced by recycled aggregates from Construction and Demolition Waste (C&DW) on the short-term tensile behaviour of an HDPE geogrid**
 Pereira, Paulo Miguel; Vieira, Castorina Silva
- 15:30** **Valorisation of C&D Waste as backfill material of geosynthetic reinforced structures – Study of the long-term behaviour**
 Vieira, Castorina Silva; Ferreira, Fernanda; Pereira, Paulo M.; Cristelo, Nuno; Madeira, Sérgio; Gomes, António Topa; Lopes, Maria de Lurdes
- 15:40** **Discussion**
- 16:00** **Closure of session**

Tuesday 19 September

SESSION S17

14:00-16:00 ROOM B

UNPAVED AND PAVED ROADS, RAILWAYS AND OTHER TRANSPORTATION APPLICATIONS

Chairs: **Piergiorgio Recalcati (IT), Amir Shahkolahi (AU)**

- 14:00 Geogrid-Reinforced Pavement Design**
Alexander, Wayne Stephen; Alexiew, Dimiter
- 14:10 Reinforcement of local soils for unpaved forest roads: CBR and triaxial tests and estimate of properties**
Carlos, David Miranda; Pinho-Lopes, Margarida; Macedo, Joaquim
- 14:20 Evaluation of the mechanical behavior of a soil reinforced with geogrids through numerical modeling with finite elements**
Cordoni Jara, Veronica Isumi; Ossa Lopez, Alexandra
- 14:30 Quantifying Geogrid Reinforcement Mechanism in Roadway Performance Using Cyclic Plate Load (CPL) Test**
Ellithy, Ghada
- 14:40 The shear bonding of interlayer's effect on rutting parameters of an asphalt overlay**
MoghadasNejad, Fereidoon; Noory, Alireza; Khodadadi, Mojtaba
- 14:50 Evaluation of geogrid base reinforcement on lateritic gravel and granular material bases using accelerated pavement testing**
Pedroso, Gabriel Orquizas Mattiello; Lins da Silva, Jefferson
- 15:00 Behaviour of biaxial geogrids in unpaved roads - research from Ireland**
Reilly, Ciaran; Nell, Keith
- 15:10 Investigation of variability in large-scale laboratory box testing**
Robinson, W. Jeremy; Tingle, Jeb S.
- 15:20 Mechanistic analysis of a pavement with GRC (Geoweb Reinforced Concrete)**
Schmalbach, Joshua
- 15:30 Using non-destructive testing to evaluate geogrid-stabilised aggregates subject to accelerated traffic loading**
Yesnik, Chelsey M.; Morozov, Igor; Fleming, Ian R.; Soliman, Haithem (1); Landry, Ethan; Hammerlindl, Adam; Wayne, Mark H.; Lees, Andrew; Kawalec, Jacek
- 15:40 Discussion**
- 16:00 Closure of session**

SESSION S18

16:30-18:30 PLENARY ROOM

BASAL REINFORCED EMBANKMENTS, GEC, PILES AND SHALLOW FOUNDATIONS

 Chairs: **Claudio di Prisco (IT), Patrick Naughton (IE)**

- 16:30** **Numerical study of the geosynthetics reinforced platforms laid over soft subgrade soil**
 Abou Chaz, Nisrine; Villard, Pascal; Silvani, Claire; Briancon, Laurent; Nancey, Alain; Abdelouhab, Abdelkader
- 16:40** **Parametric analysis of a footing on reinforced soil slope**
 Anjos, Rafael; Crescenzo, Luca; Calvello, Michele; Pinho-Lopes, Margarida
- 16:50** **System efficacy and diffused arching in embankments supported by piles**
 Brzeziński, Karol; Michalowski, Radosław
- 17:00** **Soil arching analysis of pile-supported embankment with geosynthetics and verification by centrifuge tests**
 Li, Bo; Chen, Ling-wei; Deng, Wen-ni
- 17:10** **Experimental study of pile-supported embankment**
 Terqueux, Clara; Briancon, Laurent; Pantet, Anne; Racinais, Jerome; Gotteland, Philippe
- 17:20** **Two years field measurements in a partly submerged woven geotextile-reinforced pile-supported embankment with a varying ground water level**
 van Eekelen, Suzanne J.M.; Zwaan, Rob A.; Nancey, Alain; Hazenkamp, Marco; Jung, Young-Hoon
- 17:30** **Physical and Numerical Study of Load Transfer Mechanism of Geotextile-Reinforced Sand Fill over Soft Marine Clay Improved by Deep Cement Mixed Soil Columns**
 Wu, Peichen; Lin, Jinghua; Feng, Weiqiang; Yin, Jianhua
- 17:40** **Influence of Layers and Stiffness of Geosynthetics on the Stability and Failure Modes on Embankments over Soft Ground**
 Zheng, Gang; Xia, Boyang; Zhou, Haizuo; Yu, Xiaoxuan
- 17:50** **Revisiting the reinforced fill over a void problem considering geosynthetic reinforcement stiffness**
 Naftchali, Fahimeh M; Bathurst, Richard J
- 18:00** **Discussion**
- 18:30** **Closure of session**

Tuesday 19 September

SESSION S19

16:30-18:30 ROOM A

GEOSYNTHETICS PROPERTIES AND TESTING

Chairs: **Han Yong Jeon (KR), Jorge Zornberg (US)**

- 16:30** **A practical isochronous stiffness model for analysis and design of reinforced soil structures**
Bathurst, Richard J; Naftchali, Fahimeh M.
- 16:40** **Geogrids in Cold Climates: Insights from In-Isolation Tensile Tests at Low Temperatures**
Desbrousses, Romaric Léo Esteban; Meguid, Mohamed
- 16:50** **Response of diagonally enhanced geocells to significant planar tensile loads**
Fakharian, Kazem; Kashkooli, Mohammadreza; Pilban, Aref
- 17:00** **Soil-geosynthetic interface shear behaviour: insights from inclined plane and direct shear tests**
Ferreira, Fernanda Bessa; Fernandes, Joana; Vieira, Castorina Silva; Lopes, Maria Lurdes
- 17:10** **Reduction in geosynthetic ultimate tensile strength caused by the dropping of recycled backfilling materials**
Fleury, Mateus P.; Lima, Mateus A.; Santos, Eder C. G.; Lins da Silva, Jefferson
- 17:20** **Geosynthetics initial creep behavior parameters as function of the load level applied in ramp and hold tests**
Fleury, Mateus P.; Valentin, Clever A.; Lins da Silva, Jefferson
- 17:30** **Shear strength prediction of fiber-reinforced soils based on direct shear test results**
Markou, Ioannis N.; Evangelou, Evangelos D.; Chalkos, Dimitrios G.
- 17:40** **The effect of soil on the shear strength of geosynthetic interfaces**
Pavanello, Paolo; Carrubba, Paolo
- 17:50** **Triaxial compression tests on the stress-strain responses of geocell-reinforced normally consolidated clay**
Song, Fei; Chen, Wangsheng; Nie, Yawei
- 18:00** **Roughness based prediction of geofoam interfaces with concrete**
Sreekantan, Parvathi Geetha; Ramana, G. V.
- 18:10** **Prediction of the vertical permeability coefficient of needle-punched nonwoven geotextiles**
Li, Keyi; Tang, Xiaowu; Liang, Jiaxin; Lin, Weikang; Wang, Tianqi; Xiang, Qingqing
- 18:20** **Discussion**
- 18:30** **Closure of session**

SESSION S20

16:30-18:30 ROOM B

UNPAVED AND PAVED ROADS, RAILWAYS AND OTHER TRANSPORTATION APPLICATIONS

Chairs: **Muthukumar Mayakrishnan (IN), Erol Tutumluer (US)**

- 16:30** **Experimental Study on Rainwater Infiltration Countermeasures by Reinforcing Base Course with Geotextile**
 Akimitsu, Mei; Sato, Kenichi; Fujikawa, Takuro; Koga, Chikashi;
 Wakabayashi, Yuichiro; Aono, Fuminori; Shimazaki, Masaru; Hirakawa, Kazunari;
 Hironaka, Junichi; Kimura, Sousuke; Suzuki, Kazunari; Isobe, Yusaku
- 16:40** **Evaluation of Deformation Modulus of Unreinforced and Reinforced Sandy Soil Layers using LWD Device**
 Duddu, Sidhu Ramulu; Kommanamanchi, Vamsi; Chennarapu, Hariprasad;
 Balunaini, Umashankar
- 16:50** **Experimental and theoretical analysis of reinforcement of weak soils on the basis of field studies of a road embankment bypassing the city of Reni, Ukraine**
 Gurtina, Liliia; Kharin, Pavel; Plytus, Rostyslav; Sedin, Volodymyr; Bikus, Kateryna;
 Kovba, Vladyslav; Mazur, Iryna; Slyusarenko, Yuriy; Tytarenko, Volodymyr;
 Kosheleva, Nina; Kaliukh, Iurii
- 17:00** **Delay of crack propagation in 4PB test of double-layered geocomposite reinforced asphalt concrete beams**
 Jaskula, Piotr; Rys, Dawid; Stienss, Marcin; Szydłowski, Cezary; Golos, Michal;
 Kawalec, Jacek
- 17:10** **Effect of geosynthetics on stability of hidden cavity in base course**
 Kuwano, Jiro; Kuwano, Reiko; Hashimoto, Jion; Terauchi, Ryusei
- 17:20** **Characterization of Asphalt Mixtures with Geosynthetic-reinforced Asphalt Millings**
 Saxena, Ashray; Kumar, V. Vinay; Correia, Natalia S.; Zornberg, Jorge G.
- 17:30** **Field performance and monitoring of geogrid stabilised and reinforced pavement on soft and expansive subgrade**
 Shahkolahi, Amir; Gallage, Chaminda; Lacey, David; Klomp maker, Jorg
- 17:40** **Numerical Evaluation on the performance of pervious concrete pavement with geocell base**
 Vinay, Konichetti; Mayakrishnan, Muthukumar
- 17:50** **Effect of Spatial Variability in Asphalt Layer on Critical Strain of Geogrid Reinforced Flexible Pavement**
 Xiao, Li; Xue, Jianfeng
- 18:00** **Recommendations for the protection of an earthen embankment from flooding on the Big Almaty Ring Road (BAKAD)**
 Zhussupbekov, Askar; Aidargaliyeva, Nazgul; Tulebekova, Assel;
 Yessentayev, Askar; Zhankina, Aizhan
- 18:10** **Discussion**
- 18:30** **Closure of session**

Tuesday 19 September

CHINESE SPECIAL SESSION

16:30-18:30 ROOM C

DEVELOPMENT AND CURRENT STATE OF THE GEOSYNTHETIC INDUSTRY IN CHINA

Chairs: **Jie Han (US), Huabei Liu (CN)**

- 16:30** **Introduction of the attending IGS officers and CTAG officers**
Opening speech by Chao Xu, CCIIGS chair
- 16:40** **Development and current state of geosynthetic industry in China**
Shiguang, Zhou; Guangqing, Yang
- 17:10** **Application of geosynthetics in environmental protection in China**
Liangtong, Zhan; Haijian, Xie; Ning, Liu; Shiping, Xie; Shengli, Zhen
- 17:30** **Application of geosynthetics in water conservancy and hydropower projects in China**
Haimin, Wu; Weilie, Zou; Zhong, Han; Jungao, Zhu
- 17:50** **Application of geosynthetics in transportation in China**
Shiguang, Zhou; Guangqing, Yang; Chao, Xu; Zongling, Yan; Aimin, Liu; Weichao, Liu; Zhijie, Wang; He, Wang; Peng, Xu
- 18:10** **Q&A**
- 18:25** **Concluding remarks by Shiguang Zhou, CTAG president**
- 18:30** **Closure of session**

Wednesday 20 September

SESSION S21

11:00-13:00 PLENARY ROOM

YOUNG MEMBER CONTEST

Chairs: **David Hercules Marx (US)**, **Fernanda Bessa Ferreira (PT)**

- 11:00** **A micromechanical model of a PVC geomembrane**
 Akel, Nesrin Omar; Stoltz, Guillaume; Wautier, Antoine; Touze, Nathalie;
 Nicot, Francois
- 11:10** **Numerical Modelling of a Reinforced Embankment in Cold Regions Environment**
 De Guzman, Earl Marvin; Alfaro, Marolo; Arenson, Lukas; Doré, Guy
- 11:20** **Laboratory device to evaluate connection loads in segmental
 geosynthetic-reinforced soil walls**
 Figueiredo, Paulo Victor de Carvalho; Portelinha, Fernando Henrique Martins;
 Zornberg, Jorge Gabriel
- 11:30** **Evaluation of Geosynthetic-Asphalt Interface Characteristics using Leutner
 Shear Tester**
 Kumar, V. Vinay; Roodi, Gholam H.; Zornberg, Jorge G.
- 11:40** **Hyperbolic models to represent the effect of mechanical damage and abrasion
 on the short-term tensile response of a geocomposite**
 Lombardi, Giovanni; Pinho-Lopes, Margarida; Paula, António Miguel;
 Bastos, António
- 11:50** **Basal reinforced earth embankments on piled foundations: the role of
 embankment construction process**
 Mangraviti, Viviana; Flessati, Luca; di Prisco, Claudio
- 12:00** **Topology optimization of a junction in a biaxial geogrid under in-isolation
 tensile loading**
 Paiva, Lucas; Pinho-Lopes, Margarida; Valente, Robertt; Paula, António Miguel
- 12:10** **Predicted Performance of Geogrid-stabilized Unbound Aggregate Layers Using
 Confined Soil-Geosynthetic Composite Stiffness**
 S, Subramanian; Zornberg, Jorge G.
- 12:20** **GCL hydration by lateritic soils under isothermal conditions and simulated
 daily thermal cycles**
 Silva, José Wilson Batista da; Correia, Natalia de Souza;
 Portelinha, Fernando Henrique Martins
- 12:30** **Interface shear bond analysis of different geosynthetic paving interlayers**
 Silva, Matheus Pena da Silva e; Santos, Karolina Maria dos;
 Correia, Natália de Souza
- 13:00** **Closure of session**

Wednesday 20 September

SESSION 22

11:00-13:00 ROOM A

REINFORCED WALLS AND SLOPES

Chairs: **Radoslaw L Michalowski (US), Arnstein Watn (NO)**

- 11:00** **Reinforced embankments impacted by landslides: analytical and numerical modelling**
Cuomo, Sabatino; Di Perna, Angela; Savino, Michele; Frigo, Lorenzo; Martinelli, Mario
- 11:10** **Evaluation of the response of a geosynthetics reinforced structure to a debris flow impact**
Gioffré, Domenico; Ciurleo, Marianonietta; Mandaglio, Maria Clorinda; Moraci, Nicola
- 11:20** **Dynamic response of an innovative reinforced soil embankment subjected to high energy impacts**
Korini, Oltion; Bennani, Yassine
- 11:30** **Influence of geometric configuration on the interaction of back-to-back MSE walls under static loading**
Li, Fuxiu; Guo, Wenhao; Zheng, Yewei
- 11:40** **Numerical investigation on the behaviour of geosynthetic-reinforced embankment under dynamic impact of rockfall**
Maheshwari, Shreya; Bhowmik, Riya
- 11:50** **Influence of different parameters on back-to-back mechanically stabilized earth walls**
Malekmohammadi, Khashayar; Lajevardi, Seyyed Hamid; Dias, Dainel
- 12:00** **Biodegradable formwork for reinforced soil structure**
Palma, Donatella
- 12:10** **Numerical investigation of geogrid back-anchored sheet pile walls**
Schoen, Maximilian; Hölter, Raoul; König, Diethard; Lavasan, Arash Alimardani; van Eekelen, Suzanne; van Duijnen, Piet; Detert, Oliver; Wittekoek, Britt; Wichtmann, Torsten
- 12:20** **Reinforced Soil Walls/Slopes and Piling Platforms for a Causeway Route over very soft soils using Geogrids – HS2 Thame Valley Viaduct, Aylesbury, United Kingdom**
Vazquez Bernardini, Pablo
- 12:30** **Geogrid-anchored sheet pile walls under strip footing surcharge loading. Medium-scale experiments and numerical simulation**
Wittekoek, Britt; van Eekelen, Suzanne; Terwindt, Jarno; van Duijnen, Piet G.; Detert, Oliver van den Berg, Joris H.; König, Diethard
- 12:40** **Discussion**
- 13:00** **Closure of session**

SESSION S23**11:00-13:00 ROOM B****BASAL REINFORCED EMBANKMENTS, GEC, PILES AND SHALLOW FOUNDATIONS**Chairs: **Oliver Detert (DE), Suzanne J.M. van Eekelen (NL)**

- 11:00** **Numerical analysis of low height piled embankments**
 Ahern, Sean; Naughton, Patrick
- 11:10** **Effect of strip footing on the stress-strain behavior of soil-geogrid interaction: a new simple concept**
 Ahmad, Hussein; Mahboubi, Ahmad
- 11:20** **Laboratory study for the new usage of EPS geofoam as a column material**
 Bazzazian Bonab, Saeid; Lajevardi, Seyed Hamid;
 Mirhosseini, Seyed Mohammad
- 11:30** **Model tests on soil foundation reinforced by geosynthetic encased granular columns subjected to reverse fault movement**
 Chiang, Jung; Yang, Kuo-Hsin; Zornberg, Jorge G.; Michel, Emerson E.;
 Wu, Chun-Wei
- 11:40** **2D behavior of a granular platform above a soft soil reinforced by rigid inclusions subjected to a rolling load traffic**
 Dubreucq, Thierry; Thorel, Luc
- 11:50** **Numerical study of shear behavior of a geosynthetic encased stone column under direct shear loading**
 Ji, Mingchang; Wang, Jiaxin; Zheng, Yewei
- 12:00** **Numerical study for the new use of EPS geofoam as a column material**
 Mirhosseini, Seyed Mohammad; Lajevardi, Seyed Hamid;
 Bazzazian Bonab Saeid
- 12:10** **Cyclic response of geosynthetics-reinforced soil with respect to scale effect**
 Tavakoli Mehrjardi, Gholamhosein; Ramin, Behrad; Mehdi, Khazaei
- 12:20** **On the practical use of geosynthetics to karsts reinforcement**
 Valdeyron, Gilles; Clément, Frédéric; Respaud, Cyril; Vedie, Emeric
- 12:30** **Discussion**
- 13:00** **Closure of session**

Wednesday 20 September

SESSION 24

11:00-13:00 ROOM C

DESIGN APPROACHES AND OTHER APPLICATIONS

Chairs: **Jie Han (US), Richard Thiel (US)**

- 11:00** **LDPE geomembrane liner design on soft soil foundation: case study**
Carvalho, Beatriz; Castro, Paulo; Castro, Marina; Amaral, Luiz; Martins, Paula
- 11:10** **Bituminous geomembrane (BGM) - testing program for use in heap leach pads**
Escobar, Emilio; Breul, Bertrand; Breul, Bernard
- 11:20** **Water drainage and gas collection with geocomposites - Hydraulic software development**
Fourmont, Stephan; Decaens, Justine; Beaumier, David; Riot, Mathilde
- 11:30** **Ensuring the bearing capacity of the ground base of airfields pavement on loess soils**
Gameliak, Igor Pavlovych; Diakovska, Tetiana Ihorivna; Zhurba, Ganna Volodimirovna
- 11:40** **Evaluation of different common geosynthetic design procedures for materials in pavements**
Kamalzare, Mehrad; Ahmed, Sahar
- 11:50** **Working platforms for cranes - review of design approaches and recommendations for a safe designs**
Lavasan, Arash A.; Poberezhnyi, Viktor; Detert, Oliver
- 12:00** **Innovative designs for extreme mining applications using bituminous geomembranes**
Mc Ilwraith, Robert
- 12:10** **GCL design requirements guide specification**
von Maubeuge, Kent
- 12:20** **A Brief Summary of Worldwide Used Regulations and Recommendations Requesting Geosynthetic Barriers**
von Maubeuge, Kent; Shamrock, Jonathan; Shahkolahi, Amir
- 12:30** **Discussion**
- 13:00** **Closure of session**

SESSION S25**14:00-16:00** PLENARY ROOM**TC BARRIER SPECIAL SESSION ON "GEOSYNTHETIC BARRIER QUALITY ASSURANCE,
QUALITY CONTROL AND INSTALLATION**Chair: **Jonathan Richard Shamrock (NZ)**

- 14:00** **Introduction**
Jonathan Shamrock
- 14:05** **To do and not to do during geomembrane installation**
Boyd Ramsey
- 14:20** **To do and not to do during GCL installation**
Bruno Herlin
- 14:35** **Panel discussion with action items for TC-B – Moderator: Kent von Maubeuge (DE)**
Eddie Weiser, Bruno Herlin, Boyd Ramsey, Amir Shahkolahi

Chair: **Boyd Ramsey (US)**

- 14:55** **Importance and suggestions for QC and QA of Geomembranes and GCLs**
Sam Allen
- 15:15** **Interpretation of geosynthetic barriers test results during QA**
George Koerner
- 15:35** **Panel discussion with action items for TC-B – Moderator: Amir Shahkolahi (AU)**
Sam Allen, George Koerner, Jonathan Shamrock, Kent von Maubeuge
- 15:55** **Closing remarks**
Jonathan Shamrock
- 16:00** **Closure of session**

Wednesday 20 September

SESSION 26

14:00-16:00 ROOM A

SUSTAINABILITY WITH GEOSYNTHETICS

Chairs: **Giuseppe Cardile (IT), Véronique Heili (FR)**

- 14:00** **Climate change and extreme weather conditions: applications of geosynthetics securing flood defenses and coastal protection - part 1"**
Gerritsen, Rijk
- 14:10** **Climate change and extreme weather conditions: applications of geosynthetics securing flood defenses and coastal protection**
Gerritsen, Rijk; Bezuijen, Adam; Dorst, Kees
- 14:20** **How an Enhanced Lateral Drainage Geosynthetic Provides Resilience to Civil Structures**
Laprade, René; Lostumbo, John
- 14:30** **Pavement rehabilitation with polymeric reinforcing grids – economic and environmental benefits**
Elsing, Andreas; Russo, Luis Eduardo
- 14:40** **Integrating Engineered and Nature-Based Solutions for River Bank Stabilization**
Loizeaux, Drew
- 14:50** **Performance of turbidity curtains in mine waste dump drainage system**
Macedo, Luiz Gustavo Moraes; Almeida, Maria das Graças Gardoni; Palmeira, Ennio Marques
- 15:00** **Vertical drainage of compressible soils subjected to artesian pressure under The Moroccan High-speed railway line**
Mridakh, Ahmed Hamza
- 15:10** **Contribution to the study of mechanical degradation of geosynthetic products in a saline environment**
Naga, Linda; Chikhaoui, Mohamed; Djerbal, Lynda
- 15:20** **Some current topics regarding liners and covers for water storages**
Sadlier, Michael Andrew
- 15:30** **Investigation of the effect of using geogrids on the performance of the road in pavements constructed with reduced layer thicknesses**
Terzi, Serdal; Saltan, Mehmet; Gökova, Süleyman; Erkmen, Firat; Tutumluer, Erol; Karaşahin, Mustafa; Uz, Volkan Emre; Pekcan, Onur; Taciroğlu, Murat Vergi; Çömez, Şenol; Sağlık, Ahmet; Komut, Muhammet; Altiok, Şenol; Yalçın, Ergun
- 15:40** **Discussion**
- 16:00** **Closure of session**

SESSION S27

14:00-16:00 ROOM B

LANDFILLS AND REMEDIATION OF CONTAMINATED SITES

Chairs: **Andrea Dominijanni (IT), Charles Shackelford (US)**

- 14:00** **Yet another excellent reason for locating exposed geomembrane electrical leaks prior to carrying out dipole surveys**
 Charpentier, Carl; Jacquelin, Thierry
- 14:10** **Geosynthetic sorption sheet —Another function of geosynthetics?**
 Kato, Tomohiro; Takai, Atsushi; Yu, Zhang; Kinoshita, Yosuke;
 Gathuka, Lincoln W.; Katsumi, Takeshi
- 14:20** **Advanced Application of Bituminous Geomembrane (BGM) for Waste Capping in Australia**
 Kendall, Preston; Mc Ilwraith, Rob
- 14:30** **Suction behavior of geosynthetic clay liners with polymerized bentonite**
 Khan, Muhammad Khizar; Di Emidio, Gemmina; Bezuijen, Adam
- 14:40** **Hydration, desiccation and self-healing capacity of geosynthetic clay liners**
 Lieske, Wolfgang; Christ, Florian; von Maubeuge, Kent; Wichtmann, Torsten
- 14:50** **A Medical-Triage Approach to Mitigating Risk of Geomembrane Uplift in High Wind Events During Construction**
 Maskal, Adam; Maskal, Shannon
- 15:00** **Subaqueous sediment capping with a geocomposite containing activated carbon in Sydney/Australia**
 Niewerth, Stefan; Martins, Gus
- 15:10** **Permeable contaminant filter for storage and passive decontamination of PFAS-polluted soil**
 Niewerth, Stefan; Walker, Trevor; Martins, Gus
- 15:20** **Hydraulic Performance of Na CMC-Added GCLs Permeated with a Simulated Leachate at Different Temperatures**
 Ozhan, Hakki O.
- 15:30** **Multi-linear drainage geocomposite for Sub-slab Depressurization and Radon mitigation**
 Vial, Éléonore; Vanhee, Michael; Fourmont, Stephan
- 15:40** **Discussion**
- 16:00** **Closure of session**

Wednesday 20 September

SESSION CSC

14:00-16:00 ROOM C

CASE STUDIES CONTEST

Chair: **Francesco Fontana (IT)**

- 14:00** **Application of geosynthetics solutions in the construction of 'El Salitre' artificial beach - Chile**
Huesker
GeoAmericas contest winner
- 14:30** **Sustainable geosynthetic design for a shooting sports club noise barrier with recycled construction material, Germany**
Naue
EuroGeo contest winner
- 15:00** **Reinforced Earth Containment Structure For Abutment Seismic Protection – Taiwan**
ACE
GeoAsia contest winner
- 15:30** **Second River Niger Bridge in Onitsha, Nigeria – Use of geosynthetic encased granular columns for soil improvement**
Huesker
GeoAfrica contest winner
- 16:00** **Closure of session**

Thursday 21 September

SESSION S28

11:00-13:00 PLENARY ROOM

LANDFILLS AND REMEDIATION OF CONTAMINATED SITES

Chairs: **Evelina Fratolocchi (IT)**, **Chew Soon Hoe (SG)**

- | | |
|--------------|---|
| 11:00 | The compatibility and equivalency of natural and geosynthetic materials for the design of landfill barriers
Bannour, Hajer |
| 11:10 | Proposed Improvement in Estimation of Anchorage Capacity of Veneer Reinforcement in Landfill Cover System
Bhowmik, Riya; Shahu, J T; Datta, Manoj |
| 11:20 | Multiple use of geosynthetics in a hazardous waste landfill
Bianchi, Michele; Ghezzi, Paolo; Russo, Luis Eduardo |
| 11:30 | Equivalent intermediate geosynthetic barrier system in a landfill for hazardous waste
Bianchi, Michele; Ghezzi, Paolo; Russo, Luis Eduardo |
| 11:40 | A systems engineering and risk assessment-based approach for the design of landfills
Dominijanni, Andrea; Guarena, Nicolò; Manassero, Mario |
| 11:50 | Contaminant transport through landfill composite liners due to geomembrane defects
Guarena, Nicolò; Dominijanni, Andrea; Manassero, Mario |
| 12:00 | User guide of design standards for geosynthetics in landfills applications
Herault, Alain; Delmas, Philippe |
| 12:10 | Review of Methods for Quantifying Polymer Loading of Enhanced-Bentonite Geosynthetic Clay Liners
Norris, Anna; Sarah, Gustituse-Graham; Scalia, Joseph; Benson, Craig; Shackelford, Charles |
| 12:20 | The settlement of an ecological waste landfill built on collapsible soils
Olinic, Ernest Daniel; Olinic, Tatiana |
| 12:30 | Diffusion and membrane behavior of an exhumed geosynthetic clay liner
Tong, Shan; Sample-Lord, Kristin; Rahman, Sayed Arafat Bin; Yesiller, Nazli; Hanson, James |
| 12:40 | Discussion |
| 13:00 | Closure of session |

Thursday 21 September

SESSION 29

11:00-13:00 ROOM A

FILTRATION AND DRAINAGE - HYDRAULIC APPLICATIONS: CANALS, RESERVOIRS AND DAMS

Chairs: **Barry Christopher (US), Maria Clorinda Mandaglio (IT)**

- 11:00** **Factors affecting the long-term performance of geonet-geocomposites**
Blond, Eric; Maskal, Adam
- 11:10** **Durability of exposed PVC-P geomembranes used for rehabilitating the upstream face of dams**
Cazzuffi, Daniele; Gioffre', Domenico
- 11:20** **Effect of tailings fines content on leakage through circular geomembrane holes overlain by saturated tailings**
Fan, Jiying; Rowe, Kerry
- 11:30** **Considerations for the Calculation of Permeation Rates for Geosynthetic Clay Liners in Constant Water Head Applications**
Niehues, Christian; Köhler, Martin; von Maubeuge, Kent
- 11:40** **Leaks detection of earthwork dam with geomembrane lining system by an active technique using optic fibers**
Stoltz, Guillaume; Nicaise, Sylvie; Chaouch, Naim; Peyras, Laurent; Guidoux, Cyril; Boucher, Maxime
- 11:50** **Discussion**
- 13:00** **Closure of session**

SESSION S30

11:00-13:00 ROOM B

SEISMIC DESIGN WITH GEOSYNTHETICS

Chairs: **Erol Guler (TR), Seyed Naser Moghaddas Tafreshi (IR)**

- 11:00** **The evaluation of deformation reduction by geosynthetics sandwiched with gravel layers beneath an embankment during liquefaction**
Aung, Hla; Kubo, Mikio; Yokoyama, Masaki; Obata, Tomoyuki; Yokawa, Hiroshi
- 11:10** **A prediction model for the seismic bearing capacity of a shallow foundation positioned on the crest of a geosynthetic reinforced soil structure**
Ausilio, Ernesto; Durante, Maria Giovanna; Zimmaro, Paolo
- 11:20** **On the seismic performance of geosynthetic-reinforced soil retaining walls**
Di Filippo, Giuseppe; Biondi, Giovanni; Moraci Nicola
- 11:30** **Effectiveness of Geofoam Backfill on Seismic Performance of Retaining Structures: Numerical Study**
Edinçliler, Ayse; Sait Toksoy, Yasin; Danyıldız, Egemen
- 11:40** **Finite difference parametric study of seismic behavior of a GRS bridge abutment**
Fakharian, Kazem; Kashkooli, Mohammadreza
- 11:50** **Influence of geosynthetic interface within liner system in dynamic analysis of landfill**
Gioffre', Domenico; Lai, Carlo Giovanni
- 12:00** **Geosynthetic-reinforced soil wall failure encountered in reduced scale shaking table testing**
Guler, Erol; Selek, Oznur
- 12:10** **Seismic performance assessment of approach embankment MSE wall near Valley Fault System**
Luna, Roy Anthony Capisonda; Quebral, Ramon Diaz; Paulino, Arlene Buenaventura; Razon, Josephine Vivian De Vera; Selda, Patrick Adrian Yap; Tanap, John Michael Intal
- 12:20** **Gravel-rubber mixtures as geotechnical seismic isolation system underneath structures: large-scale tests vs FEM modelling**
Massimino, Maria Rossella; Abate, Glenda; Fiamingo, Angela; Pitilakis, Dimitris; Anastasiadis, Anastasios; Vratsikidis, Athanasios; Kapouniaris, Anastasios
- 12:30** **Effect of Reinforcement Stiffness on a Seismically Loaded Mechanically Stabilized Earth Wall**
Turkel, Berk; Yildirim, Irem Zeynep; Guler, Erol
- 12:40** **GSRW (geoforce segmental retaining wall) system as abutment construction on active fault line**
Widhiastuti, Fajar; Anindita, Nadya Ayu; Nurjannah, Dhinta Ayundyia; Harninto, Dandung Sri
- 12:50** **Discussion**
- 13:00** **Closure of session**

Thursday 21 September

SESSION 31

11:00-13:00 ROOM C

CASE HISTORIES

Chairs: **Nicolas Freitag (FR), Giulia Lugli (IT)**

- 11:00** **Case study of the use of a piled embankment system with geosynthetic as reinforcement for soft soil subgrade at the Kadusirung flyover's approach slabs, Banten, Indonesia**
Anindita, Nadya Ayu; Nurjannah, Dhinta Ayundya; Widhiastuti, Fajar; Harninto, Dandung Sri
- 11:10** **Geocells in bridge approach transitions for high-speed railway – A case study**
Karpurapu, Rajagopal; Bagli, Shahrokh; Mathur, Manjul; Rajpal, M K; Vedpathak, Suraj; Patil, Yashodeep; Dalmia, Gautam
- 11:20** **Earthquake resistant design of shallow foundations using geogrid reinforcements**
Kupec, Jan; Mahoney, Dominic; McPherson, Ian
- 11:30** **Case study of GRS design considering the effect of reverse fault movement**
Lin, Zoe; Wu, Jason; Chen, Ike; Yuan, Chung Lu; Chang, Chih Tung
- 11:40** **Steel wire meshes and Geosynthetic Reinforced Soil-Integrated Bridge Systems (GRS-IBS) in Oosterweel Verbinding, Linkeroever**
Masola, Francesco; Tubertini, Daniele; De Maesschalck, Steven
- 11:50** **Using of geosynthetics on foundation of residential complexes and low height buildings on stabilized fillings from municipality of Bucharest**
Mustăţea, Sebastian; Taloş, Liviu Tit; Barariu, Aurel
- 12:00** **Introduction of geogrid reinforced MSE retaining structures in major Ghanian Interchange project**
Nods, Max; Bempong, Kwabena
- 12:10** **A case study on strengthening the backfill of a prefabricated reinforced concrete double wall with geogrids**
Ozcelik, Hakan; Küçükkayalar, Ülkü; Küçükkayalar, Satuğ; Küçükkayalar, Defne
- 12:20** **Cost-effective method of road embankment foundation stabilization using basal reinforcement technique for Duqm roads project in Oman**
Puthiya Veettil, Jayakrishnan; Halasa, Marwan
- 12:30** **Temporary working platforms full scale testing – review of valid methodology**
Zamara, Kasia; Moormann, Christian; Kawalec, Jacek; Wayne, Mark
- 12:40** **Discussion**
- 13:00** **Closure of session**

SESSION S32

14:00-16:00 PLENARY ROOM

CASE HISTORIES

Chairs: **Sabatino Cuomo (IT), Chao Xu (CN)**

- 14:00** **Rehabilitation of Landslide and Construction of the World's Tallest Reinforced Earth® Structure at Tindharia on NH-55, India**
Adhikari, Atanu; Biswas, Somnath; Dutta, Hirak
- 14:10** **Avalanche risk mitigation by means of a reinforced earth embankment: the Ludrigno case study**
Barbolini, Massimiliano; Simini, Alberto; Stefanini, Francesco
- 14:20** **Gallivaggio rock cliff: risk management and reinforced earth embankment for rockfall protection**
Bragonzi, Gianluca; Cancelli, Paolo; Simini, Alberto; Mazzarolli, Stefano
- 14:30** **The construction of the access roads to the Pelješac bridge with the use of geogrid reinforced soil structures**
Calvarano, Lidia Sarah; Recalcatti, Piergiorgio
- 14:40** **Settlements of a heterogeneous soil deposit improved with geosynthetic vertical drains**
Di Filippo, Giuseppe; Casablanca, Orazio; Biondi, Giovanni; Cascone, Ernesto
- 14:50** **MSE Wall with Geosynthetic Reinforcement and Polymeric Connections Case Studies in Maryland and California**
Ferrara, Marianna; Lugli, Giulia
- 15:00** **Numerical analysis of geo-tubes with reference to an Italian case-history**
Frigo, Lorenzo; Pavanello, Paolo; Carrubba, Paolo
- 15:10** **The Application of Modularized MSE wall in the Project of Montenegro BB Expressway**
Han, Yaming; Chen, Lili; Xia, Wang
- 15:20** **The Central Luzon Link Expressway Embankment Construction with High Stiffness Geotextile and Prefabricated Vertical Drains, Manila, Philippines**
Teh, Stephen It Seen; Tolentino, Rene; Laguitao, Kenneth
- 15:30** **The Effect of Prefabricated Vertical Drain (PVD) with Membraneless Vacuum Preloading Method on a Test Area in the North Coast of Central Java**
Tiasundari, Nastiti; Harninto, Dandung Sri
- 15:40** **Discussion**
- 16:00** **Closure of session**

Thursday 21 September

SESSION 33

14:00-16:00 ROOM A

DURABILITY AND LONG TERM PERFORMANCE

Chairs: **Domenico Giofrè (IT), Sanjay Kumar Shukla (AU)**

- 14:00** **Risks and alternatives to the use of PET reinforcement in lime treated backfills**
Aressy, Matthieu; Lozano, Robert
- 14:10** **Status of existing information on installation requirements for sealing products under Nordic conditions (RoUGH Project)**
Blond, Eric; Leppänen, Minna; Delmas, Philippe; Recker, Christian
- 14:20** **Assessment of creep behavior in aged geotextiles**
Dias Filho, José Luiz Ernandes
- 14:30** **Geogrid durability: a 25-yr case history on a steep reinforced soil slope**
Fannin, Jonathan; Quinteros, Santiago
- 14:40** **Geotextile durability by outdoor weathering and tensile creep: Case study**
Guimarães, Mag Geisielly Alves; Urashima, Denise de Carvalho;
Urashima, Beatriz Mydori Carvalho
- 14:50** **Evaluation of durability of PVC-P geomembranes for tunnel waterproofing with laboratory tests**
Luciani, Andrea
- 15:00** **Interaction between the PVC-P and HDPE geomembranes used in the waterproofing and re-waterproofing of a reservoir**
Mateo, Beatriz; Leiro, Ángel; Solera, Rosario; Vara, Tatiana; Cabrera, Dolores
- 15:10** **Feedback from the bituminous geomembrane (BGM) implemented 20 years ago at the Galaube dam**
Pepin, Nicolas; Deroo, Luc; Breul, Bertrand; Gasc, Benoit
- 15:20** **Determination of the Reduction Factors applied to polymeric coated steel woven wire mesh reinforcement in new Eurocodes**
Rimoldi, Pietro; Vicari, Marco; Trovato, Fabrizia
- 15:30** **Design requirements and long-term performance of multi-component coated GCLs**
von Maubeuge, Kent; Shahkolahi, Amir
- 15:40** **Discussion**
- 16:00** **Closure of session**

SESSION S34**14:00-16:00 ROOM B****GEOSYNTHETICS PROPERTIES AND TESTING**Chairs: **Peter Stuart Atchison (UK), Warren Peter Hornsey (AU)**

- 14:00** **The Evolution of Geosynthetic Hydraulic Performance Measurement**
Allen, Samuel
- 14:10** **Investigation and comparison of inlet port design strengths**
Chew, Soon Hoe; Soh, Jun Ming; Tan, Yeow Chong; Yim Hor Mun, Audrey;
Quek Jia Wei, Abel; Lim, Dao Jing; Kee, Shanyin
- 14:20** **Designing and analysis of carbon fiber reinforced grid materials for application to seismic resistance improvement**
Jeon, Han Yong; Nam, Kyunghwa
- 14:30** **Experiments on the cyclic shear behavior of staggered assembly of soilbags**
Jia, Fan; Chen, Shuang; Liu, Si-Hong
- 14:40** **At the limit of Liner puncture resistance for high-capacity leach pads projects**
Leon, Andres
- 14:50** **Prediction of the vertical permeability coefficient of needle-punched nonwoven geotextiles**
Li, Keyi; Tang, Xiaowu; Liang, Jiaxin; Lin, Weikang; Wang, Tianqi; Xiang, Qingqing
- 15:00** **Geotextiles used for separation and filtration in UL-FGA applications**
Loux, Theresa Andrejack; Calabria, Craig; McGuire, Michael; Filshill, Archie
- 15:10** **A comparison of particle motions in reinforced and unreinforced triaxial specimens of transparent sand**
Marx, David Hercules; Kumar, Krishna; Zornberg, Jorge Gabriel
- 15:20** **Evaluation of the mechanical characteristics of the nonwoven geotextiles made by mechanical needle-punching starting from the tenacity and elongation data of the fibers used**
Niccolai, Francesco
- 15:30** **Mathematical modeling of geotextiles durability exposed to weather**
Urashima, Beatriz Mydori Carvalho; Urashima, Denise de Carvalho;
Guimarães, Mag Geisielly Alves Ferreira, Lucas Deleon
- 15:40** **Discussion**
- 16:00** **Closure of session**

12 ICG

September 17-21, 2023
Auditorium Parco della Musica,
Roma - Italy

12th International
Conference
on Geosynthetics

IGS MEETINGS AND OTHER MEETINGS

Geosynthetics: leading the way
to a resilient planet



Date	Time	Meeting	Room
16 SEP (SAT)		IGS Officers meeting	Hotel Radisson Blue
17 SEP (SUN)		IGS Council meeting	Hotel Radisson Blue
18 SEP (MON)	13:00 - 14:00	IGS Foundation	Room C
	14:00 - 15:00	IGS Chapter Presidents' Meeting	Room C
	19:00 - 22:00	IGS Corporate event only upon IGS invitation	
19 SEP (TUE)	08:00 - 08:45	IGS Diversity Breakfast	Room C
	13:00 - 14:00	Editorial Board "Geotextiles and Geomembranes" (G&G)	Meeting Room
	14:00 - 16:00	ISSMGE TC 218 meeting	Room C
20 SEP (WED)	09:30 - 09:45	GI and G&G - Best Paper Award	Plenary Room
	13:00 - 14:00	Editorial Board "Geosynthetics International" (GI)	Meeting Room
	13:00 - 14:00	EAGM/GMA/ABINT meetings	Room C
	14:00 - 16:00	IGS Corporate Case Study Competition	Room C
	16:30 - 18:10	IGS General Assembly & IGS Awards	Plenary Room
	18:10 - 18:40	Young Member Winner Session	Plenary Room
21 SEP (THU)	13:00 - 14:00	IGS ERAC (European Regional Activity Committee)	Room C
	14:00 - 16:00	IGS TC-R meeting	Room C

12 ICG

September 17-21, 2023
Auditorium Parco della Musica,
Roma - Italy

12th **International
Conference
on Geosynthetics**

SOCIAL PROGRAMME

Geosynthetics: leading the way
to a resilient planet



Welcome Concert and Reception

The 12 ICG social program opens with a Concert Opera Arias with instrumental interludes that accompanies the audience on a sound journey to rediscover the most famous arias of Rossini, Bellini, Donizetti, Mascagni, Verdi and Puccini.

By remaining in the splendid location of the Parco della Musica and moving to the hanging gardens or the foyer of Santa Cecilia, depending on the weather conditions, a Welcome Reception is scheduled.



CONCERT

Auditorium Parco della Musica
Sinopoli Hall

SEP 17 (SUN)

18:00 - 19:00

Concert Opera Arias with instrumental interludes

Ensemble: Soprano, Tenor, Baritone, strings and piano

Soprano	Aleksandra Buczek
Tenor	Francesco Fortes
Baritone	Paolo Ciavarelli
Piano	Denis Volpi
Violin	Elvin Dhimitri
Other strings	Ilia Kanani Valentino Ferraro Radoslaw Srodon

I act

- 1 – Gioacchino Rossini: Overture Barbiere di Siviglia (instrumental) – 3,8 min
- 2 – Vincenzo Bellini: Casta Diva Norma (soprano) – 4 min
- 3 – Gaetano Donizetti: Una furtiva lagrima L'Elisir d'amore (tenor) – 3,4 min
- 4 – Gioacchino Rossini: Largo al factotum Barbiere di Siviglia (baritone) – 4 min
- 5 – Pietro Mascagni: Intermezzo Cavalleria Rusticana (instrumental) – 3,4 min
- 6 – Giuseppe Verdi: Sempre Libera La Traviata (soprano) – 4 min
- 7 – Giacomo Puccini: E lucevan le stelle (tenor) Tosca – 3,4 min

II act

- 8 – Giacomo Puccini: Vissi d'arte Tosca (soprano) – 3,4 min
- 9 – Giacomo Puccini: Nessun dorma Turandot (tenor) – 3,4 min
- 10 – Giuseppe Verdi: Preludio La Traviata (instrumental) – 3,4 min
- 11 – Giuseppe Verdi: Parigi o Cara La Traviata (soprano and tenor) – 3,4 min
- 12 – Gioacchino Rossini: Ah! qual colpo inaspettato! Barbiere di Siviglia (trio) – 3,4 min
- 13 – Giuseppe Verdi: Libiam nei lieti calici La Traviata (trio) – 3,4 min



WELCOME RECEPTION

Auditorium Parco della Musica
Hanging Gardens or Foyer Santa Cecilia

SEP 17 (SUN)

19:00 - 20:30

Football Match and Special Event

Football (soccer) match during the ICGs

The idea to organize a friendly match of football (soccer) among the participants of the international conferences on geosynthetics was conceived at the University of Grenoble, France, in May 1985 during the meeting of the Scientific Committee for the preparation of the Third International Conference on Geotextiles to be held in Vienna, Austria, in April 1986.

In fact, exactly during those days, it happens a crowd disaster that occurred on 29 May 1985 in the Heysel Stadium in Brussels, Belgium, before the start of the 1985 football (soccer) European Cup Final between the Italian team of Juventus and the English team of Liverpool: due to a collapsing wall in the Stadium, unfortunately 39 people were killed and 600 were injured. This fact generated a lot of frustration also among the members of the Scientific Committee for the preparation of the Third International Conference on Geotextiles: therefore, on that occasion Daniele Cazzuffi (Italy), Jean-Pierre Gourc (France) and Jean-Marie Rigo (Belgium) proposed to start the tradition to organize a friendly match of football (soccer) among the participants of the international conferences on geosynthetics, and in particular between a so-called Latin team and a so-called Anglo team, in order to keep a memory of that tragedy also in the geosynthetic engineering field. The organizers of the Third International Conference on Geotextiles accepted enthusiastically this idea, in particular Heinz Brandl and Heinrich Schneider, respectively Chair of the Scientific Committee and Chair of the Organizing Committee. Thus, in April 1986, the first real IGS football (soccer) match took place in Vienna and this first match was continued ever in Den Haag (1990), Singapore (1994), Atlanta (1998), Nice (2002), Yokohama (2006), Guarujá – Brasil on the beach (2010), Berlin (2014), Seoul (2018) and will be held also in the magic atmosphere of Roma (2023). In Montréal for the 13 ICG in 2026 we will have therefore the occasion to celebrate the 40th anniversary of this fantastic and unique event!

	<p>FOOTBALL MATCH ORANGE FUTBOL CLUB Via degli Olimpionici n.71</p> 	<p>SEP 19 (TUE) 19:00 - 21:00</p>
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Sponsor **Anglo** team t-shirt: Solmax - Sponsor **Latin** team t-shirt: Maccaferri

Special Event

In connection with the Football Match, it is possible to attend a nice Roman cooking show and taste a delicious “cacio e pepe” for those attendees who are cooking also lovers.

	<p>COOKING SHOW ORANGE FUTBOL CLUB Via degli Olimpionici n.71</p>	<p>SEP 19 (TUE) 19:00 - 21:00</p>
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After either the game or the cooking show, a light buffet and dj set is organised to conclude the evening in the best way possible: having fun!

	<p>POST EVENTS COCKTAIL & DJ SET ORANGE FUTBOL CLUB Via degli Olimpionici n.71</p>	<p>SEP 19 (TUE) 21:00 - 23:00</p>
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Gala Dinner



GALA DINNER AT TERRAZZA CAFFARELLI
Piazzale Caffarelli, 4, Roma
(itinerary from 12 ICG venue)

SEP. 20 (WED)
20:00-23:00

Admiring the Capital City from one of the most fascinating viewpoints and getting lost amid the timid rooftops of the houses located in the heart of the Eternal City. This is one of the great opportunities that only a city like Rome can offer.

The Terrace is a magnificent and exclusive location, with outdoor spaces and is a source of pride and boast for the city of Rome. It offers visitors from all over the world the opportunity to live unique moments and experience quality food and passion for art in an exclusive location, feeling like the custodians of timeless memories.



Cultural tour for accompanying persons

Not included in the Accompanying Person fee. Tours can be booked during registration as a supplementary option.

The 12 ICG Organizing Committee will provide accompanying persons the chance to go on cultural tours organized from 18 to 21 September 2023.

Please note that the programs may be canceled due to low participation.

If a program is canceled, the Secretariat will inform you in advance and registration will be refunded.

Ancient Rome: history and legends of the Eternal City **Monday 18 September 2023**

Experience over 2,500 years of history on a private tour through Rome's beautiful historic centre. A narrated journey of the palaces, monuments, churches, fountains, and statues of Italy's capital to discover its history and most famous sightseeing spots.

Duration: 2 hours approx

Meeting time: 10:00 am

Meeting point: Metro B "Colosseo" stop – Largo Gaetana Agnesi exit



Photo of the meeting point



Cultural tour for accompanying persons

ROME AND ITS GHOSTS: THE NARRATION OF ROME AND ITS GHOSTS

Tuesday 19 September 2023

Rome is not only saturated in history but also legends: walk around the city center to visit the ghosts of Rome from Trevi Fountain to Ponte Sisto: discover the secrets of Rome's "boia" and his lover, the lovers hiding at Trevi Fountain and Castel Sant'Angelo and more.

Duration: 2 hours approx

Meeting time: 10:00 am

Meeting point: in front of Castel Sant'Angelo's entrance, Sant'Angelo bridge side



Photo of the meeting point



DOLCE VITA – ROME AND ITS MOVIES: ROME HAS ALWAYS BEEN THE SET OF GREAT MOVIES THAT HAVE ENTERED EVERYONE’S HEART.

Wednesday 20 September 2023

Discover the most iconic scenes and cinematic locations in Rome from Piazza del Popolo to the Via Veneto, Piazza Navona: From Angels and Demons to La Dolce Vita, from La Grande Bellezza to Roman Holiday, from Eat, Pray and Love to To Rome With Love, prepare to be taken on a cinematic trip around Rome’s most famous film locations.

Duration: 2 hours approx

Meeting time: 10:00 am

Meeting point: Piazza Barberini, Fontana del Tritone (fountain)



Photo of the meeting point



Cultural tour for accompanying persons

ROMA AND ITS POPES: VISIT OF THE HISTORIC CENTER AND THE MOST IMPORTANT CHURCHES RELATED TO PAPAL HISTORY

Thursday 21 September 2023

Discover the most famous churches of Rome from Trastevere to the Pantheon to learn more about Rome and its bond with the Pope.

Discover the Basilica's of Rome with a prepared guide.

Duration: 2 hours approx

Meeting time: 10:00 am

Meeting point: Fontana di Santa Maria In Trastevere, Piazza Santa Maria in Trastevere

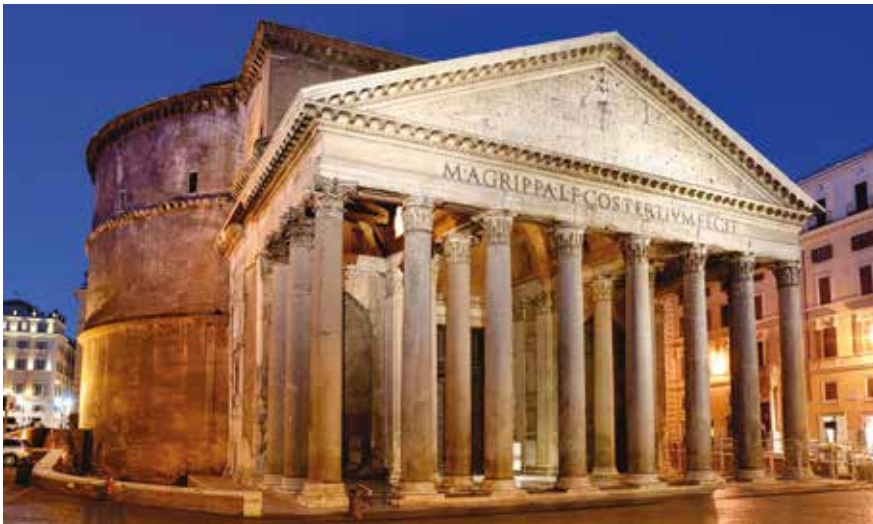


Photo of the meeting point



12 ICG

September 17-21, 2023
Auditorium Parco della Musica,
Roma - Italy

12th International
Conference
on Geosynthetics

TECHNICAL VISITS

Geosynthetics: leading the way
to a resilient planet





ROMA METRO LINE C Via Claudia

SEP 22 (FRI)
10:00 - 12:30

Meeting point at the entrance of the Metro C construction site, Via Claudia (at the crossroads with via Annia).

The visit schedule is as follows:

10:00 - 10:30 am

Eliano Romani, Head of Engineering and Design Department at Metro C of Rome underground will briefly present the main activities going on at the sites with specific reference to the ventilation shaft and to the Fori Imperiali metro station.

10:30 - 11:00 am

Visit at the site of the ventilation shaft, with a diameter of 35 m and 60 m deep, and at the Basilica of Santo Stefano Rotondo, one of the oldest Christian churches, erected in the time of Pope Simplicius, between 468 and 483 (V century), where the instrumentation installed to monitor ground and church movements induced by tunnelling will be illustrated.

11:00 - 12:30 am

Walking to the construction site of the metro station of Fori Imperiali, 30 to 50 m wide and about 240 m long, that is to be excavated down to a depth of 32 m. At the site compensation grouting is being carried out underneath the entrance of the existing Line A Colosseo station to compensate for ground loss and stress relief caused by tunnelling, and the first excavation level has been reached, this allowing to admire the Colosseo from inside of the excavation.

The visit will end at about 12:30 am.





BORGIO MONTELLO LANDFILL

SEP 22 (FRI)
09:00 - 15:00

The Borgo Montello landfill site is a landfill operated between 1998 and 2015 and was filled by MSW. It has 8 different disposal basins and the last one (S8) is ready for the permanent capping construction. In the landfill area is functioning an innovation treatment biogas' plant to obtain Methane gas and is under construction a new leachate treatment plant by osmotic membrane. The permanent capping of S8 basin will be under the new Italian law (D.Lgs 121/2022) that allowed an intensive use of geosynthetics to avoid natural soil consumption.

The capping design is based on a original settlement monitoring based on the use of a geomembrane as reference plane for the measurement.

For the final shape configuration of the landfill heap it will necessary remodeling the waste body so a critical aspect on the odor was under attention.

A combination of odor electronic monitoring (electronic nose) and temporary capping was designed for a reduction of environmental impacts

During the technical visit, these two arguments will be presented to the delegates.

The visit schedule is as follows:

9.00 am

Meeting point at Congress venue

9.30 am

Bus transfer to landfill site

11:00 - 11:30 am

Quintilio Napoleoni and Valerio Baiocchi will show the settlement monitoring system of S8 basin. They will explain the role of geomembrane and benchmarks tools to support GPS and UAV surveys

11:30 - 12:00 am

Valerio Naddeo will show the use and role of electronic nose and temporary geosynthetic capping on the odor control during waste remodeling

12:00 - 1:00 pm

Buffet lunch

1:30 - 3:00 pm

Bus transfer to Roma

The visit will end at about 3:00 pm.



12 ICG

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Roma - Italy

12th **International
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CONFERENCE INFORMATION

Geosynthetics: leading the way
to a resilient planet



Registration & information desk

LOCATION

Parco della Musica
Viale Pietro de Coubertin 30
00196 Roma

OPERATING HOURS

Sep. 17 09:00 – 17:30
Sep. 18 -21 08:00 – 18:00

ON-SITE REGISTRATION FEE

Member	850 €
Non-member	950 €
Student	335 €
One-day conference registration	350 €
Accompanying Person	100 €
Gala Dinner	120 €

* The conference secretariat accepts cash and credit card (VISA, MasterCard and AMEX).

* Gala Dinner is not included in the registration fee.

Conference kit

12 ICG kit will be given to each conference registered attendee at the registration desk. The kit includes the programme book and USB Proceedings.

Preview desks

LOCATION

Plenary Room, Room A, B and C

OPERATING HOURS

Sep. 18-21 08:00 – 18:00

All speakers are invited to use the Preview Desk to check and upload their presentation files at least reasonable time prior to presentation.

Language

The official language of 12 ICG is English.

Venue address

Auditorium Parco della Musica, Viale Pietro de Coubertin 30 00196 Roma.

Emergency

Italy is a safe country. However, should you find yourself in a difficult situation, it is best to turn to the police forces in charge of security for Italian and foreign people visiting the country.

An efficient, modern, integrated network, with the switchboards of the various police forces, emergency services, organisations and agencies is ready to respond to emergency calls from anywhere in Italy. Access to this network is simple and quick: all you have to do is call the national emergency number (112) which is well known and easy to remember.

Wifi

Free wi-fi is available in Auditorium Parco della Musica.

Please find wifi-12ICG FREE WI-FI ZONE in your mobile device.

Currency used in Italy

The currency used in Italy is the Euro. There are eight different coins (1, 2, 5, 10, 20 and 50 cents) and seven notes (5, 10, 20, 50, 100, 200 Euros).

Those arriving in Italy with foreign currency can obtain Euros through any bank, ATM or bureau de change.

Credit cards

As well as in cash, purchases can be paid for using the most common credit cards. This payment system is common in Italian shops, which generally display the symbols of the credit cards they accept on the outside door. If you pay by credit card you will be asked to show an identity document.

Tips

Tips are not compulsory and in Italy there are no generally established rules, although it is common practice to leave a sum amounting up to 10% of the bill if you are satisfied with the service you have received.

Making calls to, from and within Italy

To call an Italian telephone number from outside Italy, either from a landline or a mobile phone, you will need to add the international dialling code for Italy, which is 0039 (+39), followed by the telephone number you require.

To call another country from Italy, you will need to add the international dialing code for the country you are calling, followed by the telephone number you require.

To make calls within Italy, dial the number you require without adding the international country dialing code.

Internet

In Italy you will find Wi-Fi access available in many airports, hotels, train stations and other public places where travellers pass through or stop off.

Local time in Italy

Local time in September is UTC +2, Central European Summer Time (CEST).

Typical mealtimes in Italy

In Italy breakfast starts from 7.00 a.m. onwards. Hotels generally set a time (around 10.00 a.m.) after which breakfast may no longer be ordered. In restaurants, lunch is served from 12.30 to 2.30 p.m, and dinner between 19.30 and 23.00.

Shop opening hours

Shops are generally open from Monday to Saturday, from 9.30 a.m. to 12.30 and from 3.30 p.m. to 7.30 p.m., although shopping centres and department stores often stay open all day, from 10.00 a.m. to 9.00 or 10.00 p.m. Shopping centres and stores are also open on several Sundays throughout the year.

Pharmacies have the same opening hours as shops, from 9.30 a.m. to 12.30 and from 3.30

p.m. to 7.30 p.m.; in the larger cities, some pharmacies are open 24 hours. For emergencies during the night, or when the pharmacies are normally closed, a number of them remain open, on a rotational basis.

A calendar listing the nearest open one can be found on the doors of all local pharmacies.

Electrical system in Italy

In Italy the electrical current is 220 volts AC (50 Hz). Electrical sockets comply with European regulations.

In most hotels you will find adaptors for different types of plugs. A variety of plugs are in use including the European-style two-pin plug.

Tapwater drinkable in Italy

The supply of drinking water is guaranteed throughout Italy. The water from taps and fountains is checked regularly, and is perfectly safe to drink, unless there is a notice indicating otherwise.

Metric system used in Italy

In Italy, the basic unit of measurement is the metre.

The International System of Units (SI), the standard metric system in use in the European Union, defines the seven fundamental units used (metre, kilogramme, second, ampere, kelvin, mole, candela).

App for 12 ICG

APP for 12 ICG can be downloaded using the following QR code.



12 ICG

September 17-21, 2023
Auditorium Parco della Musica,
Roma - Italy


12th **International
Conference
on Geosynthetics**

COMPANY DIRECTORY

Geosynthetics: leading the way
to a resilient planet



* Sorted by Alphabetical Order

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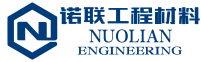
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