

Time	Lambrakis Hall	Mitropoulos Hall	Skalkotas Hall	MC2 Hall	Poster Area
09:00 - 11:00	<p>OPENING CEREMONY Welcome by Chair of Organizing Committee WTC2023 Welcome by State's Authorities Representatives Welcome by Athens Mayor Welcome by President of Greek Tunnelling Society Welcome by President of ITA-AITES Welcome by President of ITA-AITES Young Members Group ITACET Foundation Awards & GTS Award Welcome by Chair of WTC2023 Scientific Committee</p> <hr/> <p>Round Table Underground Space for Mobility: Frontier Technologies Moderator: Lord Robert Mair Tarcisio Celestino, Martin Knights, Kancheepuram N. Gunalan, Marco Rosso</p> <hr/> <p>Entertainment</p>				
11:00 - 11:30	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break
11:30 - 13:00	<p>Chairs: Arnold Dix, Yiannis Bakoyiannis 13th Muir Wood Lecture: "The Convergence - Confinement Method" Marc Panet</p> <p>Keynote Lecture: "Seismic design and risk assessment of tunnels & underground structures" Kyriazis Pitilakis</p> <p>Official opening of exhibition by ITA President/Organising Committee Chair</p>				
13:00 - 14:00	Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break
14:00 - 15:20	<p>Technical Session 1.1. Knowledge & Passion to Expand Underground for Sustainability & Resilience Chairs: Anna Lewandowska, Panos Spyridis</p> <p>14:00 - 14:20 Managing tunnel infrastructure: a new guideline M. Knights</p> <hr/> <p>14:20 - 14:40 Sustainable and Resilient city: the case study of a hypogeum stadium in a desert area G. Lunardi, P. Lunardi, G. Cassani, M. Gatti, C. L. Zenti</p> <hr/> <p>14:40 - 15:00 What might be our vision of the ecological transition in tunnels and underground spaces for the years to come? L. D'Aloia Schwartzentruber</p> <hr/> <p>15:00 - 15:20 BIM-enabled Carbon Accounting and Integrated Design of Underground Infrastructures X. L. Chen, M. Q. Huang, Q. B. Zhang, R. Wang</p>	<p>Technical Session 6.1. Tunnelling in challenging conditions, Case histories and lessons learned Chairs: Jinxiu (Jenny) Yan, Wout Broere</p> <p>14:00 - 14:20 The second trunk line project - Construction of a deep railway station in the heart of Munich J. Classen, R. Listl</p> <hr/> <p>14:20 - 14:40 Discrete Fracture Network Combined with Discontinuum Based Design for Deep Shafts - Quantifiable Risk Assessment and Design Method I. S. Haryono, P. W. Booth, A. Purwodihardjo, B. Vorster</p> <hr/> <p>14:40 - 15:00 Tunneling through a graphite bearing fracture zone during the expansion of the Stockholm metro to Nacka H. Ittner, M. Roslin, L. Martinsson, C. Iskender, R. Swindell, P. Sunesson</p> <hr/> <p>15:00 - 15:20 Numerical Analysis of the Melbourne Metro Town Hall Station Cavern D. P. Sainsbury, B. Coombes, R. Storry, A. Amon</p>	<p>Technical Session 2.1. Geological, Geotechnical Site Investigation and Ground Characterization Chairs: Petr Salak, George Stoumpos</p> <p>14:00 - 14:20 Innovative assessment methodologies to introduce rock mass behaviour into tunnelling - The legacy of Professor Paul Marinos in the Athens Metro V. Marinos, M. Benissi, G. Rovolis, K. Korkaris, G. Stoumpos, N. Syrtariotis, K. Aggelidaki, I. Papadatos, M. Panteliadou, D. Papouli</p> <hr/> <p>14:20 - 14:40 Characteristic of ground deformation with unsupported tunnel excavation in a sedimentary soft rock H. Takase, K. Namikawa, M. Matsumoto, J. Koseki</p> <hr/> <p>14:40 - 15:00 Contribution of twenty years of exploratory work in the complex carboniferous formation of the Montcenis Base Tunnel J. Senemaud, B. Serrano, C. Salot, M. E. Parisi, L. Brino</p> <hr/> <p>15:00 - 15:20 3D Geo-modelling using geophysical tools to aid injection grouting P. Lane-Nott, J. Whittaker, T. M. A. Delpont, R. S. A. Al-Harthy</p>	<p>Technical Session 3.1. Planning and Designing of Tunnels and Underground Structures Chairs: Tarcisio Celestino, Nikolaos Kazilis</p> <p>14:00 - 14:20 Reducing uncertainty in tunnel design A. Syed, C. Paraskevopoulou, V. Marinos</p> <hr/> <p>14:20 - 14:40 A design approach of large diameter surge shaft and passageway connection between headrace tunnels Ö. Kökten</p> <hr/> <p>14:40 - 15:00 3D numerical modelling of a large shallow cavern in densely built-up area for Sydney Metro S. Azari, D. Tsang, A. R. A. Gomes, R. Nair</p> <hr/> <p>15:00 - 15:20 A numerical investigation of the lining performance of composite SCL tunnels with debonded sprayed waterproofing membrane J. Su</p>	<p>Poster Session 1 <i>(detailed program on page 36)</i></p>
15:20 - 15:50	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break
15:50 - 17:30	<p>Technical Session 1.2. Knowledge & Passion to Expand Underground for Sustainability and Resilience Chairs: Martin Knights, Konstantinos Kirytopoulos</p> <p>15:00 - 16:10 Underground solution for urban resilience: Stormwater management infrastructure A. Kolji, T. Kazerani, G. Questi, J. Senn</p> <hr/> <p>16:10 - 16:30 Carbon footprint emissions of different tunneling construction methods P. Jarast, M. Bakhshi, V. Nasri</p> <hr/> <p>16:30 - 16:50 Preliminary design and socio-economic benefits of a road tunnel construction in the Tzoumerka mountainous area D. Kaliampakos, A. Benardos, P. Nomikos, V. Marinos, I. Zevgolis, E. Vlahogianni, G. Panagiotopoulos, A. Bougas</p> <hr/> <p>16:50 - 17:10 Search for potential Compressed Air Energy Storage sites in Switzerland E. Pimentel, G. Anagnostou, A. Brauchart</p> <hr/> <p>17:10 - 17:30 Urban underground space use in a climate neutral city N. G. Bobylev, D. Guo, A. Benardos</p>	<p>Technical Session 6.2. Tunnelling in challenging conditions, Case histories and lessons learned Chairs: Bill Newns, Kurosch Thuro</p> <p>15:00 - 16:10 TBM Cutter head management sub-sea in the Arabian Gulf G. Peach, H. Vigil</p> <hr/> <p>16:10 - 16:30 Jet grouting treatment for excavating a large tunnel in saturated soil in Norway F. Gallego, W. Summerer</p> <hr/> <p>16:30 - 16:50 Groundwater Control Measures Implemented in Singapore's Deep Tunnel Sewerage System Phase 2 (DTSS2) Project A. K. K. Soe, W. L. Lynn, B. Chionh, K. Khin</p> <hr/> <p>16:50 - 17:10 Construction of the largest road tunnel in Brazil - Tamoios Highway, Caraguatuba, Sao Paulo B. A. Cajueiro</p> <hr/> <p>17:10 - 17:30 Structural Design of Piraeus Port Metro Station D. Alifragkis, E. Gavrielatou, A. Gkavogiannis</p>	<p>Technical Session 2.2. Geological, Geotechnical Site Investigation and Ground Characterization Chairs: Klaus Rieker, Thomas Marcher</p> <p>15:00 - 16:10 Reliability analysis of discrete fracture network projections from borehole to shaft scale discontinuity data C. Brueckman, E. Eberhardt, S. Rogers</p> <hr/> <p>16:10 - 16:30 Observations on the condition of a hydraulic pressure tunnel through an ROV survey S. Lopez, F. Micheli, M. Buestan</p> <hr/> <p>16:30 - 16:50 The management of excavation data in accordance with the WBS for the Mont Cenis Tunnel M. E. Parisi, A. Rajevich, M. Cussino</p> <hr/> <p>16:50 - 17:10 Mapping by pictures: a case study of simplified rock mass classification to improve consistency P. Evins</p> <hr/> <p>17:10 - 17:30 Televiewer defect aperture logging for detailed model development - A case study from the M8, Sydney, Australia H. Baxter-Crawford, A. Lippert</p>	<p>Technical Session 3.2. Planning and Designing of Tunnels and Underground Structures Chairs: Søren Degn Eskesen, Zach Agioutantis</p> <p>15:00 - 16:10 Design Summary and Construction Considerations for the Nagdhunga Tunnel, Nepal T. Tomita, J. Mitsuo, Y. Nozue, R. Asai, N. M. Shakya</p> <hr/> <p>16:10 - 16:30 Consolidation and waterproofing by injection of PU resins. Ilarion Dam - treatment on the spillway tunnel D. Velez, D. Alumbros, D. Carpintero, P. Tsakas, E. Tsaka, K. Sakellariadis, Z. R. Papachatzaki</p> <hr/> <p>16:30 - 16:50 Copenhagen M4 line - safeguarding for future OSD B. North, M. Abrahamsen, F. Munck, E. Paulatto, M. Kjær Jensen</p> <hr/> <p>16:50 - 17:10 Design methodology for tunnel collars assessment under fire load M. De Poli, B. Lafarga</p> <hr/> <p>17:10 - 17:30 Design of porous tunnel for ecosystem protection in High Speed Two railway in UK S. Massinas, M. O'Sullivan, M. Miller, S. Poulin, B. Kayadan, S. Neno, S. Parr, H. Taivo</p>	<p>Poster Session 2 <i>(detailed program on page 38)</i></p>

Time	Trianti Hall	Mitropoulos Hall	Skalkotas Hall	MC2 Hall	MC 3 Hall	Poster Area	
08:30 - 10:30	<p>Technical Session 7.1.</p> <p>Innovation, Robotics and Automation Chairs: Florent Robert, Jamal Rostami</p> <p>8:30 - 8:50 LiDAR Navigation in Underground Openings Z. Agioutantis, V. Androulakis, S. Schafrik, J. Sottile</p> <p>8:50 - 9:10 Storytelling as Collaboration Support for 3D Tunnel Monitoring C. Traxler, K. Chmelina</p> <p>9:10 - 9:30 Automated Tunnel Design with Dynamo and SAP2000 B. A. Boye, M. J. Wilcock</p> <p>9:30 - 9:50 Automation in Segmental Lining Production, use of robots, hydraulically systems and artificial intelligence S. Medel</p> <p>9:50 - 10:10 3D Printing of tunnels D. P. Phillips, T. M. A. Delpoit</p> <p>10:10 - 10:30 Detection system of inner lining cracks for the Athens Metro P. Yiouta-Mitra, L. Lecornu, Z. Mouroutis</p>	<p>Technical Session 6.5.</p> <p>Tunnelling in challenging conditions, Case histories and lessons learned Chairs: Daniele Peila, George Proutzopoulos</p> <p>8:30 - 8:50 Control of water leakages during TBM excavation – An example from the Follo Line tunnel project A. K. Kalager</p> <p>8:50 - 9:10 Geotechnical Challenges of Conventional Tunnelling underneath Sensitive Structures H. Jayarama, S. K. Gupta, C. Jadhav</p> <p>9:10 - 9:30 The use of Fiber Optics for Ground and Tunnel Support Monitoring – Two Decades of Lessons Learned N. Vlachopoulos</p> <p>9:30 - 9:50 Class A predictions of damage level in an historical fortress induced by twin tunnelling D. Boldini, C. Spaggiari, J. K. Abul, S. Fuoco, E. Lusini</p> <p>9:50 - 10:10 Ground freezing for cross-passages in Milan Metro Line 4 G. Lunardi, G. Cassani, M. Gatti, A. Pettinaroli, P. Caffaro, G. Pirro, A. Celot</p> <p>10:10 - 10:30 TBM performance in a complex geology when driving a water conveyance tunnel in Istanbul M. Cinar, F. Kara, N. Bilgin</p>	<p>Technical Session 3.5.</p> <p>Planning and Designing of Tunnels and Underground Structures Chairs: Magali Schivre, Dimitrios Litsas</p> <p>8:30 - 8:50 Using a vermiculite-based fire protection mortar to increase the fire resistance of reinforced concrete tunnels A. Kounadis, N. Anagnostopoulos, P. Douvis, P. Nomikos, A. Benardos, A. N. Tsakiris, E. Katsivelis</p> <p>8:50 - 9:10 Preliminary comparison of the life cycle cost and safety of a single bore bidirectional tunnel including semitransverse ventilation, with a twin bore unidirectional tunnel of the same length longitudinally ventilated G. Angistalis, A. Astrantzis, A. Papamargariti</p> <p>9:10 - 9:30 Planning of the Tel Aviv Metro Network T. Grammenos, M. Sims, L. Samama, G. Nacht</p> <p>9:30 - 9:50 Optimizing the climate impact of tunnel structures by advanced numerical simulations P. Spyridis, K. Bergmeister</p> <p>9:50 - 10:10 Pillar stress estimation: 3D & 2D numerical analysis vs. Tributary Area Theory I. Vlachogiannis, A. Benardos</p> <p>10:10 - 10:30 Numerical simulation of the rock cutting process using the Discrete Element Method A. Kalogeropoulos, T. Michalakopoulos</p>	<p>Technical Session 5.1.</p> <p>Conventional tunnelling, Drill-and-blast applications Chairs: Pekka Nieminen, Tatiana Rotonda</p> <p>8:30 - 8:50 Design and Planning of Excavation Sequence and Blasting Techniques for large UG caverns R. Khalil, N. Bahuguna</p> <p>8:50 - 9:10 Development of Projection Mapping Technique for the Tunnel Face T. Tani, Y. Koga, S. Miyamoto</p> <p>9:10 - 9:30 French Hill Road Tunnels: A Pragmatic Rock Support Approach P. Salak, O. Nathan, O. Koc, A. Paml</p> <p>9:30 - 9:50 Design and Construction of the Deepest Underground Station in Canada V. Nasri, T. Vovou</p> <p>9:50 - 10:10 High temperature ground improvement J. Malone, C. Paraskevopoulou, B. Jones, G. Doukkas</p> <p>10:10 - 10:30 3D numerical investigation of the axial forces acting on tunnel junctions constructed in fractured/weathered to very blocky rockmass F. Chortis, M. Kavvadas</p>	<p>ITACUS SPECIAL SESSION</p> <p>The Way Forward 08:30-08:45 Welcome and Session Opening</p> <p>08:45-09:15 Advocacy and capacity building Abidemi Agwor, Vince Rono, Her Excellency Opunimi Akinkugbe</p> <p>09:15-09:45 Future think Veronika Petschen, Michael Kompatscher</p> <p>09:45-10:15 Collaboration and knowledge building Petr Salak, Marcel't Hart, Konstantinos Karantzoulis</p> <p>10:15-10:30 Session Wrap-up Antonia Cornaro, Han Admiraal</p>		
09:30 - 10:30						Poster Session 5 <i>(detailed program on page 46)</i>	
10:30 - 11:00	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	
11:00 - 13:00	<p>Technical Session 8.1.</p> <p>BIM, Big Data and Machine Learning Applications in Tunnelling Chairs: Hangseok Choi, Ulrich Maidl</p> <p>11:00 - 11:20 The digitalization of the Tunnel Schöneich - Using a Digital Twin to improve operation and maintenance workflows of an existing road tunnel R. Sanfilippo, P. Canini, E. Carrera, M. Neidhart, R. Eberle, M. Wieland</p> <p>11:20 - 11:40 Settlements in NATM tunnels with deep neural networks M. Parra, E. Ochoa-Cornejo, F. Hernandez, G. Corral</p> <p>11:40 - 12:00 Computer Vision and Machine Learning for Cost-effective Fully Automated Visual Inspection of Tunnels: A Case Study E. Panella, J. Lucy, E. Fisk, S. T. Huang, Y. Loo</p> <p>12:00 - 12:20 Deep learning for masonry lined tunnel condition assessment J. Smith, C. Paraskevopoulou, A. Bedi, M. Invernici</p> <p>12:20 - 12:40 BBT, Lot Mules 2-3. Application of Machine Learning on TBM parameters for Risk Prediction tools F. Amadini, A. Flor, M. Secondulfo, D. Baliani, F. Cernera, M. La Morgia, A. Mei, F. Sassi</p> <p>12:40 - 13:00 BIM modelling of underground structures in the design and operation phases. What can we expect? S. Charlemagne, F. Robert, M. Macary, J. Doreau-Malioche, C. Banos</p>	<p>Technical Session 6.6.</p> <p>Tunnelling in challenging conditions, Case histories and lessons learned Chairs: Eric Leca, Alex Schneider</p> <p>11:00 - 11:20 Taxaquara Fault – A complete solution for a complex problem I. J. F. Teixeira, C. V. Chanquini, G. Aguiar, M. Vassalo, C. A. Campanhã, P. França, M. Gurgueira, D. D. Carlo, E. Fecho</p> <p>11:20 - 11:40 Low cover tunnelling under North America's busiest highway A. Gakis, C. Karner, T. Schwind</p> <p>11:40 - 12:00 Water Inrush and Countermeasures at a Tunnel in South-Link Highway, Taiwan T. T. Wang, C. J. Kuo, C. L. Tseng, K. F. Lo, F. Y. Hsiao</p> <p>12:00 - 12:20 Construction of Kalbadevi Underground Metro Station of Mumbai Metro Line 3 by dealing with numerous social and technical challenges in the congested old city - Financial Capital of India A. Rawat, S. K. Gupta, S. Dalvi, R. R. Kumar</p> <p>12:20 - 12:40 Design and construction challenges of deep shafts in chalk R. Sivakumar, A. Maheetharan, M. Bevan, I. Thomas</p> <p>12:40 - 13:00 Lessons Learned During Excavation of the Incredibly Challenging Yin Han Ji Wei Water Diversion Tunnel L. Home, H. He</p>	<p>Technical Session 3.6.</p> <p>Planning and Designing of Tunnels and Underground Structures Chairs: Elena Chirioti, Ioannis Vazaios</p> <p>11:00 - 11:20 Thermal performance of a metro station in Turin equipped with energy geostructures A. Insana, M. Barla, S. Aiassa, F. Antolini</p> <p>11:20 - 11:40 Use of the Tunnel Face Stability Factor in unsupported and supported tunnel faces D. Georgiou, M. Kavvadas</p> <p>11:40 - 12:00 The Glacier Garden in Lucerne gets a new main underground attraction S. Cattori, S. Zingg</p> <p>12:00 - 12:20 Porto Metro Rubi Line – The Design of the Conventional Tunnels in Residual Soils C. Cabral Dias, P. Lamas Alvarez, S. Gomez, V. Silva, J. Dores</p> <p>12:20 - 12:40 The excavation of the Brenner Base Tunnel where the Eurasian and Adriatic tectonic plates collide D. Marini, G. Venditti</p> <p>12:40 - 13:00 The new major railway lines in Southern Italy: planning and design approaches towards sustainable solutions A. Pigorini, A. Sciotti, A. Corbo, G. Quarzicci, A. Romualdi</p>	<p>Technical Session 4.2.</p> <p>Mechanised Tunnelling (and microtunnelling) Chairs: Laurence Delplace, Markus Thewes</p> <p>11:00 - 11:20 Simulation of EPB tunneling using discrete event model: case study of various grounds in Korea J. W. Lee, H. B. Kang, Y. J. Shin, J. H. Jung</p> <p>11:20 - 11:40 TBM excavation underneath a road viaduct and railway lines for Warsaw M2 metro line: 3D modelling and monitoring results M. Minno, L. Ciochetti, F. Capata, V. Capata</p> <p>11:40 - 12:00 Expanding the application range of EPB shields using SolidFoam M. Schröer, N. Gramlich, M. Thewes, L. Langmaack</p> <p>12:00 - 12:20 New service tunnel Kerenzerberg: innovative approach in order to increase the degree of mechanization F. Carrera-Henke, P. Beeler, G. Gubler</p> <p>12:20 - 12:40 On the way to a better performance prediction for small-diameter hard rock TBMs G. Lehmann, H. Käsling, K. Thuro</p> <p>12:40 - 13:00 Estimation of Face Pressure Based on Empirical and Numerical Methods in Mechanized Tunneling A. S. Peker, B. Zengin</p>	<p>WOMEN IN TUNNELLING</p> <p>Picture an underground expert: paving the road to diversity Moderators: Paraskevi Yiouta-Mitra, Chrysothemis Paraskevopoulou</p> <p>Eleytheria Vagli</p> <p>Theodora Vovou</p> <p>Helen Reeves</p> <p>Mark Diederichs</p> <p>Artemis Plemmenou</p> <p>Arnold Dix</p> <p>Sanja Zlatanovic</p> <p>Jinxiu (Jenny) Yan</p>		
						Poster Session 6 <i>(detailed program on page 47)</i>	

Time	Trianti Hall	Mitropoulos Hall	Skalkotas Hall	MC2 Hall	MC 3 Hall	Poster Area	
13:00 - 14:00	Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break	
14:00 - 15:20	Technical Session 8.2. BIM, Big Data and Machine Learning Applications in Tunnelling Chairs: Dimitios Rizos, Jurij Karlovsek 14:00 - 14:20 Tunnel Euralpin Lyon-Turin CO08 – BIM implementation in conventional tunneling F. Rich, C. Giai Via, B. Bitetti, G. Ragazzo, J. Pepiot, S. Lione 14:20 - 14:40 Tunnel 4.0: Managed Digital Twin for Tunnel Operations N. S. Diren, S. Althen 14:40 - 15:00 Development of Penetration Rate Prediction Models for Hard Rock TBM in Construction Phase by Deep Learning and Block Model Techniques: A Case Study in Mae Tang-Mae Ngad Tunnel, Northern Thailand N. Monthanopparat, T. Tanchaisawat, C. Tanomtin 15:00 - 15:20 Multi-Camera-Based Tunnel Segment Detection and Inspection Using Artificial Intelligence A. Boerzel, F. Werres, L. Steinmann, J. Fehrenbach, D. Fehrenbach	Technical Session 9.3. Safety, Risk and Operation of Underground Infrastructure Chair: Konstantinos Sakkas, Carmine Todaro 14:00 - 14:20 Monitoring of compressed air workers during hyperbaric interventions in TBM N. Subbotina, J. Castro, L. Pellegrini, J. Frydman, L. Correa 14:20 - 14:40 ASET Estimation through fire dynamics Simulation for various cases of fire incidents in rail tunnels D. Papakonstantinou, A. Kallianiotis, A. Benardos 14:40 - 15:00 Seismic performance of a major twin tunnel with unreinforced concrete lining: Expert witness study for the needs of arbitration I. Anastasopoulos, G. Gazetas 15:00 - 15:20 Modelling underground mine ventilation characteristics using artificial neural networks M. Karagianni, A. Benardos	Technical Session 7.2. Innovation, Robotics and Automation Chairs: Ross Dimmock, Nikolaos Vlachopoulos 14:00 - 14:20 New development of sprayed concrete with improved waterproofing, durability and sustainability performance K. G. Holter, T. A. M. Hammer, N. H. Trussell 14:20 - 14:40 Continuous advance – developments for a new Herrenknecht TBM J. Tröndle, G. Wehrmeyer, F. Steiner 14:40 - 15:00 Integration of Robotics in underground mining construction works C. Crespo, F. Rodriguez 15:00 - 15:20 Some hydro-mechanical properties of treated sand with colloidal silica G. Spagnoli, G. Tintelnot	Technical Session 4.3. Mechanised Tunnelling (and microtunnelling) Chairs: Stefan Maurhofer, Giovanni Alvarado 14:00 - 14:20 Determination of the flow behaviour of excavated soils – Correlation between consistency and the penetration resistance M. Schröder, M. Thewes 14:20 - 14:40 Influence of chip-size on development of adhesion for conditioned clayey soils A. Carigi, A. Di Giovanni, S. Saltarin, D. Peila, C. Todaro 14:40 - 15:00 Challenges experienced during simultaneous backfill grouting using Single Shield Large Diameter TBM driven in a sharp negative slope V. B. M. Braga, J. C. S. Zapico, V. Tyagi, R. Bono 15:00 - 15:20 Overview of soft ground TBM performance K. Gunnar-Holter, P. D. Jakobsen, K. D. Young, A. Bruland, O. Roset, D. van Oosterhout			Poster Session 7 (detailed program on page 50)
15:20 - 15:50	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	
15:50 - 17:30	Technical Session 8.3. BIM, Big Data and Machine Learning Applications in Tunnelling Chairs: Jurij Karlovsek, Cemal Balci 15:50 - 16:10 Analysing and predicting surface settlements from metro construction using Machine Learning methods K. N. Sioutas, A. Vlachogiorgos, A. Benardos 16:10 - 16:30 Generating a digital twin for tunneling projects during the construction phase F. Hegemann, J. Stascheit, U. Maidl, R. Gangrade, P. Kottke 16:30 - 16:50 Are we ready for TBM tunneling automation? Two strategies to improve model performance S. Mostafa, R. L. Sousa, B. Klink, H. Einstein 16:50 - 17:10 Tunnel Digitalization Center – Beyond BIM in underground construction V. Petschen, R. Brandt, O. Celebi, R. Wyss, N. Elkuch 17:10 - 17:30 Methods for local big data integration to reduce geotechnical uncertainty and risk on subsurface infrastructure projects M. A. Mooney, J. G. Grasmick, R. Gangrade	Technical Session 9.4. Safety, Risk and Operation of Underground Infrastructure Chair: Spyridon Konstantis 15:50 - 16:10 Monitoring daily and seasonal movement of an immersed tunnel W. Broere, X. Zhang 16:10 - 16:30 Tunnel inspections with the aid of high-performance image acquisition tools: an insight on key parameters for a successful detection of structural defects J. Doreau-Malioche, F. Paillette, M. Puglia, P. Spohn, S. Frachon, B. Poli 16:30 - 16:50 Earth, Fire, Water, Wind: Addressing insurance expectations by pro-actively taming the four elements T. Konstantis 16:50 - 17:10 Verification of effectiveness of tunnel face monitoring supportive system using VR on evacuation behavior of workers R. Hase, Y. Mihara, D. Awaji, R. Hojo, S. Shimizu 17:10 - 17:30 Capturing Soil Transition Location Uncertainty in TBM Tunnelling R. Gangrade, J. Grasmick, M. A. Mooney	Technical Session 3.7. Planning and Designing of Tunnels and Underground Structures Chairs: Alexandre Gomes, Marliena Cardu 15:50 - 16:10 The application of DFN modelling to assess the applicability for shaft construction I. Vazaios, C. Hu, J. Bottomley, P. Stakne, G. Williams, D. Warburton 16:10 - 16:30 Tomography based method for investigation of steel fibre distribution in tunnel shotcrete A. Ansell 16:30 - 16:50 Tunnel excavations supported by frozen soil bodies: Lab testing and modelling U. Schindler, S. Chrisopoulos, W. Yan, R. Cudmani 16:50 - 17:10 Final Tunnel Design within 24 hours R. R. E. Vervoorn, A. Santos, A. Khalaf, O. Noureldin 17:10 - 17:30 Significance of Initial Lining on Dynamic Performance of Final Lining for Large Size Cavern S. H. (J.) Choi, W. H. Hansmire, C. Herranz	Technical Session 4.4. Mechanised Tunnelling (and microtunnelling) Chairs: Lars Babendererde, Georgios Angistalis 15:50 - 16:10 Correlation Study between Indentation Indices and Physical-Mechanical Properties of Rocks A. Shaterpour-Mamaghani, H. Copur, C. Balci, D. Tunc, T. Erdogan, E. Dogan, O. Sirin 16:10 - 16:30 From calamity to full compliance - the Rijnlandroute bored tunnel H. Mortier, M. Brugman, Y. Liem, B. van de Water, J. Vervoort, O. Gastebled, S. Giuliani 16:30 - 16:50 The Central Interceptor Project: A complex sewage tunnel network in the city of Auckland G. Giacomini, M. Maffucci, F. Saibene, S. Vittor, D. Goudelis 16:50 - 17:10 Monastiraki Station Main Tunnel temporary lining design, using microtunnels E. Zygouri, D. Bairaktaris 17:10 - 17:30 The washing-out resistance of the two-component grout: a laboratory test campaign C. Todaro, A. Carigi, D. Martinelli, D. Peila			

ITA PLENARY SESSION • TUESDAY, MAY 16, 2023

Time	Trianti Hall
08:30 - 10:00	<p style="text-align: center;">ITA Plenary Session, Part I Presentation of WGs and Committees report</p> <p style="text-align: center;">OPENING Arnold Dix, <i>ITA President</i></p> <hr/> <p style="text-align: center;">Rock Support for mechanically bored tunnels Sindre Log, <i>ITAttech</i></p> <hr/> <p style="text-align: center;">Guideline for radially installed bolts in Tunnelling Günther Volkmann, <i>ITAtec</i></p> <hr/> <p style="text-align: center;">Logistics aspects of long and deep tunnels Magali Schivre, <i>WG17</i></p> <hr/> <p style="text-align: center;">An owner's guide to submerged floating tunnels Marcel't Hart, <i>WG11</i></p> <p style="text-align: center;">Walter Grantz memorial</p> <hr/> <p style="text-align: center;">Code of practice for risk management of tunnels works - 3RD edition Patrick Bravery, <i>ITA- IMIA</i></p> <hr/> <p style="text-align: center;">Presentation of the work of the task force on possible restructuring of the Working Groups Jamal Rostami, <i>ITA Vice President</i></p>
10:00- 10:15	<p style="text-align: center;">SPECIAL PRESENTATION CERN Existing and Future Tunnels John Osborne</p>
10:15- 10:45	<p style="text-align: center;">Coffee Break</p>
10:45 - 13:00	<p style="text-align: center;">ITA Plenary Session, Part II Underground infrastructures to strengthen resilience and reduce vulnerability to climate change</p> <p style="text-align: center;">OPENING Arnold Dix</p> <hr/> <p style="text-align: center;">Introduction Presentation of the WG 20 report: Urban Underground Space for resilient cities Wout Broere (WG20)</p> <hr/> <p style="text-align: center;">Round Table 1 Building Resilient infrastructures – New materials, examples from China, US and Italy Benoit de Rivaz, Hongwei Huang, Nasri Munfah, Daniele Peila</p> <hr/> <p style="text-align: center;">Round Table 2 Tunnels part of city resilience – examples from India, Portugal, Canada, New Zealand, Norway A.K. Dinkar, Goncalo Diniz, Giuseppe Gaspari, Matt Mules</p> <hr/> <p style="text-align: center;">Round Table 3 Planning the future – How underground space is used in selfsustaining communities, Mission Earth first, use of subsurface in Cities Climate plans, resilience towards natural disasters (earthquake) Antonia Cornaro, Nikolai Bobylev, Suresh Sharma</p> <hr/> <p style="text-align: center;">Conclusion ITA Committee on Sustainability Tommy Olsen, Arnold Dix</p>

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POSTER SESSION 1

Monday, May 15, 2023 🕒 14:00 – 15:00 📍 Poster Area

Poster Station A**14:00 - 14:20**

PP_Theme01_01: Low-carbon ground support design for an underground tunnel crossover with a narrow roof pillar in a road tunnel project in Sydney, Australia

S. Thirukumaran, D. Oliveira, M. Sheffield

14:20 - 14:40

PP_Theme01_02: Shafts and spiral tunnels for heat storage – an economic study on ideal geometries

S. Messerklinger, M. Smaadahl, E. Saurer

14:40 - 15:00

PP_Theme01_03: Low Carbon Lining for Tunnelling Precast Segment – How Dramix® Fibre Reinforced Concrete Could Facilitate this Achievement

B. De Rivaz

Poster Station B**14:00 - 14:20**

PP_Theme01_04: The New Line 16 Sao Paulo Metro and Best use of zero-carbon technology

H. C. Rocha, F. M. Pontes, D. L. C. Lima

14:20 - 14:40

PP_Theme01_05: Final Design Considerations for the Major Rehabilitation of the Montreal Lafontaine Tunnel

J. Habimana, B. Amara, R. Showbary, L. Rus

14:40 - 15:00

PP_Theme01_06: Advancement of Conventional Cost Benefit for Selection of Truly Sustainable Infrastructure Alternatives

T. Kondrachova, G. Grasselli, E. Miller

Poster Station C**14:00 - 14:20**

PP_Theme01_07: A look at embodied carbon in segmental tunnel lining

J. P. Banyai, A. Caspersen

14:20 - 14:40

PP_Theme01_08: Traceability and environmental follow-up of excavated materials – learnings from implementation experiences with bigger projects

C. Villette, T. Dumas

14:40 - 15:00

PP_Theme01_09: Environmental profile of bentonite drilling fluids for civil engineering applications

S. Padulosi, D. F. Putzu, N. Bartolini, D. Sebastiani, M. Cinelli, S. Mangifesta, I. Bavasso

Poster Station D**14:00 - 14:20**

PP_Theme02_01: Acceleration of soft ground with tunnels near soft-hard strata interface: longitudinal shaking

Y. Yong, L. Siming, X. Mingqing

14:20 - 14:40

PP_Theme02_02: Geotechnical analysis of adapted permeation and compaction grouting techniques for detailed design and construction of underground structures

T. M. A. Delport, J. A. S McCosh, K. M. Nowak

14:40 - 15:00

PP_Theme02_03: Geostatistical modelling of geotechnical properties in the context of a tunneling project: application to the Grand Paris Express project (France)

L. Lacherade, A. Marache, A. Denis, I. Halfon, L. Closset, J. Rohmer, F. Quesnel

Poster Station E**14:00 - 14:20**

PP_Theme02_04: Acoustic emission of calcitic and dolomitic rock specimens during uniaxial compression tests

M. A. Lotidis, P. P. Nomikos

14:20 - 14:40

PP_Theme02_05: Innovative and conventional geophysical investigations at the Hamza Bey (Alcazar) monument in Thessaloniki, Greece

G. N. Tsokas, P. I. Tsourlos, G. Vargemezis, A. Stampolidis, E. Athanasiou, C. Raptis

POSTER SESSION 1

Monday, May 15, 2023 🕒 14:00 – 15:00 📍 Poster Area

14:40 - 15:00

PP_Theme02_06: Hydrogeology of the Brenner Base Tunnel in the Italian section: observed inflows and forward monitoring procedures
P. Perello, S. Skuk, A. Spaziani, A. Voza

Poster Station F

14:00 - 14:20

PP_Theme03_01: Comparing the issues, risks and levels of geotechnical investigation for remote hydropower tunnels with urban transportation tunnels
A. G. Noble

14:20 - 14:40

PP_Theme03_03: Parametric analysis of shotcrete lining capacity using an improved Compressive Membrane Action model
E. S. Bernard, R. Winterberg

14:40 - 15:00

PP_Theme03_02: Pre-Cast Tunnel Linings for Hydropower Tunnels: Advantages and Successes
D. Brox, R. Grandori

Poster Station G

14:00 - 14:20

PP_Theme04_01: The assessment of intact rock strength for penetration
H. Wannenmacher, P. Hamdi, F. Amann, T. Marcher, T. Frühwirt

14:20 - 14:40

PP_Theme04_02: Innovation and application of triple-mode shield machine/TBM
C. P. Zhong, W. B. Zhu

14:40 - 15:00

PP_Theme04_03: Study on the cutter wear based on the cutterhead working status monitoring system in TBM tunnelling
Q. Gong, X. Xie, F. Wu, J. Liu, H. Xing, H. Ren, H. Zhang, Y. Xiao

Poster Station H

14:00 - 14:20

PP_Theme09_02: Risk Management in Outfall Tunnelling, the MPSO Tunnel, Doha, Qatar
J. B. Stypulkowski, A. M. Najder Olliver, K. S. F. S. Al-Khayareen

14:20 - 14:40

PP_Theme09_03: Development near Underground Rail Corridors –Engineering Assessment with Case Studies
J. Pan, A. Kuras, N. Loganathan

14:40 - 15:00

PP_Theme09_04: Experimental study on macro synthetic fibre reinforced concretes subjected to tunnel fires
T. Clarke, S. Fragomeni, M. Guerrieri

Poster Station I

14:00 - 14:20

PP_Theme09_05: A 3D numerical study of sprayed concrete lined junctions
A. Keneti, A. Thomas, B. Sainsbury

14:20 - 14:40

PP_Theme09_01: Correlation of ROV Observations with Actual Damage in the Tala Headrace Tunnel
D. Brox, S. Wangdi, L. Namgyal

14:40 - 15:00

PP_Theme09_06: Influence of grouting on recovery of longitudinal differential settlement of shield tunnel lining
Y. S. Hua, H. W. Huang, D. M. Zhang, P. D. Li

Poster Station J

14:00 - 14:20

PP_Theme03_04: Study of a large opening in a retaining wall by a TBM: consequences on the ground and the structures, structural reinforcement solutions and impacts on neighboring constructions.
E. Charanton, L. Marchese, N. Noroozpour

14:20 - 14:40

PP_Theme03_05: Tunnel Euralpin Lyon Turin C08- Design of temporary support profile of base tunnels and cross-passages
A. Ettaouil, G. Ragazzo, J. Piepot, B. Bitetti, L. Peano, F. Rich

14:40 - 15:00

PP_Theme03_06: Advanced semi-probabilistic methods for the design and assessment of concrete tunnel linings
P. Spyridis, L. Novák, D. Novák, K. Bergmeister

POSTER SESSION 2

Monday, May 15, 2023 🕒 15:50 – 17:10 📍 Poster Area

Poster Station A

15:50 - 16:10

PP_Theme03_07: Tunnelling in the Desert, Wakrah and Wukair Tunnel, Doha, QatarJ. B. Stypulkowski, A. M. Najder Olliver, K. S. F. S. Al-Khayareen

16:10 - 16:30

PP_Theme03_08: Numerical analysis of the effects of grouting on mitigating the risk of hydraulically induced failure during deep shaft excavationJ. Šaponjić, S. Radovanović, N. Divac, D. Divac

16:30 - 16:50

PP_Theme03_09: Design and Construction of Underground Infrastructure at AirportsL. J. Pakianathan

16:50 - 17:10

PP_Theme03_10: Curved diaphragm wall construction: A case study on the challenges facedK. P. Lim, K. Kaliaperumal, X. Zheng, Y. Zheng

Poster Station B

15:50 - 16:10

PP_Theme03_11: Interaction between underground works and deep foundations. A risk assessment approachJ. V. Cruanyes Gavilà, M. Becerril Muñoz, P. Ramírez Rodríguez, P. Ingram

16:10 - 16:30

PP_Theme03_12: The Traditional Method of Madrid – a 2D SSI approach calibrated via 3D modellingC. Cabral Dias, A. Gonzalez Villavicencio, J. Masagué Martín

16:30 - 16:50

PP_Theme03_13: Effective use of fibres of various types and material for shotcrete in rock support for tunnelsA. Sjölander, A. Ansell, E. Nordström

16:50 - 17:10

PP_Theme03_14: Rehabilitation of an existing water supply gallery network built in the early 1970sA. Nicolle, A. Wohnlich, B. Quigley, A. Arigoni

Poster Station C

15:50 - 16:10

PP_Theme01_10: Resins filling injections of an extensive system of voids behind the final lining of Monte Baldo highway tunnelM. Mazzola, M. Giordano, C. Alessio, B. Spigarelli, C. Ghilardi

16:10 - 16:30

PP_Theme01_11: Autostrade per l'Italia (ASPI) TRS Tunnel Renewal Strategy: the cases of Castello 1 left, San Fermo right and Colle Marino left tunnelsM. Mazzola, M. Giordano, C. Alessio, B. Spigarelli

16:30 - 16:50

PP_Theme01_12: ADVANTEX: Research of innovative tools to support the logistics of use of excavation materials produced by the Lyon-Turin railway line for the best sustainability and circular economy of the processA. Fantilli A., M. Cardu, A. M. Lingua, P. Marini, J. M. Tulliani, M. Rocca, R. Scevaroli

16:50 - 17:10

PP_Theme01_13: Practical countermeasures for road tunnels against collapse of lining caused by earthquakeA. Kusaka, N. Isago, K. Kawata

Poster Station D

15:50 - 16:10

PP_Theme02_07: Optimization of electrical resistivity survey utilizing harmony search algorithm to predict anomalous zone ahead of tunnel faceY. Yoon, M. Kang, J. Lee, Y. Choe, H. Choi

16:10 - 16:30

PP_Theme02_08: Rheological Properties of Artificial Sandy Soil Conditioned with Foam and PolymerB. Hwang, J. Kwak, D. Lee, A. Bae, H. Choi

16:30 - 16:50

PP_Theme02_09: Laboratory experiments for hazardous ground prediction ahead of a TBM tunnel face based on resistivity and induced polarizationM. Kang, J. Lee, S. Park, K. Kwon, H. Choi

POSTER SESSION 2

Monday, May 15, 2023 15:50 – 17:10 Poster Area

16:50 - 17:10

PP_Theme02_10: Which tests for a rapid geotechnical characterization of excavated materials for use as concrete aggregates? Application to the Lyon Turin base Tunnel
A. Cherrey, D. Chamoley, J. Vennat, P. Schriqui, J. Blache

Poster Station E**15:50 - 16:10**

PP_Theme04_04: Analysis of annular grouting in tunnels tail void with gap by an interface model
A.H. Ahn, A. Pouya, G. C. Cho

16:10 - 16:30

PP_Theme04_05: New Technology of readily biodegradable soil conditioning foaming agents
M. A. Sposetti

16:30 - 16:50

PP_Theme04_06: Dispersion of fine-grained soils in slurry shield tunnel excavation
J. Fillibeck, U. Schindler, R. Cudmani

16:50 - 17:10

PP_Theme04_07: Computational modelling of artificial ground freezing in mechanized tunnelling
R. J. Williams, A. Alsahly, G. Meschke

17:10 - 17:30

PP_Theme04_08: Semi-Analytical Approach to Estimate Slurry Penetration in Highly Permeable Soils
A. Wiendl, J. Fillibeck, R. Cudmani

Poster Station F**15:50 - 16:10**

PP_Theme07_01: Automating fault identification along the HS2 Chilterns tunnel alignment from aerial LiDAR scanning
G. Sercombe, C. Paraskevopoulou, A. Bedi, I. Vazaios

16:10 - 16:30

PP_Theme07_02: Utilising remote sensing to digitally map discontinuities in tunnelling
A. Allen, C. Paraskevopoulou, J. Smith, A. Bedi, M. Invernici

16:30 - 16:50

PP_Theme09_07: Statistical interpretation of tunnel project

characteristics and their influence on technical risks - current and future challenges
C. Paraskevopoulou, P. Spyridis, D. Proske, G. Doulikas

Poster Station G**15:50 - 16:10**

PP_Theme05_01: A framework to assess the expected utility of the observational method
T. P. Roper, J. Karlovšek

16:10 - 16:30

PP_Theme05_02: Origin of the vibrations induced by tunnels' excavation
M. Cardu, C. Todaro

16:30 - 16:50

PP_Theme05_03: Correlation between the Round Panel test and the Barcelona test for the control of shotcrete reinforced with fibers in tunnels
S. Carmona, C. Molins, C. Parada

16:50 - 17:10

PP_Theme05_04: Face stability of tunnels under the groundwater level: comparison of existing theories and introduction of a new analytical method calibrated on 3D FEM calculations
D. L'Amante, G. Fantauzzi

Poster Station H**15:50 - 16:10**

PP_Theme09_08: Numerical analysis of rehabilitating an existed tunnel by grouting with different grouting volumes considering soil spatial variability
Z. W. Ye, J. Z. Zhang, D. M. Zhang, H. Shao

16:10 - 16:30

PP_Theme09_09: Shaking table test of fault site effect on seismic response of fault-crossing tunnels
R. H. Li, Y. Yuan, X. Zhao

16:30 - 16:50

PP_Theme09_10: Experimental study on ultimate bearing capacity of shield tunnel segments under unloading conditions
K. P. Zhang, X. H. Zhang, Q. Zhang, Z. C. Pei, L. Z. Qi

POSTER SESSION 2

Monday, May 15, 2023 15:50 - 17:10 Poster Area

16:50 - 17:10

PP_Theme09_11: Experimental study on ultimate bearing capacity of the stagger-jointed shield tunnel reinforced by steel plate

X. Zhang, Z. Pei, K. Zhang

Poster Station I

15:50 - 16:10

PP_Theme09_12: A probabilistic approach to evaluate the seismic loss of metro tunnels in Shanghai City

Z. K. Huang, D. M. Zhang, W. D. Zhou, K. Pitilakis, G. Tsinidis, S. Argyroudis

16:10 - 16:30

PP_Theme09_13: Time-dependent reliability assessment of shield tunnel considering corrosion of segment reinforcement and joint bolts

D. M. Zhang, Z. K. Huang, W. D. Zhou, C. C. Chen, Y. Tong

16:30 - 16:50

PP_Theme09_14: Seismic Experiment of Tunnel-group Metro Station in Rock Site

R. Li, Y. Yuan

16:50 - 17:10

PP_Theme09_15: Role of variable speed drives in safe, reliable and sustainable tunnel ventilation

M. Fedorovicheva

Poster Station J

15:50 - 16:10

PP_Theme10_01: Project Alliances: Do they work for tunneling projects?

M. Xanthouli, C. Kerber, N. Khokhar

16:10 - 16:30

PP_Theme10_02: Contractual Practices & Project Management: TELT Time Adjustment Mechanism

M. Bertrand, A. Fontana, C. Salot, C. Dumoulin, M. Macary

16:30 - 16:50

PP_Theme10_03: Development of a Project Objective and Requirement System (PORS) for major infrastructure projects to align the interests of all the stakeholders

S. C. Becker, P. Sander



POSTER SESSION 3

Tuesday, May 16, 2023 🕒 14:00 – 15:00 📍 Poster Area

Poster Station A**14:00 - 14:20**

PP_Theme01_14: Waterproof sprayed concrete with improved sustainability performance
E. S. Moe, K. G. Holter, H. Strømsvik

14:20 - 14:40

PP_Theme01_15: Mixed use potential of existing road tunnels for conveying water for hydropower generation: A case study of motorway tunnels in Swat, Pakistan

A. Riaz, A. Hussain, M. Ajar, Z. Ud Din

14:40 - 15:00

PP_Theme01_16: Experimental study on cyclic shear behavior of biopolymer-treated soil as a tunnel backfill material

D. Y. Park, M. H. Lee, G. C. Cho, I. H. Chang

Poster Station B**14:00 - 14:20**

PP_Theme06_01: Anti-soil ingress for immersion joints

H. Mortier, P. Menge, P.-J. Verdonck

14:20 - 14:40

PP_Theme06_02: Tunneling with low rock cover within tight geometric constraints

M. Abrahamsen, R. Alves, C. Cátedra

14:40 - 15:00

PP_Theme06_03: Extending Immersion Technology for the First Immersed Tunnel in the Alps

M. Ø. Sørensen, S. Sterkenburgh, J. Bubel

Poster Station C**14:00 - 14:20**

PP_Theme06_04: Experiences and challenges during the implementation of the Blominmäki sewage tunnels, Espoo, Finland

I. Konstantas, C. af Hällström, J. Salmelainen, J. Paajanen, J. Yli-Kuivila

14:20 - 14:40

PP_Theme06_05: Grand Paris Express Line 16-1: difficulties of mining under a rail junction into a steel bell

L. Carlos, F. Grisel, G. Pini

14:40 - 15:00

PP_Theme06_06: Geotechnical assessment of ground surface settlements induced by microtunneling construction. Case study: Pikrodafneza stream.
P. Matsouliadis, C. Stratakos, A. Ntountoulakis

Poster Station D**14:00 - 14:20**

PP_Theme06_07: Ground settlements induced by tunneling in soft and variable rock formations. Observed performance of SEM tunnelling for a section of Athens Metro - Line 3.

A. Alexandris

14:20 - 14:40

PP_Theme06_08: Numerical simulation of circular tunnel intersections in anisotropic rock mass

A. Zafeiropoulos, P. Nomikos

14:40 - 15:00

PP_Theme06_09: The Icelandic Glacier Tunneling System

H. Ö. Arngrímsson, R. Sævarsson

Poster Station E**14:00 - 14:20**

PP_Theme06_10: Construction of Platform Tunnel by Conventional Tunnelling below Heritage Buildings

P. Singh, R. Mittal, S. K. Gupta, A. H. Khan

14:20 - 14:40

PP_Theme06_11: Tunnel construction under dense urban agglomeration - The Dwarka Najafgarh Metro Corridor

A. Sahu, A. Kumar

14:40 - 15:00

PP_Theme06_12: Conventional Excavation for widening of TBM bored tunnel by mechanical means for Shitladevi Station, Mahim

S. Vishwakarma, A. K. Rai, R. R. Kumar, D. Binnar, A. D. Shinde

POSTER SESSION 3

Tuesday, May 16, 2023 14:00 – 15:00 Poster Area

Poster Station F

14:00 - 14:20

PP_Theme07_03: The use of an Innovative Fiber Optic Methodology to Capture the Axial Response of Rib Spacing and Grout Annulus Effects on Grouted Rock Bolts
K. S. Moore, N. Vlachopoulos

14:20 - 14:40

PP_Theme07_04: Underground Replacement of a 100 Year Old Tunnel using the Sequential Demolition Method
G. J. E. Kramer, J. Habimana

14:40 - 15:00

PP_Theme07_05: Compressible linings solutions: a multi-scale mechanical and technical demonstration up to a full 6m diameter surface loading "accelerator" device
J. Zghondi, G. Armand, L. Kerner, B. Terrade, N. Dias, J. M. Bosgiraud

Poster Station G

14:00 - 14:20

PP_Theme07_06: Innovative Steering of Tunnel Boring Machines
E. Nathanson, S. Mauerberger, G. Wehrmeyer

14:20 - 14:40

PP_Theme07_07: Long-term structural behavior of inner-city segmental tunnel linings investigated by an innovative structural monitoring
F. Rauch, O. Fischer

14:40 - 15:00

PP_Theme07_08: Innovative methodology for advanced structural condition assessment of tunnels
A. Parasyris, D. Bairaktaris

Poster Station H

14:00 - 14:20

PP_Theme08_01: Deep learning methods for underground deformation time-series prediction
E. Ma, M. Janiszewski, M. Torkan

14:20 - 14:40

PP_Theme08_02: 3D Numerical Simulation of TBM Excavation for Predicting Surface Settlements - State of the Art
B. Kratz, P. Jehel, M. Tatin

14:40 - 15:00

PP_Theme08_03: Safety level assessment of segmental linings in rock
N. Gottardi, S. Freitag, G. Meschke

Poster Station I

14:00 - 14:20

PP_Theme08_04: TunAID - Interactive simulation-based tunnel track design tool for mechanized tunneling in urban areas
Y. Zendaki, B. T. Cao, A. Alsahly, S. Freitag, G. Meschke

14:20 - 14:40

PP_Theme08_05: Data Science in TBM Tunneling: Use Cases, Benefits and Challenges
K. Glueck, K. Glab, J. Tröndle

14:40 - 15:00

PP_Theme08_06: Digital strategies and technologies in the management of existing railway tunnels
F. Forja, E. Moschetti, M. Calicchio, V. M. Grigoras, B. Boyaci

Poster Station J

14:00 - 14:20

PP_Theme09_16: Decision support tool for resilience assessment of road tunnels
K. Anastassiadou, U. Bergerhausen, F. Lindström, C. Zulauf

14:20 - 14:40

PP_Theme09_17: Seepage mitigation in karst with customised grouting techniques; the rehabilitation case of Enguri pressure tunnel, Georgia
E. Christakis

14:40 - 15:00

PP_Theme09_18: Engineering Correlations for Critical Velocity Estimation in Road Tunnel Fires: A Comparative Assessment using CFD Tools
G. Papadima, D. I. Kolaitis

POSTER SESSION 4

Tuesday, May 16, 2023 15:50 – 17:10 Poster Area

Poster Station A

15:50 - 16:10

PP_Theme01_17: ATG Ceneri Base Tunnel: Driving Method and Production of Concrete Aggregates
E. Catelli, P. Lanfranchi

16:10 - 16:30

PP_Theme01_18: On the mechanical behavior of underground pipeline with separated joints rehabilitated by cured in place pipe
K. J. Shou, J. M. Hsu

16:30 - 16:50

PP_Theme02_11: Equivalent Material Modelling of Fractured Rock Mass Resonance Effects
H. T. Holmes, C. Paraskevopoulou, M. Hildyard, K. Neaupane, D. P. Connolly

16:50 - 17:10

PP_Theme02_12: Tunnel portal design optimisation in tectonically disturbed and weathered gneissic rock masses
F. Kritikou, C. Paraskevopoulou, V. Marinos

Poster Station B

15:50 - 16:10

PP_Theme03_15: Structural safety of tunnels in case of fire based on CFD simulations
M. Filus, T. Pappou, B. Protopsaltis, K. Diakakis, A. Giskas, K. Stokos

16:10 - 16:30

PP_Theme03_16: Effect of the rock mass disturbance due to the tunnel excavation on the tunnel loading, based on numerical simulation
D. Georgiou, A. Benardos, P. Nomikos

16:30 - 16:50

PP_Theme03_17: Tunnel design guideline in cases of tunnel face pre-support by fiberglass nails and / or forepoling umbrella
D. Georgiou, G. Georgakopoulos, E. Diakoumi, A. Malandraki

16:50 - 17:10

PP_Theme03_18: Effect of rock heterogeneity on the Convergence-Confinement curve during numerical analysis of underground excavation in discontinuous rock mass
N. Lathourakis, P. Yiouta - Mitra

Poster Station C

15:50 - 16:10

PP_Theme03_19: TBM excavation under existing operation railway: a practical example applied to the Brenner railway
C. Iasiello, M. Aganetti, D. Maturi, D. Buttafoco, V. Perrotta Orgnani

16:10 - 16:30

PP_Theme03_20: Circular economy and reuse of excavated materials from TBM excavations
D. Sebastiani, I. Bavasso, M. Amici, N. Valiante, M. Di Nauta, M. Santamicone, G. De Carli

16:30 - 16:50

PP_Theme03_21: Influence of Construction Joints on the Mechanical Behavior of Linings in Mountain Tunnels Acted on by External Forces
K. Kawata, R. Okawa, R. Nakazato, T. Natsume, N. Isago, A. Fujii

16:50 - 17:10

PP_Theme03_22: Effect of spatial heterogeneity of geomechanical properties on stability of tunnel face
Y. Okazaki, T. Fukuma, M. Ohya, S. Morimoto, H. Hayashi, M. Shinji

Poster Station D

15:50 - 16:10

PP_Theme04_09: A non-conventional system for TBM recovery: abandonment of the shield and underground disassembly of the mechanical equipment and inner structures
P. F. Coto, F. Domínguez Mayans, P. García de Haro, G. Zonghua, Y. Zhuangzhi

16:10 - 16:30

PP_Theme04_10: Development of a tension-resistant single pass segmental lining in high pressure tunnels. The experience of Snowy 2.0 (Australia)
N. Valiante, H. Elgarhi, F. Lazzarin, R. Crapp, R. Stucchi

16:30 - 16:50

PP_Theme04_11: Tunnel linings made of precast concrete segmental rings - from design choice to installation and performance
D. Marini, G. Venditti

POSTER SESSION 4

Tuesday, May 16, 2023 15:50 – 17:10 Poster Area

16:50 - 17:10**PP_Theme04_12:** Single and two-component grout as high-performance backfilling materialsA. Di Giulio, M. Di Felice, N. Valiante, G. De Carli**Poster Station E****15:50 - 16:10****PP_Theme05_05:** 3D numerical investigation of the bending moments acting on tunnel junctions constructed in fractured/weathered to very blocky rockmassF. Chortis, M. Kavvadas**16:10 - 16:30****PP_Theme05_06:** Challenges faced during conventional tunneling in urban environment – Mumbai Metro Line 3A. Dorugade, G. Raju, S. Gupta**16:30 - 16:50****PP_Theme05_07:** Investigation of microfine cement both rheological properties and permeation in soilsK. Boschi, R. P. Castellanza, C. G. di Prisco, D. Grassi**16:50 - 17:10****PP_Theme05_08:** Blasting and vibration control for hard rock shafts in urban centersI. J. F. Teixeira, C. V. Chanquini, F. Abreu, P. Messa, L. B. Partelli**Poster Station F****15:50 - 16:10****PP_Theme06_13:** Tunneling Construction Challenges on Mumbai Coastal Road ProjectV. Surana, J. D. Celentano, G. V. R. Raju, M. M. Swami**16:10 - 16:30****PP_Theme06_14:** Semi-Analytical Prediction of Ground Surface Settlements due to EPB Tunnelling in KolkataH. Jain, T. G. Sitharam**16:30 - 16:50****PP_Theme06_15:** Construction of Headrace Tunnel of Vishnugad-Pipalkoti HE Project (444MW) in Extreme Geological Conditions: Issues and Challenges-A Case StudyR. K. Khali, S. Potnis**16:50 - 17:10****PP_Theme06_16:** Classification of fault zones in mechanized tunneling projectsF. Shayan, A. Uromeie, J. Hassanpour**Poster Station G****15:50 - 16:10****PP_Theme06_17:** The successful crossing of an extended fault zone in carboniferous squeezing rocks: a practical case from TELT's SMP4 construction siteM. Calorio, F. Franchetti, L. Rew, A. Counilh, A. Saitta, B. Serrano, C. Salot**16:10 - 16:30****PP_Theme06_18:** An integrated design approach for the renovation of masonry railway tunnels of Central Italy with ARCHITA and MIRETF. Foria, S. Gazzola, M. Calicchio**16:30 - 16:50****PP_Theme06_19:** North-West road bypass of Merano - South Tyrol - ItalyG. Barovero, M. Moja, E. M. Pizzarotti, F. Prati, J. Strimmer**16:50 - 17:10****PP_Theme06_20:** Design criteria for caverns under high stress rock conditions for Snowy 2.0 Power Station ComplexS. Khodr, P. L. Tonioni, P. Lignier, A. Lambrughi, M. Diederichs, I. Ching, F. Lazzarin**Poster Station H****15:50 - 16:10****PP_Theme07_09:** New products for rapid refurbishment of existing tunnelsD. Michelis, E. Dal Negro**16:10 - 16:30****PP_Theme07_10:** A new approach to measure the stress level in tunnel linings of the Italian highway networksG. Ascari, A. Dalle Fratte, A. Terraneo, C. Alessio, L. Baccolini**16:30 - 16:50****PP_Theme07_11:** Mobile mapping systems and Algorithms for Italian Tunnel AssessmentF. Iacobini, A. Pranno

POSTER SESSION 4

Tuesday, May 16, 2023 🕒 15:50 – 17:10 📍 Poster Area

16:50 - 17:10**PP_Theme07_12: Automation of tunnel lining construction with Self-Compacting Concrete: full-scale experiment and numerical simulation**K. Kato, H. Koyama, T. Hiromitsu, S. Fujiwara, C. Kuroda, N. Utagawa, T. Ono, Y. Uno**Poster Station I****15:50 - 16:10****PP_Theme08_07: Soft Ground Tunnel Lithology Classification using Resampling and Supervised Learning**K. Kilić, H. Ikeda, T. Adachi, Y. Kawamura**16:10 - 16:30****PP_Theme08_08: Development of simple floating dust sensor during tunnel construction using video image sequences – algorithm of automatic particle recognition**K. Tanaka, S. Nakashima, H. Hayashi, M. Shinji, K. Ide, N. Kishida**16:30 - 16:50****PP_Theme08_09: Development of a Ground Forecasting System Based on the Geological and Groundwater Conditions in Mountain Tunneling**T. Fukuda, S. Yoshikawa, K. Hosono, S. Iwanaga**16:50 - 17:10****PP_Theme08_10: Automated semantic segmentation of 3D point clouds of railway tunnel using deep learning**J. Park, B.-K. Kim, J. S. Lee, M. Yoo, I.-W. Lee, Y.-M. Ryu**Poster Station J****15:50 - 16:10****PP_Theme09_19: Time-dependent impact of expansive soil location on tunnels**A. Saqib, L. Changjian, C. Ying**16:10 - 16:30****PP_Theme09_20: Analytical study of anomalies in tunnel lining thickness: critical temperature variations**S. Aiello, V. De Biagi, B. Chiaia, C. Alessio, L. Baccolini, R. Fantuz**16:30 - 16:50****PP_Theme09_21: The strength of concrete in existing Italian tunnels**A. P. Fantilli, B. Chiaia, M. Giordano**16:50 - 17:10****PP_Theme09_22: A probabilistic approach to evaluate the risk due to a fire in unidirectional road tunnels ventilated by jet fans**D. Martinelli, P. Oreste

POSTER SESSION 5

Wednesday, May 17, 2023 🕒 09:30 – 10:10 📍 Poster Area

Poster Station A

9:30 - 9:50

PP_Theme03_23: A 3-D finite element design of a tunnel temporary lining, under Archaeological area
E. Zygouri, D. Bairaktaris

9:50 - 10:10

PP_Theme03_24: Reinforcement and Bonded Block Modelling
G. A. Skarvelas

Poster Station B

9:30 - 9:50

PP_Theme03_25: Analysis and numerical simulation of mechanical interaction between ground and elastic supporting elements for circular tunnel
T. Nishimura, M. Kohno

9:50 - 10:10

PP_Theme03_26: Function of Reinforcement in Concrete Tunnel Linings
R. Winterberg

Poster Station C

9:30 - 9:50

PP_Theme04_13: Finite element analysis of surface settlement above TBM tunnels for Jakarta MRT project
N. Yingyongrattanukul, S. Nagano, W. Maulina, T. Boonyatee

9:50 - 10:10

PP_Theme04_14: Development of environment-friendly tail grease for shield tunnelling method
K. Yamashita, M. Hayashi, K. Matsubara, S. Arai, T. Arai, K. Takakuwa

Poster Station D

9:30 - 9:50

PP_Theme05_09: Development and Application of Remote Monitoring Systems for Tunneling Works in Conventional Tunnel Construction
K. Sakai, K. Mitani, T. Tani, S. Miyamoto

9:50 - 10:10

PP_Theme05_10: Application of Radar Measurement for Energy Efficient Blast Calculation by the tunnelling
J. Ortuta, M. Bakoš, V. Greif

Poster Station E

9:30 - 9:50

PP_Theme05_11: Montreal Metro Blue Line Extension Tunnels and Caverns
V. Nasri, M. Bakhshi, G. Maurel, R. Saghaee

9:50 - 10:10

PP_Theme05_12: Modernization of a Century Old Mont-Royal Tunnel
M. Motallebi, B. Esmaeilkhaniyan, V. Nasri

Poster Station F

9:30 - 9:50

PP_Theme06_21: Stilling basin built in the form of ultra-large cross-sectional tunnel
S. Igarashi, A. Fujimi, S. Murakami, K. Akiyoshi

9:50 - 10:10

PP_Theme06_22: Watertight Rail Tunnel Excavation and environmental Conservation of Wetlands Registered under the Ramsar Convention
A. Kameyama, R. Kashiwagi, T. Ishida

Poster Station G

9:30 - 9:50

PP_Theme06_23: Triple layered tunnel supports system against extremely high squeezing ground condition
D. Awaji, R. Hase, K. Matsuo, S. Okubo, J. Nakamura

9:50 - 10:10

PP_Theme06_24: Case Study in the Construction of Tunnels on the Durango - Mazatlan Highway (Mexico)
A. Ramírez-Piedrabuena, L. Cañete-Enríquez, W. Araújo-Quimbaya

Poster Station H

9:30 - 9:50

PP_Theme07_13: Characteristics of laser ablation-excited vibrations in concrete
N. Yasuda, T. Asakura

POSTER SESSION 5

Wednesday, May 17, 2023 🕒 09:30 – 10:10 📍 Poster Area

9:50 - 10:10

PP_Theme07_14: Vision-based Measurement method with Segmentation for Concrete Tunnel Crack Inspection
J. Kim, J. Park, G. C. Cho, S. Shim

Poster Station I

9:30 - 9:50

PP_Theme08_11: Stage-updated TBM operational parameter prediction model using random forest algorithm
D. Kim, K.-H. Lee, N. Y. Kim, K. Kwon, H. Choi

9:50 - 10:10

PP_Theme08_12: Estimation of uniaxial compressive strength at tunnel face using TBM operation data
T. Y. Ko, T. H. Kim

Poster Station J

9:30 - 9:50

PP_Theme09_23: Tunnels revamping a compulsory necessity for the assessment of tunnels safety and duration
M. Coli, M. Tanzini

9:50 - 10:10

PP_Theme09_24: Impact of Evacuees' "Psychological Profile" in Road Tunnel Fire Evacuation Simulations
D. Pikiokos, D. I. Kolaitis, K. Kirytopoulos

POSTER SESSION 6

Wednesday, May 17, 2023 🕒 11:00 – 12:20 📍 Poster Area

Poster Station A

11:00 - 11:20

PP_Theme03_27: The importance of axisymmetric simulations for the estimation of tunnel support pressure for sequentially supported deep tunnels
V. Gkikas, P. Nomikos

11:20 - 11:40

PP_Theme03_28: Design Challenges of Underground Highway Structures in Qatar
Y. Matsuo, G. Sergakis, T. Tzaveas

11:40 - 12:00

PP_Theme03_29: Ensuring face support and control of surface deformations in soft ground urban tunnels: Verification through international case studies
S. Konstantis, G. Prountzopoulos, P. Spyridis

12:00 - 12:20

PP_Theme03_30: Numerical simulation of the mechanical behaviour and support of laminated discontinuous roof of underground excavations
P. Yiouta-Mitra, E. Vougioukas

Poster Station B

11:00 - 11:20

PP_Theme03_31: Highway Tunnel Design Under River With Shallow Overburden-Terzili Tunnel Example
B. Koçak, I. Sáenz de Santa María Gatón, C. H. Sentürk

11:20 - 11:40

PP_Theme03_32: Evaluation of subway stations from an architectural point of view
Ö. Öztürk

11:40 - 12:00

PP_Theme03_33: Stress status of sprayed waterproofing membrane under groundwater pressure within composite SCL tunnels
J. Su

12:00 - 12:20

PP_Theme03_34: Single and Double Tube Configurations for Transit Systems
M. Sepehrmanesh, V. Nasri

Poster Station C

11:00 - 11:20

PP_Theme04_15: Successful usage of steel fibres in the Parisian Metro network expansion
B. Rossi, P. Decobecq, A. Cornille, F. Delort, A. Bertrand

POSTER SESSION 6

Wednesday, May 17, 2023 11:00 – 12:20 Poster Area

11:20 - 11:40**PP_Theme04_16:** Development of waterjet drilling system with dual nozzles for graniteJ.-S. Park, H.-J. Cha, E.-S. Hong, T.-M. Oh**11:40 - 12:00****PP_Theme04_17:** Analysis of the disc cutters spacing in the face area of a small diameter TBMS. Y. Lee, K. I. Song, H. W. Ryu, K. N. Kang, D. G. Lee**12:00 - 12:20****PP_Theme04_18:** Numerical investigation of segmental lining with compressible layers in deep soft rockJ. Park, J. B. An, J. Kim, G.C. Cho**Poster Station D****11:00 - 11:20****PP_Theme04_19:** Refurbishment of a 15,2 M TBM (S19 Rzeszow Poludnie – Babica project) 17 years after its first use (M-30 Madrid project)F. Vara, M. Calero**11:20 - 11:40****PP_Theme04_20:** Effect of cutting speed on conical pick cutter performance obtained from portable linear rock cutting machine (PLCM)C. Balci, F. Shoaei, D. Tuncak, H. Copur**11:40 - 12:00****PP_Theme04_21:** Comparison of two identical EPB TBMs under different and complex geological conditionsI. S. Binen, F. Kara, M. Temur, M. Cinar, U. Ates**12:00 - 12:20****PP_Theme04_22:** Validity of Stickiness and Consistency Index in Assessment of Cutterhead Clogging Potential of Cohesive SoilsR. Shetty, A. Eisenman, S. Lopez, M. A. Mooney**Poster Station E****11:00 - 11:20****PP_Theme06_25:** Condition Assessment Survey and Repair Work of the Headrace Tunnel for the Warangoi HPPB. Ashcroft, B. Børresen, F. Mamia, L. Labe**11:20 - 11:40****PP_Theme06_26:** Impacts and challenges faced during deep excavation 1125.3m, rock encountered its effects on support and solution: A Case Study Review from Suki Kinari Hydro Power Project 870 MW PakistanH. Waheed, A. Riaz, A. Hussain, A. Q. Khan**11:40 - 12:00****PP_Theme06_27:** Collapse of a pressurized subsea tunnel in cohesive marine depositsS. H. Kim, K. H. Kim, D. H. Kim, S. H. Kim, J. H. Shin**12:00 - 12:20****PP_Theme06_28:** Investigation of the effect of ground freezing on shield tunnel restorationS. Park, C. Hwang, S. Yang, H. Choi, T. Y. Ko, Y. Son**Poster Station F****11:00 - 11:20****PP_Theme06_29:** Challenges in the Construction of a Tunnel Under Crossing a Channel in SingaporeZ. Chen, T. Y. S. Chew, C. W. Wan, D. Loh**11:20 - 11:40****PP_Theme06_30:** Evaluation of Over-Excavation for Earth Pressure Balance (EPB) Shields through Data AnalyticsC. Teo, Y. L. Paterson, J. Kumarasamy, Y. H. Zhang**11:40 - 12:00****PP_Theme06_31:** A case study on design and construction of mined tunnel in challenging ground conditions in SingaporeY. Jinrong, M. Claudia, K. Sharique, G. Venkatesh**12:00 - 12:20****PP_Theme06_32:** Design challenges and construction experience of the main tunnels of Brescia-Verona high-speed railwayD. Merlini, M. Tanzini, F. Avesani, M. Falanesca, R. Rutigliano, A. Anania, M. Laffranchi

POSTER SESSION 6

Wednesday, May 17, 2023 🕒 11:00 – 12:20 📍 Poster Area

Poster Station G**11:00 - 11:20****PP_Theme06_33:** Repurposing of reception shaft, Mumbai Coastal Road Project – Case studyA. Di Fabio, A. Panciera, M. Varma, S. Kumar, P. Kachhy, S. Singh, S. Pajni**11:20 - 11:40****PP_Theme06_34:** Zhinvali HPP tailrace tunnel maintenance: investigations, design and works implementation under challenging constraintsB. M. Quigley, A. Arigoni, S. Liccardo, G. Matcharadze**11:40 - 12:00****PP_Theme06_35:** Experiences on the Use of GBR in Tunnel and Cavern ProjectsC. S. Lau, A. Dematteis, R. Ovena, A. Di Fabio**12:00 - 12:20****PP_Theme06_36:** TBM excavation under high water pressureR. Schuerch, P. Perazzelli, M. Piemontese, M. Scialpi**Poster Station H****11:00 - 11:20****PP_Theme07_15:** The benefits of InSAR monitoring during the construction of the Ceneri Base TunnelD. Stocker, D. Merlini, M. Falanesca, A. Del Col, C. Gervasi, I. Iannicella**11:20 - 11:40****PP_Theme04_23:** Increasing safety in small-diameter tunnelling: the role of automation and microtunnellingP. Schmäh, M. Lübbers, F. Seng**11:40 - 12:00****PP_Theme04_24:** Penetration behaviour of slurry in saturated soil – analysis of particle deposition on the basis electrical resistanceS. Kube, B. Schoesser, M. Thewes**12:00 - 12:20****PP_Theme07_16:** Underwater Car Keeps Current FlowingM. Short, S. Drobny**Poster Station I****11:00 - 11:20****PP_Theme08_13:** Reduction of risks and operation improvement in TBM tunneling through advanced techniques of data management, processing and analysisE. París, S. Arrate**11:20 - 11:40****PP_Theme08_14:** Optimization of shield tunneling parameters under controlled surface settlementsP. Jongpradist, S. Wainiphithapong, C. Phutthananon**11:40 - 12:00****PP_Theme08_15:** Investigating the effectiveness of transfer learning in rock strength predictionA. L. J. Khoury, C. Paraskevopoulou, A. Benardos**12:00 - 12:20****PP_Theme08_16:** Establishing the digital engineering approach for the UKs Geological Disposal Facility: Aligning a major capital programme in the nuclear sector to adopt ISO 19650, enabling BIMD. Garbutt, A. McCabe, A. Nawell, A. Gigante Barrera, D. Ruikar**Poster Station J****11:00 - 11:20****PP_Theme09_25:** Estimation of permanent lining stress of road tunnel by ultrasonic velocityT. Ishimura, A. Kusaka, N. Isago**11:20 - 11:40****PP_Theme09_26:** Evaluation of Mechanical Behavior of Hanging and Anchorage System supporting Jet Fan for Safety of Road TunnelsY. Koizumi, A. Kusaka, Y. Tatsumi**11:40 - 12:00****PP_Theme09_27:** Performance and monitoring results of repair work to prevent chloride attack in operating subway tunnelsY. Mutou, S. Nakamura, N. Ogura**12:00 - 12:20****PP_Theme09_28:** Design of stress level for accelerated life test of HLW repository sensorC. Park, H.-J. Hwang, G.-C. Cho, C.-H. Hong

POSTER SESSION 7

Wednesday, May 17, 2023 🕒 14:00 – 15:20 📍 Poster Area

Poster Station A**14:00 - 14:20****PP_Theme03_35:** Design aspects of deep water distribution shafts
N. Allahverdi, V. Nasri**14:20 - 14:40****PP_Theme04_25:** Design of Orange Line Project in Austin, TexasT. Malouf, A. Bhargava, V. Nasri**14:40 - 15:00****PP_Theme03_36:** Design and construction of internal structures of Montreal REM Airport Tunnel using precast steel fiber reinforced concrete unitsM. Rabiei, M. Bakhshi, V. Nasri**Poster Station B****14:00 - 14:20****PP_Theme06_37:** Study into the TBM jamming hazard in Opalinus clayA. N. Nordas, M. Natale, G. Anagnostou, L. Cantieni**14:20 - 14:40****PP_Theme06_38:** Problems derived from designing tunnels in loose soils with rock mass methodologiesN. Della Valle, P. García de Haro, B. Koçak**14:40 - 15:00****PP_Theme06_39:** The performance of an EPB-TBM in a complex geology with frequently encountered dykes and in transition zonesM. Aymir, İ. Yağcıoğlu, B. Türker, N. Bilgin**15:00 - 15:20****PP_Theme06_40:** Tunnelling in challenging topography and geological conditions for a railway doubling project in Eastern Ghats, IndiaS. S. Nirmal, L. Kumar, A. Shaz, R. Gupta**Poster Station C****14:00 - 14:20****PP_Theme06_41:** Hybrid SCL and Handmined Shaft - A Case Study from the Bank Station Upgrade ProjectA. Nasekhian, Z. Ng, G. Savage, S. Macknight**14:20 - 14:40****PP_Theme06_42:** Design Aspects of Swelling of Shales for Tunnelling Projects in Southern Ontario, CanadaM. Rahjoo, V. Nasri, M. Sepehrmanesh, M. Soudkhah**14:40 - 15:00****PP_Theme06_43:** Construction of the First Street Connector Tunnel as part of the Northeast Boundary Tunnel Project in Washington D.C.B. Giurgola, F. Azzarà, F. Bonaiuti, N. Fuegenschuh**15:00 - 15:20****PP_Theme06_44:** Ground Freezing for Deep Shaft Excavation Shaft 17B-1 New York City Water Tunnel No. 3 New York, New YorkJ. Sopko**Poster Station D****14:00 - 14:20****PP_Theme04_26:** Design of FRC Precast Segments for Fire in Light-Rail TunnelsM. Bakhshi, M. Partovi, A. Haghighat, V. Nasri**14:20 - 14:40****PP_Theme03_38:** REM de l'Est Project in MontrealV. Nasri, M. Sepehrmanesh**14:40 - 15:00****PP_Theme09_29:** Self-Rescue in Traffic Tunnels - Simulation MethodM. Bettelini**15:00 - 15:20****PP_Theme09_30:** Tunnels and Underground Stations Ventilation SystemA. Haghighat, N. Shahcheraghi, V. Nasri

POSTER SESSION 7

Wednesday, May 17, 2023 🕒 14:00 – 15:20 📍 Poster Area

Poster Station E**14:00 - 14:20****PP_Theme09_31:** Shaking table test of segmental linings with ground-penetrating shield tunnel (GPST) under transverse excitationsQ. Wang, Y. Yuan**14:20 - 14:40****PP_Theme04_27:** Fundamental TBM selection criteria in urban environment based on engineering geological and geotechnical conditionsD. Papouli, V. Marinos**14:40 - 15:00****PP_Theme09_33:** Risk management process for underground worksG. Armetti, A. Panciera**Poster Station F****14:00 - 14:20****PP_Theme08_17:** Near Surface Full Waveform Inversion via deep learning for subsurface imagingA. Parasyris, L. Stankovic, S. Pytharouli, V. Stankovic**14:20 - 14:40****PP_Theme08_18:** A novel holistic approach to rehabilitation of underground structuresV. Gall, T. Martin, L. Boyd**14:40 - 15:00****PP_Theme08_19:** BIM Implementation in a Major Tunnel RehabilitationT. Vovou, H. Bosques-Mendez, V. Nasri**Poster Station G****14:00 - 14:20****PP_Theme10_05:** Lessons learned procuring a high availability tunnel asset for the A303 StonehengeD. R. Hull**14:20 - 14:40****PP_Theme10_06:** Introducing the ATOM risk management methodology for managing risks in heavy subway projects - The middle section of the Tehran Metro L6 & Tehran-Eslamshahr subway phase 1B. Mardani Givi, A. Akbarpour, Z. S. Hashemi, H.R. Abbassian Jahromi, S. Mousazadeh**14:40 - 15:00****PP_Theme10_07:** Tunnel Assessment: the Italian caseG. Lunardi, G. Cassani, M. Gatti, A. Amadi, A. Marchiondelli, M. Malacalza, A. Vitiello, S. Verga, C. Nardone, A. Sella**15:00 - 15:20****PP_Theme10_04:** Tunnel and Underground Works: Managing insurance particulars in a well-structured and risk-averse environmentT. Konstantis, A. Towers**Poster Station H****14:00 - 14:20****PP_Theme08_20:** Comparison between Machine Learning Algorithms for TBM Advance Rate PredictionS. Huang, P. Dastpak, M. Esmaeilpour, K. Liu, R. L. Sousa**14:20 - 14:40****PP_Theme08_21:** Study on the Digitalization of Tunnel Inspection Using Deep LearningY. Ohara, T. Nakayama, A. Miwa, T. Shimizu**14:40 - 15:00****PP_Theme06_45:** Non-open-cut tunnel construction technology and monitoring system for railway underpassA. Miwa, Y. Ohara, T. Ushida, T. Shimizu, T. Nakayama