Società Italiana Gallerie
Italian Tunnelling Society

ITA AITES

WTC 2019

CONGRESS & EXHIBITION

NAPLES MAY 3|9

ITALY

45th ITA-AITES General Assembly and World Tunnel Congress

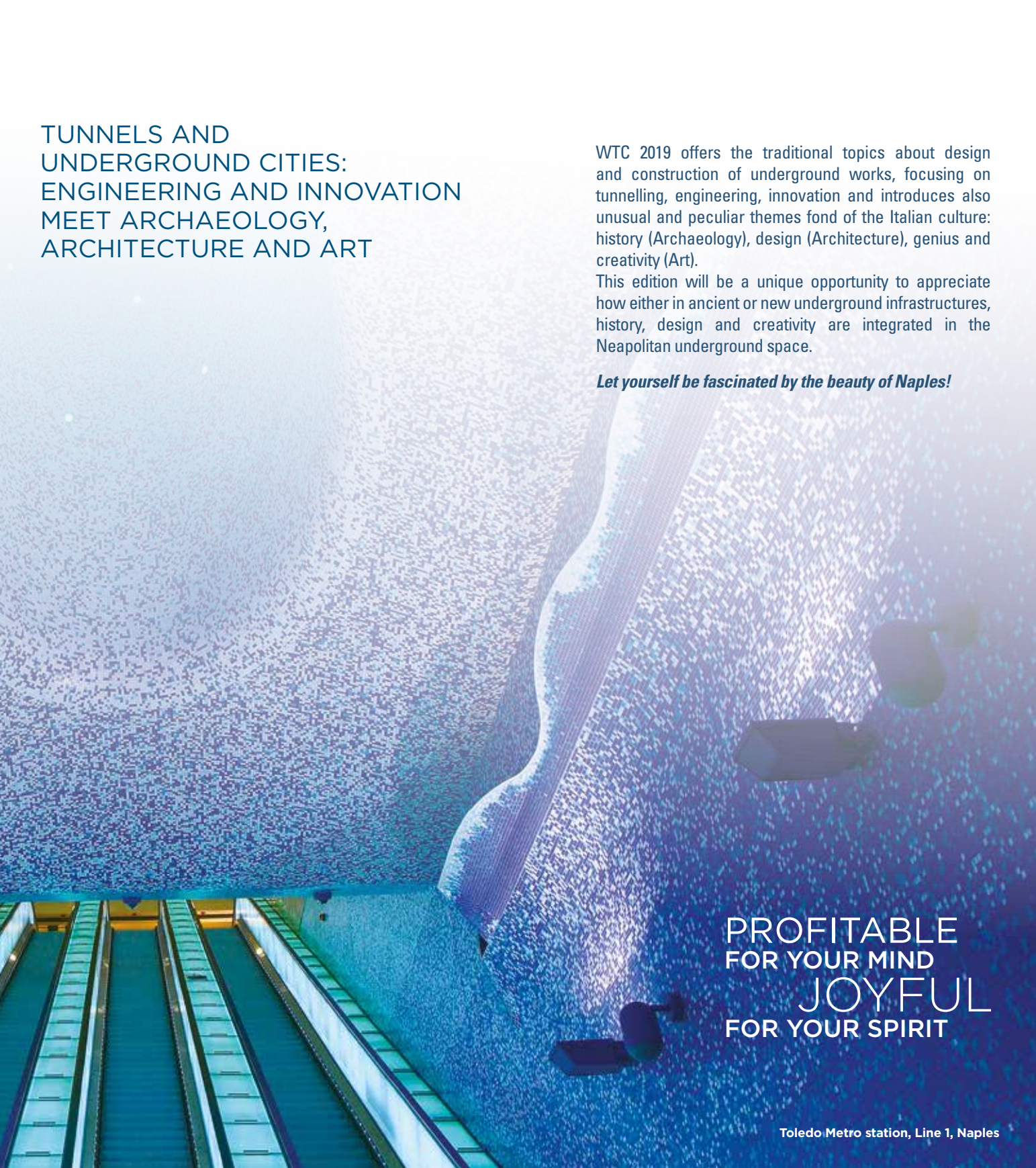
PROGRAM

Released in April 10, 2019
For any updates download the WTC 2019 App

TUNNELS AND UNDERGROUND CITIES: ENGINEERING AND INNOVATION MEET ARCHAEOLOGY, ARCHITECTURE AND ART

WTC 2019 offers the traditional topics about design and construction of underground works, focusing on tunnelling, engineering, innovation and introduces also unusual and peculiar themes fond of the Italian culture: history (Archaeology), design (Architecture), genius and creativity (Art).
This edition will be a unique opportunity to appreciate how either in ancient or new underground infrastructures, history, design and creativity are integrated in the Neapolitan underground space.

Let yourself be fascinated by the beauty of Naples!



Toledo Metro station, Line 1, Naples

WTC 2019

45th ITA - AITES General Assembly and World Tunnel Congress

INDEX

WELCOME TO WTC 7

WELCOME 8
PATRONAGES & PARTNERS 12
CORPORATE SPONSORS 14
MEDIA PARTNERS 16
WTC 2019 COMMITTEES 17

WTC 2019 AT A GLANCE 27

GENERAL INFORMATION 28
PROGRAM OVERVIEW 43
CONGRESS VENUE 44
OPENING & CLOSING CEREMONY 52

ITA-AITES PROGRAM & ITACET TRAINING COURSES 57

ITA-AITES ANNUAL MEETING, WG & COMMITTEES PROGRAM 58
ITA YOUNG MEMBERS INFO 66
ITACET TRAINING COURSES 68

TECHNICAL SESSIONS PROGRAM 71

TECHNICAL SESSIONS OVERVIEW 73
DETAILED TECHNICAL SESSIONS PROGRAM 75
SPECIAL AAA OFF-SITE EVENTS 82

TECHNICAL VISITS 87

ARCHAEOLOGICAL WORKING LUNCH 89
TECHNICAL VISITS 92

SOCIAL EVENTS 99

SOCIAL HIGHLIGHTS 100

ACCOMPANYING PERSONS PROGRAM 107

TOURS 108

EXHIBITION 113

EXHIBITORS LIST 114
EXHIBITION TIMETABLE 120
EXHIBITION MAP 121

Società Italiana Gallerie
Italian Tunnelling Society

ITA AITES

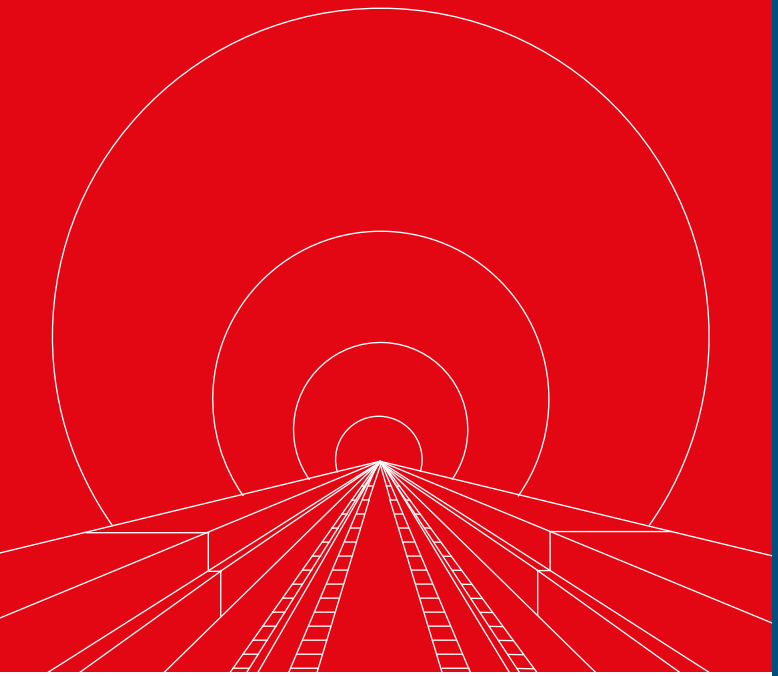
salini impregilo
we build value

ON TRACK TOWARDS THE FUTURE

7,062 km
of railways

1,587 km
of underground works

472 km
of metro lines



www.salini-impregilo.com www.webuildvalue.com Follow us on:

WELCOME
TO WTC 2019

- WELCOME
- PATRONAGES & PARTNERS
- CORPORATE SPONSORS
- MEDIA PARTNERS
- WTC 2019 COMMITTEES

Società Italiana Gallerie
Italian Tunnelling Society

ITA AITES

WELCOME FROM **ITA**

Dear Colleagues, Dear Friends

We are all meeting this year in Naples, Italy for World Tunnel Congress (WTC) and 45th ITA General Assembly. During the last 3 years, the Italian Tunnelling Society (SIG) has carefully prepared this event, which will probably be the biggest WTC ever. The numbers available so far indicate that the congress will be very successful. A total of over 1000 abstracts were received, and 670 manuscripts have been accepted for oral (170) or poster presentations (500). At the exhibition, all the booths initially planned were sold out. An additional area with more booths was created by the organizers to comply with the high demand from exhibitors.

For many of us who have attended WTCs for a long time, this is the most appropriate occasion along the year to be informed about new projects and new techniques, a unique opportunity for networking and meeting colleagues and friends. I hope those coming for the first time will have the chance of appreciating all the technical, commercial and social possibilities open in a WTC. For the newcomers, I would like to call the attention to the value and the importance, in addition to the congress itself, of the meetings to be held by the Working Groups and Committees, responsible to produce so many reports and articles that ITA has published along the years. Some of those publications have had strong impact on many aspects of our industry, like new possibilities of underground space use, operational safety of underground facilities, technical developments, contractual practices, etc. This year 6 reports will be released by the ITA Working Group, ITAtech and ITA COSUF committees.

The topic of the Open Session will be "Tunnel - A resilient link between past and future" this year, mainly dealing with maintenance and repair strategies. I am also very glad to announce that the Emerald Book on "Contracts for Underground Works" prepared by ITA and FIDIC and presented last year, will be launched at WTC.

I wish all of you fruitful discussions and networking during the Congress.

Sao Paulo, March 15, 2019
Tarcisio B. Celestino
ITA President 2016-2019

WELCOME FROM **SIG**

Dear Friends, Dear Colleagues,

We are delighted to welcome you in Naples, Italy, to the 45th ITA-AITES General Assembly and World Tunnel Congress, hosted by the International Tunnelling and Underground Space Association (ITA-AITES) and the Italian Tunnelling Society (SIG).

The city of Naples was the inspirational venue of this conference, starting from the title: Tunnels and Underground cities: engineering and innovation meet Archaeology, Architecture and Art.
Naples is a cradle of underground works, with an extended network of Greek and Roman tunnels and underground cavities dating to the fourth century BC, but also a vibrant and innovative city boasting a modern and efficient underground transit system, whose stations represent one of the most interesting Italian experiments on the permanent insertion of contemporary artwork in the urban context.
All this has inspired and deeply enriched the scientific contributions arrived from authors coming from over 50 different countries. The Scientific Committee has reviewed more than 1.000 abstracts and 750 papers and decided the publication in the proceedings of about 670 papers - probably the biggest number ever for a WTC – subdivided in the 11 main Topics of the congress.

The WTC 2019 in Naples is also an opportunity to overlook the Mediterranean basin with all its history, culture and art, where past and traditions are blended with innovation and future. Naples has always been a melting pot of cultures, a place to share knowledge and to establish new business relationships. You will experience the atmosphere of culture, technology and good living of this historic city filled with life, good humor and full of marvelous natural, artistic and historical treasures.

The WTC 2019 is also the frame of an International Exhibition, where major companies have booked their booths to show their products, technologies and know-how. The blooming gardens of the Congress and Exhibition Centre Mostra d'Oltremare, host also an outdoor exhibition area for machineries and equipment.

Technical and cultural visits have been planned, including the Rome's new Metro C line – that is currently under construction and is unique for the enormous historic and monumental value of the areas it underpasses – and the Brennero Base Tunnel, in the charming Alps mountain, that will be the longest railway underground connection in the world.

Finally, the WTC Organizing Committee has prepared an extraordinary social program that will represent a great opportunity for all participants to experience the beauties of Naples and its surroundings.
We are sure that the Opera Musical event at the San Carlo Theatre and the historical train journey to reach Pietrarsa - the charming Italian Railway National Museum set in front of the Naples gulf - for the Gala Dinner, will leave you astonished.

Dear guests, once again you are very welcome to the WTC 2019 which we wish you to be profitable for your mind and joyful for your spirit!

Andrea Pigorini
SIG President

Renato Casale
WTC 2019
Organizing Committee President

GREETING FROM THE **MAYOR OF NAPLES**

On behalf of the city of Naples, I thank the members of the International Tunneling Association for choosing Naples as the host of the World Tunneling Congress in May 2019.

We give everyone a warm welcome to Naples, a city where engineering and innovation really meet archaeology, architecture and art every day. Our subsoil preserves history and the various ages follow one another layer by layer: from the Neolithic to the Greek, from the Roman to the Byzantine, from the medieval to the Aragonese up to the present day.

The technicians, the companies, the workers who built the tunnels and the subway stations have therefore intercepted history, fielding their skill and genius. They have ensured that modern execution technologies guaranteed the protection of the historical heritage, which was enhanced by the subway stations, while remaining buried. A perfect balance between ancient and modern time but in maximum security, with a past that has become present and has allowed the best respect for historical memory even on the surface

Located in a splendid position within the homonymous gulf, Naples is a beautiful city, surrounded by a breathtaking scenery and enriched by an exceptional artistic and architectural heritage, but it is above all, a warm and welcoming city.

It is a great pleasure and an important opportunity to host the 45th ITA-AITES General Assembly and World Tunnel Congress "Tunnels and Underground Cities: Engineering and Innovation meet Archaeology, Architecture and Art" and I am waiting for you all in May 2019.

Luigi de Magistris
Mayor of Naples

COMUNE DI **NAPOLI**

WITH THE PATRONAGE

Ministero degli Affari Esteri e della Cooperazione Internazionale

Ministero delle Infrastrutture e dei Trasporti

REGIONE CAMPANIA

COMUNE DI NAPOLI

CNAPPC CONSIGLIO NAZIONALE DEGLI ARCHITETTI PIANIFICATORI PAESAGGISTI E CONSERVATORI

CONSIGLIO NAZIONALE DEI GEOLOGI

CONSIGLIO NAZIONALE DEGLI INGEGNERI

AGI Associazione Geotecnica Italiana

GIFI

GEAM ASSOCIAZIONE GEORISORSE E AMBIENTE

ANCE ASSOCIAZIONE NAZIONALE COSTRUTTORI EDILI

oice

INSTITUTIONAL SPONSOR

FERROVIE DELLO STATO ITALIANE

CULTURAL DONOR

salini impregilo

CULTURAL SUPPORTER

ROCKSOIL
www.rocksoil.com

TECHNICAL PARTNERS

MN METROPOLITANA DI NAPOLI SpA

FAV IN VIAGGIO DAL 1889

CHARITY PARTNER

FONDAZIONE ARCHÉ ONLUS

PLATINUM SPONSOR

Ghella
1894
5 Generations of Tunnelers

HITACHI
Inspire the Next

utt
MAPEI

GOLD SPONSOR

ArcelorMittal
ArcelorMittal Fibres
Reinforced concrete solutions
中国交建
CHINA COMMUNICATIONS CONSTRUCTION
CIFA
中国铁建重工集团有限公司
CHINA RAILWAY CONSTRUCTION HEAVY INDUSTRY CO.,LTD.
CREG
WIRTH
Epiroc
HERRENKNECHT
Tunnelling Systems
ITALFERR
GRUPPO FERROVIE DELLO STATO ITALIANE
MM
normet
BUILDING TRUST
Sika
WÜRTH
zitron

SILVER SPONSOR

BASF
BEKAERT
MACCAFERRI
UNDERGROUND SOLUTIONS
DSI
UNDERGROUND
GOLDER
GRUPPO ICM
JACOBS
MACCAFERRI
PENETRON
PINI
BUILDING OUR FUTURE
pwc
RAMBOLL
SANDVIK
SOPREMA
GROUP

MEDIA PARTNERS

OFFICIAL ACCREDITED MAGAZINES

gallerie E GRANDI OPERE SOTTERRANEE

tunnel

Tunnelling Journal www.tunnellingjournal.com

Tunnels AND TUNNELLING

TunnelTalk Direct by Design

MEDIA PARTNERS

DEEP FOUNDATIONS INSTITUTE DFI

Ernst & Sohn A Wiley Brand

leStrade LS Aeroporti Autostrade Ferrovie

STRADE & AUTOSTRADE

tunnelbuilder Promoting the world's tunnelling industry to a huge qualified audience

TBM TUNNEL BUSINESS MAGAZINE

TUNNEL INSIGHT

COMMITTEES

WTC 2019 CONGRESS PRESIDENT

Pietro Salini
CEO Salini Impregilo S.p.A.

HONORARY ADVISORY PANEL

Pietro Lunardi
President WTC 2001 Milan

Sebastiano Pelizza
ITA-AITES Past President (1995-1998)

Bruno Pigorini
President WTC 1986 Florence

INTERNATIONAL STEERING COMMITTEE

Giuseppe Lunardi, Italy
Coordinator

Tarcisio Celestino, Brazil
ITA President

Søren Eskesen, Denmark
ITA Past President

Alexandre Gomes, Australia
ITA Vice President

Ruth Haug, Norway
ITA Vice President

Eric Leca, France
ITA Vice President

Jinxiu (Jenny) Yan, China
ITA Vice President

Felix Amberg, Switzerland
Lars Babendererde, Germany
Arnold Dix, Australia
Randall Essex, USA
Davorin Kolic, Croatia
Pekka Nieminen, Finland
Teik Aun Ooi, Malaysia
Chung-Sik Yoo, Korea
Olivier Vion, France
Miguel Fernandez-Bollo, Spain (AETOS)
Yann Leblais, France (AFTES)
Johan Mignon, Belgium (ABTUS)
Xavier Roulet, Switzerland (STS)
Joao Bilé Serra, Portugal (CPT)
Martin Bosshard, Switzerland (STS)
Luzi R. Gruber, Switzerland (STS)

EXECUTIVE COMMITTEE

SIG President
Andrea Pigorini
Head of Infrastructures
Engineering Department
Italferr S.p.A.

WTC2019 Organizing Committee President
Renato Casale
Railway Infrastructures and Technologies Expert

SIG Vice President
Scientific Committee Representative
Daniele Peila
Professor of Tunnelling
Politecnico di Torino

SIG Vice President
Italian member appointed to ITA Exco
International Steering Committee Coordinator
Giuseppe Lunardi
CEO
Rocksoil S.p.A.

SIG Vice President
Sponsor&Expo Committee Chair
Massimiliano Bringiotti
CEO
GeoTunnel S.r.l.

ITA Executive Director
Olivier Vion
ITA-AITES

Technical Visits Committee Chair
Antonello De Risi
Technical Director
Metropolitana di Napoli S.p.A

Web&Communication Committee Chair
Anna Forciniti
Head of Communication
Astaldi Group

Logistics and Venue Supervision Committee Chair
Francesco Bellone
CEO
Cipa S.p.A.

Program Organization Committee Chair
Enrico Maria Pizzarotti
Board Member and Technical Director
Pro Iter S.r.l.

Transportation & Mobility Committee Chair
Giuseppe Molisso
Senior Program Manager
Hitachi Rail STS S.p.A

Social Program Committee Chair
Anna Bortolussi
Sales Manager
Bekaert Maccaferri Underground Solutions BVBA

ITACET-SIG
Training courses Organization Committee Chair
Daniele Martinelli
Assistant Professor of Tunnelling
Politecnico di Torino

WTC 2019 Young Member Coordinators
Marco Ranieri
Manager Capital Projects & Infrastructure
PwC Advisory | Strategy Consulting

Giuseppe M. Gaspari
Senior Manager
Arup - Infrastructure Group

Scheduling & Budget Committee Chair
Ignazio Carbone
Past Business Development Director of MM SpA Milan
Transportation and galleries Senior Consultant

ORGANIZING COMMITTEE

Enrico Luigi Arini
SIG General Secretary

Joseph Attias
Group Engineering, Development and Concessions Director
Salini Impregilo S.p.A.

Margherita Bellone
Cipa S.p.A.

Claude Berenguier
Executive Director
ITACET Foundation

Filippo Bonasso
Communication
BBT SE (Brenner Base Tunnel)

Massimo Concilia
Head of the TBM Tunnelling Department
Impresa Pizzarotti & C. S.p.A.

Matteo d'Aloja
Head of External Relations & Communications
Ghella S.p.A.

Enrico Dal Negro
Director Underground technology team
Mapei S.p.A.

Gianluca Dati
Deputy Director Communications and External Relations
TELT Tunnel Euralpin Lyon Turin

Giovanni Giacomin
TBM & Tunnels Department
Director at Ghella S.p.A.

Aniello A. Giamundo
ATP S.r.l. President

Mario Giovanni Lampiano
Technical Engineering Services Director
Salini Impregilo S.p.A.

Pompeo Levanto
Global Manager Italian Contractors
BASF Construction Chemicals Italia S.p.A.

Mario Lodigiani
Former SIG EXCO Member

Maurizio Marchionni
Project Manager
Autostrade per l'Italia

Davide Mardegan
Proposal Manager
MM S.p.A.

Paolo Mazzalai
SWS engineering S.p.A. President

Gian Luca Menchini
Civil Engineer, Director of Overseas Operations
Cooperativa Muratori e Cementisti di Ravenna

Alessandro Micheli
Geotechnical and tunnels Manager
Anas S.p.A.

Cesare Salvadori
Former SIG President

Stelvio Santarelli
Former SIG EXCO Member

Andrea Sciotti
Director of Project Execution
Project Manager "Line C"
Roma Metropolitane S.r.l.

Alberto Selleri
Director of Infrastructure Works
Autostrade per l'Italia
Atlantia Group

Patrizio Torta
Chief Executive
Project Management & Engineering S.r.l

Daniele Vanni
Research&Development Advisor
Trevi S.p.A.

SCIENTIFIC ADVISORY BOARD

Prof. Daniele Peila
Politecnico di Torino, Italy

Prof. Giulia Viggiani
University of Rome Tor Vergata, Italy

Prof. Tarcisio Celestino
University of São Paulo - Brazil

SCIENTIFIC COMMITTEE

Lorenzo Brino, Italy
Giovanna Cassani, Italy
Alessandra De Cesaris, Italy
Pietro Jarre, Italy
Donato Ludovici, Italy
Vittorio Manassero, Italy
Matthias Neuenschwander, Switzerland
Moreno Pescara, Italy
Enrico Maria Pizzarotti, Italy
Tatiana Rotonda, Italy
Alessandra Sciotti, Italy

Han Admiraal, The Netherlands
Luisa Alfieri, Italy
Georgios Anagnostou, Switzerland
Andre Assis, Brazil
Stefano Aversa, Italy
Jonathan Baber, United Kingdom
Monica Barbero, Italy
Carlo Bardani, Italy
Mikhail Belenkiy, Russia
Paolo Berry, Italy
Adam Bezuijen, The Netherlands
Nuh Bilgin, Turkey
Emilio Bilotta, Italy
Nikolai Bobylev, United Kingdom
Romano Borchiellini, Italy
Martin Bosshard, Switzerland
Francesca Bozzano, Italy
Wout Broere, The Netherlands
Domenico Calcaterra, Italy
Carlo Callari, Italy
Luigi Callisto, Italy
Elena Chiriotti, France
Massimo Coli, Italy
Franco Cucchi, Italy
Paolo Cucino, Italy
Stefano De Caro, Italy
Bart De Pauw, Belgium
Michel Deffayet, France
Nicola Della Valle, Spain
Riccardo Dell'Osso, Italy
Claudio Di Prisco, Italy
Arnold Dix, Australia
Amanda Elioff, USA
Carolina Ercolani, Italy
Adriano Fava, Italy
Sebastiano Foti, Italy
Piergiuseppe Froldi, Italy
Brian Fulcher, USA
Stefano Fuoco, Italy
Robert Galler, Austria
Piergiorgio Grasso, Italy
Alessandro Graziani, Italy
Lamberto Griffini, Italy
Eivind Grov, Norway
Zhu Hehua, China
Georgios Kalamaras, Italy
Jurij Karlovsek, Australia
Donald Lamont, United Kingdom
Albino Lembo Fazio, Italy
Roland Leucker, Germany
Stefano Lo Russo, Italy
Sindre Log, USA
Robert Mair, United Kingdom
Alessandro Mandolini, Italy
Francesco Marchese, Italy
Paul Marinos, Greece
Daniele Martinelli, Italy
Antonello Martino, Italy
Alberto Meda, Italy
Davide Merlini, Switzerland

Alessandro Micheli, Italy
Salvatore Miliziano, Italy
Mike Mooney, USA
Alberto Morino, Italy
Martin Muncke, Austria
Nasri Munfah, USA
Bjørn Nilsen, Norway
Fabio Oliva, Italy
Anna Osello, Italy
Alessandro Pagliaroli, Italy
Mario Patrucco, Italy
Francesco Peduto, Italy
Giorgio Piaggio, Chile
Giovanni Plizzari, Italy
Sebastiano Rampello, Italy
Jan Rhode, Norway
Jamal Rostami, USA
Henry Russell, USA
Giampiero Russo, Italy
Gabriele Scarascia Mugnozza, Italy
Claudio Scavia, Italy
Ken Schotte, Belgium
Gerard Seingre, Switzerland
Alberto Selleri, Italy
Anna Siemińska-Lewandowska, Poland
Achille Sorlini, Italy
Ray Sterling, USA
Markus Thewes, Germany
Jean-François Thimus, Belgium
Paolo Tommasi, Italy
Daniele Vanni, Italy
Francesco Venza, Italy
Luca Verrucci, Italy
Mario Virano, Italy
Harald Wagner, Thailand
Bai Yun, China
Jian Zhao, Australia
Raffaele Zurlo, Italy

Technology for
underground construction

- **Alkali-free set accelerators for shotcrete**
- **Products for mechanized tunneling**: foaming agents for soil conditioning, polymers, sealants, lubrificants
- **Products for grouting and consolidating**
- **Products for concrete repairing, protection and coating**
- **Products for waterproofing**: synthetic waterproofing membranes, waterproofing accessories

Learn more on
utt.mapei.com
hq.utt@utt.mapei.com

utt MAPEI

HITACHI
Inspire the Next

BUILD THE FUTURE, FUELLING THE PRESENT

Hitachi Rail STS

WTC 2019
AT A GLANCE

- GENERAL INFORMATION
- PROGRAM OVERVIEW
- CONGRESS VENUE
- OPENING & CLOSING CEREMONY

Società Italiana Gallerie
Italian Tunnelling Society

ITA
AITES

GENERAL INFORMATION

LOCATION INFORMATION

WTC 2019 relevant congress areas are:

> **PAVILION 10**
> **PALACONGRESSI**
> **TEATRO MEDITERRANEO**

Mostra d'Oltremare

> **PALAZZO SERRA DI CASSANO**

- **The ITACET Training Courses will take place at:**
  Venue: Palacongressi
  Address: Mostra d'Oltremare, Piazzale Tecchio, Naples
- **The Technical Sessions will take place at:**
  Venue: Palacongressi and Teatro Mediterraneo
  Address: Mostra d'Oltremare, Piazzale Tecchio, Naples
- **The special AAA Off-site Events will take place at:**
  Venue: Palazzo Serra di Cassano
  Address: Via Monte di Dio, 14, Naples
- **The Archaeological Working Lunch will take place at:**
  Venue: Pausilypon Archaeological Site and Seiano Grotto
  Address: Discesa Coroglio, 36 - Grotta di Seiano, Naples
- **The Exhibition will take place at:**
  Venue: Pavilion 10, tent A, tent B and outdoor areas
  Address: Mostra d'Oltremare, Piazzale Tecchio, Naples

REGISTRATON HOURS

Attendee & Exhibitor Registration & Secretariat Opening Hours

Location: Pavilion 10

Sunday 05 May	08.00-19.00
Monday 06 May	08.00-18.00
Tuesday 07 May	08.00-18.00
Wednesday 08 May	08.00-17.30

2-Day ITACET Training Course Registration

Location: Palacongressi (Stromboli room)

Friday 03 May	08.30-09.30

1-Day ITACET Training Course Registration

Location: Palacongressi (Panarea room)

Saturday 04 May	08.00-09.00

EXHIBITION HOURS

Exhibition Hall Opening Hours:

Monday 06 May	10.30 -18.00
Tuesday 07 May	08.00 -18.00
Wednesday 08 May	08.00 -17.30

COFFEE BREAK & LUNCH

(Exhibition Area, Pavilion 10)

Monday 6

Morning coffee break (30 min.)	10.30-11.00
Lunch	13.00-14.00
Afternoon coffee break (20 min.)	15.20-15.40

Tuesday 7

Morning coffee break (30 min.)	10.15-10.45
Lunch	13.00-14.00
Afternoon coffee break (20 min.)	15.20-15.40

Wednesday 8

Morning coffee break (30 min.)	10.30-11.00
Lunch	13.00-14.00
Afternoon coffee break (20 min.)	15.20-15.40

Lunch is arranged from 12.30 to 14.30 every day.

PROGRAM OVERVIEW

About 700 contributions from more than 50 countries make the WTC2019 Scientific Programme outstanding and unique. A wide range of topics have been covered, from the more traditional subjects connected to technical challenges of design and construction of underground works, with emphasis on innovation in tunnelling and engineering, to the less conventional and archetypically Italian themes such as Archaeology, Architecture, and Art in underground construction.

GENERAL INFORMATION

PODIUM AND E-POSTER PRESENTATIONS

The Scientific Board selected about 170 Podium Presentations and 500 E-poster presentations.
Please refer to Technical and Open Sessions Overview for a quick look at the technical sessions timetable. The daily schedule for the E-Poster sessions is also mentioned.
All presentations, discussions and questions will be in English.

E-Poster

A new presentation system has been chosen for the first time in WTC: the E-poster will be displayed on large screens.
E-posters stations will be available in a reserved area at Teatro Mediterraneo (foyer and 1st floor) for free consultation and discussion.
The discussion will take place on May 6th from 14.00 until 17.20, on May 7th from 14.00 until 17.40, on May 8th from 14.00 until 17.00.

Meet The Author

This innovative procedure will help the participants and the authors to exchange opinions and share information. It will be possible for any participants to contact the E-poster author and schedule a meeting to discuss the paper content.
Each presentation will last not more than 20 minutes including Q&A. The Author will receive by email a request for a meeting fixing the time and E-poster station number.

Podium Presentations

The main goal of this congress is to promote the exchange of information and knowledge, therefore do not consider podium presentations as a simple "slides show" but as an opportunity for experts to discuss together.
The timing for each podium presentation is the following:
- introduction of the author by the chairman (1 min)
- oral presentation by the author (16 min)
- Q&A discussion (3 min)

Presenters should strictly respect the scheduled time, since it is extremely important for all participants to know exactly when and where a paper will be presented.
All podium presenting authors should meet in the morning and in the afternoon 15 minutes before the beginning of the session of the day and in the room scheduled for their presentation.

Meeting times:

Monday 06 May	13.45-14.00
Tuesday 07 May	13.45-14.00
Wednesday 08 May	08.15-08.30 and 13.45-14.00

ABSTRACTS BOOK & PROCEEDINGS USB KEY

"Tunnels and Underground Cities: Engineering and Innovation meet Archaeology, Architecture and Art" is a valuable reference text for tunnelling specialists, owners, engineers, architects and others involved in underground planning, design and building around the world, and for academics who are interested in underground construction and geotechnics.
The Scientific Board reviewed more than 1.000 abstracts and 750 papers, to end up with the publication of about 670 papers, inserted in this WTC2019 proceedings.
The book has the following main themes: Archaeology, Architecture and Art in underground construction, Environment sustainability in underground construction, Geological and geotechnical knowledge and requirements for project implementation, Ground improvement in underground constructions, Innovation in underground engineering, materials and equipment, Long and deep tunnels, Public communication and awareness, Risk management, contracts and financial aspects, Safety in underground construction, Strategic use of underground space for resilient cities, Urban tunnels.
The abstract of all manuscripts and the full-length manuscripts of all presentations are contained in a set made up of The Book of Abstracts and a USB key that you will find in your backpack.
The congress backpack is a quality gift for you from the Institutional Sponsor and the Platinum sponsors of the Congress.

WTC APP

The APP was conceived as a useful tool before and during the congress for quick consultation and interaction. The contents of this Program Book will be included together with additional functions:
- participants will be able to check in the APP all E-posters for the whole conference duration.
- participants will be able to vote through the APP the best E-poster presentation expressing 3 preferred choices.
- a WTC special Award will be given to the three best E-Posters during the Closing Ceremony on May 8th

Download WTC2019 in your Google Play or Apple App store or simply scan this QR code.

Available on the iPhone App Store
Available on the Android Market

GENERAL INFORMATION

SOCIAL MEDIA

You are invited to follow WTC 2019 on the social media for updates and news, to share experiences and practices, or to simply ask for opinions.

Join us on Facebook, LinkedIn, Twitter and Youtube, and actively connect and interact with other professionals in the field.

WTC Napoli 2019	WTC 2019 Napoli
@wtcnapoli2019	YouTube WTC 2019 Naples 3-9 May

#WTC2019

INTERNET

A complimentary Wifi network is set up throughout the Mostra d'Oltremare venue, including the Pavilion 10, the Palacongressi and the Teatro Mediterraneo.
Name of network: **wtc2019**
Password: **swsengineering**

Sponsored by SWS

PRESS AREA & INTERVIEW ROOM

Location: Palacongressi
The Press area (first floor) and the Interview room (Procida Room) will be available to all accredited media journalists. The press area is a work space with desks and printers.

• Press Area Opening Hours:

Monday 06 May	08.00-18.00
Tuesday 07 May	08.00-18.00
Wednesday 08 May	08.00-17.00

• Interview Room Opening Hours:

Monday 06 May	09.00-18.00
Tuesday 07 May	08.00-18.00
Wednesday 08 May	08.00-17.00

Press Conference

A Press Conference will take place in the Sardegna room at Palacongressi on Monday, May 6 from 13.00 to 14.00.

PRESS CONTACTS

Italian press and media partners:
WTC 2019 PRESS OFFICE:
PPAN
Mrs. Federica Ruggeri
federica.ruggeri@ppan.it; wtc2019@ppan.it
+39 06 87751723 | +39 388 576 2810

International press:
ITA-AITES PRESS OFFICE
Mrs. Diane Loth
d.loth@giesbert-mandin.fr
+ 33 6 47 27 74 29

Broadcast list: +39 388 5762810

SLIDE CENTER

All Speakers and Podium presenters should submit their presentation in advance to the technicians for checking the spelling and features, in order to ensure the quality of their presentation(s) including fonts, bullets, outlines, animations, etc.
The computers in the Slide Centre are configured with the same hardware and software as those in the presentation rooms. All presenters are asked to submit their final version on the day before their scheduled presentation.

An exception is made for the Offsite Sessions at Palazzo Serra di Cassano: podium presenters are allowed to submit their final version either on the day before at the Slide Centre in Palacongressi or on the same day of their scheduled presentation time at Palazzo Serra di Cassano but at least 15 minutes in advance.
Location: Palacongressi
Room signed: Slide Center

Opening Hours:

Sunday 05 May	14.30-18.00
Monday 06 May	07.30-18.00
Tuesday 07 May	07.30-18.00
Wednesday 08 May	07.30-18.00

LOUNGE AREA

Participants will enjoy an indoor area close to ITA Secretariat Office in order to work, meet up colleagues, have a chat, relax and recharge mobile devices.
Location: Palacongressi, ground floor

REGISTRATION INFORMATION

As of Sunday, May 5 at 08H00 on-site registrations will be available at the registration desks.

REGISTRATION POLICY

All attendees, authors, and exhibitors of the WTC 2019 are required to be registered. Badges are required for admittance to all technical sessions, exhibits, and social events.

HOTEL RESERVATIONS

For any information please go to the registration desk in the registration area or contact the Official Housing Bureau and Travel Agency of the congress:

AIM Group International - Milan Office
Via Ripamonti, 129 - 20141 Milan, Italy
Phone: +39 02 56601851
E-mail: wtc2019.hotel@aimgroup.eu

Any change or cancellation of the hotel reservation must be sent in writing to AIM Group International - Milan Office.

AIM Group International - Milan Office reserves the right to charge on the given credit card the following cancellation fees: no refund for amendments, no-shows or cancellations.

Please Note

Rooms not occupied from the day of arrival will be seen as No-Show, unless prior arrangement has been made. Reservation will be automatically cancelled and payment not refund.

TRANSPORTATION

Delegate Transport Information

Daily transportation to the Congress Venue will be provided to participants in order to arrive at the venue prior to the first main session of the daily Scientific Program, and will depart from the Congress Venue following the last session of the daily Scientific Program or following the Congress Social Event on May 5, 2019.

Buses are available for all registered delegates on presentation of their conference badge to the driver/hostess and are free of charge. You do not have to be staying at a hotel to pick up a shuttle at that location. All Congress buses are marked with the WTC2019 logo. Please check the sign in the bus window to make sure you are on right bus.

M LINEA 2

Free tickets valid one day will be available at the entrance of the Congress venue in the Registration area.

Offered by

REGIONE CAMPANIA

Service frequency every 10 minutes on the route to the Congress venue from Garibaldi Station. Hostess assistance during the morning at Garibaldi Station, full-time hostess assistance at Campi Flegrei Station.

BUSES WILL OPERATE AS SHUTTLES AS PER THE TIMETABLE AND ROUTES BELOW (for more details, please download the WTC2019 App):

MEETING POINT A
LUNGOMARE
VIA N. SAURO
at the corner of via Cuma and via Petronio

MEETING POINT B
PIAZZA MUNICIPIO
VIA MEDINA
at the corner of via Incoronata and via S. Tommaso D'Aquino

MEETING POINT C
METROPARK
GARIBALDI STATION

MEETING POINT A B C AND LISTED HOTELS BELOW ► TO CONGRESS VENUE

MEETING POINT	Pick up Location	MAY 5	MAY 6	MAY 7	MAY 8
A	**LUNGOMARE** Via N. Sauro	17H45	07H30	07H30	07H30
B	**P.ZZA MUNICIPIO** Via Medina	17H45	07H30	07H30	07H30
C	**METROPARK** Garibaldi Station	17H45	07H30	07H30	07H30

HOTELS	Pick up Location	MAY 5	MAY 6	MAY 7	MAY 8
Best Western Suites & Residence Hotel	Front entrance of the hotel	18H00	07H45	07H45	07H45
American Hotel		18H05	07H50	07H50	07H50
Montespina Park Hotel		18H20	08H00	08H00	08H00
Hotel Nuvò		18H30	08H10	08H10	08H10
Best Western JFK	Front entrance of the hotel	18H10	07H45	07H45	07H45
Hotel Serius		18H20	07H55	07H55	07H55
Hotel Cristina		18H30	08H05	08H05	08H05
Palazzo Salgar	Front entrance of the hotel	17H45	07H30	07H30	07H30
Grand Hotel Parker's	Front entrance of the hotel	17H45	07H30	07H30	07H30
Holiday INN	Front entrance of the hotel	17H30	07H30	07H30	07H30

CONGRESS VENUE ► MEETING POINT A B C AND TO ALL ABOVE HOTELS BUSES WILL DEPART THE CONGRESS VENUE AS FOLLOWS:

MEETING POINT	Pick up Location	MAY 5	MAY 6	MAY 7	MAY 8
CONGRESS VENUE	Mostra d'Oltremare/ Piazzale Tecchio	21H30	17H30	17H50	17H40

Delegate Transport for Archaeological Working lunch

A daily Conference Shuttle service is provided from the Congress Venue to the Seiano Grotto, and back.

BUSES ARE AVAILABLE FOR ALL REGISTERED DELEGATES ON PRESENTATION OF THEIR EVENT COUPON ON THE CONFERENCE BADGE TO THE DRIVER/HOSTESS AND ARE FREE OF CHARGE:

FROM CONGRESS VENUE ▶ TO SEIANO GROTTO					
MEETING POINT	**Pick up Location**	**MAY 5**	**MAY 6**	**MAY 7**	**MAY 8**
CONGRESS VENUE	Mostra d'Oltremare/ Piazzale Tecchio	11H00	11H00	11H00	11H00

FROM SEIANO GROTTO ▶ TO CONGRESS VENUE					
MEETING POINT	**Pick up Location**	**MAY 5**	**MAY 6**	**MAY 7**	**MAY 8**
SEIANO GROTTO	Discesa Gaiola 37 Seiano Grotto	13H30	13H30	13H30	13H30

Delegate Transport for AAA Off-site Events

A daily Conference Shuttle service is provided from the Congress Venue to the Bourbon Tunnel, and back.

BUSES ARE AVAILABLE FOR ALL REGISTERED DELEGATES ON PRESENTATION OF THEIR EVENT COUPON ON THE CONFERENCE BADGE TO THE DRIVER/HOSTESS AND ARE FREE OF CHARGE:

FROM CONGRESS VENUE ▶ TO BOURBON TUNNEL				
MEETING POINT	**Pick up Location**	**MAY 6**	**MAY 7**	**MAY 8**
CONGRESS VENUE	Mostra d'Oltremare/ Piazzale Tecchio	14H00	14H00	14H00

FROM BOURBON TUNNEL ▶ TO THE CONGRESS VENUE AND MEETING POINT A B C				
MEETING POINT	**Pick up Location**	**MAY 6**	**MAY 7**	**MAY 8**
BOURBON TUNNEL	Morelli Parking, Via D. Morelli, 61c	-	-	12H30*
BOURBON TUNNEL	Morelli Parking, Via D. Morelli, 61c	17H30	17H30	17H30

PLEASE NOTE:

Shuttle service to get to the Bourbon Tunnel for the morning session on May 8, is not available at the moment.
Please check on WTC2019 App for any updates on the shuttle service.
* Return pick up for the morning session to the congress venue.

Gala Dinner (For registered Delegates only)

You will be able to enjoy a journey on vintage carriages from Naples to the National Railway Museum of Pietrarsa.

* There are limited number of seats on the historic train for the special journey, available on first come first served basis according to the date of your Gala dinner registration

Date	Event Location	Timetable and pick up Location
MAY 8	Railway National Museum of Pietrarsa	**19H30** Garibaldi Station Travel aboard an historic train * and Trenitalia Jazz
		Timetable and Return pick up Location
		23H00 Railway National Museum of Pietrarsa to Meeting point A B C Hotel Esedra and hotels listed on p. 35 *(return transfer by bus)*

Provided by FONDAZIONE FS ITALIANE — TRENITALIA GRUPPO FERROVIE DELLO STATO ITALIANE

WTC 2022 Candidates Dinner

Date	Event Location	Timetable and pick up Location
MAY 7	Belvedere Carafa	**19H30** Meeting point A B C Hotel Esedra and hotels listed on p. 35
		Timetable and Return pick up Location
		22H00 Belvedere Carafa to Meeting point A B C Hotel Esedra and hotels listed on p. 35

PLEASE NOTE: For more details on social event, please see p. 63

Technical Visits

Date	Technical Visit	Pick up and drop off Location
MAY 9	Metro Line 1 & 6	**09H30** Metropark next to Garibaldi Station
	Naples-Bari High Speed Railway line	

PLEASE NOTE: For more details on Technical Visits, please see pp. 92-93

Please note space is limited.
Pick-up times may vary according to the routes and traffic.

This service is provided by

BUSITALIA
GRUPPO FERROVIE DELLO STATO ITALIANE

AUDIO/VIDEOTAPING, DIGITAL RECORDING, AND PHOTOGRAPHY

Because all presentations and associated materials are the speakers' intellectual property, please obtain the speakers' permission to record their session or activity in any medium.

PRIVACY POLICY

The information on the processing of personal data in accordance with European Regulation no. 679 of 2016 is published on the website of the event at www.wtc2019.com/privacy-policy.
Please consult this website for further details.

PROFESSIONAL CONGRESS ORGANIZER

AIM GROUP INTERNATIONAL

AIM Group International - Milan Office
Via G. Ripamonti, 129 - 20141 Milano (Italy)
wtc2019@aimgroup.eu
www.aimgroupinternational.com

COMMUNICATION PARTNER

PPAN

PPAN srl - Comunicazione e networking per il costruito
Via Nomentana, 63 - 00161 Roma (Italy)
info@ppan.it
www.ppan.it

ArcelorMittal

ArcelorMittal Fibres
Reinforced concrete solutions

Supporting your project from start to finish

The right advice
The right fibres
The right solutions

Why choose ArcelorMittal Fibres?

Expert support
Your reliable project partner
High performance fibres
Shotcrete solutions
Precast tunnel lining solutions
Comprehensive range of fibres
Comprehensive packaging options
Guaranteed quality

ArcelorMittal Fibres is working with Engineers, Construction companies and suppliers of Precast and Ready-mix products on some of the most challenging tunnelling projects in the world.

Let's talk TUNNELS
Contact: tunnels@arcelormittal.com

Visit us at:
Stand 32-33
May 3-9 2019
WTC 2019

EXPLORERS OF THE UNDERGROUND

Ghella

1894

5 Generations of Tunnelers

PROGRAM OVERVIEW

MAY 2019	FRIDAY 3rd	SATURDAY 4th	SUNDAY 5th	MONDAY 6th	TUESDAY 7th	WEDNESDAY 8th	THURSDAY 9th
MORNING	ITACET Training Courses	ITACET Training Courses	ITA General Assembly	Opening Ceremony	Open Session 1 ITA WGs & Committees Reports	Technical Sessions Special AAA Off-site Event	Technical Visits
	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	
	ITACET Training Courses	ITACET Training Courses	ITA General Assembly	Opening Ceremony & Keynote Lecture	Open Session 2 Panel Discussion on Tunnels A resilient link between past and future	Technical Sessions Special AAA Off-site Event	
	Lunch	Lunch	Lunch	Lunch Press Conference	Lunch	Lunch	
			Archaeological Working Lunch *at Pausilypon Archaeological Site and Seiano Grotto*	Archaeological Working Lunch *at Pausilypon Archaeological Site and Seiano Grotto*	Archaeological Working Lunch *at Pausilypon Archaeological Site and Seiano Grotto*	Archaeological Working Lunch *at Pausilypon Archaeological Site and Seiano Grotto*	
AFTERNOON	ITACET Training Courses	ITACET Training Courses	ITA WG Meetings	Technical Sessions Special AAA Off-site Event ITA WG Meetings	Technical Sessions Special AAA Off-site Event ITA Committees Meetings	ITA General Assembly Technical Sessions Special AAA Off-site Event	
	Coffee Break						
	ITACET Training Courses	ITACET Training Courses	ITA WG Meetings	Technical Sessions Special AAA Off-site Event ITA WG Meetings	Technical Sessions Special AAA Off-site Event ITA Committees Meetings	ITA General Assembly Technical Sessions Special AAA Off-site Event	
						Closing Ceremony *Mostra d'Oltremare*	
EVENING		ITA President's Reception *Monumental complex of Santa Chiara* By invitation only	Welcome Reception *Mostra d'Oltremare at Exedra Fountain*	WTC2019 Special Event & ITA Tech Dinner *San Carlo Theatre* Concert on a first come first served basis ITA TECH Dinner by invitation only	WTC 2022 Candidates Dinner *Belvedere Carafa* By invitation only	Gala Dinner *Pietrarsa Railway Museum*	

ITACET Training Courses For more details see p. 68

ITA General Assembly For more details see pp. 58, 63

ITA WG Meetings For more details see pp. 59-60

ITA Open Session For more details see pp. 61-62

ITA Committee Meetings For more details see pp. 62-63

Archaeological Working lunch For more details see p. 89

Technical Sessions For more details see pp. 73-80

Special AAA Off-site Event For more details see pp. 82-84

Opening Ceremony For more details see pp. 52-53

Closing Ceremony For more details see p. 54

Press Conference For more details see p. 32

Evening Events For more details see pp. 58, 60, 63, 100, 101

Technical Visits For more details see pp. 92-95

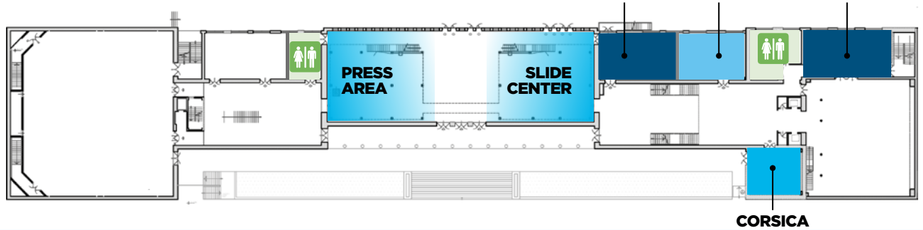
WTC 2019

45th ITA - AITES General Assembly and World Tunnel Congress

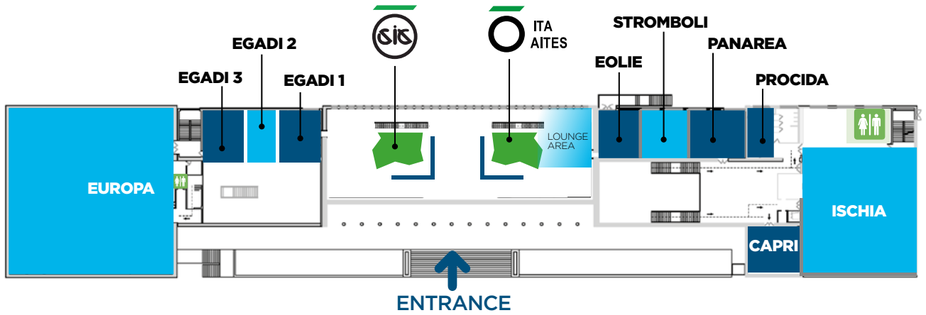
- A REGISTRATION AREA & OFFICIAL MEDIA PARTNERS AREA
- B PAVILION 10 **EXHIBITION AREA 1**
- C **ESEDRA MEETING ROOM**
- D TENT A **EXHIBITION AREA 2**
- E TENT B **EXHIBITION AREA 3**
- F **TEATRO MEDITERRANEO & ITALIA ROOM**
- G **PALACONGRESSI**
- H TENTS 1-4 MEETING ROOMS
- I **EXEDRA FOUNTAIN**
- 1-8 **OUTDOOR EXHIBITION AREA**
- 1-10 **E-POSTER STATIONS**

PALACONGRESSI

FIRST FLOOR

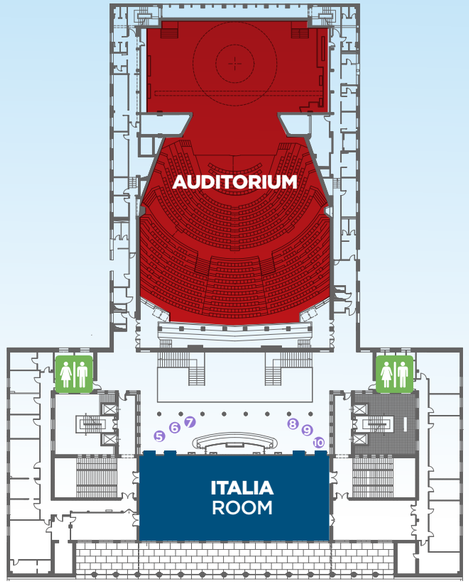


GROUND FLOOR

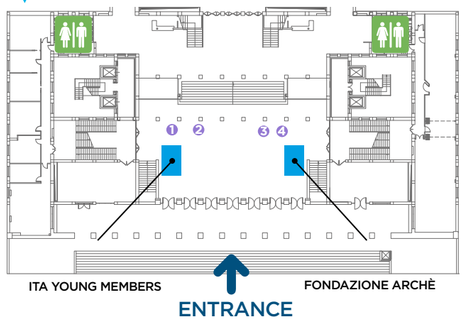


TEATRO MEDITERRANEO

FIRST FLOOR



GROUND FLOOR



GLOBAL IDEAS AND SOLUTIONS FOR WORLDWIDE INFRASTRUCTURE PROJECTS

Italferr, the engineering company of Ferrovie dello Stato Italiane Group, is a leading provider of design, site supervision and project management services for infrastructure projects, on the Italian and International markets.

From planning and design to commissioning, we have the know-how - based on more than 30 years' experience – to offer our clients the best integrated technology solutions, with a low environmental impact.

ITALFERR
GRUPPO FERROVIE DELLO STATO ITALIANE

Dramix®

Steel fibre tunnel applications

3D Dramix®

USED IN
- NorthConnex
- WestConnex M4
- WestConnex M5

4D Dramix®

USED IN
- Expolink in Dubai
- Folo Line Norway

5D Dramix®

SUCCESFULLY USED IN VARIOUS INTERNATIONAL PROJECTS
- Riva Tunnel Turkey
- Jansen Mine in the USA
- Lee Tunnel - Thames Tideway in the UK

Synmix®

ALSO AVAILABLE

Synmix synthetic fibres for shotcrete, the ideal support for your mining project

BEKAERT MACCAFERRI UNDERGROUND SOLUTIONS

Because we are tunnelling

www.bm-underground.com

www.pwc.com/it

Audit

Legal

Actuarial

Tax

Consulting

Innovation

Deals

Strategy

Digital

Capital Markets

Technology

Accounting Advisory

Risk

PwC's purpose is to build trust in society and solve important problems. PwC accompanies Italian companies in their process of growth by helping them deal with current business issues and complex challenges.

pwc

© 2019 PricewaterhouseCoopers SpA. All rights reserved.

METRO & THE CITY - ART METRO STATIONS IN NAPLES

Several stations of the underground involve sites that, although heavily stratified, remain linked to a specific moment in history. This particular moment can be discerned by aspects that are still apparent today; or by findings of particular importance that were concealed by successive transformations and then came to light during the excavations.

As a consequence, it is possible to link multiple stations to specific urban areas that are representative of a precise moment in history, considering the city, with its quotidian as well as its pivotal events, as the key to understanding the new urban infrastructure.

Hence the stations of Garibaldi, Duomo and Università can be linked to the Bourgeois City, which finds its true quintessence in the Renewal works; Toledo and Municipio, brimming with stratifications, to the Viceregal City, which maintains is original significance in the current urban layout; Chiaia, Mirelli, San Pasquale, to the development of the western area of the city; Mergellina, Lala, Viale Augusto, Piazzale Tecchio, of an essentially urban nature, to the further spread westward, spanning Fuorigrotta; Tribunale and Poggioreale, Centro Direzionale, Capodichino, to the eastern front; Museo and Dante, Materdei and Salvator Rosa, Quattro Giornate and Vanvitelli, to the stretches of residential areas along the hills, beginning with the historic district.

Special thanks to MN METROPOLITANA DI NAPOLI SpA

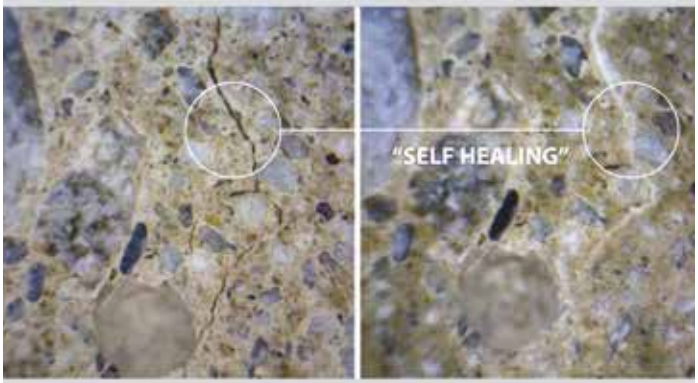
PENETRON

TOTAL CONCRETE PROTECTION

The Watertigh and Durable

CRYSTALLINE CONCRETE

Integral System of Waterproofing and Protection of Concrete by Crystallization



The exclusive effect of PENETRON®
"Self Healing" for increasing durability over time

PINI

BUILDING OUR FUTURE

Engineering for our Society, Environment and Economy

Headquarter
Pini Swiss
Via Besso 7
6900 Lugano
+41 91 961 24 00
info@piniswiss.com

Pini Italia
Via Cavour 2
22074 Lomazzo (CO)
+39 02 3671 44 18
lomazzo@piniswiss.com

www.piniswiss.com

Brenner Base Tunnel
Konrad Bergmeister, BBT-SE | Adrian Fontana, ÖBA Pini Group

OPENING CEREMONY

06 May 2019

The Opening Ceremony will be held at Mostra d'Oltremare.
The halls Auditorium (at Teatro Mediterraneo) and Europa
(at Palacongressi) will be connected by audio-video.
When registering, participants will be addressed to the assigned location.

1st PART 08.45 -10.30

08.45	Official opening by Masters of Ceremony Serena Rossi **(Performer)** Mauro Moretti **(Fondazione FS Italiane President)**
08.50	Institutional greetings Luigi De Magistris **(City Mayor)** **Ministry of Infrastructure and Transport** Representative Maurizio Gentile **(CEO Rete Ferroviaria Italiana)**
09.05	Speech by WTC 2019 President Pietro Salini **(CEO Salini Impregilo)**
09.20	Speech by Master of Ceremony Mauro Moretti
09.30	Music entertainment Serena Rossi
09.35	Greetings from SIG Andrea Pigorini **(SIG President)**
09.40	Greetings from ITA Tarcisio Celestino **(ITA President)**
09.45	Architecture in negative: the form of the void Alessandro Viscogliosi **(Università di Architettura La Sapienza Roma)**
10.05	Tunnels for knowledge Guido Tonelli **(CERN)**
10.25	Final remarks (1st part) Renato Casale **(WTC Organizing Committee President)**

10.30- 11.00
OFFICIAL OPENING OF THE EXHIBITION AREA
and Coffee break in Pavilion 10

2nd PART 11.00-13.00

11.00	Muir Wood Lecture Pushing boundaries in tunnelling together Martin Herrenknecht **(Herrenknecht AG)**
11.40	Music entertainment Serena Rossi
11.50	Institutional greetings Vincenzo De Luca **(Regione Campania President)**
11.55	Digital Tunnels Gianluigi Castelli **(Ferrovie dello Stato Italiane President)**
12.10	Tunnelling the most beautiful metro in the world Ennio Cascetta **(Metropolitana di Napoli President, Università Federico II Napoli)**
12.25	ITA Tunnel Landmark – The Brunel's Tunnel of London Martin Knights **(FREng, Former President of The International Tunnelling Association and a Founding Trustee of the Brunel Museum)**
12.50	ITACET Foundation Awards Abdullah Al-Mogbel **(ITACET Foundation President)**
12.55	Final remarks Serena Rossi Mauro Moretti

CLOSING CEREMONY

08 May 2019

The Closing Ceremony will be held at Mostra d'Oltremare - Auditorium Teatro Mediterraneo.

17.00-17.30

17.00	Congress Scientific overview and E-Poster Awards Daniele Peila **(Politecnico di Torino, WTC2019 Scientific Advisory Board)**
17.05	Speech by elected ITA President
17.10	Italian Past WTC President, Awards ceremony Andrea Pigorini **(SIG President)**
17.15	Flag Ceremony Andrea Pigorini **(SIG President)** *and* Teik Aun Ooi **Director IEM WTC 2020 Organizing Committee Chair**
17.20	WTC 2020 Presentation Teik Aun Ooi **Director IEM WTC 2020 Organizing Committee Chair**
17.25	Closing speech and invitation to Gala Dinner **WTC 2019 Organizing Committee**

WÜRTH

YOUR PARTNER

for major infrastructure projects and construction sites.

We support our customers with products and services.

UNDER GROUND MACHINERY RANGE

TUNNEL FORMWORKS

SOLUTION FOR ALL TYPE OF TUNNELS' SECTIONS

16 m

CSSE

THEORETICAL OUTPUT: 5 - 30 m³/h
MAX PRESSURE ON CONCRETE: 65 bar

COGUARO 4

NOMINAL CAPACITY: 4 m³

16 m

SHOTCRETE CSS3 EVO

THEORETICAL OUTPUT: 5 - 30 m³/h
MAX PRESSURE ON CONCRETE: 65 bar

10m

SHOTCRETE CST 8.20

THEORETICAL OUTPUT: 2 - 20 m³/h
MAX PRESSURE ON CONCRETE: 65 bar

COMING SOON

9 m

DINGO

THEORETICAL OUTPUT: 30 m³/h
MAX PRESSURE ON CONCRETE: 60 bar

SHOTCRETE PCS209 D/E

MAX THEORETICAL OUTPUT: 20 m³/h
MAX PRESSURE ON CONCRETE: 90 bar

CIFA

A ZOOMLION COMPANY

www.cifa.com

ITA-AITES PROGRAM & ITACET TRAINING COURSES

- ITA-AITES ANNUAL MEETING, WG & COMMITTEES PROGRAM
- ITA YOUNG MEMBERS INFO
- ITACET TRAINING COURSES

Società Italiana Gallerie
Italian Tunnelling Society

ITA AITES

ITA-AITES
ANNUAL MEETING PROGRAM

You will find the ITA Secretariat at the ground floor of Palacongressi, Mostra d'Oltremare.

SATURDAY, MAY 4

08.00 WTC 2019 Registration
(Palacongressi)

08.30-12.30 ITA-AITES Executive Council Meeting
(Corsica room, Palacongressi)

14.00-17.00 WGs/Committees/ExCo meeting
(Sardegna room, Palacongressi)

19.00-22.30 ITA President's Reception
(by invitation only)
Monumental Complex of Santa Chiara
Address: Via Santa Chiara, Naples

Discover one of the most beautiful and beloved monastery in Naples. The large Franciscan complex includes tombs, beautiful cloisters, an archeological museum and, behind the Basilica, the Church of Santa Chiara. Here the event will involve you into a fascinating mix of Provencal-Gothic and Baroque style which will lead you to discover.

Guided visit 19.00-20.00
No transfer service will be provided

Dress code: smart casual

SUNDAY, MAY 5

08.00 WTC 2019 Registration
(Registration area)

08.30-13.00 ITA-AITES General Assembly
(Italia room, Teatro Mediterraneo)

13.00-14.00 Lunch for ITA Member Nations delegates
(Italia room terrace, Teatro Mediterraneo)

14.00-18.00 Working groups:
- WG 2 Sicilia 2 room, Palacongressi
- WG 3 Egadi 1 room, Palacongressi
- WG 5 Tent 1, outdoor, Palacongressi
- WG 6 Ischia 1 room, Palacongressi
- WG 9 Tent 3, outdoor, Palacongressi
- WG 11 Sicilia 1 room, Palacongressi
- WG 12 Capri room, Palacongressi
- WG 14 Eolie-Stromboli room, Palacongressi
- WG 15 Egadi 2 room, Palacongressi
- WG 17 Egadi 3 room, Palacongressi
- WG 19 Meeting room at Hotel Esedra
- WG 20 Tent 4, outdoor, Palacongressi
- WG 21 Tent 2, outdoor, Palacongressi
- WG 22 Eolie-Panarea room, Palacongressi
- WG shafts Procida room, Palacongressi

SUNDAY, MAY 5

itacus
for an urban underground future

15.00-18.00
ITACUS THINK DEEP NATIONAL ACTION PROGRAMME
& ITACUS Steering Board
(Sardegna room, Palacongressi)

Through the initiative of ITACUS, THINK DEEP groups have been established in recent years or are in the process of being established in several countries. These groups aim at raising awareness of all aspects of the subsurface, and create a much-needed space for interdisciplinary exchange on urban and subsurface development. The workshop will bring together members of existing THINK DEEP Groups as well as interested conference participants to discuss the aims and setups of the National Action groups, their audiences and strategies as well as how they are working together. Join us for an exciting exchange beyond tunnelling!

Join the THINK DEEP National Action and ITACUS representatives:

- **Marilu Melo**, THINK DEEP Downunder, Australia
- **Chris Swaine**, THINK DEEP Downunder, Australia
- **Loretta von der Tann**, THINK DEEP UK
- **Petr Salak**, THINK DEEP UK
- **Per Tengborg**, THINK DEEP Sweden
- **Abidemi Agwor**, THINK DEEP Naija, Nigeria
- **Rosanne Verloop**, THINK DEEP Netherlands
- **Antonia Cornaro**, ITACUS, co-chair
- **Han Admiraal**, ITACUS, co-chair

ITA-AITES
ANNUAL MEETING PROGRAM

MONDAY, MAY 6

08.00 WTC 2019 Registration
(Registration area)

14.00-17.00 Working groups:
- WG 2 Sicilia 2 room, Palacongressi
- WG 3 Egadi 1 room, Palacongressi
- WG 5 Tent 1, outdoor, Palacongressi
- WG 9 Tent 3, outdoor, Palacongressi
- WG 11 Sicilia 1 room, Palacongressi
- WG 12 Capri room, Palacongressi
- WG 14 Eolie-Stromboli room, Palacongressi
- WG 15 Egadi 2 room, Palacongressi
- WG 17 Egadi 3 room, Palacongressi
- WG 19 Meeting room at Hotel Esedra
- WG 20 Tent 4, outdoor, Palacongressi
- WG 21 Tent 2, outdoor, Palacongressi
- WG 22 Eolie-Panarea room, Palacongressi

15.40-17.20 Prime Sponsor Meeting
(Sardegna room, Palacongressi)

21.00- 23.00 ITAtech Dinner
(by invitation only)
San Carlo Theatre
Address: Via San Carlo, 98, Naples

The San Carlo Theatre is the most ancient in Europe, built in 1737 and wanted by King Charles of Bourbon to provide the capital of his kingdom of a great work culture: an amazing scenery where to experience a typical Italian atmosphere.

No transfer service will be provided

Dress code: Business formal

21.00-01.00 ITA Young Members Dinner
(for all participants under 35, by invitation only)
El Pirata
Address: Via Mergellina Pier Luise, Naples
(for more details see p. 66)

TUESDAY, MAY 7

08.00 WTC 2019 Registration
(Registration area)

08.30-10.30 ITA COSUF Steering Board Meeting
(Egadi 3 room, Palacongressi)

08.30-13.00 **WG & Committees Report Presentation & Open Session**
(Auditorium, Teatro Mediterraneo)

08.30-10.15
PRESENTATION OF ITA PUBLICATIONS
The following new publications will be presented by the Authors:

WG 2	Guidelines for the Design of Segmental Tunnel Linings
WG 5	Guide to ITA/BTS CAWG Report 10 for Clients and others not familiar with high pressure compressed air work
WG 14/15	Handling, Treatment and Disposal of Tunnel Spoil Materials
ITAtech	Practical approach for controlling the blasting vibration and optimizing advance in urban tunnelling
ITAtech	Guidelines on rebuilds of machinery for mechanized tunnelling excavation
ITA COSUF	Current practice on cross-passage design to support safety in rail and metro tunnels
ITA-FIDIC	Condition of Contract for Underground Works (Emerald Book)

10.45-13.00
TUNNELS A RESILIENT LINK BETWEEN PAST AND FUTURE

1st ROUND TABLE
Tunnel life-cycle considerations. How long-term maintenance requirements are addressed during design, construction, and asset financing

- Tunnels and other underground openings are assets that require large investments
- These assets are meant to have an operating life of 100 to 120 years, but many of them have been in operation for 200 years or more.

ITA-AITES
ANNUAL MEETING PROGRAM

- Today, when deciding this type of investment, how is the extended operating life taken into account?
- What are the maintenance planning considerations?
- How do the maintenance and repair costs over an extended operation life impact the funding of the asset?
- How is the maintenance and repair strategy addressed in the financial model?

2st ROUND TABLE

Surveying and maintenance works

In order to maintain infrastructure in operation for planned and extended operating lifetimes, a maintenance and repair strategy has to be developed.
The maintenance strategy is based primarily on good and adequate survey and monitoring of the asset.
The inspection of the asset is performed at intervals that can vary significantly depending of the asset and the country.
Monitoring methods of the past were limited to visual inspection and manual measurements. However, more methods are being utilized such as non-destructive scanning, thermography, etc., and destructive methods such as coring. New technologies are being developed using IoT, AI and data analytics for example.
When repairs are required, the challenge is being able to make such repairs under live conditions or during minimal outage periods.

The roundtable participants will discuss and debate new surveying technologies and repair methods

The participants of both roundtables will consist of owners, financiers, engineers, contractors, and survey specialists drawn from different countries around the world as well as experts from the ITA Working Groups. Participants to the Round Tables are to be found in the WTC 2019 App.

For Q&A use Sli.do
Code **#WTC2019**

sli.do

TUESDAY, MAY 7

11.00-13.00 ITA COSUF Activity Groups
(Egadi 1 room, Egadi 2 room, Egadi 3 room, Sicilia 1 room, Palacongressi)

14.00-15.20 ITAtech Steering Board Meeting
(Egadi 3 room, Palacongressi)

14.00-17.40 Nordic Forum
(Capri room, Palacongressi)

14.00-17.40 ITA-CET Steering Board Meeting
(Sicilia 1 room, Palacongressi)

15.40-17.40 ITAtech Activity Groups
(Egadi 1 room, Egadi 2 room, Egadi 3 room - Palacongressi; Tent 1 and Tent 2 outdoor)

20.00-22.30 WTC 2022 Candidates Dinner
(by invitation only)
Belvedere Carafa
Address: Via Aniello Falcone, 122, Naples

Enjoy an exclusive view of the Gulf of Naples where the sea meets the sky and a dinner in a unique and historic location dated back to the end of the seventeenth century, located on the Vomer hill. Purely breath-taking! Guests will really find it hard not to fall in love with this city after a dinner with panorama at Belvedere Carafa!

Transfer service provided.
(for more details see p. 37)

Dress code: smart casual

WEDNESDAY, MAY 8

08.30-13.00 ITA Young Members General Meeting
(Egadi room, Palacongressi)
(for more details see p. 67)

13.30-17.00 ITA-AITES General Assembly
(Italia room, Teatro Mediterraneo)

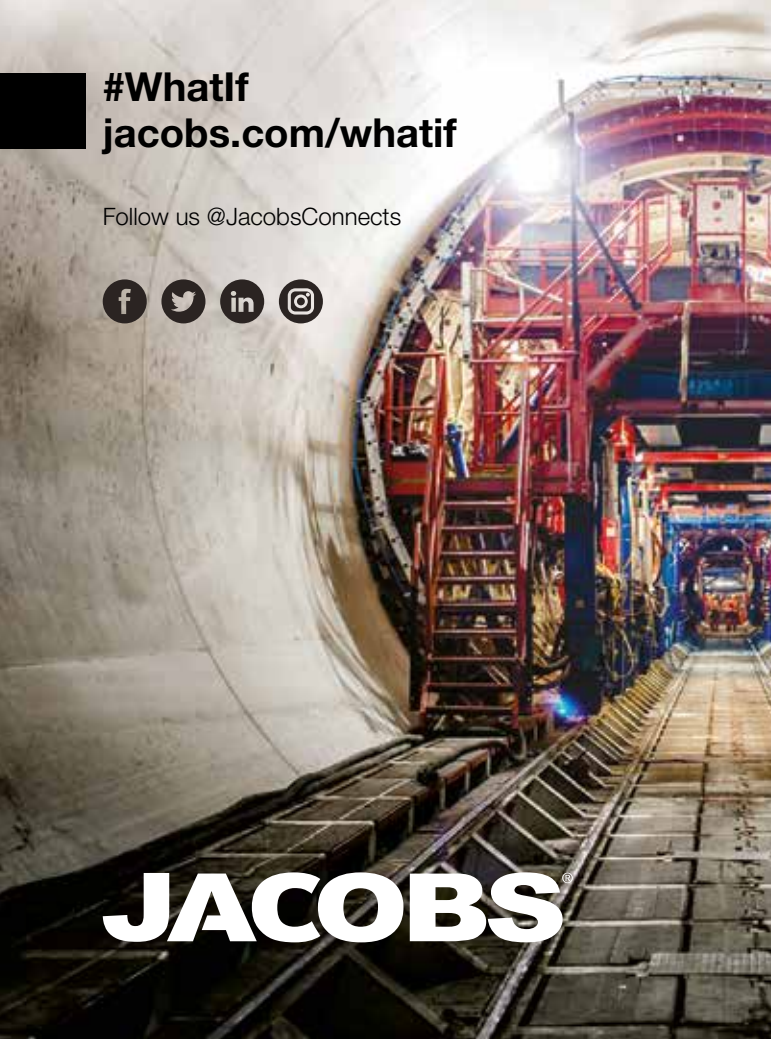
What if?

What if we showed you how we're solving the world's greatest challenges by transforming intangible ideas into intelligent solutions for a more connected, sustainable world?

At Jacobs, we think differently about the future. We start with "what if" to surface new possibilities and harness deep technical expertise to bring bold solutions to fruition.

#WhatIf
jacobs.com/whatif

Follow us @JacobsConnects



JACOBS®

ENGINEERING EXPERIENCE

SINCE 1955

Our company is one of the largest and most diversified engineering companies in Italy, with an increasing presence on an international level, capable of providing tailor-made solutions in the design and upgrading of urban ecosystems. We are partners of institutions, managing authorities and state-owned enterprises that operate in the sector of infrastructure, large-scale construction, network and service design and planning.

MM mmspa.eu

ITA YOUNG MEMBERS INFO

The ITA Young Members group will be active at WTC 2019 and has a few events available for young professionals!

YOUNG MEMBERS DINNER

MAY 6, 2019
21.00-01.00

El Pirata

Address: Via Mergellina Pier Luise, Naples

All young attendees are invited to join us on Monday, May 6 at 20.30. This will be an excellent opportunity to network with other young professionals from all over the world and learn what ITA-YM is up to.

Join us for an informal evening of networking!

"El Pirata" is a modern brigantine, recalling galleons which crossed the legendary Sea of Cortez. Don't miss the YMs Dinner enjoying the beautiful scenery of the Gulf of Naples.

No transfer will be provided. Public transit available.
El Pirata is a 15-minute walk from Mergellina Metro Station, 25-minute walk from Castel dell'Ovo, 4 km from the centre of Naples and 2.4 km from San Paolo Stadium.

Access to the galleon will be by invitation only.

Invitation will be distributed by YMs and by the organizing staff proven the age and membership to a tunneling association.

GENERAL MEETING

MAY 8, 2019
08.30-13.00
EGADI Room
Palacongressi - Mostra d'Oltremare, Naples

The event will be shared in streaming to allow the participation of Young Members worldwide.

Join us as the ITA-YM General Meeting and know more about the Steering Committee and ITAym yearly activities.
Hear from Member Nations on what is being done in different countries and don't miss out the election of NEW steering board members.

OTHER MINOR EVENTS

- APERITIF
- MORNING RUN

For more details, please download the WTC2019 App

International Tunnelling Association Young Members

ITAYM Media

For more information
ym@societaitalianagallerie.it
itaym@ita-aites.or

Visit the ITA (International Tunnelling and Underground Space Association) **and SIG** (Italian Tunnelling Society) **YM at the ground floor of Teatro Mediterraneo!**

The ITA YM look forward to seeing you at WTC 2019!

WTC 2019

ITACET TRAINING COURSES

ITACET FOUNDATION

The ITACET Training Courses are co-organized by SIG (the Italian Tunnelling Society) and ITACET Foundation whose function is to promote, endorse and organize international technical events to facilitate the continuing education of specialists of all levels in the various fields of Tunneling and Underground Space Use together with Italian Tunnelling Society (SIG) more on the Foundation at www.itacet.org.
The program and the selection of the lecturers is developed by the ITA-CET Committee for Education and Training and SIG.

1st ITACET TRAINING COURSE

Location: Palacongressi (Stromboli room)

May 3, 2019	09.30-18.00
May 4, 2019	09.00-18.30

TUNNELLING 4.0 - INFORMATION TECHNOLOGY FOR THE DESIGN, CONSTRUCTION AND MAINTENANCE OF UNDERGROUND WORKS

The first two-day course (3-4 May 2019) is entitled "**Tunneling 4.0 and IT technologies for the design, construction and maintenance of underground works**" and will focus on the latest technological innovations in the different phases of design, construction and maintenance of underground works. We will talk about BIM methodology applied to all these phases, as well as about **automation of the construction process and use of virtual reality and augmented** as an aid to optimize the construction of tunnels. It is therefore a course of great interest to share the state-of-the-art knowledge about these technologies.

2nd ITACET TRAINING COURSE

Location: Palacongressi (Panarea room)

May 4, 2019	09.00-18.00

COMMUNICATION AND STAKEHOLDERS ENGAGEMENT

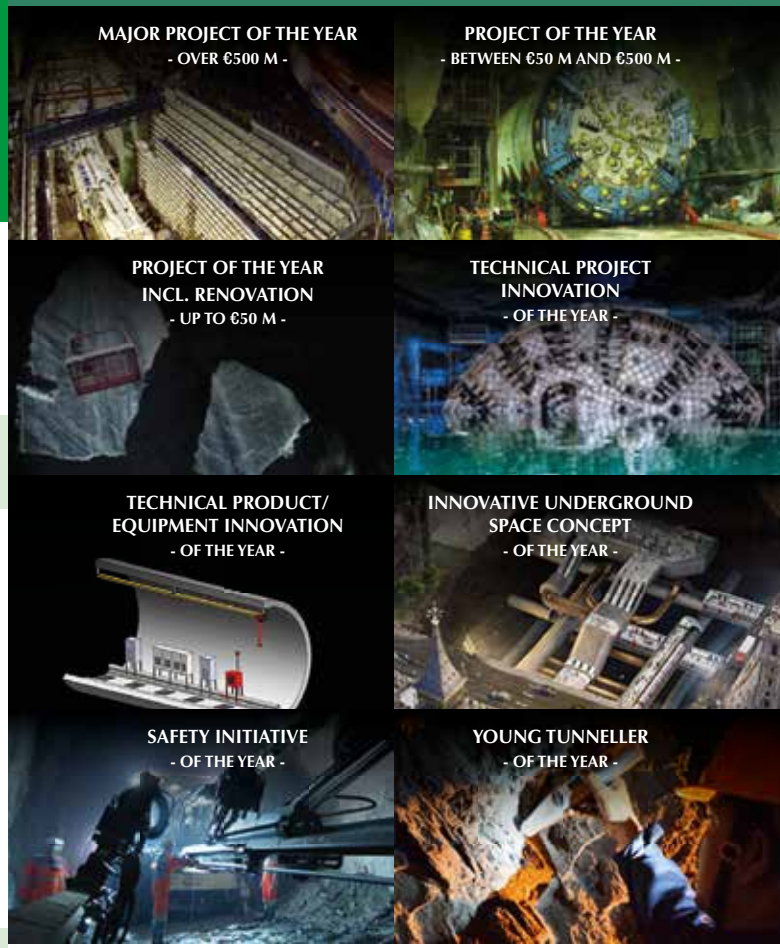
The second course (4 May 2019) is entitled "**Tunnels design construction and operation communication and stakeholder engagement**". Although its less technical cut, we consider this course of extreme interest, due to the growing needs to effectively communicate the underground works (and their role for the quality of life) and to interact with the communities and all the various stakeholders, today. In the first part of the course, you will have the opportunity to know the **modern techniques and strategies to face communication issues**, through for example the use of new media. In the second part, the word will be given to the players involved in some of the major construction works in the world, to learn about the **strategies adopted to effectively deal with communication with the populations and stakeholders for large projects**.

ITA TUNNELLING AWARDS 2019

18-20 November 2019
MIAMI – USA

Participate in the 2019 Awards

ENTRIES ACCEPTED UNTIL 15 JUNE 2019
awards.ita-aites.org



- A contest for 8 categories
- A 1 day conference during the Cutting Edge
  Organised by UCA of SME and Tunnelling Journal
- An award ceremony banquet

AN EVENT TO MEET, LEARN AND CELEBRATE IN MIAMI

In cooperation with

ASSOCIATION INTERNATIONALE DES TUNNELS ET DE L'ESPACE SOUTERRAIN AITES | ITA INTERNATIONAL TUNNELLING AND UNDERGROUND SPACE ASSOCIATION

UCA of SME | Eight Annual Cutting Edge Conference

Secretariat: ITA-AITES c/o MIE 2
Chemin de Balexert 9 - Châtelaine CH 1219 - Switzerland – Tel.: +41 22 547 74 41
Mob.: +33 695 87 13 85 – e-mail: awards@ita-aites.org – www.ita-aites.org

HITACHI
Inspire the Next

BUILD THE FUTURE,
FUELLING THE PRESENT

Hitachi Rail STS

TECHNICAL SESSION PROGRAM

- TECHNICAL SESSIONS OVERVIEW
- DETAILED TECHNICAL SESSIONS PROGRAM
- SPECIAL AAA OFF-SITE EVENTS

Società Italiana Gallerie
Italian Tunnelling Society

ITA
AITES

WTC 2019

TECHNICAL SESSIONS OVERVIEW

MONDAY, MAY 6TH

	PALACONGRESSI				TEATRO MEDITERRANEO		
hrs	EUROPA	ISCHIA	EOLIE	EGADI	FOYER & FIRST FLOOR	ITALIA	AUDITORIUM
08.45-10.30	Opening Ceremony						Opening Ceremony
10.30-11.00	Opening of the Exhibition & Coffee Break						
11.00-13.00	Opening Ceremony & Keynote Lecture						Opening Ceremony & Keynote Lecture
13.00-14.00	Lunch						
14.00-15.20	ENVIRONMENT SUSTAINABILITY IN UNDERGROUND CONSTRUCTION	GROUND IMPROVEMENT IN UNDERGROUND CONSTRUCTIONS			E-POSTER SESSION	PUBLIC COMMUNICATION AND AWARENESS	URBAN TUNNELS
15.20-15.40	Coffee Break						
15.40-17.20	ENVIRONMENT SUSTAINABILITY IN UNDERGROUND CONSTRUCTION	GROUND IMPROVEMENT IN UNDERGROUND CONSTRUCTIONS			E-POSTER SESSION	SAFETY IN UNDERGROUND CONTRUCTION	URBAN TUNNELS

SPECIAL AAA OFF-SITE EVENT

	PALAZZO SERRA DI CASSANO
14.45-17.30	**ARCHAEOLOGY, ARCHITECTURE AND ART IN UNDERGROUND CONSTRUCTION/STRATEGIC USE OF UNDERGROUND SPACE FOR RESILIENT CITIES** AAA & ITACUS SESSION

TUESDAY, MAY 7TH

	PALACONGRESSI				TEATRO MEDITERRANEO		
hrs	EUROPA	ISCHIA	EOLIE	EGADI	FOYER & FIRST FLOOR	ITALIA	AUDITORIUM
08.30-10.15							OPEN SESSION 1 ITA WGs & Committees Reports
10.15-10.45	Coffee Break						
10.45-13.00							**OPEN SESSION 2** Panel Discussion on Tunnels A resilient link between past and future
13.00-14.00	Lunch						
14.00-15.20	LONG AND DEEP TUNNELS	INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT	RISK MANAGEMENT, CONTRACTS AND FINANCIAL ASPECTS		E-POSTER SESSION	SAFETY IN UNDERGROUND CONTRUCTION **ITA COSUF & IRF SESSION**	URBAN TUNNELS
15.20-15.40	Coffee Break						
15.40-17.40	LONG AND DEEP TUNNELS	INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT	RISK MANAGEMENT, CONTRACTS AND FINANCIAL ASPECTS		E-POSTER SESSION	SAFETY IN UNDERGROUND CONTRUCTION **ITA COSUF & IRF SESSION**	URBAN TUNNELS

SPECIAL AAA OFF-SITE EVENT

	PALAZZO SERRA DI CASSANO
14.45-17.30	**ARCHAEOLOGY, ARCHITECTURE AND ART IN UNDERGROUND CONSTRUCTION/STRATEGIC USE OF UNDERGROUND SPACE FOR RESILIENT CITIES** AAA & ITACUS SESSION

WEDNESDAY, MAY 8TH

	PALACONGRESSI				TEATRO MEDITERRANEO		
hrs	EUROPA	ISCHIA	EOLIE	EGADI	FOYER & FIRST FLOOR	ITALIA	AUDITORIUM
08.30-10.30	LONG AND DEEP TUNNELS	INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT **ITAtech SESSION**	GEOLOGICAL AND GEOTECHNICAL KNOWLEDGE AND REQUIREMENTS FOR PROJECT IMPLEMENTATION				ARCHAEOLOGY, ARCHITECTURE AND ART IN UNDERGROUND CONSTRUCTION **ITACUS SESSION**
10.30-11.00	Coffee Break						
11.00-13.00	LONG AND DEEP TUNNELS	INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT **ITAtech SESSION**	GEOLOGICAL AND GEOTECHNICAL KNOWLEDGE AND REQUIREMENTS FOR PROJECT IMPLEMENTATION				ARCHAEOLOGY, ARCHITECTURE AND ART IN UNDERGROUND CONSTRUCTION **ITACUS SESSION**
13.00-14.00	Lunch						
14.00-15.20	LONG AND DEEP TUNNELS	INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT	GEOLOGICAL AND GEOTECHNICAL KNOWLEDGE AND REQUIREMENTS FOR PROJECT IMPLEMENTATION	INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT	E-POSTER SESSION		STRATEGIC USE OF UNDERGROUND SPACE FOR RESILIENT CITIES **ITACUS SESSION**
15.20-15.40	Coffee Break						
15.40-17.00	LONG AND DEEP TUNNELS	INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT	GEOLOGICAL AND GEOTECHNICAL KNOWLEDGE AND REQUIREMENTS FOR PROJECT IMPLEMENTATION	INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT	E-POSTER SESSION		STRATEGIC USE OF UNDERGROUND SPACE FOR RESILIENT CITIES **ITACUS SESSION**
17.00-17.30							CLOSING CEREMONY

SPECIAL AAA OFF-SITE EVENT

	PALAZZO SERRA DI CASSANO
10.00-12.40	**ARCHAEOLOGY, ARCHITECTURE AND ART IN UNDERGROUND CONSTRUCTION/STRATEGIC USE OF UNDERGROUND SPACE FOR RESILIENT CITIES** AAA & ITACUS SESSION

	PALAZZO SERRA DI CASSANO
14.45-17.30	**ARCHAEOLOGY, ARCHITECTURE AND ART IN UNDERGROUND CONSTRUCTION/STRATEGIC USE OF UNDERGROUND SPACE FOR RESILIENT CITIES** AAA & ITACUS SESSION

Technology for **underground construction**

- **Alkali-free set accelerators for shotcrete**
- **Products for mechanized tunneling**: foaming agents for soil conditioning, polymers, sealants, lubrificants
- **Products for grouting and consolidating**
- **Products for concrete repairing, protection and coating**
- **Products for waterproofing**: synthetic waterproofing membranes, waterproofing accessories

Learn more on
utt.mapei.com
hq.utt@utt.mapei.com

utt MAPEI

Rione Alto Metro station, Line 1, Naples

MAY 6	PALACONGRESSI EUROPA	ISCHIA	TEATRO MEDITERRANEO ITALIA	AUDITORIUM
08.45-10.30	**OPENING CEREMONY**			**OPENING CEREMONY**
10.30-11.00	Opening of the Exhibition & Coffee Break			
11.00-13.00	**OPENING CEREMONY & KEYNOTE LECTURE**			**OPENING CEREMONY & KEYNOTE LECTURE**
13.00-14.00	Lunch			
14.00-14.20	**ENVIRONMENT SUSTAINABILITY IN UNDERGROUND CONSTRUCTION** GENERAL ASPECTS **D. Ludovici (Italy), L. Petrelesco (Italy)** City Rail Link, New Zealand - Reduction of land acquisition time and risk on the City Rail Link Project *R. Gatt, T. Hoand & C. Howard*	**GROUND IMPROVEMENT IN UNDERGROUND CONSTRUCTIONS** ARTIFICIAL GROUND FREEZING **G. Viggiani (Italy), S. Nemeth (New Zealand)** Design of artificial ground freezing for an access tunnel of a railway station in Switzerland *E. Pimentel & S. Anagnostou*	**PUBLIC COMMUNICATION AND AWARENESS** **M. Barberio (Italy), A. Ajewo (Nigeria)** Best practice of communication for a complex transnational project - the Brenner Base Tunnel *K. Bergmeister*	**URBAN TUNNELS** CONVENTIONAL TUNNELLING **E.M. Pizzarotti (Italy), D. Zhang (China)** A Record of Constructing a Rame Section of an Expressway by the Jacking Pipe Roof Reinforcement method *M. Oshima & M. Watanabe*
14.20-14.40	The role of Cairo metro in saving the social costs of air pollution *M.A. Madany*	Monitoring Artificial Ground Freezing and relevant fundamental observations *V. Marascero*	TELT and the tunnel art work project *M. Vassal, C. Destrée, C. Gall & G. Pelletier*	Brescia Driverless Metro Line - San Faustino Station: a joint work example between Client, Superintendence, Designers and Public Administration in a complex case *A. Marini, A. Bresciani, F. Carsana & M. Gori*
14.40-15.00	Testing of an Eberturl segment prototype at Bochum University, Germany *M. Barla, A. Insana & F. Zocco*	Design of ground freezing for cross passages and shafts *J.A. Sopko*	The Naples Line 6 underground metro system works: from design to the tunnel boring machine operation *D. Carbone, G. Molisso & S. Rocco*	3D numerical back-analysis on an experimental conventional tunnel in Paris Samoiselan "Green" Clay *J.P. Janin, A. Bouissiere, H. Le Bissonnais, C. Gaveriaux & I. Chaminomiou*
15.00-15.20	Stockholm bypass: environmental sustainability in the excavation of the Lovön rock tunnels *E.L. Malmcrona & G. Pettersson*	Ground freezing and excavation of the Museum Island metro station under a river in central Berlin - challenges and experiences *J. Grossmann, F. Hoppe & L. Gerygers*	Designing a sustainable railway infrastructure: Envision protocol and the carbon footprint *A. Kwiatkowski*	Special design considerations for underpinning systems of existing structures due to tunnelling *S.K. Gan, K.W.S. Tan & A.C. Lee*
15.20-15.40	Coffee Break			
15.40-16.00	**ENVIRONMENT SUSTAINABILITY IN UNDERGROUND CONSTRUCTION** MANAGEMENT & EXPERIMENTAL ASPECTS **D. Ludovici (Italy), A. Barra Caracciolo (Italy)** Tunnel excavation material - waste or valuable mineral resource? European research roadmap to resource efficient tunnelling *R. Galler*	**GROUND IMPROVEMENT IN UNDERGROUND CONSTRUCTIONS** GROUTING AND CONSOLIDATION PROJECT **V. Marascero (Italy), P. Gazzarrini (Canada)** Brenner Base Tunnel & Isarco River Underpass Sections: Ground improvement measures and results *P. Lunardi, G. Cassani, M. Gatti & L. Bellardo*	**SAFETY IN UNDERGROUND CONSTRUCTION** SAFETY PROCEDURES & CONSTRAINTS **L. Brino (Italy), A. Sorlini (Italy)** Practical guidelines for obstacles work. Close to building and under the water table *A. Ansell*	**URBAN TUNNELS** MECHANIZED TUNNELLING **R. Crova (Italy), M. Thewes (Germany)** Construction Methods, Monitoring and Follow-Up of TBM Tunnelling Beneath an Operating Metro Station in Bucharest *B. Bilalic, P. Vladimarem, C. Lapuit, M. Mazzi, G. Lamare & A. Cosmatu*
16.00-16.20	Management of the muck produced by EPB TBM tunnel excavation: environmental aspects and consistency control for efficient handling *E. Dal Negro, A. Bonasera, A. Frassoni & E. Barbero*	The technical management of the permeation grouting works in the excavation of the Milan Metro Line 4 *A. Pellizzaroli, P. Caffaro, M. Lodico & A. Carrettucci*	Pennocchi Bis water tunnel: Tunnel Boring Machine selection and safety standards for excavating in presence of methane *R. d'Angelo, M. Mancini, G. Calzolari, M. Lessandri & F. Cardelli*	Did the selection of TBMs for the construction of the Italy-Lyon project tunnels satisfy the expectations? *A.K. Kolsgard & B. Gammelsæter*
16.20-16.40	Environmental reclamation for the Gotthard Base Tunnel: Effects of spoil management on landscape *P. Lambrecht, E. Calaiti & T. Bühler*	Cerebellum model tests on shallow overburden tunnels with pre-ground improvement to clarify arching behavior *Y. Sawamura, K. Kanazawa, K. Kishida & M. Kimura*	Excavation through contaminated ground by gasoline with EPB-TBM *H.A. Vazzoler, M.B. Qvistermann & C. Budak*	Twin tunnels excavated in mixed face conditions *M.A.A.P. Silva, F.L. Bampalas, S.A.A. Ferreira & R.C. Rocha*
16.40-17.00	Environmental risk assessment of conditioned soil: some Italian case studies *S. Palazzo, A. Bonasera, A. Frassoni & F. Pelizza, M. Filippone & G. Minnini*	Stockholm Bypass Project - Passage under the Lake Mälaren *B. Sillar, F. Johansson, F. Rosa Bayona, R. Balme Estrada & M. Rodin*	Excavation with traditional methods through geological formations containing asbestos *N. Meletiou, F. Pinna, U. Russo, F. Ruggiero & C. D'Aluria*	Effects of construction and demolition of a TBM excavated tunnel inside existing diaphragm walls *S. Autucci, M.V. Nicotera, G. Russo, A. Di Luccio & G. Melisso*
17.00-17.20	Online identification of the excavation materials on the Saint Martin La Porte site *A. Barral & C. Salat*	Influence of the Rhonglass reinforcement stiffness on the mechanical response of deep tunnel fronts reinforced by glass fiber reinforced polymer bars *C. di Prisco, L. Flessati, G. Cassani & R. Pero*	A novel watcher system for securing works at tunnel face *V. Cura, I. Hagan, H. Hayasaka & M. Kaneda*	Grand Paris Express Ligne 15 and T2C TBM driving parameters and complex passing of critical zones *S. Cavagnet, A. Giammarino, L. Mancinelli & C. Colmar*

itacus
for an urban underground future

ARCHAEOLOGY, ARCHITECTURE AND ART IN UNDERGROUND CONSTRUCTION/STRATEGIC USE OF UNDERGROUND SPACE FOR RESILIENT CITIES

AAA & ITACUS SESSION

OFF-SITE SESSION AND BOURBON TUNNEL VISIT

PALAZZO SERRA DI CASSANO

	Chair: C. Da Vila (Italy), G. Minio (Italy)
	Travel from Mostra d'Oltremare to the Palazzo Serra di Cassano
14.00-14.45	KEY NOTE LECTURE The Roman Tunnels in the Phlegrean Fields *C. Maggiani*
14.45-15.20	Effective use of underground space for sustainable cities *S.W. Chiu, K.H. Lai, K.W. Chu & S.P. Lai*
15.20-15.40	Enabling underground transport construction Guatemala, City, Central America *F. Bink Ruf*
15.40-16.00	Coffee Break
16.00-16.20	BOURBON TUNNEL VISIT
16.20-17.30	Travel from Palazzo Serra di Cassano to Meeting points
17.30-18.00	

MONDAY, MAY 6TH

MAY 7	PALACONGRESSI			TEATRO MEDITERRANEO	
	EUROPA	ISCHIA	EOLIE	ITALIA	AUDITORIUM
08.30-10.15					**OPEN SESSION 1 - ITA WGs & COMMITTEES REPORTS**
10.15-10.45	Coffee Break				
10.45-13.00					**OPEN SESSION 2 - PANEL DISCUSSION ON TUNNELS A RESILIENT LINK BETWEEN PAST AND FUTURE**
13.00-14.00	Lunch				
	LONG AND DEEP TUNNELS TRANSALPINE TUNNELS	**INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT** TUNNEL REFURBISHMENT	**RISK MANAGEMENT, CONTRACTS AND FINANCIAL ASPECTS** THE EMERALD BOOK: THE NEW FIDIC-ITA CONTRACT	**SAFETY IN UNDERGROUND CONSTRUCTION** OPERATIONAL SAFETY OF UNDER-GROUND TRANSPORTATION FACILITIES	**URBAN TUNNELS** MECHANIZED TUNNELLING
	A. Pigorini (Italy), G. Seingre (Switzerland)	**P. Firmi (Italy), M. Mitew-Czajewska (Poland)**	**M. Neuenschwander (Switzerland), R. Zurlo (Italy)**	**E. Premat (France), L. Carrarini (Italy)**	**P. Grasso (Italy), W. Burger (Germany)**
14.00-14.20	Numerical back-analysis of the Fréjus road tunnel and of its safety gallery *M. de la Fuente, J. Sulem, R. Taherzadeh & D. Subrin*	Refitting strategies for Italian historical railway tunnels *A.R. Fava, M. Ghidoli, L. Carli & P. Galvanin*	Risk allocation in the FIDIC Forms of Contract, and the Emerald Book's place in the Rainbow Suite *H. Ertl*	**INVITED LECTURE** NEC vechicles in underground transportation facilities: ITA COSUF White paper workshop & expert group meeting results *M. Wietek*	Soft ground tunneling below a mixed foundation building *D. Simic & B. Martínez-Bacas*
14.20-14.40	Brenner Base Tunnel - Interaction between underground structures, complex challenges and strategies *R. Insam, R. Wahlen & G. Wieland*	The use of artificial intelligence for a cost-effective tunnel maintenance *O. Schneider, A. Prokopová, F. Modetta & V. Petschen*	Contractual Time for Completion Adjustment in the FIDIC Emerald Book *A. Marulanda & M. Neuenschwander*	**INVITED LECTURE** Operational safety from first responders perspectives *U. Lundstrom*	North East Boundary Tunnel: Applied Lessons learned from the Anacostia River Tunnel Project, Washington, USA *M. Pescara, N. Della Valle, D. Nebbia & M. Gamal*
14.40-15.00	The Montcenis base tunnel: how to turn project environmental constraints into opportunities *S. Lione, L. Brino, P. Grieco, L. Pinchiaroglio & A. Mordasini*	Tunnels widening and renewal using precast lining: the Swiss Rhaetian railway construction method applied to tunnel Mistail *D. Fortunato & G. Barbieri*	The role of the Engineer in the Emerald book *J. Maclure*	**INVITED LECTURE** New IT systems in road tunnels *O. Landolfi*	The challenging yet successful excavation of the TBM tunnel for the Athens Metro Line 3, Extension Haidari-Piraeus *G. Giacomin, P. Pediconi & D. Goudelis*
15.00-15.20	Brenner Base Tunnel, Italian Side: construction methods for a railway 22 km long tunnel *S. Fuoco, R. Zurlo, M. Moja & E.M. Pizzarotti*	Tunnels damage management system: an application for Italian railways tunnels *I. Firmi, F. Iacobini, A. Pranno & C. Matera*	The claims, dispute avoidance and dispute resolution procedure in the new FIDIC Emerald Book *C. Nairac*	**INVITED LECTURE** Risk diagnostic - monitoring tools in road tunnels *M. van Gils*	TBM Selection for tunneling beneath urbanized areas at shallow depth. A practical case: the machine selection for the excavation of Metro Gran Paris Line 15 Section 2C *M. Concilia*
15.20-15.40	Coffee Break				

	LONG AND DEEP TUNNELS TRANSALPINE TUNNELS	**INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT** INNOVATION IN MECHANIZED TUNNELS	**RISK MANAGEMENT, CONTRACTS AND FINANCIAL ASPECTS**	**SAFETY IN UNDERGROUND CONSTRUCTION** OPERATIONAL SAFETY OF UNDER-GROUND TRANSPORTATION FACILITIES	**URBAN TUNNELS** DESIGN AND MONITORING
	A. Pigorini (Italy), G. Seingre (Switzerland)	**M. Pescara (Italy), J. Pascoal Jr. (Brazil)**	**M. Neuenschwander (Switzerland), P. Torta (Italy)**	**G. Vollmann (Germany), L. Carrarini (Italy)**	**C. di Prisco (Italy), E. Taylor (Australia)**
15.40-16.00	Presentation of the successful crossing by the "Federica" TBM of a geological accident in Saint-Martin-la-Porte construction site *F. Gamba, E. Hugot, P. Gilli, C. Salot & G. Giacomin*	Riachuelo Lote 3 - Innovative method for the construction of the sea outfall *N. Valiante, M. Martini & L. Gaggioli*	**ROUND TABLE** DISCUSSION ON THE EMERALD BOOK *M. Neuenschwander & R. Zurlo*	Ventilation of tunnels and cross-passages of the Ceneri Base Tunnel and similar projects *S. Nyfeler & P. Reinke*	Ground movement problems in EPB tunneling through confined station boxes *T. Babendererde, L. Babendererde & R. Hasanpour*
16.00-16.20	Mechanized tunnel excavation of lot KAT2 of the KoralmTunnel, Austria: achievements and lessons learned *D. Fabbri, R. Crapp, H. Hölzl & H. Wagner*	Key technologies of double shield TBM for urban metro tunnel with small radius curve *F. He, X.J. Zhuo & L.H. Jia*	Transposition into national law of the new EU public procurement directives and the impact on subsurfa-ce construction contracts - the Portuguese case *G. Diniz-Vieira, R. Pistone, F. Meláneo & C. Baião*	Reducing the monotonous design in the worlds deepest and longest sub-sea road tunnel Rogfast, Norway *T. Andersen & J. Braa*	The construction of the tunnel Kennedy in Santiago de Chile. A major challenge of an urban tunnel in soils *J. Kuster, R. Núñez, E. Chávez, J.M. Galera & D. Santos*
16.20-16.40	Tunnel costs related to the quality of the rock mass *R. Zurlo, S. Fuoco, M. Loffredo & A. Marottoli*	Design of the support medium for slurry pressure balance (SPB) shield tunnelling in demanding ground conditions *B. Schoesser, M. Straesser & M. Thewes*	Integrating risk management in underground works: the French experience and AFTES Recommendations *M. Pré, E. Chiriotti, G. Hamaide & J. Piraud*	Safety in the Italian railway tunnels *P. Firmi, F. Iacobini & A. Pranno*	Embedded barriers as a mitigation measure for tunnelling induced settlements: a field trial for the Line C in Rome *N. Losacco, E. Romani, G.M.B. Viggiani & G. Di Mucci*
16.40-17.00	The second Gotthard tunnel tube *G. Biaggio & V. Kumpusch*	The Rijnlandroute bored tunnel - continuously impro-ving the mechanized tunneling process *H. Mortier, M.Brugman, B. Peerdeman & T. Schubert*	Shallow TBM launch - alternative to cut and cover *W. Angerer, A.M. Haimoni, A. Ozturk & V. Tellioglu*	How to Refurbish a Tunnel: Shop Open or Closed? *B.A. van den Horn, A.M.W. Duijvestijn & C.S. Boschloo-van der Horst*	The "CNIT La Défense" railway station in Paris: a large scale underpinning in a constrained environment *A. Burdiel, J. Pinto, L. Canolle, M. Pré, N. Coquelle & V. Rigoux*
17.00-17.20	Risk management for the Brenner Base Tunnel *K. Bergmeister*	Forrestfield Airport Link project - Variable density TBMs to deal with unexpected ground conditions *M. Di Nauta, A. Anders & C. Suarez Zapico*	Risk management process applied on design and construction of deep stations and TBM tunnel: analysis and actions to mitigate potential impacts on buildings during the Line 6 underground metro system works, Naples *A. Di Luccio, M. Mele & G. Molisso*	Civil engineering constraints on tunnel ventilation and safety *M. Bettelini, A. Arigoni & S.S. Saviani*	Back analysis of ground settlements induced by TBM excavation for the north extension of Paris metro, line 12 *S. Mahdi, O. Gastebled & S. Khodr*
17.20-17.40	Milan to Genoa high speed/capacity railway: the Italian section of the Rhine-Alpine corridor *P. Lunardi, G. Cassani, A. Bellocchio & N. Meistro*	The role of mechanized shaft sinking in international tunnelling projects *S. Frey & P. Schmaeh*	A model for fair compensation of construction costs in TBM tunneling: a novel contribution *N. Radončić, W. Purrer & K. Pichler*	Ventilation applied to fire safety in metro tunnels, Naples line 1 project *M. Bramani & P. Fugazza*	Monitoring excavation-related ground deformation in London, UK using SqueeSAR™ *C.A. Bischoff, P.J. Mason, R.C. Ghail, C. Giannico & A. Ferretti*

itacus
for an urban underground future

ARCHAEOLOGY, ARCHITECTURE AND ART IN UNDERGROUND CONSTRUCTION/STRATEGIC USE OF UNDERGROUND SPACE FOR RESILIENT CITIES

AAA & ITACUS SESSION

OFF-SITE SESSION AND BOURBON TUNNEL VISIT

PALAZZO SERRA DI CASSANO

	Chair: G. Minin (Italy), L. Sacchi (Italy)
14.00-14.45	Travel from Mostra d'Oltremare to the Palazzo Serra di Cassano
14.45-15.20	KEY NOTE LECTURE Art and public Transportation - A Continuing Journey in the Development of the Yellow Metro Line in Stockholm E. Wifstrand
15.20-15.40	The outlets of the Albano and Fucine lakes and their influence from Roman times up to the birth of modern tunnel engineering *C. Callari*
15.40-16.00	The new Lugano tram underground station: an example to combine architectural requirements, serviceability and challenging geotechnical conditions *G. Barbieri, P. Bassetti & A. Galli*
16.00-16.20	Coffee Break
16.20-17.30	BOURBON TUNNEL VISIT
17.30-18.00	Travel from Palazzo Serra di Cassano to Meeting points

MAY 8

	PALACONGRESSI			TEATRO MEDITERRANEO
	EUROPA	ISCHIA	EOLIE	AUDITORIUM
	LONG AND DEEP TUNNELS CONVENTIONAL TUNNELLING	**INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT** SOIL CONDITIONING FOR EPB TUNNELLING AND BACKFILLING ITAtech	**GEOLOGICAL AND GEOTECHNICAL KNOWLEDGE AND REQUIREMENTS FOR PROJECT IMPLEMENTATION** GENERAL ASPECTS	**ARCHAEOLOGY, ARCHITECTURE AND ART IN UNDERGROUND CONSTRUCTION** itacus for an urban underground future
	T. Rotonda (Italy), K. Bergmeister (Austria)	**N. Chittenden (UAE), H. Golser (Austria)**	**Alessandra Sciotti (Italy), J. Bilé Serra (Portugal)**	**H. Admiraal (The Netherlands), S. Sharma (India)**
08.30-08.50	Brenner Base Tunnel, Lots Mules, 2-3 (Italy): the emergency stop in Trens *D. Merlini, M. Falanesca, D. Stocker & A. Voza*	Soil Conditioning for EPB Tunnelling: Relevant Foam Properties and Characterisation *M. Galli, M. Thewes & S. Freimann*	3D geological modelling for the design of complex underground works *F. Giovacchini, M. Vendramini, L. Soldo, M. Merlo, D. Marchisio, G. Ricci & A. Eusebio*	**ITACUS SPECIAL REPORT I** The next level up is down - working with industry to further an urban underground future *H. Admiraal & A. Cornaro*
08.50-09.10	Anisotropic convergence of tunnels in squeezing ground: the case of Saint-Martin-la-Porte survey gallery *Y. Liu, J. Sulem, D. Subrin & E. Humbert*	Possibility of using vane shear testing device for optimizing soil conditioning *H. Copur, E. Avunduk, S. Tolouei, D. Tumac, C. Balci, N. Bilgin & A.S. Mamaghani*	Risk Maps for Cutter Tool Wear Assessment and Intervention Planning *J.G. Grasmick & M.A. Mooney*	KEY NOTE LECTURE Groundscape Stories *D. Perrault*
09.10-09.30	The Genoa Bypass project: The new Highway System to overcome the congestion in the Genoa area. The geological and engineering challenges. *A. Selleri*	EPB excavation of cohesive mixed soils: combined methodology for clogging and flow assessment *D.G.G. de Oliveira, M. Diederichs & M. Thewes*	Geotechnical data standardization and management to support BIM for Underground Infrastructures and Tunnels *M. Beaufils, S. Grellet, B. Le Hello, J. Lorentz, M. Beaudouin & J. Castro Moreno*	
09.30-09.50	Key construction technology of Long Metro Subsea Tunnel in Complex Site Conditions *W. He, C. Song & B. Du*	Tilt Sliding Test to assess the behaviour of conditioned soil with large amount of cobbles *A. Carigi, A. Luciani, D. Martinelli, C. Todaro & D. Peila*	The Impact of Saturation on the Mechanical Response of Low Porosity Rocks and Implications for Tunnelling *M.T. Ahmed Labeid, E.L. Jaczkowski, W. Dossett, M.S. Diederichs & J.J. Day*	Metro Thessaloniki - Intersecting microtunnels to support archeological findings at Sintrivani Station *D. Rizos, G. Vassilakopoulou, P. Foufas & G. Anagnostou*
09.50-10.10	Experimental setup for studying tunnels in squeezing ground conditions *K. Arora, M. Gutierrez & A. Hedayat*	Investigation on the geotechnical properties of a chemically conditioned spoil from EPB excavation, a case study *P. Tommasi, P. Lollino, A. Di Giulio & G. Belardi*	Geological and geotechnical key-factors for tunnel design of the new Naples-Bari High-Speed railway line in Southern Italy *A. Amato, G. Quarzicci, A. Sciotti, A. Pigorini & A. Nardinocchi*	Interdisciplinary research in geotechnical engineering and geoarchaeology - a London case study *F.K. Vonstad, P. Ferreira & D. Sully*
10.10-10.30	Experimental determination and plausibility proof of the longitudinal displacement profile for deep tunnels for case studies at the Brenner Base Tunnel *T. Cordes, C. Reinhold, K. Bergmeister, B. Schneider-Muntau & I. Bathaeian*	Influence of consistency index on soil conditioning in EPB-TBM tunneling *S. Tarigh Azali, E. Khorasani & J. Hassanpour*	Adapting tunnel construction to hydrogeological conditions in a karst region *M. Neukomm, M. Mercier, P.Y. Jeannin, A. Malard, D. Rickerl & E. Weber*	Integration of archaeology in architectural design of Milan metro connection M2-M4 in st. Ambrogio station *M.N. Colombo, A. Bortolussi & E. Noce*
10.30-11.00	Coffee Break			

	LONG AND DEEP TUNNELS MECHANIZED TUNNELLING DIFFICULT GROUND AND UNTRAPPING TBMS	**INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT** SOIL CONDITIONING FOR EPB TUNNELLING AND BACKFILLING ITAtech	**GEOLOGICAL AND GEOTECHNICAL KNOWLEDGE AND REQUIREMENTS FOR PROJECT IMPLEMENTATION** INVESTIGATION AND SURVEYING	**ARCHAEOLOGY, ARCHITECTURE AND ART IN UNDERGROUND CONSTRUCTION** itacus for an urban underground future
	S. Miliziano (Italy), E. Chiriotti (France)	**N. Chittenden (UAE), E. Dal Negro (Italy)**	**G. Cassani (Italy), G. Piaggio (Chile)**	**H. Admiraal (The Netherlands), S. Sharma (India)**
11.00-11.20	Countermeasure of Jammed TBM in Rock Tunnel Excavation: feedback from two cases study *C.H. Lee, Y.C. Chiu & T.T. Wang*	Main advantages and operational aspects of two-components backfilling grout in mechanized tunnelling with hard-rock TBM: Example of the Saint-Martin-La-Porte TBM job-site at Lyon-Turin *E. Dal Negro, A. Boscaro, A. Picchio, E. Barbero, C. Acquista & G. Comin*	Salamonde II underground hydroelectric complex in the North of Portugal. Design and construction *R.S. Pistone, N. Plasencia & L. Gonçalves*	Reflecting the art, culture and history into the interior design of underground metro stations, case study: Dnipro Metro Extension Line *B. Avanoğlu-Çetin & Ö. Öztürk*
11.20-11.40	Brenner Base Tunnel - Challenges of Gripper TBM application for the 15 km long exploratory tunnel Ahrental in challenging rock mass *K. Bäppler & M. Flora*	Development of a test setup for the simulation of the annular gap grouting on a semi technical scale *C. Schulte-Schrepping & R. Breitenbücher*	Use of TBM parameters for assessing rock mass conditions during excavation: a feedback from the Tunnel 4, Angat Water Transmission Improvement Project (Philippines) *G.W. Bianchi, I. Andreis & S. La Valle*	Line C in Rome: the archaeological findings are changing Amba Aradam station design *E. Romani, M. D'Angelo, R. Sorge*
11.40-12.00	Problems associated with an EPB-TBM in a complex geology with serpentinites and peridotites in Turkey *M. Sakalli, D. Talu, N. Bilgin & I.H. Aksoy*	The management of the soil conditioning process for the excavation of the Rome Metro C line *M. Pirone, F. Carriero, R. Sorge, D. Sebastiani, S. Miliziano & V. Foti*	Drone based deformation monitoring at the Zentrum am Berg tunnel project, Austria. Results and Findings 2017-2019 *K. Chmelina, A. Gaich, M. Keuschnig, R. Delleske, R. Wenighofer & R. Galler*	Underground car park in the ancient "Morelli" cavern in Naples *F. Rossano, A. Bellone & M.A. Piangatelli*
12.00-12.20	Polcevera Adit - Getting unstuck on EPB-TBM in squeezing rock *F. Poma, U. Russo, F. Ruggiero & L. Lampiano*	Pressure infiltration of sandy foam during EPB shield tunnelling in saturated sand *T. Xu, A. Bezuijen & Z. Lu*	Geo-mechanical behaviour and monitoring system in the Ceneri Base Tunnel *M. Ruggiero, A. Malaguti & F. De Martino*	Line C in Rome: San Giovanni, the first archaeological station *E. Romani, M. D'Angelo & V. Foti*
12.20-12.40	Challenging mixed face tunneling at India's Sleemanabad Carrier Canal *J. Clark*	Soil improvement in tunnel face using foam reagents in EPB TBM *S. V. Mazein, A.N. Pankratenko, A.G. Polyankin & E.A. Sharshova*	Contribution of continuous geophysical measurements to the success of tunnelling *T. Dickmann, D. Krueger & J. Hecht-Méndez*	The First World War Military Tunnels of the Italian-Austrian Front *S. Pedemonte & E.M. Pizzarotti*
12.40-13.00	Tuen Mun - Check Lap Kok link in Hong Kong - Innovative solution for construction of an outstanding subsea tunnel *A. Schwob, F. Guedon, B. Combe & T. Lockhart*	Soil abrasion and penetration test for the evaluation of soft ground TBMs' excavation performance and cutter life *D.Y. Kim, H.B. Kang, Y.J.Shin, J.H.Jung & E. Farrokh*	Countermeasures against the deformation of the pilot tunnel of the Seikan Tunnel, Japan *H. Kakinuma, T. Okada, K.Yashiro & Y. Kobara*	Tunnel warfare in World War I: The underground battlefield tunnels of Vimy Ridge, France *M. Diederichs & D.J. Hutchinson*
13.00-14.00	Lunch			

itacus
for an urban underground future

ARCHAEOLOGY, ARCHITECTURE AND ART IN UNDERGROUND CONSTRUCTION/STRATEGIC USE OF UNDERGROUND SPACE FOR RESILIENT CITIES

AAA & ITACUS SESSION

OFF-SITE SESSION AND BOURBON TUNNEL VISIT

PALAZZO SERRA DI CASSANO

	Chair: D. Martinelli (Italy), G. Minin (Italy)
10.00-10.30	KEY NOTE LECTURE Historical cross-alpine tunnels of Piemonte: from craftmanship to industrialisation S. Pelizza
10.30-10.50	The Art Stations F. Brenci
10.50-11.10	Genoa underground: solidity, usefulness and beauty of the Grazie Bassa Tunnel during 100 year service life *C.Panariello, H. Mohamed Dahir & V. Molinari*
11.10-11.30	Coffee Break
11.30-12.40	BOURBON TUNNEL VISIT
12.40-13.10	Travel from Palazzo Serra di Cassano to Mostra d'Oltremare

MAY 8

	PALACONGRESSI				TEATRO MEDITERRANEO
	EUROPA	ISCHIA	EOLIE	EGADI	AUDITORIUM
	LONG AND DEEP TUNNELS MECHANIZED TUNNELLING	**INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT** ENGINEERING 4.0 - BIM	**GEOLOGICAL AND GEOTECHNICAL KNOWLEDGE AND REQUIREMENTS FOR PROJECT IMPLEMENTATION** INVESTIGATION AND SURVEYING	**INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT** SEGMENT LININGS AND SHOTCRETE	**STRATEGIC USE OF UNDERGROUND SPACE FOR RESILIENT CITIES** itacus for an urban underground future
	A. Nicola (Italy), A. Elioff (USA)	**P. Mazzalai (Italy), J. Karlovsek (Australia)**	**S. Aversa (Italy), M. Belenkiy (Russia)**	**A. Meda (Italy), K.G. Holter (Norway)**	**A. Cornaro (Switzerland), D. Boldini (Italy)**
14.00-14.20	Back-calculation model for instantaneous TBM cutter wear *H.I. Frostad, A. Bruland, P. D. Jakobsen & F.J. Macias*	BIM implementation - Brenner Base Tunnel project *R. Sorge, D. Buttafoco, J. Debenedetti, A. Menozzi, G. Cimino, F. Maltese & B. Tiberi*	Application of deflection curves, trend lines and displacement vector orientation in the evaluation of surface displacements in tunneling *A.L.C. Rissoli & A.P. de Assis*	Hybrid solution with fiber reinforced concrete and glass fiber reinforced polymer rebars for precast tunnel segments *B. De Rivaz, N. Giamundo, A. Meda, Z. Rinaldi & S. Spagnuolo*	**ITACUS SPECIAL REPORT II** The National Actions Program Think Deep - reported on the national think deep groups *A. Cornaro & H. Admiraal*
14.20-14.40	Ismailia: the first tunnels to be constructed under the Old and New Suez Canals - A Case History *G. L. Menchini & M. Liti*	BIM - Model-based project management for optimizing project development. Insights into the practical application at the "Albvorland Tunnel" project *W. Fentzloff & J. Classen*	Case study of tunnel ground reaction modeling in horizontally bedded rock using continuum and fracture network models *D. Chesser, M.J. Telesnicki & J. Carvalho*	Sprayed concrete composite tunnel lining design: analytical study on its behaviour at the bond interface *C. Green, H. Jung & A. Pillai*	Resilient City: The case of Bisagno Diversion Tunnel *G. Lunardi, G. Cassani, M. Gatti, B. Spigarelli & C. L. Zenti*
14.40-15.00	The feeder 9, River Humber, replacement pipeline project, United Kingdom *S. Jukes*	Integrated functional metro station design using BIM tools *C. Pallaria, D.Vercellino & A. Bolzonello*	Geological and geotechnical main design aspects of two tunnels on Fortezza - Verona High Speed Line in Northern Italy *A. Corbo, A. Sciotti, S. Vagnozzi & S. Rodani*	Durability of Precast Concrete Tunnel Segments *M. Bakhshi & V. Nasri*	Shafts and drainage tunnels as a sustainable and preventive measure to mass movements of saturated soils in Bucaramanga, Colombia *P.F. Castillo & G. Pardo*
15.00-15.20	Lining stresses in a TBM-driven tunnel: a comparison between numerical results and monitoring data *V. De Gori, A. de Lillis & S. Miliziano*	Intelligent Attitude Control during Shield Tunneling in Soft Soils based on Big Data *B. J. Wu, M. Hu, W. Xu, P. Dong & X. Bai*	Characterization of underground rock masses employing structure from motion: Application to a real case *R. García-Luna, S. Senent, R. Jurado-Piña & R. Jimenez*	Advanced constitutive modelling for the approach of real shotcrete performance in tunnels *F.A. Sánchez & G.G. Saldivar*	Conventional tunneling in urban areas *N. Munfah, V. Gall, W. Klary & T.M. O'Brien*
15.20-15.40	Coffee Break				

	LONG AND DEEP TUNNELS SPECIAL PROJECTS	**INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT** ENGINEERING 4.0 - BIM	**GEOLOGICAL AND GEOTECHNICAL KNOWLEDGE AND REQUIREMENTS FOR PROJECT IMPLEMENTATION** SEISMIC ASPECTS AND ROCKBURTS	**INNOVATION IN UNDERGROUND ENGINEERING, MATERIALS AND EQUIPMENT** SEGMENT LININGS AND SHOTCRETE	**STRATEGIC USE OF UNDERGROUND SPACE FOR RESILIENT CITIES** itacus for an urban underground future
	M. Ranieri (Italy), E. Grøv (Norway)	**K. Pini (Italy), G. Gaspari (Canada)**	**E. Bilotta (Italy), Andrea Sciotti (Italy)**	**A. Meda (Italy), K.G. Holter (Norway)**	**A. Cornaro (Switzerland), S. Venturoni (Italy)**
15.40-16.00	Specificities of the underground structure design of Cigéo. Presentation of the constrains and construction phasing stages of "Phase 1" *G. Champagne de Labriolle, H. Ouffroukh, E. Boidy & H. Miller*	Recent developments towards Autonomous Tunneling and Mining Machinery *T. Peinsitt, H. Haubmann, H. Kargl & C. Kary*	Loading magnitude for rock tunnel during earthquake estimated by dynamic measurement at an actual tunnel *A. Kusaka, S. Hara & N. Isago*	Steel fibre reinforced concrete for segmental lining - crack mitigation measures at design phase *G. Castrogiovanni, G. Busacchi, T. Léber & G. Mariani*	Extending the urban underground utility network capacity. A long drive large diameter pipe-jacking tunnel *A. Kolji, E. Rascol & S. Crisinel*
16.00-16.20	CERN (HL-LHC): New underground & surface structures at Point 1 & Point 5 *A. Canzoneri, J. Amiot, F. Rozemberg, D. Merlini, F. Gianelli, G. Como, F. De Salvo, C. Helou, L.A. Lopez & P. Mattelaer*	Building Information Modeling in Warsaw metro extension project *L.J. Szczepaniak, F. Bizzi & R. Sorge*	Acoustic emissions from flat - jack test for rock - burst prediction *A. Voza, L. Valguamera, S. Fuoco, G. Ascari, D. Boldini & D. Buttafoco*	The Load-bearing capacity of primary linings, considering time dependent parameters, at the Brenner Base Tunnel *T. Cordes, K. Bergmeister, A. Dummer, M. Neuner & G. Hofstetter*	Compound use of underground space for integrated campus-urban development: a case study from Tsinghua University, China *W.J. Zhu, Q.C. Bao & S.J. Gai*
16.20-16.40	A new underground laboratory for exploring the deep Universe: the design of a third generation of a Gravitational Waves Observatory *L. Schiavinato, P. Mazzalai, G. Gemme, G. Losurdo, M. Punturo, A. Paoli, F. Ricci, E. Calloni, G. Oggiano & M. Carpinelli*	The convergence of all communication and data requirements onto a single IP backbone *D. Kent & D. Edmonds*	Design of shaking table tests on atrium-style subway station models under seismic excitations *Z.M. Zhang, Y. Yuan, E. Bilotta, H.T. Yu & H.L. Zhao*	Real behavior of shotcrete primary lining in squeezing rock mass: the experience at the Brenner Base Tunnel *L. Ziller & S. Fuoco*	Investing in urban underground space - maximising the social benefits *S. Bricker, L. von der Tann, E. Reynolds, C. Bocci & P. Salak*
16.40-17.00	Challenges of Designing a Tunnel Boring Machine (TBM) for Development of Underground Structures on the Moon *J. Rostami, C. Dreyer, R. Duhme & B. Khorshidi*	A fast detection method for tunnel surface defects based on video processing *M. Hu, X.W. Zhou & X.W. Gao*	Experiences of tunnels subject to earthquake in central Italy *A. Micheli, L. Cedrone, A. Andreacchio & S. Pelizza*	The design of a segmentally lined tunnel for a large sewer outfall. Lote 3 - Emisario Planta Riachuelo, Argentina *R.D. Aradas, D. Tsingas & M. Martini*	The A2 Maastricht Project: A joint action plan *B. Grote, B. Lobbezoo, L. Prompers & D. Florie*
17.00-17.30					**CLOSING CEREMONY**

itacus
for an urban underground future

ARCHAEOLOGY, ARCHITECTURE AND ART IN UNDERGROUND CONSTRUCTION/STRATEGIC USE OF UNDERGROUND SPACE FOR RESILIENT CITIES

AAA & ITACUS SESSION

OFF-SITE SESSION AND BOURBON TUNNEL VISIT

PALAZZO SERRA DI CASSANO

	Chair: G. Minin (Italy), G. Viggiani (Italy)
14.00-14.45	Travel from Mostra d'Oltremare to the Palazzo Serra di Cassano
14.45-15.20	KEY NOTE LECTURE Underground Urbanism - Embedding AAA into Contemporary Development E. Reynolds
15.20-15.40	Moncenisio, from Myth to history TELT–Tunnel Euralpin Lyon Turin and the collection of historic engravings on the Frejus tunnel *M. Virano, G. Dati, M. Ricci & G.Avataneo*
15.40-16.00	Comparative Analyses of Through - running vs. Dead - end Tunnel to Urban Transit Network Efficiency and Design of Through - running Tunnel in the New York Pennsylvania Station *J. C. Venturi, E. Chao & C. Nicolescu*
16.00-16.20	Coffee Break
16.20-17.30	BOURBON TUNNEL VISIT
17.30-18.00	Travel from Palazzo Serra di Cassano to Meeting points

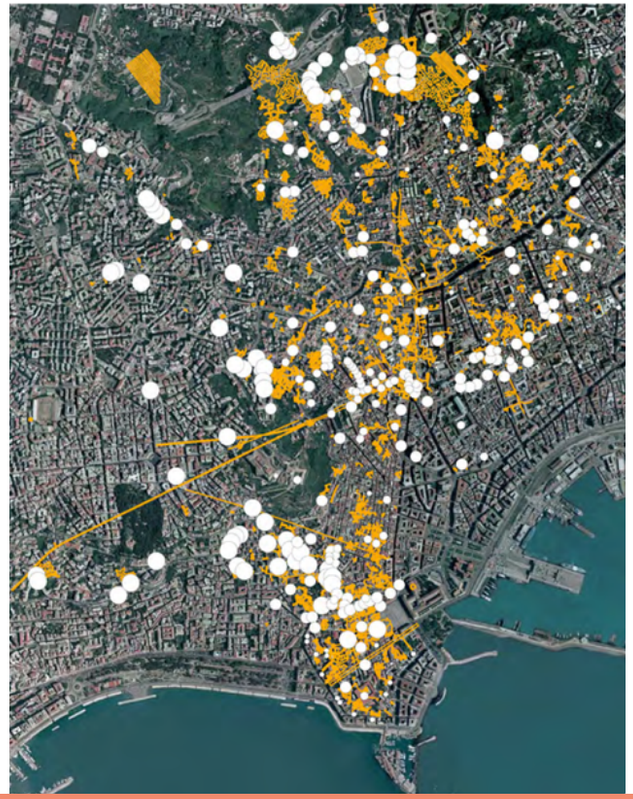
Rione Alto Metro station, Line 1, Naples

SPECIAL AAA

OFF-SITE EVENTS

Urban underground spaces are important for their history and archeology. Naples has an extremely well preserved underground city worthwhile to visit for anyone interested in the field of contemporary urban design/arts/architecture/planning and underground space use.
In 2015, ITACUS commissioned a compilation of case studies from ISOCARP. "Think Deep: Planning, development and use of underground spaces in cities", illustrating how urban planners perceive underground space. One case study observed: "Naples urban area, (…) has a huge heritage of underground spaces both artificial and natural, (…), which constitute a "parallel city" laid down beneath the bustling streets of the ancient city."
During the congress, 4 AAA off-site events are scheduled that include descending into the underground parallel city for a 1-hour tour. Each event is preceded a keynote and two lectures on archeology/architecture/art and its relationship to contemporary urban underground space use. Keynote speakers include renowned architect Dominique Perrault and architect Elizabeth Reynolds, one of the authors of the ITACUS/ISOCARP study.

Let yourself be inspired by this unique program and a descent into the parallel city!



Naples underground cavities map

Bourbon Tunnel and Palazzo Serra di Cassano

In conjunction with

itacus
for an urban underground future

On a first come first served basis
(max 110 persons per session).

The AAA Off-site Event will offer a unique underground spaces experience. The event is organized in conjunction with ITACUS and includes presentations from world-renowned architects and paper presentations on the theme of archaeology, architecture and art in underground construction. After the presentations a tour of the Bourbon Tunnel will be provided. Guests will jump into the past, through the steep stairs caved in the tuff rock that link the basement of the Serra di Cassano Palace to the Bourbon Tunnel, accompanied by the narration of local guides.

All participants will receive a special souvenir at the end of the visit.

Registration fee: **€ 30,00** (VAT included)

Check at the registration desk if tickets
are still available and make your reservation!

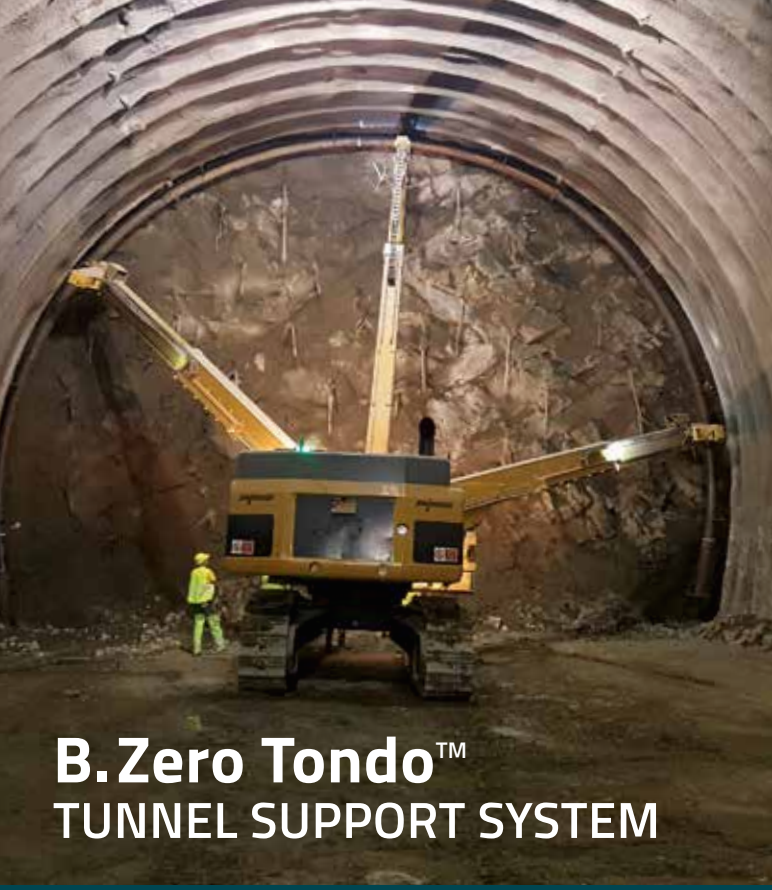
May 6, 2019
afternoon 14.00-18.00 (including travel time)
The session starts at 14.45 and ends at 17.30

May 7, 2019
afternoon 14.00-18.00 (including travel time)
The session starts at 14.45 and ends at 17.30

May 8, 2019
morning 09.15-13.10 (including travel time)
The session starts at 10.00 and ends at 12.40

afternoon 14.00-18.00 (including travel time)
The session starts at 14.45 and ends at 17.30

Return transfer service is available
(for more details see p. 36)



B.Zero Tondo™
TUNNEL SUPPORT SYSTEM

Your safety first.

B.Zero Tondo™ Tunnel Support is a patented and semi-automated system that enhances safety and offers greater structural efficiency than traditional steel-arch supports.

The system provides the following benefits:

- **less exposure of workers to risks arising from hazardous conditions (workers are always in the protected area)**
- **more accurate, safer and simpler installation than traditional arch support systems**

TECHNICAL VISITS

- ARCHAEOLOGICAL WORKING LUNCH
- TECHNICAL VISITS

Società Italiana Gallerie
Italian Tunnelling Society

ITA
AITES

中国铁建重工集团有限公司
CHINA RAILWAY CONSTRUCTION HEAVY INDUSTRY CO.,LTD.

China Railway Construction Heavy Industry Co., Ltd. (CRCHI) was founded in 2007, an affiliate of a Fortune 500 company-China Railway Construction Corporation (CRCC). The company has more than 6000 employees, of which over 20% are R&D persons.

CRCHI is benefited from CRCC to share construction experiences and technique, and has become China Construction Machinery Manufacturer Top 5 Enterprise and World Construction Machinery Manufacturer Top 50 Enterprise.

By the positioning of non-standard, specialized, characterized and customized high-end equipment, CRCHI shapes three industry sections: rail track equipment represented with turnout, fastener and clip, tunnel boring machine represented with shield machine and hard rock TBM, and specialized tunneling equipment represented with drilling jumbo and multi- function vehicle.

For the future, CRCHI will continue to focus on main industries, constantly promoting intelligent upgrading of products, and push high-end equipment into the era of artificial intelligence, becoming the World leader on the overall solution of intelligent tunnel construction equipment and high-end rail track equipment.

China Railway Construction Heavy Industry Co., Ltd.
Add: No.88, Dongqi Road, National Economic & Technical Development Zone,Changsha, Hunan, China.
Website: www.crchi.com
Fax:+86-731-84071800
Tel:+86-400-8956789
Email:crchioversea@163.com
Postcode: 410100

CRCHI

ARCHAEOLOGICAL WORKING LUNCH

FROM 5 TO 8 MAY 2019
From 11.00 to 14.00

PAUSILYPON ARCHAEOLOGICAL SITE AND SEIANO GROTTO

Attend a fascinating tour across a man-made tunnel of 770 meters that runs through the tuffaceous promontory of Posillipo hill, connecting the Phlegraean fields with the Gaiola deep valley.

Beyond the cavern, you will be guided in a path lined with typical Mediterranean vegetation and the area called Posillipo, or "place which stops all the cares" from Greek, in order to describe its spell and beauty.

Discover all the remarkable archaeological remains and enjoy the light lunch overlooking the sea with a glance at the Roman age.

Return transfer service available

(for more details see p. 36)

Registration Fee: € 70,00 (VAT included)

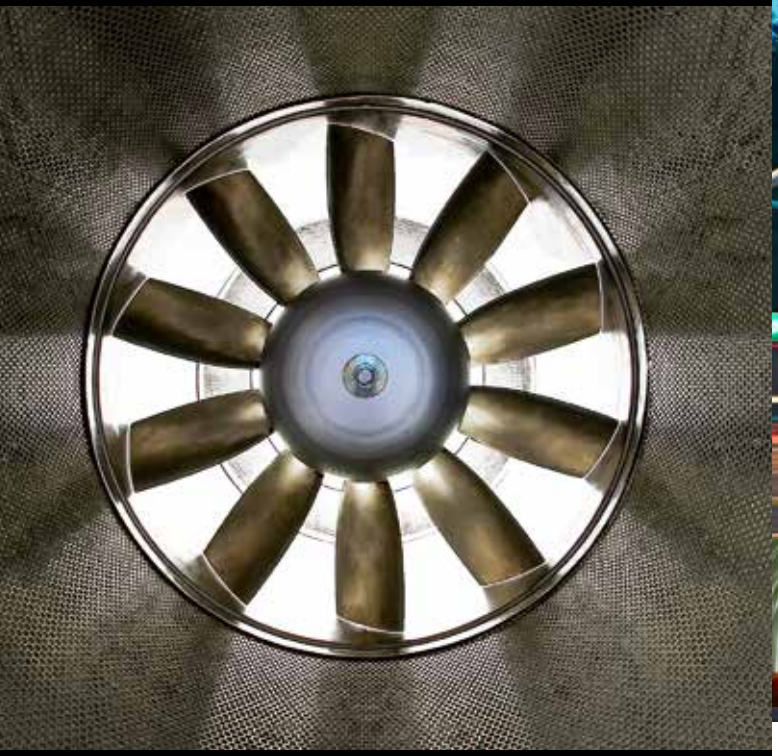
Check at the registration desk if tickets are still available and make your reservation!

With the kind support of

IN VIAGGIO DAL 1889

zitrón

The Trusted Name in Underground Ventilation Systems



The world's biggest aerodynamic test bench

"A passion for design, innovation, quality and service"

www.zitron.com

CIVIL ROCK by SOPREMA

PROFESSIONALS IN
CIVIL ENGINEERING SOLUTIONS

...WE TAKE CARE OF YOUR PROJECTS!

SOPREMA GROUP

Soprema S.r.l.
Via Industriale dell'Isola, 3
24040 Chignolo d'Isola (Bergamo) Italy
Phone +39.035.095.10.11 Fax +39.035.494.06.49
Mail: info@soprema.it Web: www.soprema.it

half day VISIT

THURSDAY MAY 9

THE NAPLES-BARI HIGH SPEED RAILWAY LINE (NAPLES) RETE FERROVIARIA ITALIANA (RFI)

COMPANY OF **THE FERROVIE DELLO STATO ITALIANE GROUP**

The Naples-Bari High Speed Railway line is part of the TEN-T European Network, as it constitutes a diversion within the Scandinavian-Mediterranean corridor. The project will enable the integration of the southern railway network with the existing Italian high-speed network and will provide better intermodal transport facilities. With a total length of about 180km (from Naples to Foggia) with 120km that remain to be built, the alignment has been divided in 8 stretches and either design or construction is underway in all the eight functional lots. Tunnels are foreseen in more than 50% of the total length of the line and namely in the central stretch where the alignment will underpass the Apennine mountain chain with long and deep tunnels (up to 27km long and up to 400m overburden) in difficult geotechnical conditions (squeezing ground and explosive gas are foreseen).
Recently, the first two lots closer to Naples have been awarded by RFI to main Italian Contractors and in May 2019 the jobsites will be in operation.
The participants will have the opportunity to have a complete presentation of the project - with a special focus on the Casalnuovo and the Monte Aglio tunnels - and to listen at a special speech from Zaha Hadid Architects studio London about the project of new Naples-Afragola HS Railway station, recently completed and in operation, and then visiting the station with a guided tour with Zaha Hadid studio expert.

Check at the registration desk if tickets are still available and make your reservation!

€ 70,00 (VAT included)

1 day VISIT

THURSDAY MAY 9

METRO LINES 1 & 6 IN NAPLES - A MODERN UNDERGROUND INFRASTRUCTURE BORED THROUGH THE HISTORY

The Naples Metro Lines 1 and 6 are part of an integrated metro system serving the whole city that today embodies six underground railway lines and four funiculars. For these underground lines, participants will have the chance to visit 5 job sites for the construction of line 1 & 6 underground stations (Capodichino, Centro Direzionale, Municipio, Chiaia, San Pasquale) besides tunnels construction between Capodichino and Centro Direzionale stations.
Namely, Centro Direzionale-Capodichino represents an extension of Line 1 of Naples underground from the center to the airport of Naples. The project includes the construction of two relevant stations designed by Benedetta Tagliabue and Richard Rogers as well as works in tunnel excavated by 2 TBM EPB. The Metro Line 6 works involve four new Stations and a single tube tunnel of about 3,8 km. Each station has been designed by a different Architect: H. Kollhof (Berlin) for Arco Mirelli Station, B. Podrecca (Wien) for San Pasquale Station, U. Siola (Naples) for Chiaia Station, A. Siza e E. Souto de Moura (Porto). In San Pasquale and Chiaia Stations the civil works has been completed and the architectural finishing and the installation of plants and equipments are still in progress. Very important and extremely interesting is also Municipio Station, located close to the Port of Naples, that is the connection station between Line 1 and 6; it has been designed by Àlvaro Siza and Eduardo Souto de Moura, and represents one of the largest archeological excavation in Europe. Some parts of the station are still to be completed; once completed, the archeological treasures found during its construction will be part of the station.

Check at the registration desk if tickets are still available and make your reservation!

€ 80,00 (VAT included)

TECHNICAL VISITS

1 day VISIT

THURSDAY MAY 9

METRO LINE C IN ROME: THE ANCIENT ROME UNDERGROUND STRETCH FROM FORI IMPERIALI TO SAN GIOVANNI STATION & GUIDED TOUR OF THE COLOSSEO

Line C is the third line of the Underground in Rome, underpassing the historical and archaeological heart of the city; it is also the first fully automated metro line in the city. The T3 stretch, from San Giovanni to Fori Imperiali, is 3-km long and is still under construction. The tunnels (6.7m diameter) run 35m below the ground level, while the stations (platforms length: 120m) are located very close to the Colosseum and the Aurelian Walls ("Mura Aureliane").
The technical visits will give access to the new San Giovanni station/museum and to the construction site of T3 stretch (Amba Aradam and Fori Imperiali stations and tunnels). After the visit all participants will have the opportunity to enjoy a guided tour of the Colosseo.
The stations and tunnels are distinctive examples of the constructive and architectural solutions implemented in a very unique archaeological and historical context, facing bad geotechnical conditions with up to six bars of hydraulic pressure at the bottom of excavations. The project has foreseen specific technologies: cut and cover, top-down modified, trench cutter, TBM EPB, ground freezing, soil injections, compensation grouting, as well as a specialized architectural design for the underground stations.

Check at the registration desk if tickets are still available and make your reservation!

€ 220,00 (VAT included)

1 day VISIT

overnight accommodation included

THURSDAY MAY 9

THE BRENNER BASE TUNNEL: THE LONGEST UNDERGROUND RAILWAY TUNNEL IN THE WORLD (BOLZANO)

The Brenner Base Tunnel (BBT), between Italy and Austria, will be the world's longest underground rail link and is currently under construction. Once completed, it will be 55-km long between the two main portals. However, including the rail bypass of Innsbruck, to which it is directly connected, it will have a total length of 64km. The infrastructure is a crucial element in the European TEN-T network, as it constitutes the central link within the Scandinavian-Mediterranean corridor.
The Brenner Base Tunnel consists of an exploratory tunnel, two main tunnel tubes, four lateral access tunnels and three underground security areas. The project foresees the excavation of approximately 230km of tunnels, of which roughly three quarters using open or shielded TBMs and one quarter using the conventional drill and blast method. One particular challenge for the construction is the Periadriatic fault zone that separates European and African tectonic plates: with a total length of 700km, it is the longest geological fault in the Alps and is intersected by the tunnel for approximately 700m. In May 2019, underground excavations and civil works will be in full activity and the participants will experiment the visit "at its best"!

Check at the registration desk if tickets are still available and make your reservation!

One way ticket € 325,00 (VAT included)
Return ticket € 445,00 (VAT included)

OPERATOR TRAINING SIMULATOR
LEARN ANYWHERE, ANYTIME

The new Sandvik operator training simulator is available for the DT922i tunneling drill rig. This light, compact, portable training solution acts like a real rig with authentic controls, enabling operators to be fully operational from day one through the use of various situations and exercises.
Further boosting operational performance, it can be used to reassess operators regularly without impacting on site productivity, delivering gains of up to 5% in annual productivity.

The simulator is also available for other drill rig models.

WTC2019
Visit us at booth 5 - Area 1
Explore Sandvik operator training simulator
ROCKTECHNOLOGY.SANDVIK

SANDVIK

中国交建
CHINA COMMUNICATIONS CONSTRUCTION

We build a better connected world
We make cities more livable
We create better life for people

MAY 6th–9th
Naples Italy

No.08 Outdoor Area

DSI UNDERGROUND

Delivering the Support You Need

Reliable Ground Support

You can count on our System Solutions

Customized for your challenging tunneling projects!

Visit us at

Booth 64-65

www.dsiunderground.com

SOCIAL EVENTS

- SOCIAL HIGHLIGHTS

Società Italiana Gallerie
Italian Tunnelling Society

ITA
AITES

SOCIAL EVENTS

MAY 5, 2019
WELCOME RECEPTION
MOSTRA D'OLTREMARE EXEDRA FOUNTAIN

Address: Piazzale Tecchio, Mostra D'Oltremare, Naples

A spectacular show of sounds and lights and extraordinary water special effects will be performed during the Welcome Reception: the ideal pre congress atmosphere, you will never forget!

19.30-21.30

Dress code: smart casual

This reception is included in the registration fee.
Transfer service from/to the congress venue
(for more details see pp. 34-35)

MAY 6, 2019
WTC 2019 SPECIAL EVENT
SAN CARLO THEATRE

Address: Via San Carlo, 98, Naples

Do not miss the chance to attend an open concert in one of the most famous and prestigious Opera House in the world.

The San Carlo Theatre is the most ancient in Europe, built in 1737.
An amazing scenery where to experience a typical Italian atmosphere.

19.30-20.45
Dress code: Business formal

Concert on a first come first served basis
(for registered delegate to the event only)

No transfer service will be provided

Offered by salini impregilo

ROCKSOIL
www.rocksoil.com

MAY 8, 2019
GALA DINNER
PIETRARSA RAILWAY MUSEUM

Address: Via Pietrarsa, Naples

A fascinating Gala Dinner through time among the locomotives and trains!

This is where the Italian railway history began with the first railway track from Naples to Portici, the same route that runs by the museum today. Nestling between the sea and the Volcano Vesuvius, the museum is housed in the carefully restored Bourbon factory.
Guests will be able to enjoy a journey on vintage carriages from Naples to the National Railway Museum of Pietrarsa.
Transfer service from/to the meeting points will be provided
(for more details see p. 37)

Welcome Cocktail 20.00
Dinner 20.45
Dress code: Business formal

Do not miss the grand finale of the WTC 2019 and enjoy a stunning view of the Gulf of Naples!

€ 150,00 (VAT included)
Maximum capacity 750 seats

Check at the registration desk if tickets are still available and book your seat!

CREG

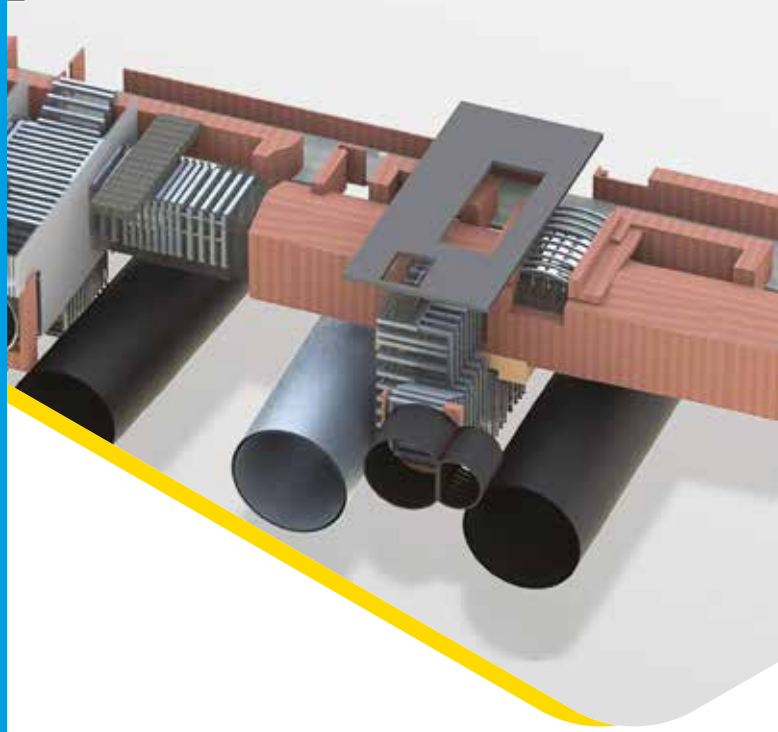
CHINA RAILWAY ENGINEERING EQUIPMENT GROUP CO., LTD.

CREG is a worldwide underground solutions provider for a full range of mechanized tunnelling technology and services

WWW.CREG-GERMANY.COM
WWW.CRECTBM.COM

+ China:
Contact: cregoverseas@crectbm.com
Phone: +86 371 60608837
+ Asia & Africa:
Contact: enquiries@cte – limited.com
Phone: +603 7954 0314
+ Europe & Latin America:
Contact: info@creg – germany.com
Phone: +49 2431 9011 533

CREG Underground Solutions
WIRTH



Global infrastructure needs are growing.

Complex ground conditions must be managed.

Technical demands on tunnels are increasing.

We see through complexity to create solutions.

We thrive on challenges

golder.com

GOLDER

CHARITY PARTNER

FONDAZIONE ARCHÉ ONLUS

Arché **was established** by Fr Giuseppe Bettoni in **1991** in Milan, in response to the childhood HIV crisis. Today, people are facing different difficulties, and Arché has changed and evolved accordingly: **it now takes care of mothers and children in situations of social distress or personal vulnerability**, protecting and supporting them in their journey towards autonomy in their social condition, housing and working life.
Arché has projects in **Milan, Rome and San Benedetto del Tronto, Italy.**

La Corte di Quarto
From social housing to homing
Archè wants to create an apartment block of 14 homes reserved for mother-and-child semi-autonomy projects in the Milan area, sharing experiences of cultural integration and social inclusion involving vulnerable families and welcoming local families.

For more information visit **www.arche.it**

CIVILTÀ del COSTRUIRE

GRUPPO ICM

ICM SpA | Viale dell'Industria, 42 | Vicenza | Italy
www.gruppoicm.com

M9 Museo del '900 - Venezia Mestre/credits: Alessandra Chemollo

WHEN PARTNERSHIP AND PERFORMANCE GO HAND IN HAND THAT'S BUILDING TRUST

The building owner expects timely completion of a project in high quality, also in consideration of local conditions. We provide you with system solutions that meet these demands and ensure you competent service and punctual delivery of high quality products.

You have clear demands regarding economical rock support and durable lining system, the concept of the waterproofing system and of the sustainability of products and solutions used. Sika provides quality products to meet your requirements, including those for unforeseen circumstances.

Sika Services AG
Tüffenwies 16
CH-8048 Zürich
Switzerland
Phone: +41 58 436 40 40
Fax: +41 58 436 41 50
www.sika.com

BUILDING TRUST

ACCOMPANYING PERSONS PROGRAM

• TOURS

Società Italiana Gallerie
Italian Tunnelling Society

ITA
AITES

MATERA
MAY 4-5, 2019

2 day TOUR

Visit the enchanting Matera, UNESCO World Heritage Site and European Capital of Culture 2019. You will experience the authentic hospitality and typical flavors of Southern Italy. The cost of the tour includes 1 night accommodation, transfer from/to Naples on a private bus, an English speaking guide and a Welcome dinner. Departure from Naples port (300 m from Municipio metro station) at h 13.00.

Check at the registration desk if tickets are still available and make your reservation!

€ 500,00 (VAT included)

AMALFI COAST & LIMONCELLO CLASS
MAY 5, 2019

full day TOUR

Enjoy the panoramic sea views of the Amalfi coast, a stunning driving route from Naples to Amalfi. Explore the colorful Positano and experience the Limoncello making process during a full-day excursion. Departure from Naples port (300 m from Municipio metro station) at h 08.15.

Check at the registration desk if tickets are still available and make your reservation!

€ 150,00 (VAT included)

NAPLES CITY TOUR
MAY 5-6-7-8, 2019

half day TOUR

Discover the Naples' highlights with an expert local guide. During the tour you will admire some of the most impressive monuments of the city. The first part of the tour will take you on a comfortable coach up to Capo Posillipo to admire the entire gulf of Naples. The second part consists in a pleasant walk through the historical centre. Admire the Duomo, S. Gennaro Chapel, Spaccanapoli and the ancient Cloister of Santa Chiara where the tour ends. Departure from Naples port (300 m from Municipio metro station) at h 09.00.

Check at the registration desk if tickets are still available and make your reservation!

€ 60,00 (VAT included)

CAPRI & ANACAPRI
MAY 7, 2019

full day TOUR

Experience La Dolce Vita of Capri island on a full-day tour departing from Naples.
Departure from Naples port (300 m from Municipio metro station) at h 08.15.

Check at the registration desk if tickets are still available and make your reservation!

€ 200,00 (VAT included)

POMPEII TOUR
MAY 8, 2019

half day TOUR

Hop aboard a comfortable private bus for a fully-guided tour of the archaeological site of Pompeii. Discover this incredible archaelogical site on a half-day excursion. Departure from Naples port (300 m from Municipio metro station) at h 8.30.

Check at the registration desk if tickets are still available and make your reservation!

€ 100,00 (VAT included)

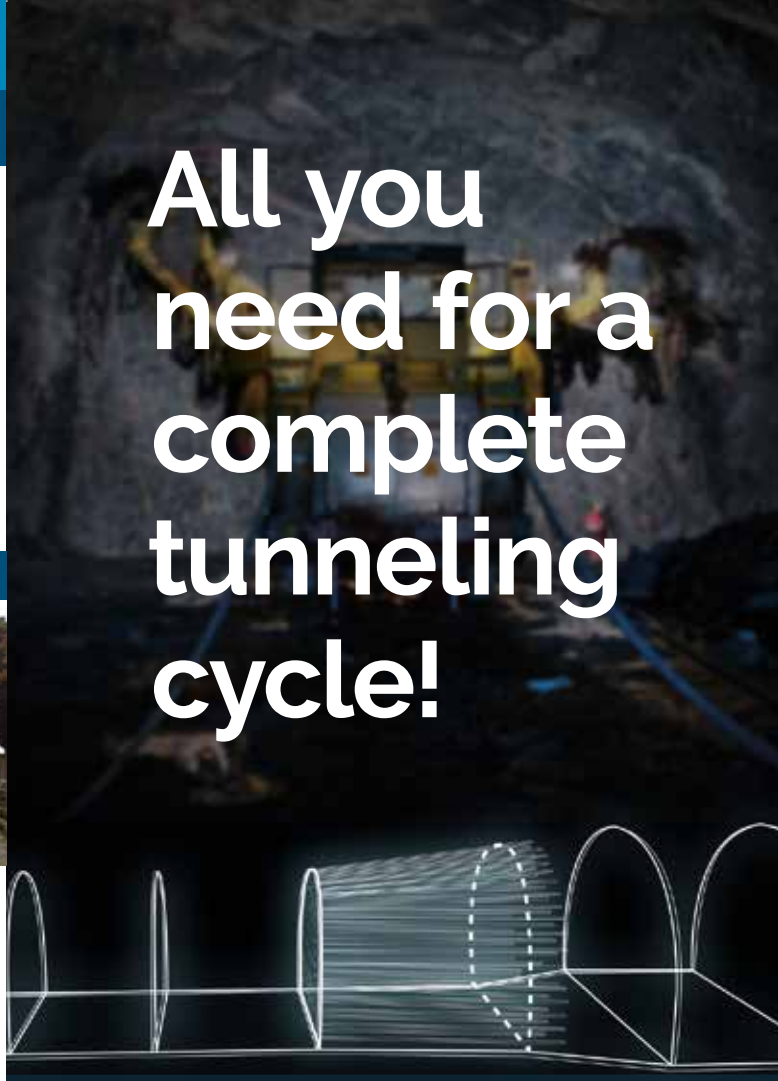
CASERTA ROYAL PALACE & PARK
MAY 9, 2019

full day TOUR

Discover the enchanting Royal Palace of Caserta and its beautiful park. Traditional lunch in a Restaurant is included.
Departure from the Naples port (300 mt from Municipio metro station) at h 09.00.

Check at the registration desk if tickets are still available and make your reservation!

€ 150,00 (VAT included)



United. Inspired.

No matter what your challenge is

A small tunnel or a large tunnel, a hydroelectric plant or a subway line, a utility tunnel for heating pipes or for any other purpose. We are specialists in underground tunnels! And we have all the equipment you need for a complete tunneling cycle.

Come to booth no 123 and talk to us about tunnels.

Epiroc

FOLLO LINE, NORWAY

A THOUSAND TONNES OF INGENUITY

Four Double Shield TBMs running in parallel, rock strengths of up to 268 MPa, and managing potential water pressures of up to 12 bar – Follo Line is undoubtedly a technical and logistical top-class project. Smart engineering, unshakeable willpower and mutual trust between all partners are necessary to make Norway's biggest infrastructure project a success.

› herrenknecht.com/hardrock/

Contractors:
› Acciona Infraestructuras
› Ghella ANS

PIONEERING UNDERGROUND TOGETHER

HERRENKNECHT
Tunnelling Systems

EXHIBITION

- EXHIBITORS LIST
- EXHIBITION TIMETABLE
- EXHIBITION MAP

Società Italiana Gallerie
Italian Tunnelling Society

ITA
AITES

EXHIBITORS LIST

Listing as of April 10, 2019, for complete details on exhibiting companies please download the WTC2019 App

Company	Booth No.
3GSM Gmbh	A10
AF CONSULT Italy srl	41
AFTES	45
AFTES PLANT EQUIPMENT BRANCH	46-47
ALGAHER S.A.	102
AMBERG GROUP Ltd	62-63
AME - Advanced Microwave Engineering	B14
AMITOS	B23
ANAS S.p.A.	outdoor area 7
ANBEL	119
ArcelorMittal Fibres	32-33
AR.CO. S.r.l.	B15
ATP	27-28
BABENG GMBH + TUNNELSOFT	117
BALLARD MARINE CONSTRUCTION	A44
BarChip Inc	A12
BASF / Construction Chemicals	50-51
BAUER MACCHINE ITALIA S.r.l.	B7
BEKAERT MACCAFERRI UNDERGROUND SOLUTIONS BVBA	29-30
BELLOLI SA	25
BERTINEX SRL	92
BESSAC	43
BG CONSULTING ENGINEERS Ltd	A25
BJ TUNNELLING S.R.L.	103
BRESCIANI Srl	A21-A22
BROKK AB	B8
BUNDREX- KOSTEEL CO., Ltd	A2-A3
CBE GROUP	53
CCCC - China Communications Construction Company Ltd.	outdoor area 8
CIFA	77
CFT GmbH	A21-A22
CIPA	92bis-103bis
COMACCHIO DRILLING HIGH TECH	73
CONDAT	87
CONTEC FIBER AG	A35
CP TECHNOLOGY	101
CRCHI - China Railway Construction Heavy Industry Co., Ltd	120-121
CREG TBM Germany GmbH	108-109
CREZZA SRL	outdoor area 5bis
CRM - COSTRUZIONI ROMANE MACCHINE Srl	A43
DAI PRA' SRL	B32
Datwyler Sealing Technolgies Deutschland GmbH	110-111
DE CARDENAS FANS & SERVICE SRL	96
Denka Company Limited	A14
DESOI GmbH	A37
DEVICO AS	B3
DIBIT	B12
DMT-Group / GOECKE SCHWELM	91
DSI Underground	64-65
E-BERK	124-125
EDILMAC DEI F.LLI MACCABELLI S.R.L.	A39-A40
ELKUCH BATOR	60
Encardio-Moniterra	26
ENGLO INC	2
ENSER SRL	1
EPC GROUPE	89
Epiroc	123
ETS	B2
FAMA Srl	31
FERROVIE DELLO STATO ITALIANE	outdoor area 7
FIBROCEV	B16
FIP MEC	B31
fischerwerke GmbH & Co. KG	A28
FORTA	9
Galleria di Base del Brennero - Brenner Basistunnel BBT SE	11
GCP Applied Technologies Inc.	A41-A42
GD TEST srl - Geodes srl	16
GEEG & GDG	B19
GEODATA	17
GEODATA & CONSULT	72
GEOKON LLC	B26
GEOLOGIN S.r.l	A38
GEOTUNNEL Srl	103d
GETECH SRL - GENNARETTI CENTRIFUGE	outdoor area 5
GHELLA	12-13
GONAR -Systems International Sp. Z o.o	95
GRYDALE	A34
HBI Haerter - Consulting Engineers	B18
HECO-SCHRAUBEN GMBH & CO. KG	B30
HERRENKNECHT AG	104-105-106-107
HILTI AG	B24
HITACHI RAIL STS	57-58
HODAPP GmbH & Co. KG	118
I.L.E.S.P. Srl	7-8
IMGECO Srl	103e
Immersed Tunnel Specialists	A4-A5
IMPER ITALIA	A36
IMPRESERVICE & AB TUNNELLING	112
InnoTrans 2020	80
ISCHEBECK, FRIEDR. GMBH	B36
ITALFERR S.p.A.	outdoor area 7
JAMES HARDIE EUROPE GMBH, Aestuver	B39-B40
JAPAN TUNNELLING ASSOCIATION	A15

JEAN LUZ SA	83
KOMATSU Mining Corp. Group	B37-B38
KORDSA TEKNİK TEKSTİL A.Ş.	84
LA MATASSINA SRL	B28
LAVIOSA	A17
Leica Geosystems	B1
LIDERROLL	20
LIAONING CENSCIENCE INDUSTRY Co., Ltd	A1
Liebherr-Components AG	69-70
Liebherr-Werk Nenzing GmbH	103c
LOMBARDI	66
LOW&BONAR ADFIL	A26
MAI International GmbH	122
MAPEI SpA	35-36-37
MAPLAD	outdoor area 4
Marti Technik AG	98
MASTER SPRAYING TECHNOLOGY	B13
MAYR	40
MCT ITALY	94
METALLIANCE	88
MIGHTY SHIELD INDUSTRIES Sdn Bhd	81
MINEARC SYSTEM	B5
MINOVA	A31
MIM MÜHENDISLIK ÇELIK END.AŞ.	A21-A22
MM Spa	6
MORETRENCH	A11
NHAZCA S.r.l.	A23
MST Global	19
NINGBO JINTAI FASTENER CO. Ltd	A24
NORMET INTERNATIONAL Ltd	113-114
Northern Light Technologies	B35
NORWEGIAN TUNNELLING SOCIETY - NFF	85-86
OFFICINE MACCAFERRI S.P.A.	outdoor area 6
OPERE SPECIALISTICHE GEOTECNICHE Srl & SOCIETÀ ITALIANA FONDAZIONI SpA	outdoor area 4
PALMIERI GROUP	115-116
PENETRON INTERNATIONAL	34
PINI GROUP	23
PINSSAR	A13
PLANETEK	55
PRETEC	B6
PROCHIN ITALIA	4
PROITER	71
PROMAT- ETEX	14-15
PROMETEOENGINEERING.IT SRL	59
PROTAN AS	97
PUTZMEISTER	B22
RAET	B34
Raising Measurement (Shanghai) CO.,LTD	82
RAMBOLL	54
RBL-REI	90

R.C.M. COSTRUZIONI S.r.l.	A30
RENOLIT	A33
RFI Rete Ferroviaria Italiana	outdoor area 7
RIPAMONTI DR GIANNI SRL	B17
The Robbins Company	67-68
ROBIT	A29
ROBODRILL	outdoor area 5
ROCKMORE INTERNATIONAL Gmbh	56
ROCKSOIL	38
ROWA TUNNELLING LOGISTICS AG	25
ROXARD INDUSTRIES	A21-A22
ROYAL IHC	A27
SANDVIK MINING AND ROCK TECHNOLOGY	5
SCISYS UK Ltd	A16
SEMA	42
SENCEIVE	A7
SIKA SCHWEIZ AG - ALIVA EQUIPMENT	outdoor area 4
SIKA SERVICES AG	78-79
Simatec Maschinenbau AG	99
SINA	3
Sireg Geotech S.r.l.	18
SISGEO S.R.L. - ITALY	B4
SOPREMA SRL	61
SPIE BATIGNOLLES	44
STM	outdoor area 1
SWS	48-49
TELT Tunnel Euralpin Lyon Turin	10
TERRATEC	100
TNL 18	A21-A22
ToughCrete Steel Fibre	B25
TPH BAUSYSTEME GmbH	74-75-76
TRADECC	A32
TRE ALTAMIRA	21-22
TRELLEBORG	B21
TRIMBLE ITALIA	93
TUNELMAK CONSTRUCTION MACHINERY INC.	24
TUNNEL WATERPROOFING	B29
TUNROCK Srl	A21-A22
TURBOSOL	A9
VIP-POLYMERS LTD	A45
VMT GmbH	126
Wacker Chemie AG	A18-A19
WEBAC-Chemie GmbH	B11
W.Giertsen Tunnel - Vikørsta	A6
WIMMER	outdoor area 2
World Tunnel Congress 2020 - The Institution of Engineers Malaysia	B33
WÜRTH	39
ZITRON	52
ZOLLERN GmbH & Co. KG	B9-B10

normet

NORMET.COM

DEFINING THE FUTURE
UNDERGROUND

SECURING A SAFE FUTURE
Adopting safe & sustainable solutions for all underground operations to build the safest places underground

INNOVATING FOR PERFORMANCE
Providing the best process understanding & productivity

PARTNERING FOR THE FUTURE
Co-developing with our customers solutions to fulfil the business needs

EQUIPMENT
SERVICE
CONSTRUCTION CHEMICALS
ROCK REINFORCEMENT

WITH 15,000 ENGINEERS, DESIGNERS AND CONSULTANTS ACROSS 35 COUNTRIES, WE CREATE SUSTAINABLE SOLUTIONS WITHIN BUILDINGS, TRANSPORT, PLANNING & URBAN DESIGN, WATER, ENVIRONMENT & HEALTH,ENERGY, AND MANAGEMENT CONSULTING

BREAKING NEW GROUND (IN TUNNEL ENGINEERING)

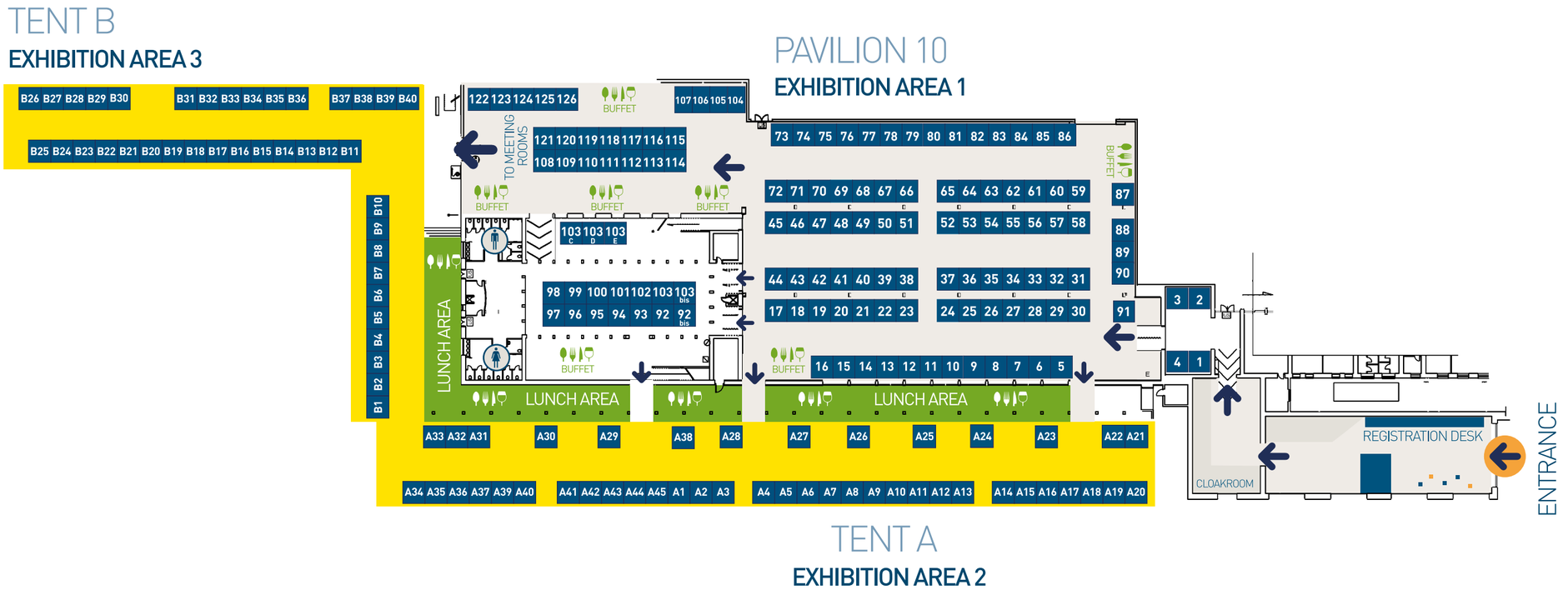
See more at ramboll.com/tunnels

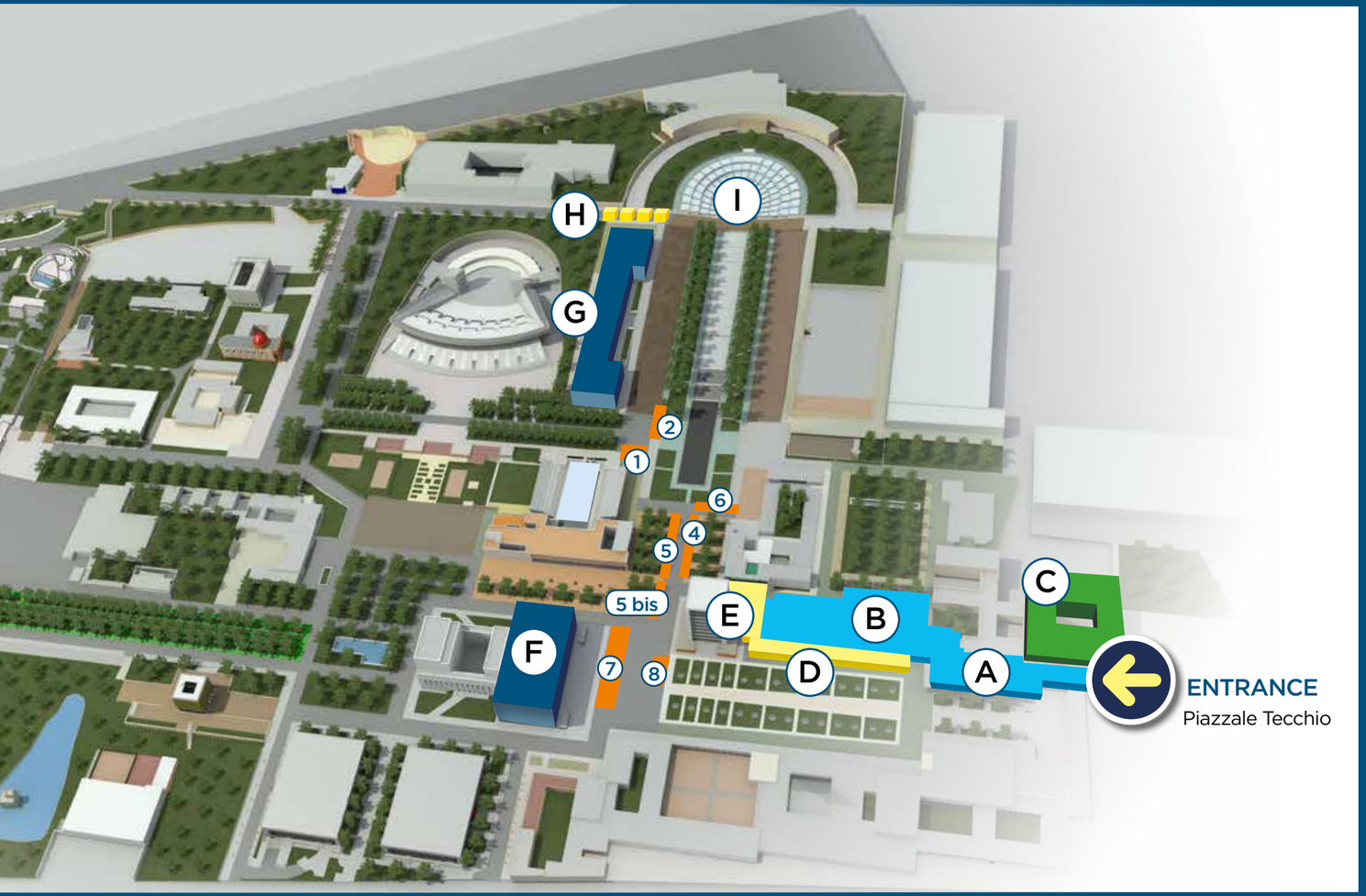
RAMBOLL Bright ideas. Sustainable change.

EXHIBITION HOURS

Exhibition Halls Opening Hours:

MONDAY 6 MAY	10.30-18.00
TUESDAY 7 MAY	08.00-18.00
WEDNESDAY 8 MAY	08.00-17.30

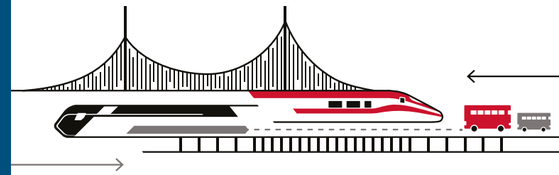




- A REGISTRATION AREA & OFFICIAL MEDIA PARTNERS AREA
- B PAVILION 10 **EXHIBITION AREA 1**
- C **ESEDRA MEETING ROOM**
- D **TENT A EXHIBITION AREA 2**
- E **TENT B EXHIBITION AREA 3**
- F **TEATRO MEDITERRANEO & ITALIA ROOM**
- G **PALACONGRESSI**
- H **TENTS 1-4** MEETING ROOMS
- I **EXEDRA FOUNTAIN**
- 1-8 **OUTDOOR EXHIBITION AREA**

FERROVIE DELLO STATO ITALIANE

A MAJOR GROUP
IN THE MOBILITY INDUSTRY.



TECHNOLOGICAL EXCELLENCE
AT THE SERVICE OF PEOPLE,
FOR AN INCREASINGLY
INTEGRATED TRANSPORT SYSTEM.

WWW.FSITALIANE.IT

FERROVIE DELLO STATO ITALIANE

ITA-AITES WTC 2020
15 - 21 May 2020
Kuala Lumpur, Malaysia

Innovation and Sustainable Underground Serving Global Connectivity

ITA-AITES World Tunnel Congress 2020 and 46th General Assembly

Kuala Lumpur Convention Centre, Malaysia

ITA-AITES World Tunnel Congress (WTC) 2020 and 46th General Assembly is the world's leading tunnelling congress attracting the largest number of tunnelling professionals and thought leaders. It offers the ideal platform to encourage industry learning and growth with its extensive reach and influence across the globe.

WTC 2020 also presents an excellent opportunity for leading international tunnelling companies to showcase innovative tunnelling technology, practices, and contracting methods.

Register your interest in World Tunnel Congress 2020.
Please send more information on:

- ☐ Sponsoring
- ☐ Advertising
- ☐ Submitting technical paper
- ☐ Exhibiting

Please fill in your particulars in the space below and email to:
wtc2020@iem.org.my

Name: _____
Job Title: _____
Company: _____
Address: _____
_____
Tel: _____ Fax: _____
Email: _____

For more information, please contact:

World Tunnel Congress 2020 Secretariat
c/o IEM Training Centre Sdn. Bhd. (0127273K) / SST ID No. B16-1901-32000051
Wisma IEM, First Floor, 21, Jalan Selangor, 46150 Petaling Jaya,
P.O. Box 224 (Jalan Sultan), 46720 Petaling Jaya,
Selangor Darul Ehsan, Malaysia. ✆ +603 7958 6851 +603 7958 2851

An event jointly organised by: Supported by:

www.wtc2020.my

SAVE THE DATE

WTC
COPENHAGEN 2021

WORLD TUNNEL CONGRESS 2021

Copenhagen, Denmark
16-20 May 2021

UNDERGROUND SOLUTIONS FOR A WORLD IN CHANGE

For sponsorship enquires please contact
Peder Andersen, psa@discongress.com

www.wtc2021.dk

DOWNLOAD APP

Wi-Fi

Sponsored by

SWS

DOWNLOAD THE WTC2019 APP AND STAY TUNED DURING THE CONGRESS!

Available on the iPhone App Store

Available on the Android Market

NAME OF NETWORK
wtc2019

PASSWORD
swsengineering