MONDAY, MAY 17  13:00 – 15:00

Session 1A  
T02 Tunnelling in Soft Ground (I)

Room: 211, 212, 213, 214

Chaired by:  D. Zoldy, AECOM
Y. Leblais, ITA Vice-President

13:00 Earth Pressure Balance Tunnel Boring Machines, Experience in Mixed Face Conditions
E. Chriqui1, P. Jackson2, S. Taylor3, Systra SA, Paris, France, 1COFW A/S, Copenhagen, Denmark

13:15 Analysis of Shield’s Mechanism Inducing Ground Deformations
C. Chaiwonglek, S. Suwansawat, King Mongkut’s Institute of Technology Ladkrabang, Bangkok, Thailand

13:30 Construction of Casting Support Tunneling System
Y. Leblais, ITA Vice-President
Chaired by:  D. Zoldy, AECOM
Room: 211, 212, 213, 214

13:45 Application of Slurry Pressure Balance (SPB) Tunneling Method under Challenging Project Conditions
Y. Tanaka1, A. Nomura2, S. Mino2, K. Yamachi2, 1Obayashi Corporation, Tokyo, Japan, 2Obayashi Corporation, Pittsburgh, USA

14:00 Case Study of the Croydon Cable Tunnel, London, U.K.
W. Sawicki1, I. Spencer2, 1LOVAT Inc., Toronto, Canada, 2MORGAN EST, Stone, UK

14:15 Milan Metro 5th Line
L. Mancinelli, M. Gatti, G. Cassani, Rocksoil SpA, Milan, Italy

14:30 Design and Construction of the Luz Subway Station for the São Paulo Subway
T.B. Celestino1,2, C.T. Mitsuse1, F. Casagrande3, T. Harada, H.C. Rocha, C. Silyetti, 1Themag, Englandaria, São Paulo, Brazil, 2University of São Paulo, São Carlos, Brazil, 3Construtora Andrade Gutierrez, São Paulo, Brazil, 4Consórcio Via Amarela, São Paulo, Brazil, 5São Paulo Subway Company, São Paulo, Brazil

14:45 Construction of Head Race Tunnel for Sewa H.E. Project (Stage-II) Lot SW-1: Innovative Approach of Gammon - A Case Study
R.K. Khalil, Gammon India Limited, Mumbai, India

13:00 Geotechnical Risks when Tunnelling through Flysch - Practical Experience
V. Vegas, O. Jandejsek, ARCADIS Geotechnika, Prague, Czech Republic

K. Rieker, Wiss & Freytag Ingenieurbau AG, Frankfurt am Main, Germany

13:30 TBM Design for Rosedale Waste Water Treatment Plant Outfall Tunnel
M. Dowler1, J. Cooper2, T. Ireland3, M. Frenke4, 1McConnell Dowell Constructors Ltd., Auckland, New Zealand, 2AECOM, Auckland, New Zealand, 3Aurecon, Auckland, New Zealand, 4LOVAT Inc., Toronto, Canada

13:45 State of the Art in Drill Plan Design
J.T. Kukkonen, Sandvik Mining and Construction, Tampere, Finland

13:15 Towards Precise Under Ground Mapping System in Canada
A.J. Rancourt1,2, H.S. Mitri2, 1Hydro-Québec, Montréal, Canada, 2McGill University, Montréal, Canada

L. D’Alia Schwartzentruber, M. Deffayet, CETU (Centre d’Études des Tunnels), Bron, France

13:00 Tunnel Face Rockmass Characterization in Drill and Blast Tunnels Using LiDAR
S. Pekete, M. Diederichs, Queen’s University, Kingston, Canada

13:15 A Model for Selecting Efficient Tunnelling Systems
H. Toma1, H.G. Jodl2, 1King Saud University, Riyadh, Saudi Arabia, 2Vienna University of Technology, Vienna, Austria

13:30 Single Bore Concept for Transit Tunnels
V. Nasri, AECOM, New York, USA

13:45 Updated Guidelines for the Design of Unlined Pressure Tunnels
A.J. Rancourt1,2, H.S. Mitri2, 1Hydro-Québec, Montréal, Canada, 2McGill University, Montréal, Canada
### Session 2A
**T03 Hard Rock Tunnelling (I)**

**Room:** 211, 212, 213, 214  
**Chaired by:** E. Eberhardt, University of British Columbia  
F. Vuilleumier, ITA Treasurer

- **15:30** Gotthard Base Tunnel: Design History of Critical Geological Sections  
  M. Rehbock-Sander, Y. Boissonnas, Amberg Engineering Ltd., Regensdorf, Switzerland

- **15:45** Norwegian Tunnelling Technology High Performance, Quality and Safe Tunnelling  
  F. Nilsen, R. G. Haug, 1Leonhard Nilsen & Sanner AS, Risøyhamn, Norway, 1Norwegian Public Road Administration, Oslo, Norway

- **16:00** Canadian Fast-track Drill and Blast: Excavating the Room: 211, 212, 213, 214 Room: 220, 221, 222 Room: 223, 224

- **16:15** Hédinsfjardargöng Road Tunnels, Iceland  
  E. Stehlik, V. Soukup, Metrostav a.s. Prague, Czech Republic

- **16:30** Design and Construction of the Qingdao Jiaozhouwan Subsea Tunnel  
  S.M. Zhou, M. Lu, China Railway Tunnel Survey & Design Institute Co. Ltd, Tianjing, China, 2SINTEF Rock Engineering, Trondheim, Norway

- **16:45** Observations Made during Construction of a Shallow Rock Cavern in New York - A Study of the 7 Line Extension Project  
  S. Pollak1, C. George2, C. Sneé3, Anup, New York, USA, 2GZA Geoenvironmental, Inc., New York, USA, 3SneéGeoconsult, New York, USA

- **17:00** Tunnel Specific Equipment for Efficiency and Versatility-Lifting and Explosives Charging  
  M. Rispm1, J. Lehto2, 1Normet Americas, Inc., Union Grove, USA, 2Normet International Ltd, Baar, Switzerland

### Session 2B
**T13/14 Contract Practices and Commercial Aspects**

**Room:** 220, 221, 222  
**Chaired by:** B. Bohike, Myers Bohike Enterprise  
A. Dix, ITA Animator Working Group  
Contractual Practices in Underground Construction

- **15:30** Practical Considerations Related to New Trends and Developments in Contracting, Financing and Delivering Underground Infrastructure Projects  
  P. Gyorgy1, I. Janitsary1, I. Fogarasi1, 1Consultant Engineering Office, Budapest, Hungary, 2Kenaidan Contracting Ltd, Mississauga, Canada

- **15:45** Established Standards for Differing Site Condition Entitlement  
  P.J. Tarkoy, Geotechnical & Tunnel Consultant, Sherborn, USA

- **16:00** Gautrain : Site Investigations and Procurement  
  A. Boniface1, H.J. Tuczcek2, R.B. Storyy1, 1GIBB, Johannesburg, South Africa, 2BKS Pty Ltd, Pretoria, South Africa, 1Bouygues, TP, Johannesburg, South Africa

- **16:15** The Southeast Collector Trunk Sewer  
  B. Garro1, C. Quintero2, A. Baca3, 1Hatch Mott MacDonald, Mississauga, Canada, 2Hatch Mott MacDonald, Markham, Canada, 3The Regional Municipality of York, Newmarket, Canada

- **16:30** Payment for Tunnel Construction by means of the Standard Rate Method: Experience on the Bilbao South Metropolitan By-pass  
  J.A. Fuldaín1, C. Estefania2, J.A. Laguna3, M. Arlandi4, 1Idom Ingeniería Y Consultoría, S.A., Bilbao, Spain, 2Diputación Foral de Bizkaia, Bilbao, Spain, 3Dair Ingenieros, Leioa-Bizkaia, Spain, 4Geconsut Ingenieros Consultores, S.A., Madrid, Spain

- **16:45** MD-WEC - Mediterranean Sea to Dead Sea Water and Energy Conduit  
  C.D. Breeds1, P. McGuire2, J. Behr3, G. Sherry3, 1SubTerra, Inc., North Bend, USA, 2CED, Washington, USA, 3Brierley Associates, LLC, Denver, USA

- **17:00** The Brisbane Airport Link Project - Australia's Largest Ever Public Infrastructure Contract - The Challenges and Innovations  
  C.C. MacDonald4, A.J. De Aboliz5, 1BrisConnections, Brisbane, Australia, 2City North Infrastructure, Brisbane, Australia

### Session 2C
**T11/15 Rehabilitation, Repair, Linings and Grouting**

**Room:** 223, 224  
**Chaired by:** D. Klug, David R. Klug & Associates Inc.  
E. Grov, ITA Vice-President

- **15:30** Renewal of the Alpine San Bernardino Tunnel with Traffic Flowing  
  W. Bruderer1, P. Wengler2, L. Schönenberger2, 1Amberg Engineering Ltd, Regensdorf, Switzerland, 2Amberg Engineering Ltd, Sargans, Switzerland, 3Amberg Engineering Ltd, Chur, Switzerland

- **15:45** Investigation and Planning for Rehabilitation Works on Bucharest Metro Line 4  
  O. Arghiriou1, A.P. Assis2, M. Aymerich3, S. Călinescu4, 1METROUL SA, Bucharest, Romania, 2University of Brasilia, Brazil, 3European Investment Bank, Luxembourg

- **16:00** International Practices and Technology in Sealing Precast Tunnel Linings  
  Th. Gruber, Daetwyler Rubber, Schattdorf, Switzerland

- **16:15** Segment Design for a Main Sewer Project under Earthquake Influence and High Exposition Class using Fiber Reinforced Concrete  
  R. Bishop1, L. Babendererde1, B. Candia3, 1McConnell Dowell Constructors, Auckland, New Zealand, 2Babendererde Engineers, Vancouver, USA, 3Independent Consultant, La Paz, Bolivia

- **16:30** An Alternative Way to Stop Water Incomes in Tunnels  
  C. Larive, D. Chamoley, G. Chatenoud, Centre d'Études des Tunnels, Bron, France

- **16:45** Monte-Carlo Tunnel: Multiphase Methodology to Repair a Tunnel under Swelling Marlstone While Maintaining Railways Traffic  
  F. Chille1, J. Lejeune2, G. Paradis3, M. Schima4, 1Schod2, 2INEXIA, La Plaine St Denis, France, 3SNCF IG, La Plaine St Denis, France, 4RFF, Paris, France

- **17:00** Analysis of the Performance of Two Component Backfilling Grout in Tunnel Boring Machines Operating under Face Pressure  
  S. Pelizza1, D. Peila1, L. Borio1, E. dal Negro2, R. Schulkine1, A. Boscaro3, 1Politecnico di Torino, Torino, Italy, 2UTT-MAPEI S.p.A., Milan, Italy
08:00 – 18:00  Registration

08:30  ITA Open Session  
(West Ballroom A)  

Ground Reference Information for Bidding Tunnel Projects – Current Practice, Shortcomings/Benefits and Future Challenges  
Chaired by:  Martin Knights, ITA President

Requirements Concerning Geotechnical Investigation for the Minimization of Risks in Shield Tunnelling  
Markus Thewes, Ruhr-University Bochum

Clients View  
Joe Gildner, Sound Transit

Bringing Certainty to the Unknown: The Role of Law in the Apportionment of Underground Construction Risks  
Arnold Dix, ITA Working Group 3, Animateur

10:00  Coffee Break

10:30  Ground Reference Information for Bidding Tunnel Projects – Current Practice, Shortcomings/Benefits and Future Challenges  
Chaired by:  Martin Knights, ITA President

Risk Sharing: Planners / Clients’ View  
Michael Rehbock-Sander, Amberg Engineering Ltd

Ground Reference Requirements for EPBs / Experiences  
Marco Giorelli, LOVAT, Inc.

International Experience Contractors View  
Ulrich Wadepohl, HOCHTIEF

Experiences / Contractors View  
Jeff Petersen, Kiewit Corporation

12:00  Lunch  
(West Ballroom C and D)
### Session 3A
#### T02 Tunnelling in Soft Ground (II)

**Room:** 211, 212, 213, 214  
**Chaired by:** B. Garrod, Hatch Mott MacDonald  
P. Grasso, ITA Vice-President

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<td>The Forgotten St. Clair Tunnels, Toronto, Ontario</td>
<td>S. Tynan, McNally Construction Inc., Hamilton, Canada</td>
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<td></td>
<td>The Toronto - York Spadina Subway Extension - An Overview</td>
<td>A. Boden, T. Gregor, Spadina Link JV, Toronto, Canada</td>
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| 13:30 | Tunnelling Beneath the New York Harbor - The Siphon Project          | C. Lawrence1, D.M. Watson1, M. Schultz2, Hatch Mott MacDonald, New York City, USA,  
|       | Upper Northwest Interceptor Sections 3 & 4, Sacramento, CA, USA       | M.R. Crow1, J. Wong2, C.Z. Painter3, A.J. Finney4,  
|       | Brightwater Conveyance Tunnel, West Contract (BT-4), King County,    | W. Trisi1, G. Frank2, M. DiPonio3, Lovat Inc., Toronto, Canada,  
|       | Seattle, Washington, USA; TBM System Design to Facilitate Cuttinghead Maintenance in Adverse Conditions | Jay Dee Contractors Inc., Michigan, USA                                         |
| 14:15 | Two Decades of Advances Investigating, Baselining and Tunnelling in Bouldery Ground | S.W. Hury1, D.E. Del Nero3, CH2M Hill, Henderson, USA,  
|       | Estimating Face Pressures for Closed Face Tunnelling in Soft Ground   | D.J. Young1, A. Dean2, Hatch Mott MacDonald, Pleasanton, USA,  
|       | Review of TBM Utilization and Impact of Difficult Ground Conditions in Zagros Water Conveyance Tunnel | J. Rostam1, J. Khadiemi Hamidi2, M. Bayati3,  
|       | Lake Mead Intake No. 3                                               | J. McDonald1, J. Hurt2, E. Moonin2, Vegas Tunnel Constructors, Las Vegas, USA,  
| 15:30 | Coffee Break (Exhibit Area)                                           |                                                                              |
| 17:30 | Poster Awards                                                          |                                                                              |

### Session 3B
#### T06 New Advances and Innovation in Mechanized Tunnelling (I)

**Room:** 220, 221, 222  
**Chaired by:** S. Moalli, Frontier-Kemper Constructors  
F. Amberg, ITA Vice Animateur WG Mechanized Tunnelling

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<td>M. Herrenknecht, K. Bäppler, Herrenknecht AG, Schwaz, Germany</td>
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<td>13:30</td>
<td>The McNally System™ Increasing Production of Main Beam TBMs in Difficult Rock through Reliable Roof Support</td>
<td>M.P. McNally, Mike McNally &amp; Associates Inc., Freeport, Canada</td>
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| 14:15 | Two Decades of Advances Investigating, Baselining and Tunnelling in Bouldery Ground | S.W. Hury1, D.E. Del Nero3, CH2M Hill, Henderson, USA,  
|       | Review of TBM Utilization and Impact of Difficult Ground Conditions in Zagros Water Conveyance Tunnel | J. Rostam1, J. Khadiemi Hamidi2, M. Bayati3,  
| 15:30 | Coffee Break (Exhibit Area)                                           |                                                                              |

### Session 3C
#### T01 Innovative Techniques and Advances in Geotechnical Investigations for Tunnel Projects

**Room:** 223, 224  
**Chaired by:** B. Steller, EBA Engineering Consultants Ltd.  
H. Parker, ITA Immediate Past President

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<td>P.G. Marinos, National Technical University of Athens, Athens, Greece</td>
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<td>13:30</td>
<td>Instrumentation and Monitoring at Deep Excavation in Historic City of Amsterdam Design and Performance Analysis of Monitoring System at Ceintuurbaan Station</td>
<td>R.E.P. de Nijs, S.M. Buyyk, Witteveen+Bos Consulting Engineers, Amsterdam, The Netherlands</td>
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<td>14:15</td>
<td>Design and Construction of Tunnels in Karst Geology on</td>
<td>M. Zhang, H.J. Huang, Yichang-Wanzhou Railway, China</td>
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<td>Does Geological Investigation Reduce Risks in Tunnelling Projects</td>
<td>E. Bieth, C. Gaillard, F. Rival, A. Robert, CETU - Centre d'Études des Tunnels, Bron, France</td>
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**Room:** 211, 212, 213, 214  
**Chaired by:** B. Garrod, Hatch Mott MacDonald  
P. Grasso, ITA Vice-President
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<td>Evaluation of Swelling Properties of Shales for the Design of Underground Structures</td>
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<td>London, Canada, 3Tow International Ltd., Brampton, Canada</td>
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<td>Company Limited, Nagoya, Japan, 3Tobishima Corporation, Tokyo, Japan, 3Central Nippon</td>
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<td>Hydraulic Fracturing as an Essential Element in the Design Optimization of Pressure</td>
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<td>Project G. Boyce1, 2, S. Gambino2, 3, C. Jaramillo2, 3, Jacobs Associates, San Francisco,</td>
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<td>USA, 3URS Corporation, Oakland, USA, 3San Francisco Public Utilities Commission,</td>
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<td>Designing Rehabilitation Measures for the CN Tumbler Tunnels in Northern British Columbia</td>
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<td>Using Remote Techniques L.U. Arenson1, D. Tsztoo1, 2, Jacobs Associates, San Francisco,</td>
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<td>A New Method of Ground Settlement Forecast on Foundation Pit Excavation W.B. Zhou1,</td>
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<td>Shanghai University, Shanghai, China, 3Shanghai Tunnel Engineering Co. Ltd., Shanghai,</td>
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<td>Nakhonrayok, Thailand, 3King Mongkut’s Institute of Technology Ladkrabang, Bangkok,</td>
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<td>and Technology Agency, Nagano, Japan, 3Toda-Fujita-Aisaw-Fujimori Joint Venture for the</td>
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<td>Canada, 3Carleton University, Ottawa, Canada</td>
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<td>3Korea Institute of Construction Technology, Korea, 4Nielv Consultant, Seoul, Korea</td>
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<td>T04.024</td>
<td>Providing Solutions and Experiences when Facing Difficult Rock Conditions during Excava-</td>
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<td>tion in Middle American Tunnel Projects B. Pfahl1, J. Burdette2, W. Mussack1, T. Hess1,</td>
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<td>Experimental and Empirical Estimation of Failure Size of a Tunnel under Excavation I.S.</td>
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<td>Lee1, M. Sagong1, G.C. Cho2, S.Y. Choo2, 1Korea Railroad Research Institute, Euiwang,</td>
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<td>Korea, 2Korea Advanced Institute of Science &amp; Technology, Daejeon, Korea, 3Danwoo E&amp;C,</td>
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<td>T05.027</td>
<td>Hida TBM Tunnel System - A Large Diameter TBM in Operating in Areas with Deep Overburden</td>
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<td>S. Kobayashi1, M. Nakata2, S. Teramoto1, M. Terada3, 1Taisei Corporation, Tokyo, Japan,</td>
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<td>2Central Nippon Expressway Company Limited, Nagoya, Japan, 3Central Nippon Highway</td>
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<td>Engineering Nagoya Company Limited, Hikone, Japan</td>
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<td>T05.028</td>
<td>Predicting Brittle Failure in a Long and Deep Tunnel based on Martin’s Spalling-Failure</td>
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<td>and Engineers Co. Ltd., Seoul, Korea South, 3Daemil Industrial Company Limited, Seoul,</td>
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<td>1Ministry of Land, Infrastructure, Transport and Tourism, Kochi, Japan, 2Kajima</td>
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<td>Corporation, Ehime, Japan, 3Kajima Corporation, Tokyo, Japan</td>
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<td>Suggestion of the Tunnel Support Design Method by Characteristic Curve Law with the Theory</td>
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<td>Solution for Super Large Tunnel in Squeezing Rock J. Sato1, M. Nakata1, H. Kusumoto1,</td>
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<td>Central Nippon Expressway Company Limited, Atsugi City, Japan, 2Central Nippon Express-</td>
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<td>way Company Limited, Nagoya, Japan, 3Shimizu Corporation, Minakotok, Japan</td>
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T05.031 The Gibraltar Tunnel: The Design Revision
A. Panciera1, A. Bensaid2, F. Roca1, Lombard Ltd, Minusio, Switzerland, 1Société Nationale pour les Études du Détroit de Gibraltar (SNEED), Rabat, Morocco, 2Sociedad Española de Estudios para la Comunicación a través del Estrecho de Gibraltar (SECEG), Madrid, Spain

T05.032 Evaluation of Brittle Failure Characteristics around an Opening Using Acoustic Emission and X-ray CT
E.S. Park1, D.S. Cheon1, Y.B. Jung, C. Park1, S. Jeon2, 1Korea Institute of Geoscience & Mineral Resources, Daejeon, Korea, 2Seoul National University, Seoul, Korea

T06 - New Advances and Innovation in Mechanized Tunneling

T06.033 Long Drive Microtunneling Excavation in the Alluvium
Y. Rouillard1, J.N. Lasfargues, CSM BESSAC, Saint Joury, France

T06.034 Rapid Excavation with TBM in Hard Bedrock, Utilizing Information-oriented Technique
K. Miyazawa1, K. Nakano1, M. Shiromoto1, H. Sasao2, 1East Nippon Expressway Co., Ltd., Fukushima, Japan, 2Nippon Expressway Research Institute, Tokyo, Japan

T06.035 Experience in Construction in Hard Rock with Roadheader in the Ariz - Basauri Section of the Corporation, Tokyo, Japan
A. Barioffi, F. Bove, G. Fumagalli, Engineering S.p.A., Trento, Italy

T06.036 Application of Nesting Parent-Child TBM
M. Mori, A. Nakano, Obayashi Corporation, Tokyo, Japan

T06.037 Rapid Construction of HEP & JES (High speed Element Pull & Jointed Element Structure) by Mechanical Excavation
S. Sawamura1, T. Mikami1, Y. Sasaki2, 1Kajima Corporation, Tokyo, Japan, 2Obayashi Corporation, Tokyo, Japan

T06.038 Rapid Excavation with TBM in Hard Bedrock, Utilizing Information-oriented Technique
K. Miyazawa1, K. Nakano1, M. Shiromoto1, H. Sasao2, 1East Nippon Expressway Co., Ltd., Fukushima, Japan, 2Nippon Expressway Research Institute, Tokyo, Japan

T07 - Tunneling under Sensitive Structures

T07.039 Settlements Induced by the Metrobux Tunnel Excavation in the Historic Town of Brescia (Italy)
A. Sanzeni1, A. Bensaid2, F. Roca1, Construzioni S.A., São Paulo, Brasil

T07.040 Case Study in the Application of T.R.C.M and C.A.M - Construction of Subway Station with a Large Section Tunnel, Driven 15cm beneath Existing Underground Structures

T07.041 Stealth Tunneling below Sensitive, Historic Structures in New York City
B.T. Hamilton, M.E. Pujdak, T.R. Valkins, URS Corporation, New York, USA

T07.042 Corrective and Compensation Grouting in Sand - Case Histories
A. Rezrui1, J.W. Bosch1, Deltas, Delft, The Netherlands, 1TU-Delft, Delft, The Netherlands

T07.043 Krulovopolskie Tunnels in Clays: Deformation's Impacts on the Surface Buildings - Response to Excavation
O. Hort1, M. Ryhtoecky2, T. Ebermann1, J. Lossmann1, M. Polak2, 1ARCADIS Geotechnika, Prague, Czech Republic, 2GEOTest Brno, Brno, Czech Republic

T07.044 Rehabilitation of a Tunnel under Traffic
F. Martareche1, J.P. Albrecht1, B. Boy2, A. Mercier3, Bec Fayat Group, Montpellier, France, 1CETu, Bron, France

T07.045 Study for the Compensation Grouting: The Case of the Underground Railway of Florence
P. Cucini, S. Fuoco, D. Maniello, SWS Engineering S.p.A., Trento, Italy

T08 - Geotechnical Instrumentation and Monitoring

T08.046 Integrated Tunneling Data Management, Analysis and Visualization New IT Tools for Better Projects
K. Rabensteiner1,2, G. Kruce1, G. Hesina1, 1Geodata Ziviltechnikergesellschaft mbH, Leoben, Austria, 2VRVls - Center for Virtual Reality and Visualization Research, Vienna, Austria

T08.047 Instrumentation and Monitoring System of Bangkok Blue Line South Extension Subway Project
S. Prayongphan1, S. Suwansawat2, P. Srijanthong2, Kasetsart University, Bangkok, Thailand, 1King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand

T08.048 Prediction of Strength of Rock Mass Ahead of Tunnel Face Using Penetration Rate of Hydraulic Rock Drill
C.Y. Kim1, K.Y. Kim1, S.B. Yim1, S.J. Lee2, J.M. Kim, Y.T. Choi1, H. Kim1, B.K. Choi1, 1Korea Institute of Construction Technology, Goyang-si, Korea, 2Ministry of Land, Transport and Maritime Affairs, Gwacheon-si, Korea

T08.049 Transmitting Radio Signals through the Earth
W. Farr1, S. Ward1, 1MINE Radio Systems, Goodwood, Canada, 2Mine Radio Systems, Manchester, UK

T08.050 Geological Prediction Ahead of the Tunnel Face by the Exploration Drilling System during the Tunnel Excavation
T. Kuwahara, K. Hata, Technical Research Institute, Obayashi Corporation, Tokyo, Japan

T08.051 Measurements and Case Studies of Mountain Tunnel Liners under Seismic Conditions
H. Miyabayashi1, G. Takahashi1, Y. Kojima2, Y. Shigeta3, J. Saito4, T. Asakura4, 1Kajima Corporation, Tokyo, Japan, 2Obayashi Corporation, Tokyo, Japan, 3, 4Published in these proceedings

T08.052 Impact of Tunnel Ventilation Systems and Structures on the Space Required for Underground Rail Stations
P.C. Mielea, AECOM, Oakland, USA

T08.053 Road Tunnel TBM for Calming Down Traffic in the Centre of Prague
O. Hasik, J. Ruzicka, M. Kochanek, METROPROJEKT Praha a.s., Prague, The Czech Republic

T08.054 Design and Construction of Ceiling Exhaust Duct of the Shield Driven Expressway Tunnel
H. Sanders, H. Morikichi, Y. Nakamura, H. Kurioka, Metropolitan Expressway Co., Ltd, Tokyo, Japan, 2Kajima Corporation, Tokyo, Japan

T08.055 Design and Construction of Ceiling Exhaust Duct of the Shield Driven Expressway Tunnel
H. Sanders, H. Morikichi, Y. Nakamura, H. Kurioka, Metropolitan Expressway Co., Ltd, Tokyo, Japan, 2Kajima Corporation, Tokyo, Japan

T08.056 Design and Construction of Ceiling Exhaust Duct of the Shield Driven Expressway Tunnel
H. Sanders, H. Morikichi, Y. Nakamura, H. Kurioka, Metropolitan Expressway Co., Ltd, Tokyo, Japan, 2Kajima Corporation, Tokyo, Japan

T08.057 Tunneling in the Heart of Downtown Toronto
P.S. Mapowcn, MMM Group Limited, Toronto, Canada

T11/15 – Rehabilitation, Repair, Linings and Grouting

T11.058 Assumptions to Investigations of Loading Capacity of Glass Reinforced Plastic Noncircular Modules Used to Renovation of Sewerage Channels
C. Madry2, B. Nienartowicz1, I. Skomorowski1, 1Wroclaw University of Technology, Wroclaw, Poland, 2HOBA System Polska Sp. z o.o., Dabrowa Górnicza, Poland

T11.059 Rehabilitation, Repair, Linings and Grouting
H.K. Kim1, C. He1, J.M. Zhou1, Z.X. Su1,2, 1Kwangyang, 2Published in these proceedings

T11.060 Pattern Study of Deterioration in Railway Tunnel in South Korea with the Time Factor
H.K. Kim, T.K. Yoon, J.H. Choo, H.T. Kim, I.B. Hwang, KISTEC, Gyunggi-do, South Korea

T11.061 Study on Model Test of Segmental Linings of Large Underwater Shield Tunnels
K. Feng1, C. He2, J.M. Zhou2, Z.X. Su2, 1Southwest Jiaotong University, Chengdu, China, 2Published in these proceedings

T11.062 Precautionary Inspections of Tunnel Liners with Embedded PVC Liners Provide Single Pass Corrosion Protection in Segmented Concrete Tunnel
R.B. Fisher, Ameron International, Brea, USA

S.Y. Min, J.Y. Kaneshiro, Parsons Corporation, San Diego, USA

T11.064 Important Jet Grouting Applications at the Subway Line 4 in São Paulo, Brazil
G. Guatenn1,2, A. Koshima1, J.R. Lopes1,2, M.R. Pironi1,2, 1Novatec Consolidações e Construções S.A., São Paulo, Brazil, 2Terrajato Ltd - Praça Francisco Sá Carneiro, Lisboa, Portugal
T12 - Risk Assessments

T12.065 Risk-reduction during Tunnel Construction Using High-resolution Geophysical Investigations
J. Henderson, C. Robillard, Associated Geosciences Ltd., Calgary, Canada

T12.066 Case Study on the Strategic Tunnel Enhancement Program (STEP)
R.H. Marshall1, S.H. Orakzai2, 1CH2M HILL, Abu Dhabi, United Arab Emirates, 1Abu Dhabi Sewerage Services Company, Abu Dhabi, United Arab Emirates

T12.067 Risk Assessment and Mitigation for the Construction of Pedestrian Tunnels and Underground Subway Loop in Downtown Toronto
A. Flatley1, G. Slack2, B. Kelly2, 1Kenaidan Contracting Ltd, Mississauga, Canada, 2Kenaidan Contracting Ltd, Richmond, Canada

T12.068 Risk Control for the Bangkok MRTA Blue Line Extension Project
Z.Z. Aye1, S. Suwansawat2, 1Seafoo Public Company Limited, Bangkok, Thailand, 2King Mongkut’s Institute of Technology Ladkrabang, Bangkok, Thailand

T12.069 Simulation of Groundwater Fluctuation and Flow R.D. Due to Construction of Gihueung Tunnel Using Resistivity Prospecting and Hydrogeological Data in Korea

T12.070 Risk Management for the Construction of Large-Deep Caverns Facilities at the Deep Underground Science and Engineering Laboratory
C. Laughton, Fermi Research Alliance, Batavia, USA

T13 - Contract Practices and Commercial Aspects for Tunnel Projects

T13.071 A New Approach for Determining Middle and Long Term Maintenance Costs for Large Underground Works
R.M. Faure1,2, C. Larive1, F. Rival1, 1Centre d’Etudes des Tunnels, Bron, France, 2at present: Sanef, Carouge, Switzerland

T13.072 Cooperation makes Everyone a Winner - Closer Cooperation between Employer and Contractor in Norra Länken Tunnels
B. Terstad, T. Dalmalm, C.W. Kwak, 1BAU Consultant Ltd., Anyang City, South Korea, 2BAU Consultant Co. Ltd, Seoul, South Korea

T13 - Innovation and Research for Tunnelling

T16.076 Determination of Residual Water Pressure on a Shaft Lining by Hydro-Mechanical Coupled Analysis
Y.W. Shin1, J.Y. Kong1, H.G. Kim2, B.S. Chun2, 1Hakyong Engineering Co. Ltd., Seoul, Republic of Korea, 2Hanyang University, Seoul, Korea

T16.077 Innovative Numerical Modeling of Ring Joints for Bored Tunnel Cairo Metro Line III
A. Abu-krisha, National Authority For Tunnels (NRT), Cairo, Egypt

T16.078 Innovative Approach to Assess the Seismic Behaviour of Underground Structures
R. Mahajan1, G.V. Ramana2, 1Parsons Brinckerhoff, Sydney, Australia, 2Indian Institute of Technology, New Delhi, India

T16.079 Investigation and Test for Reuse of Muck in Tunnelling
C. Gigli1, C. Ronco, Politecnico di Torino, Torino, Italy

T16.080 Numerical Validation and Refinement of Empirical Rockmass Modulus Estimation
C.D. Hume, M.S. Diederichs, Queen’s University, Kingston, Canada

T16.081 Seismic Analysis for Large Underground Structures
C.W. Kwak1, J.J. Park2, S.H. Kim3, K.H. You4, J.H. Choi5, 1Korea District Heating Engineering Co. Ltd, SungNam City, South Korea, 2Hanseo University, Seoul, Korea, 3Hoseo University, Cheonan City, South Korea, 4University of Suwon, Hwasung, South Korea, 5Busan District Road and River Manage Admin. Road Facilities Bureau, Busan, South Korea

T16.082 Hydraulic Deterioration and Significance of Tunnel Drainage Systems
J.H. Shin1, S.H. Kim2, S.E. Chae1, O.Y. Kwon1, 1Konkuk University, Seoul, Korea, 2Hoseo University, Asan, Korea

T17 - Sequential Excavation and Reinforced Concrete Linings

T17.083 Experimental Tests on Tunnel Precast Segmental Lining with Fiber Reinforced Concrete
M. Moccichino1, P. Perruzza1, P. Romualdi1, 1Fermi Research Alliance, Batavia, USA, 2Z.M. Aye1, G. Stack1, B. Kelly2, 1Kenaidan Contracting Ltd, Mississauga, Canada, 2Kenaidan Contracting Ltd, Richmond, Canada

T17.084 Relevant Performance Characterisation Test for Fibre Reinforced Sprayed Concrete
B. de Rive1, Y. Ding2, 1NV Bekaert SA, Belgium, 2Dalian University of Technology, China

T17.085 ADECO RS as an Alternative to SEM in the US?
Th. Marchen1, F. Jiricny1, H. Sander2, 1ILF Consulting Engineers, Austria, 2ILF Consultants Inc., USA

T17.086 The Simple Sprayed Concrete Dust Density Measurement by Using Flashed Digital Camera Image
M. Shinji1, N. Kishida1, T. Tsutsum1, N. Hira1, 1Yamaguchi University, Ube, Japan, 2Tobishima Corporation, Tokyo, Japan

T17.087 Analysis of Deformations Prior to the Brezno Tunnel Collapse in the Czech Republic
A. Rozsypal, O. Kostoryz, ARCADIS Geotechnika, Prague, Czech Republic

T17.088 Study of the Effect of Central Beam Column (CBC) Structure and Consolidation Grouting on the Ground Settlement of Large Span Underground Station, Line 3 Tehran Metro
A. Valizade, M. M. Sadaghiani, M.M. Ahmadi, Sharif University of Technology, Tehran, Iran

T17.089 Drill and Blast Method for South Korea’s Longest Twin-tube Subsea Road Tunnel
S.C. Lee1, K.C. Ahn1, S.K. Lee1, H.L. Nam2, Y.H. Suh1, S.Y. Lee1, Y.J. Park1, S.M. Kim1, 1TESO Engineering Co., Ltd., Seoul, South Korea, 2Hyundai Engineering & Construction Co., Ltd., Seoul, South Korea, 3University of Suwon, Suwon, South Korea

T18 - Safety in Tunnelling

T18.090 The Cause and Solution of the Track Irregularity of Railroad Tunnel in Use
Y.-S. Oh, T.-H. Lee, J.-U. Lee, T.-J. Lee, Korea Infrastructure Safety and Technology Corporation, Gyeonggi, South Korea

T18.091 Numerical Simulation on Ventilation Characteristics of Road Tunnel Using Banana Jet Fan
S.C. Lee1, J.H. Lee2, 1Kangwon National University, Samcheok, South Korea, 2Hoseo University, Chenan, South Korea, 3Sangi University, Wonju, South Korea

T18.092 Fire-Proofing Performance of SFRC Segments with Polypropylene Fiber against Explosive Spalling of Lining Concrete of Shield Tunnels
T. Yashiro, T. Kawanishi, Obayashi Corporation, Tokyo, Japan

T18.093 Whole Life-cycle Health Monitoring and Sign System in Long Tunnels
S. Wang, C. He, D. Guo, Southwest Jiaotong University, Chengdu, China

T18.094 Preliminary Study of Fire Load in Tunnel by Using Conjugate Heat Transfer
J.J. Chen, J.S. Hou, CECI, Engineering Consultants, Taipei, Taiwan

T18.095 Improving the Fire Safety of Road Tunnels, TFR (Tunnel Fire-Fighting Robot): A Proposed Model of a Fire Fighting Robot Designed Specifically to Deal with Fires in Tunnels
M. Ariakia, University of Western Australia, Perth, Australia
WEDNESDAY, MAY 19 08:30 – 10:00

**Session 4A**
**T10 The Use of Underground Space (I)**

**Room:** 211, 212, 213, 214

**Chaired by:** L. McNally, McNally Construction Inc. W. Broere, ITA Vice Animateur WG Urban Problems – Underground Solutions

08:30 TUNCONSTRUCT Movie/DVD Lead Off – “Going Underground”

08:30 Planning the Use of Underground Space: Asset or Liability
- J.B.M. Admiraal, Centre Applied Research Underground Space - CARUS, Vlissingen, the Netherlands
- Enprodes Management Consultancy B.V., Rotterdam, Netherlands
- ITACUS - ITA Committee on Underground Space, Lausanne, Switzerland

08:45 The Greater Paris: Towards a New Era of Mass Transit Systems
- J.P. Godard, A. Balan, French Tunnelling and Underground Space Association, Paris, France

08:45 Orly-Rungis Area in France, a Case Study for a Global Underground Space Use Project
- M. Labbé, P. Duffaut, Comité on Underground Space (COMES) of the French Tunnelling and Underground Space Association, Paris, France

09:00 The Greater Paris: Towards a New Era of Mass Transit Systems
- J.P. Godard, A. Balan, French Tunnelling and Underground Space Association, Paris, France

09:00 Busan-Geoje Fixed Link (Korea) - Immersed Tunneling under Extreme Circumstances
- M.J. Vlaanderen Oldenzeel, D. de Groot, M. Reijm, Strukton, Mergor Underwater Construction, Maarssen, The Netherlands

09:15 Four-track Railway Tunnel Re-unifies the City of Delft in the Netherlands
- S. Delfgaauw1, H. Mortier2, J. Jonker2, H. Mastbroek4, Witteveen+Bos Consulting Engineers, Amsterdam, The Netherlands
- 1CFE, Dordrecht, The Netherlands
- 2Movares, Utrecht, The Netherlands
- 3ProRail, Utrecht, The Netherlands

09:30 A Study of Tunnel Eye Breaking Method for the Delhi Metro Phase-II
- J. Tyson1, S. Lowry2, K. Yamaoka2, C. Izumi2, Delhi Metro Railway Corporation, New Delhi, India
- 1Oriental Consultants Co., Ltd. Tokyo, Japan

08:30 Bosphorus Crossing Update, Istanbul, Turkey
- D. Madsen1, R. Miles2, C. Ingerslev3, formerly Parsons Brinckerhoff, Godalming, UK
- 4Arrasyconsult, Istanbul, Turkey, 5Parsons Brinckerhoff, New York, USA

08:45 The Fehmarnbelt Fixed Link - Innovation and Research for Tunneling
- S. Lykke1, W.P.S. Janssen2, 1Femern A/S, Copenhagen, Denmark
- 2Ramboll/Arup/TEC JV, Copenhagen, Denmark

08:45 A New AFTES Guideline 'Safety and Mechanization', How these Issues can be Integrated during Early Stages of Design
- M. Schivre1, P. Ramond2, 1INEXIA, La Plaine St Denis, France
- 2Razel, Orsay, France

09:00 The Greater Paris: Towards a New Era of Mass Transit Systems
- J.P. Godard, A. Balan, French Tunnelling and Underground Space Association, Paris, France

09:00 Busan-Geoje Fixed Link (Korea) - Immersed Tunneling under Extreme Circumstances
- M.J. Vlaanderen Oldenzeel, D. de Groot, M. Reijm, Strukton, Mergor Underwater Construction, Maarssen, The Netherlands

09:15 Challenge to Expand the Application of Box-Culvert Driving Tunneling Method (Kozukayama Tunnels on an Urban Expressway, the Tokyo Outer Ring Road)
- T. Yoshih1, H. Yamazaki2, K. Tanai2, N. Date2
- 1Ministry of Land, Infrastructure, Transport and Tourism, Tokyo, Japan
- 2Kajima Corporation, Tokyo, Japan

09:30 Safety and Health in Tunnelling and Underground Construction in Singapore
- L.J. Pakianathan1, S. McChesney2, M. Mannot-Russell3
- 1Mott MacDonald Singapore Pte Ltd, Singapore
- 2Land Transport Authority, Singapore
- 3CH2M Singapore Pte Ltd, Singapore

09:00 – 13:00 General Assembly (Second Part) (West Rooms 109 and 110)

10:00 Coffee Break (Exhibit Area and Second Floor Foyer)
WEDNESDAY, MAY 19 08:30 – 10:00

Session 4A
T10 The Use of Underground Space (I)
Room: 211, 212, 213, 214
Chaired by: L. McNally, McNally Construction Inc.
W. Broere, ITA Vice Animateur WG Urban Problems – Underground Solutions

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M. Labbé, P. Duffaut, Comité on Underground Space (COMES) of the French Tunnelling and Underground Space Association, Paris, France

09:30 Four-track Railway Tunnel Re-unifies the City of Delft in the Netherlands

Session 4B
T02 Tunnelling in Soft Ground (III)
Room: 220, 221, 222
Chaired by: J. Brockway, Herrenknecht
H. Wagner, ITA Past Vice-President

08:30 Bosporus Crossing Update, Istanbul, Turkey
D. Madsen1, R. Miles2, C. Ingersley3, formerly Parsons Brinckerhoff, Godalming, UK, 2Avrasyaconsult, Istanbul, Turkey, 3Parsons Brinckerhoff, New York, USA

08:45 The Fehmarnbelt Fixed Link - Innovation and Research for Tunneling
S. Lykke1, W.P.S. Janssen2, 1Femern A/S, Copenhagen, Denmark, 2Ramboll/Arup/TEC JV, Copenhagen, Denmark

09:00 Busan-Geoje Fixed Link (Korea) - Immersed Tunneling under Extreme Circumstances
M.J. Vlaanderen Oldenzeel, D. de Groot, M. Reijm, Strukton, Mergor Underwater Construction, Maarsen, The Netherlands

09:15 Challenge to Expand the Application of Box-Culvert Driving Tunneling Method (Kozukayama Tunnels on an Urban Expressway, the Tokyo Outer Ring Road)
T. Yoshi1, H. Yamazaki2, K. Taira3, N. Dake4, 1Ministry of Land, Infrastructure, Transport and Tourism, Tokyo, Japan, 2Kajima Corporation, Tokyo, Japan

09:30 A Study of Tunnel Eye Breaking Method for the Delhi Metro Phase-II
J. Tyagi1, K. Yamaoka2, C. Izumi3, 1Delhi Metro Railway Corporation, New Delhi, India, 2Oriental Consultants Co., Ltd. Tokyo, Japan

Session 4C
T18 Safety in Tunneling
Room: 223, 224
Chaired by: M. Malott, McNally Construction Inc.
A. Haack, ITA Past President

08:30 Monitoring the Effectiveness of Tunnel Decompression Procedures Using Doppler Techniques
D.R. Lamont, Health & Safety Executive, Bootle, UK

08:45 A New AFTES Guideline 'Safety and Mechanization', How these Issues can be Integrated during Early Stages of Design
M. Schivre1, P. Ramond2, 1INEXIA, La Plaine St Denis, France, 2RAZEL, Orsay, France

09:00 AIR LOCK SYSTEMS International Certification and Fire Fighting under Hyperbaric Conditions
K.D. Hagenah, A. Fischer, Germanischer Lloyd, Hamburg, Germany

09:15 Safety Improvements in the Maurice Lemaire Tunnel (France) with a Safety Gallery and Implementation of a Specific Evacuation Vehicle
F. Kritter1, A. Staehli1, A. Thiboud2, 1BG Consulting Engineers Ltd., Lausanne, Switzerland, 2Autoroutes Paris-Rhin-Rhône, Lyon, France

09:30 Safety and Health in Tunnelling and Underground Construction in Singapore
L.J. Pekianathan1, S. McChesney2, M. Mannot-Russell3, 1Mott MacDonald Singapore Pte Ltd, Singapore, 2Land Transport Authority, Singapore, 3CH2M Singapore Pte Ltd, Singapore

10:00 Coffee Break (Exhibit Area and Second Floor Foyer)
## Session 5A

**T10 The Use of Underground Space (II)**

**Room:** 211, 212, 213, 214  
**Chaired by:**  
J. Reilly, John Reilly Associates International  
R. Sterling, ITA Vice-Chairman ITA Committee on Underground Space  

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<td>10:30</td>
<td>The Use of Infrastructure through Tunneling over Time in Stockholm, Sweden</td>
<td>L. Lilja, R. Andersson, Swedish Road Administration, Stockholm, Sweden</td>
<td>Room: 211, 212, 213, 214</td>
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<td>10:45</td>
<td>Use of Underground Space in Korea</td>
<td>H.S. Shin, Korea Institute of Geoscience &amp; Mineral Resources, Daejeon, Korea</td>
<td>Room: 211, 212, 213, 214</td>
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<tr>
<td>11:00</td>
<td>Underground Water Treatment Facility in Downtown Toronto Heritage Environment</td>
<td>D. Kirkland, G. Fortuna, J. Pigott, I. Fogarasi, Kenaidan Contracting Ltd, Mississauga, Canada</td>
<td>Room: 211, 212, 213, 214</td>
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<tr>
<td>11:15</td>
<td>Technical Description of Design and Construction Aspects of Three Underground Caverns for Hydroelectric Projects in Colombia, South America</td>
<td>J.C. Gutierrez, Empresas Públicas de Medellín E.S.P., Medellín, Colombia</td>
<td>Room: 211, 212, 213, 214</td>
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<tr>
<td>11:30</td>
<td>Unconventional Uses of Underground Space</td>
<td>N. Munfah, S. Zlatanic, G. Macaro, S. Erbilgin, Parsons Brinckerhoff, New York, USA; Columbia University, New York, USA</td>
<td>Room: 211, 212, 213, 214</td>
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### Lunch (West Ballroom C and D)

## Session 5B

**T03 Hard Rock Tunnelling (II)**

**Room:** 220, 221, 222  
**Chaired by:**  
M. Shimokawachi, ITA Vice Animateur WG Long Tunnels at Great Depth  

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speakers</th>
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<tbody>
<tr>
<td>10:30</td>
<td>Planning and Design for the New Mine Level Access Tunnels at El Teniente Chile</td>
<td>L. Chamy, H. Charalambu, H. Pearce, G. Piaggio, J. Revueltta, A. Cabanas, J. Pereira, J. Blondell, D. Brox, R. Diez, R. Essex, D. Powell, P. Procter, S. Warren, Hatch, Santiago, Chile; Hatch, Mississauga, Canada; Codelco, Vice President Projects, Santiago, Chile; Hatch Mott MacDonald, Canada and USA; Hatch Mott MacDonald, Rockville, USA; Hatch Mott MacDonald, Los Angeles, USA</td>
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<td>10:45</td>
<td>Tunneling under Brussels International Airport - Diabolo Rail Project</td>
<td>J. Mignon, K. Rieker</td>
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<tr>
<td>11:00</td>
<td>Construction Aspects of Tunnelling and Temporary Rock Support for the North South Bypass Tunnel</td>
<td>M. Funkhouser, N. Boultbee, J. Stabler, L. McQueen, Golder Associates, Brisbane, Australia; Leighton Contractors and Boulderstone Hornbrook Bifflinger Berger Joint Venture (LBB JV), Brisbane, Australia; Golder Associates, Sydney, Australia</td>
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<td>11:15</td>
<td>Tunnel Boring Machines used for Irrigation in Andhra Pradesh, India</td>
<td>D. Harding, The Robbins Company, Solon, USA</td>
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<tr>
<td>11:30</td>
<td>Revision of the CEN Standards for Tunnelling Machinery</td>
<td>W. Burger, K.D. Hagenah, R. Kampmeier, D.R. Lamont, Health &amp; Safety Executive, Bootle, UK; Herrenknecht AG, Schwarnau, Germany; Germanischer Lloyd AG, Hamburg, Germany; VDMA, Frankfurt, Germany, CEN/TC151/WG4</td>
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### Lunch (West Ballroom C and D)
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<th>Time</th>
<th>Session 6A</th>
<th>Session 6B</th>
<th>Session 6C</th>
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<tr>
<td></td>
<td>T. Camus, G. Fontanielle, NFM Technologies, Lyon, France</td>
<td>M.S. Diedrichs1, T. Carter2, D. Martin3, Queen's University, Kingston, Canada</td>
<td>H. Ehrbar1, P. Beeler2, M. Neuenschwander2, M. Bianchi1, 1AlpTransit Gotthard AG, Lucerne, Switzerland, Lombardi Ltd., Minusio, Switzerland, 3SISO Ltd, Minusio, Switzerland</td>
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<td>2Golder Associates, Mississauga, Canada, 2University of Alberta, Edmonton, Canada</td>
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<td>13:15</td>
<td>Lessons Learned from Recent EPB Tunnel Projects in Toronto</td>
<td>Geotechnical Challenges of the Proposed Bunji Hydropower Headrace Tunnel, Pakistan: Crossing the Main Mantle Thrust under High In-situ Stress Conditions</td>
<td>13:15 Evaluating the Design Risks for Deep Underground Excavations Using Information from Surface Based Drill Holes</td>
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<td>D.A. Zoldy, M. Ghassemi, M. Kanchan, AECOM Canada, Toronto, Canada</td>
<td>E. Eberhardt1, H. Nishimiya2, P. Yang3, 2University of British Columbia, Vancouver, Canada, 3Nippon Koei Co., Ltd., Tokyo, Japan</td>
<td>C.D. Martin1, R. Christianson2, 1University of Alberta, Edmonton, Alberta, 1Swedish Nuclear Fuel and Waste Management Co., Stockholm, Sweden</td>
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<td>13:30</td>
<td>Design of Tunnel Boring Machines for Escalator Access Tunnel Construction, Moscow, Russia</td>
<td>Gilgel Gibe II Hydroelectric Project - Headrace Tunnel Tunneling under High Stress Conditions</td>
<td>13:30 Applicability of Classifications for Tunnelling - Valuable for Improving Insight, but Problematic for Contractual Support Definition or Final Design</td>
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<td>G. Stiern1, C. Bournes2, 1Mosmetrostroy, Moscow, Russia, 2LOVAT Inc., Toronto, Canada</td>
<td>A. De Biasse, F. Bartimoccia, R. Grandori, SELI S.p.A., Rome Italy</td>
<td>T.G. Carter, Golder Associates, Toronto, Canada</td>
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<td>A. Sciotti, P. Lattanzi, G. Pacifici, G. Simonacci, A. Zechini, Roma Metropolitane Srl, Rome, Italy</td>
<td>M. Srti1, P. Svoboda1, J. Nosek2, 1D2 Consult, Prague s.r.o., Czech Republic, 2Czech Technical University, Prague, Czech Republic</td>
<td>J.J. Reilly1,2,3, D.A. Sangrey4, S. Warhos5,6, 1John Reilly Associates International, Framingham, USA, 2Past President American Underground Construction Association, 3Previously, Animateur ITA Working Groups 13 and 20, 4Consultant, Portland, USA, 5WSDOT, SR99 Deep Bore Tunnel, Seattle, USA, 6Past President - AACE International</td>
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<td>14:00</td>
<td>URUP (Ultra Rapid under Pass) Method - The First Implementation in the World</td>
<td>Ground Support Equipment for Large Diameter TBMs in Difficult Ground Conditions</td>
<td>14:00 Southern Nevada Water Authority (SNWA) Risk Management Strategy to Create a Win-Win Situation for the Contractor, the Insurer, and the Owner on the “Lake Mead Intake No.3 (LMIN3), Las Vegas, Nevada”</td>
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<td>H. Fujiy1, T. Nakamura2, M. Izawa2, 1The Tokyo Metropolitan Government, Tokyo, Japan, 2Obayashi Corporation, Tokyo, Japan</td>
<td>B. Khalighi, The Robbins Company, Kent, USA</td>
<td>M. Feroz1, E. Moonin2, J. Grayson3, 1Parsons Water Infrastructure, Las Vegas, USA, 2Southern Nevada Water Authority, Las Vegas, USA, 3Vegas Tunnel Constructors JV, (VTC), Las Vegas, USA</td>
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<td>14:15</td>
<td>Soil Abrasion Effects on TB Tunnelling</td>
<td>Deep Tunnels in Poor Rock Conditions and High Water Head; How Much Can We Ask of TBM Technology?</td>
<td>14:15 Risk Control Strategy for Large Slurry Shield Crossing the Soil at Shallow Depth below Airport Taxiway</td>
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<td>U.G. Gwilda1, I. Sass2, J. Rostami3, M.B. Gilbert4, 1CDM, Bellevue, USA, 2Technical University of Darmstadt, Darmstadt, Germany, 3Penn State University, University Park, USA, 4CDM, Cambridge, USA</td>
<td>J. Wagnon1, J. Shamma2, S. Klein3, 1Jacobs Associates, Pasadena, USA, 2Metropolitan Water District of Southern California, Los Angeles, USA, 3Jacobs Associates, San Francisco, USA</td>
<td>S.M. Liao1, W. Shao1, J. Li1, J.S. Hu2, Y. Tan1, 1Tongji University, Shanghai, China, 2Shanghai Construction Engineering Administration Co., Ltd, Shanghai, China, 3Shanghai Urban Construction Group Co., Ltd, Shanghai, China</td>
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<td>14:30</td>
<td>Parameters for Soil Conditioning with Foam in Coarse-grained Soils with EPB-shields</td>
<td>Norwegian Method of Tunnelling - A Singapore Experience</td>
<td>14:30 How to Build a Metro for Half-price or Less</td>
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<td>M. Thewes1, C. Budach, Ruhr-University Bochum, Institute for Tunnelling, Pipeline Technology and Construction Management, Bochum, Germany</td>
<td>S. Sekar1, Y. Zhou1, J. Zhao2, 1Defence Science and Technology Agency, Singapore, 2École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland</td>
<td>D. Caiden, Arup, New York, USA</td>
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<td>14:00</td>
<td>ITACUS General Assembly (West Room 112)</td>
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<td>15:00</td>
<td>Coffee Break (Exhibit Area and Second Floor Foyer)</td>
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<td>15:30</td>
<td>ITA Executive Council (West Room 121)</td>
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Session 7A
T17 Sequential Excavation and Sprayed Concrete Linings
Room: 211, 212, 213, 214
Chaired by: F. Huber, Metro Vancouver
T. Celestino, ITA Animateur WG Sprayed Concrete Use
15:30 Innovation in Building Materials - Application
Experiences with Polymer-modified Sprayed Concrete in Tunnel Constructions
K. Bonm, C. Köster, F. Gregory, J. Bezler, Wacker Chemie AG, München, Germany
15:45 Excavation Scenario Analysis for NATM Tunnel in Bangkok Subsoil
S. Suwansawat1, P. Lueprasert2, P. Jongpradist3, 1,2Ladkrabang Underground and Tunneling Innovation Center (LUTIC), 3King Mongkut’s Institute of Technology Ladkrabang, Bangkok, Thailand, 3King Mongkut’s University of Technology Thonburi, Bangkok, Thailand
16:00 Construction of a Large Cross Section Tunnel with Low Overburden and under the Water Table
A. Fernández1, J. Rodríguez1, B. Celada2, J. Cuadrado2, 1ADIF, Madrid, Spain, 2Geocontrol S.A., Madrid, Spain
16:15 Transbay Transit Center Caltrain Downtown Rail Extension Project
M.M. Murphy, D.J. Penrice, B.F. Townsend, Hatch Mott MacDonald, San Francisco, USA
16:30 The Key for an Appropriate NATM Verification Process:
The Observational Method during Construction of the Devil’s Slide Tunnel, California
I.E. Ramirez1, Th. Marcher2, M. John3, A. Spieg12, 1CALTRANS, Pacifica, USA, 2ILF Consulting Engineers, USA
16:45 Fiber Reinforced Concrete for Tunnel Linings
G.A. Pizzari, G. Tiberti, University of Brescia, Brescia, Italy
17:00 Congress Closing (West Ballroom A)
19:00 Banquet (West Ballrooms C and D)

Session 7B
T07 Tunnelling under Sensitive Structures (II)
Room: 220, 221, 222
Chaired by: F. Poliocchino, City of Edmonton
C. Ingerslev, ITA Animateur WG Immersed and Floating Tunnels
15:30 EPB Operation under High Cover and Pressure to Avoid Interferences with Rome Ancient Buildings
M. Monina1, A. Scocci2, R. Ginanneschi1, 1,2S.I.E.I. Spa, Rome, Italy
15:45 Experiences with Polymer-modified Sprayed Concrete with Real Time Monitoring in Dubai, UAE
J. Yamashita, J. Nakayama, T. Saiga, K. Yamashita, Obayashi Corporation, Tokyo, Japan
16:00 Slurry Shield Tunnelling through Partially Dewatered, Mixed Face Conditions in Singapore
J.N. Shirlaw1, Y. Zhen2, X.C. Xiao2, 1Golder Associates, Singapore, 2Shanghai Tunnel Engineering Company, Singapore
16:15 Advance of EPB TBM under Pile Foundation Building with Real Time Monitoring in Dubai, UAE
J. Yamashita, J. Nakayama, T. Saiga, K. Yamashita, Obayashi Corporation, Tokyo, Japan
16:30 Construction of Underground Railways Station Beneath Unsound Buildings in Densely Populated Urban Area, Istanbul Turkey
M. Iwano1, I. Otsuka1, H. Tak2, H. Harada2, S. Sakurai3, 1Taisei Corporation Marmaray Project, Istanbul, Turkey, 2Taisei Corporation, Tokyo, Japan, 3Construction Engineering Research Institute Foundation, Kobe, Japan
16:45 Light Rail Zagreb Project
D. Kolic, NEURON Zagreb d.o.o. Zagreb, Croatia

Session 7C
T08 Geotechnical Instrumentation and Monitoring
Room: 223, 224
Chaired by: D. Martin, University of Alberta
E. Leca, ITA Animateur WG Research
15:30 Roof Profiles and Geological Structures in Myra Canyon Tunnels Mapped from High Resolution Digital Rock Surface Models
D.D. Tannant, University of British Columbia - Okanagan, Kelowna, Canada
15:45 Settlement due to Two Bored Tunnels in Mixed Soil Conditions
G.V. Mathew, B.M. Lehane, University of Western Australia, Perth, Australia
16:00 Analysis of the Settlement Trough Induced by the Excavation of a Deep Subway Tunnel Below a Densely Populated Area in Barcelona (Spain)
J. Alcoverro1, J. Cornelles1, J. Aranda1, C. López1, J. Jubany2, 11, 2S.E.L.I. Spa, Madrid, Spain, 3Generalitat de Catalunya, Barcelona, Spain
16:15 Vibration Monitoring in Tunnelling - Two Examples from Europe
P. Althaus, Associated Geosciences Ltd, Calgary, Vancouver, Canada and DMT GmbH&Co.KG, Essen, Germany
16:30 Non Destructive Integrity Testing of Rock Reinforcement at the Sunrise Dam Mine in Western Australia
W. Hartman1, L. Nienaber2, B. Lecinq3, J. Higgs4, D. Tongue1, 1GEOHART Consultants Pty Ltd, Melbourne, Australia, 2Sunrise Dam Mine, Perth, Australia, 3Austress Freysinett, Sydney, Australia, 4Integrity Testing, Victoria, Australia