

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. Chirioti¹, P. Jackson², S. Taylor², ¹Systra SA, Paris, France, ²COWI A/S, Copenhagen, Denmark
- 13:15 Analysis of Shield's Mechanism Inducing Ground Deformations
C. Chaiwonglek, S. Suwansawat, King Monkut's Institute of Technology Ladkrabang, Bangkok, Thailand
- 13:30 Construction of Casting Support Tunneling System Using TBM in Water-Bearing Unconsolidated Ground
M. Noguchi¹, A. Ogawa¹, T. Iura¹, T. Tamai¹, T. Abe², T. Kobayashi², Japan Railway Construction, Transport and Technology Agency, Yokohama, Japan, ²Kajima Corporation, Tokyo, Japan
- 13:45 Application of Slurry Pressure Balance (SPB) Tunneling Method under Challenging Project Conditions
Y. Tanaka¹, A. Nomura², S. Mino², K. Yamauchi², 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. Celestino^{1,2}, C.T. Mitsuse¹, F. Casagrande³, T. Harada⁴, H.C. Rocha⁵, C. Silvatti¹, ¹Themag Engenharia, 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

14:00 – 18:00 ITA Working Groups and Committees

15:00 Coffee Break (Exhibit Area and Second Floor Foyer)
Sponsored by The Robbins Company

Session 1B
T04 Tunnelling in Weak Rock

Room: 220, 221, 222

Chaired by: B. Lukajic, Consultant
I.M. Lee, ITA Vice-President

- 13:00 Geotechnical Risks when Tunnelling through Flysch - Practical Experience
V. Vesely, O. Jandjsek, ARCADIS Geotechnika, Prague, Czech Republic
- 13:15 Construction of Long Tunnels Using Mixshields in Slurry and Hard-Rock Mode - Finne Tunnel
K. Rieker, Wayss & 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 Construction of Head Race Tunnel for Sewa H.E. Project (Stage-II) Lot SW-1: Innovative Approach of Gammon - A Case Study
R.K. Khali, Gammon India Limited, Mumbai, India
- 14:00 Face Stability Assessment for the Lake Mead Intake No 3 Tunnel
G. Anagnostou¹, L. Cantieni¹, A. Nicola², M. Ramoni¹, ¹ETH Zurich, Switzerland, ²Impregilo SpA, Milan, Italy
- 14:15 France - Spain High-Speed Rail Link, Perthus Base Tunnel: Crossing Very Difficult Terrains with Two Double Shield 10m-Diameter TBMs
G. Venturini¹, M. Spanò¹, V. Scionti¹, M. Ducrot², P. Vicente³, J. Casado³, ¹SEA Consulting, Turin, Italy, ²EIFFAGE TP, Paris, France, ³ACS DRAGADOS, Madrid, Spain
- 14:30 Vertical Access Shaft Replaced by a Decline TBM Access Tunnel
E. Fernandez¹, G. Rojo², A. Gullón³, ¹Dragados, Madrid, Spain, ²Dragados, León, Spain, ³Obras Subterráneas, Madrid, Spain

Session 1C
T16 Innovation and Research for Tunnelling

Room: 223, 224

Chaired by: B. Fulcher, J.F. Shea Construction
S.D. Eskesen, ITA ExCo member

- 13:00 Tunnel Face Rockmass Characterization in Drill and Blast Tunnels Using LiDAR
S. Fekete, M. Diederichs, Queen's University, Kingston, Canada
- 13:15 A Model for Selecting Efficient Tunnelling Systems
H. Toma¹, H.G. Jodt², 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 State of the Art in Drill Plan Design
J.T. Kukkonen, Sandvik Mining and Construction, Tampere, Finland
- 14:00 Updated Guidelines for the Design of Unlined Pressure Tunnels
A.J. Rancourt^{1,2}, H.S. Mitri², ¹Hydro-Québec, Montréal, Canada, ²McGill University, Montréal, Canada
- 14:15 Towards Precise Under Ground Mapping System in Canada
M. Ghassemi, D. Zoldy, H. Javady, AECOM, Toronto, Canada
- 14:30 New Tools for Evaluating Underground Infrastructures According to Sustainable Development Concepts
L. D'Aloia Schwartzentruber, M. Deffavet, CETU (Centre d'Études des Tunnels), Bron, France

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. Nilsen¹, R.G. Haug², ¹Leonhard Nilsen & Sønner AS, *Riseyhamn, Norway*, ²Norwegian Public Road Administration, *Oslo, Norway*
- 16:00 Canadian Fast-track Drill and Blast: Excavating the Rupert Transfer Tunnel at James Bay, Québec, Canada
C.H. Murdock¹, R.W. Glowe², ¹Independent Consultant, *Vancouver, Canada*, ²Independent Consultant, *Longueuil, Canada*
- 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. Zhou¹, M. Lu², ¹China 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. Snee³, ¹Arup, *New York, USA*, ²GZA Geoenvironmental, Inc., *New York, USA*, ³SneeGeoconsult, *New York, USA*
- 17:00 Tunnel Specific Equipment for Efficiency and Versatility-Lifting and Explosives Charging
M. Rispin¹, 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. Bohlke, Myers Bohlke Enterprise
A. Dix, ITA Animateur 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. Fogarasi², ¹Consultant Engineering Office, *Budapest, Hungary*, ²Kenaidan Contracting Ltd, *Mississauga, Canada*
- 15:45 Established Standards for Differing Site Condition Entitlement
P.J. Tarkov, *Geotechnical & Tunnel Consultant, Sherborn, USA*
- 16:00 Gautrain : Site Investigations and Procurement
A. Boniface¹, H.J. Tluczek², R.B. Storry³, ¹GIBB, *Johannesburg, South Africa*, ²BKS Pty Ltd, *Pretoria, South Africa*, ³Bouygues, TP, *Johannesburg, South Africa*
- 16:15 The Southeast Collector Trunk Sewer
B. Garrod¹, 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. Fuldain¹, 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*, ⁴Geoconsult 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. Behr², 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. MacDonald¹, A.J. De Abotitz², 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. Wenger², L. Schönenberger³, 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. Arghiroiu¹, A.P. Assis², M. Aymerich³, S. Călinescu¹, 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. Babendererde², 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, A. Lejeune², G. Paradis², M. Schivre¹, O. Schoen³, ¹INEXIA, *La Plaine St Denis, France*, ²SNCF IG, *La Plaine St Denis, France*, ³RFF, *Paris, France*
- 17:00 Analysis of the Performance of Two Component Back-filling Grout in Tunnel Boring Machines Operating under Face Pressure
S. Pelizza¹, D. Peila¹, L. Borio¹, E. dal Negro², R. Schulkins², A. Boscaro², ¹Politecnico di Torino, *Torino, Italy*, ²UTT-MAPEI S.p.A., *Milan, Italy*

TUESDAY, MAY 18

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, Animeatur

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

- 13:00 The Forgotten St. Clair Tunnels, Toronto, Ontario
S. Tynan, *McNally Construction Inc., Hamilton, Canada*
- 13:15 The Toronto - York Spadina Subway Extension - An Overview
A. Boden, T. Gregor, *Spadina Link JV, Toronto, Canada*
- 13:30 Tunneling Beneath the New York Harbor - The Siphon Project
C. Lawrence¹, D.M. Watson¹, M. Schultz², ¹*Hatch Mott MacDonald, New York City, USA*, ²*CDM, Cambridge, USA*
- 13:45 Upper Northwest Interceptor Sections 3 & 4, Sacramento, CA, USA
M.R. Crow¹, J. Wong², C.Z. Painter³, A.J. Finney⁴, ¹*Kellogg Brown & Root, Pasadena, USA*, ²*Sacramento Regional County Sanitation District, Sacramento, USA*, ³*Parsons Brinckerhoff, Sacramento, USA*, ⁴*CH2M HILL, Sacramento, USA*
- 14:00 Brightwater Conveyance Tunnel, West Contract (BT-4), King County, Seattle, Washington, USA; TBM System Design to Facilitate Cuttinghead Maintenance in Adverse Conditions
W. Trisi¹, G. Frank², M. DiPonio², ¹*LOVAT Inc., Toronto, Canada*, ²*Jay Dee Contractors Inc., Michigan, USA*
- 14:15 Two Decades of Advances Investigating, Baselineing and Tunneling in Boulderly Ground
S.W. Hunt¹, D.E. Del Nero², ¹*CH2M Hill, Henderson, USA*, ²*CH2M Hill, Atlanta, USA*
- 14:30 Estimating Face Pressures for Closed Face Tunnelling in Soft Ground
D.J. Young¹, A. Dean², ¹*Hatch Mott MacDonald, Pleasanton, USA*, ²*Hatch Mott MacDonald, Upper Northwest Interceptor Project, Sacramento, USA*
- 15:00 Coffee Break (Exhibit Area)
- 15:30 Poster Session
- 17:30 Poster Awards
- 18:00 Film Night – *Over CANADA, An Aerial Adventure* (West Ballroom A)
Sponsored by Del Communications

TUESDAY, MAY 18 13:00 – 15:00
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

- 13:00 Challenges in Mechanized Tunnelling
M. Herrenknecht, K. Bäßler, *Herrenknecht AG, Schwanau, Germany*
- 13:15 Technological Innovation in Mechanized Tunnelling: Towards the Establishment of a New Industry of High Performance Tunnel Boring Machines
M. Noronha¹, P.O. Faria², F. Gao³, W.Z. Guo³, ¹*Federal University of Santa Catarina, Brazil*, ²*BraBo Company, Inc., Florianopolis, Brazil*, ³*Shanghai Jiao Tong University, Shanghai, China*
- 13:30 The McNally System™ Increasing Production of Main Beam TBMs in Difficult Rock through Reliable Roof Support
M.P. McNally, *Mike McNally & Associates Inc., Freelon, Canada*
- 13:45 Anti-wear and Anti-dust Solutions for Hard Rock TBMs
L. Langmaack¹, B. Grothen², P.D. Jakobsen¹, ¹*BASF Construction Chemicals, Zuerich, Switzerland*, ²*The Robbins Company, Solon, USA*, ³*NTNU Trondheim University, Trondheim, Norway*
- 14:00 Lake Mead Intake No. 3
J. McDonald¹, J. Hurt², E. Moonin³, ¹*Vegas Tunnel Constructors, Las Vegas, USA*, ²*Arup, New York, USA*, ³*Southern Nevada Water Authority, Las Vegas, USA*
- 14:15 A Case Study of Subsea Shield TBM Tunnel Design: Istanbul Strait Road Tunnel Crossing Project
K.-C. Jeon, Do-hyung Kim, Dong-hyun Kim, D.-H. Lee, *Sambo Engineering, Seoul, Korea*
- 14:30 Review of TBM Utilization and Impact of Difficult Ground Conditions in Zagros Water Conveyance Tunnel
J. Rostami¹, J. Khademi Hamidi², M. Bayati³, ¹*Pennsylvania State University, University Park, USA*, ²*Amirkabir University of Technology, Tehran, Iran*, ³*Imensazan Consulting Engineers, Tehran, Iran*

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

- 13:00 Tunnelling through Karstic Rocks
P.G. Marinou, *National Technical University of Athens, Athens, Greece*
- 13:15 Advanced Technology of the Tunnel Seismic Prediction System
T. Dickmann, R. Groschup, *Amberg Technologies AG, Regensdorf, Switzerland*
- 13:30 Instrumentation and Monitoring at Deep Excavation in Historic City of Amsterdam Design and Performance Analysis of Monitoring System at Ceintuurbaan Station
R.E.P. de Nijs, S.M. Buykx, *Witteveen+Bos Consulting Engineers, Amsterdam, The Netherlands*
- 13:45 Extensive Geotechnical Investigation for a Road Tunnel, the Stockholm Bypass, beneath Lake Malaren
B. Lindström¹, K. Windelhed², ¹*WSP Civils, Stockholm, Sweden*, ²*Swedish Road Administration, Stockholm, Sweden*
- 14:00 Field Works for the Binational Agua Negra Tunnel
J.L. Fenoglio, H. Patt, R. Gianni, R. Castro, *Rizzo Associates Argentina SA, Mendoza, Argentina*
- 14:15 Design and Construction of Tunnels in Karst Geology on Yichang-Wanzhou Railway, China
M. Zhang, H.J. Huang, M.Q. Zhang, *Project Management Center of The Ministry of Railways, Beijing, China*
- 14:30 Does Geological Investigation Reduce Risks in Tunnelling Projects?
E. Bieth, C. Gaillard, F. Rival, A. Robert, *CETU - Centre d'Etudes des Tunnels, Bron, France*

08:00 – 17:30 Registration

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”

08:45 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*

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

09:15 Orly-Rungis Area in France, a Case Study for a Global Underground Space Use Project
M. Labbé, P. Duffaut, *Committee on Underground Space (COMES) of the French Tunneling and Underground Space Association, Paris, France*

09:30 Four-track Railway Tunnel Re-unifies the City of Delft in the Netherlands
S. Delfgaauw¹, H. Mortier², J. Jonker³, H. Mastbroek⁴,
¹Witteveen+Bos Consulting Engineers, Amsterdam, The Netherlands, ²CFE, Dordrecht, The Netherlands, ³Movares, Utrecht, The Netherlands, ⁴ProRail, Utrecht, The Netherlands

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

10:00 Coffee Break (Exhibit Area and Second Floor Foyer)

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 Bosphorus Crossing Update, Istanbul, Turkey
D. Madsen¹, R. Miles², C. Ingerslev³, *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, 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. Yoshigi¹, H. Yamazaki¹, K. Taira², N. Dake²,
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, S. Lowry², K. Yamaoka², C. Izumi², ¹Delhi Metro Railway Corporation, New Delhi, India, ²Oriental Consultants Co., Ltd. Tokyo, Japan

Session 4C

T18 Safety in Tunelling

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. Ritter¹, 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. Pakianathan¹, S. McChesney², M. Mannot-Russell³,
¹Mott MacDonald Singapore Pte Ltd, Singapore, ²Land Transport Authority, Singapore, ³CH2M Singapore Pte Ltd, Singapore

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

10:30 The Use of Infrastructure through Tunneling over Time in Stockholm, Sweden
L. Lilia, R. Andersson, *Swedish Road Administration, Stockholm, Sweden*

10:45 Use of Underground Space in Korea
H.S. Shin, *Korea Institute of Geoscience & Mineral Resources, Daejeon, Korea*

11:00 Underground Water Treatment Facility in Downtown Toronto Heritage Environment
D. Kirkland, G. Fortuna, J. Pigott, I. Fogarasi, *Kenaidan Contracting Ltd, Mississauga, Canada*

11:15 Technical Description of Design and Construction Aspects of Three Underground Caverns for Hydroelectric Projects in Colombia, South America
J.C. Gutierrez, *Empresas Públicas de Medellín E.S.P., Medellín, Colombia*

11:30 Unconventional Uses of Underground Space
N. Munfah¹, S. Zlatanic¹, G. Macaro², S. Erbilgin², ¹*Parsons Brinckerhoff, New York, USA*, ²*Columbia University, New York, USA*

12:00 Lunch (West Ballroom C and D)

Session 5B
T03 Hard Rock Tunnelling (II)

Room: 220, 221, 222

Chaired by: L. Home, The Robbins Company
M. Shimokawachi, ITA Vice Animateur WG Long Tunnels at Great Depth

10:30 Planning and Design for the New Mine Level Access Tunnels at El Teniente Chile
L. Chamy¹, H. Charalambu², H. Pearce¹, G. Piaggio¹, J. Revuelta³, A. Cabanas³, J. Pereira³, J. Blondell⁴, D. Brox⁴, R. Diez⁵, R. Essex⁵, D. Powell⁶, P. Procter⁴, S. Warren⁷, ¹*Hatch, Santiago, Chile*, ²*Hatch, Mississauga, Canada*, ³*Codelco, Vice President Projects, Santiago, Chile*, ⁴*Hatch Mott MacDonald, Canada and USA*, ⁵*Mott MacDonald, Croydon, UK*, ⁶*Hatch Mott MacDonald, Rockville, USA*, ⁷*Hatch Mott MacDonald, Los Angeles, USA*

10:45 TBM Tunnelling for Maurice Lemaire Tunnel's Safety Gallery : Experience Feedback
A. Saitta¹, E. Garin², H. Tournery¹, M. Mercier², ¹*Egis Tunnels, Annecy, France*, ²*BG ingénieurs-conseils, Lausanne, Switzerland*

11:00 Construction Aspects of Tunnelling and Temporary Rock Support for the North South Bypass Tunnel
M. Funkhouser¹, N. Boutbee¹, J. Stabler², L. McQueen³, ¹*Golder Associates, Brisbane, Australia*, ²*Leighton Contractors and Baulderstone Hornibrook Billfinger Berger Joint Venture (LBB JV), Brisbane, Australia*, ³*Golder Associates, Sydney, Australia*

11:15 Tunnel Boring Machines used for Irrigation in Andhra Pradesh, India
D. Harding, *The Robbins Company, Solon, USA*

11:30 TBM Tunnelling for Alborz Service Tunnel, Iran: Difficult Ground Conditions and Solutions
D. Wenner, M. Rehbock-Sander, *Amberg Engineering Ltd., Regensdorf, Switzerland*

Session 5C
T07 Tunnelling under Sensitive Structures (I)

Room: 223, 224

Chaired by: D. Brophy, AECON
C.S. Yoo, ITA Vice Animateur WG Research

10:30 Tunneling under Brussels International Airport - Diabolo Rail Project
J. Mignon¹, K. Rieker², ¹*Wayss & Freytag Ingenieurbau AG, Antwerp, Belgium*, ²*Wayss & Freytag Ingenieurbau AG, Frankfurt am Main, Germany*

10:45 In-Tunnel Station Concept on Deep Subway Tunnel Projects in Urban Areas: Barcelona Line 9
J. Roig¹, E. Fernandez², M. Ruiz³, A. Sanz², ¹*Dragados-Canada, Toronto, Canada*, ²*DRAGADOS, Madrid, Spain*, ³*Gorg J.V.General Manager, Barcelona, Spain*

11:00 Tunneling by NATM through the River Terrace with Small Earth Covering just under a Series of River, House and Road - 2nd Uozu Tunnel, Hokuriku Shinkansen
K. Nakaiima¹, K. Iijima², H. Maruyama², S. Kajita¹, ¹*Japan Railway Construction, Transport and Technology Agency, Uozu, Japan*, ²*Japan Railway Construction, Transport and Technology Agency, Toyama, Japan*

11:15 Tunnelling and Cross Passages Below Existing Underground Metro Station- The Deepest in Downtown-New Delhi for Airport Metro Express Line
P.K. Garg, O.P. Singh, *Delhi Metro Rail Corporation Limited (DMRC), New Delhi, India*

11:30 Revision of the CEN Standards for Tunnelling Machinery
W. Burger^{2,5}, K.D. Hagenah^{3,5}, R. Kampmeier^{4,5}, D.R. Lamont^{1,5}, ¹*Health & Safety Executive, Bootle, UK*, ²*Herrenknecht AG, Schwanau, Germany*, ³*Germanischer Lloyd AG, Hamburg, Germany*, ⁴*VDMA, Frankfurt, Germany*, ⁵*CEN/TC151/WG4*

WEDNESDAY, MAY 19 13:00 – 15:00

Session 6A

T06 New Advances and Innovation in Mechanized Tunnelling (II)

Room: 211, 212, 213, 214

Chaired by: M. Giorelli, LOVAT Inc.
L. Babendererde, ITA Animateur WG Mechanized Tunnelling

- 13:00 Trends of Future Tunnel Projects and their Impact on the Design of TBMs
T. Camus, G. Fontanille, *NFM Technologies, Lyon, France*
- 13:15 Lessons Learned from Recent EPB Tunnel Projects in Toronto
D.A. Zoldy, M. Ghassemi, M. Kanchan, *AECOM Canada, Toronto, Canada*
- 13:30 Design of Tunnel Boring Machines for Escalator Access Tunnel Construction, Moscow, Russia
G. Shtern¹, C. Bournes², ¹*Mosmetrostroy, Moscow, Russia*, ²*LOVAT Inc., Toronto, Canada*
- 13:45 Mechanized Tunnelling in Urban Environment: The 'State-of-art' about Underground Metro Lines under Construction in Rome. Design Approach and Operative Choices
A. Sciotti, P. Lattanzi, G. Pacifici, G. Simonacci, A. Zechini, *Roma Metropolitana Srl, Rome, Italy*
- 14:00 URUP (Ultra Rapid under Pass) Method - The First Implementation in the World
H. Fujiki¹, T. Nakamura², M. Izawa², ¹*The Tokyo Metropolitan Government, Tokyo, Japan*, ²*Obayashi Corporation, Tokyo, Japan*
- 14:15 Soil Abrasion Effects on TBM Tunneling
U.G. Gwildis¹, I. Sass², J. Rostami³, M.B. Gilbert⁴, ¹*CDM, Bellevue, USA*, ²*Technical University of Darmstadt, Darmstadt, Germany*, ³*Penn State University, University Park, USA*, ⁴*CDM, Cambridge, USA*
- 14:30 Parameters for Soil Conditioning with Foam in Coarse-grained Soils with EPB-shields
M. Thewes, C. Budach, *Ruhr-University Bochum, Institute for Tunnelling, Pipeline Technology and Construction Management, Bochum, Germany*

14:00 – 17:00 ITACUS General Assembly (West Room 112)

15:00 Coffee Break (Exhibit Area and Second Floor Foyer)

15:30 – 17:00 ITA Executive Council (West Room 121)

Session 6B

T05 Tunnelling under High Stress Conditions

Room: 220, 221, 222

Chaired by: A. Rancourt, Hydro-Québec
J. Baber, ITA Vice Animateur WG Immersed and Floating Tunnels

- 13:00 Practical Rock Spall Prediction in Tunnels
M.S. Diederichs¹, T. Carter², D. Martin³, ¹*Queen's University, Kingston, Canada*, ²*Golder Associates, Mississauga, Canada*, ³*University of Alberta, Edmonton, Canada*
- 13:15 Geotechnical Challenges of the Proposed Bunji Hydropower Headrace Tunnel, Pakistan: Crossing the Main Mantle Thrust under High In-situ Stress Conditions
E. Eberhardt¹, H. Nishimiya², P. Yang², ¹*University of British Columbia, Vancouver, Canada*, ²*Nippon Koei Co., Ltd., Tokyo, Japan*
- 13:30 Gilgel Gibe II Hydroelectric Project - Headrace Tunnel Tunnelling under High Stress Conditions
A. De Biase, F. Bartimoccia, R. Grandori, *SELI S.p.A., Rome Italy*
- 13:45 Modern Transport Tunnels under Indian Himalayas
M. Srb¹, P. Svoboda¹, J. Nosek², ¹*D2 Consult, Prague s.r.o., Czech Republic*, ²*Czech Technical University, Prague, Czech Republic*
- 14:00 Ground Support Equipment for Large Diameter TBMs in Difficult Ground Conditions
B. Khalighi, *The Robbins Company, Kent, USA*
- 14:15 Deep Tunnels in Poor Rock Conditions and High Water Head; How Much Can We Ask of TBM Technology?
J. Waggoner¹, J. Shamma², S. Klein³, ¹*Jacobs Associates, Pasadena, USA*, ²*Metropolitan Water District of Southern California, Los Angeles, USA*, ³*Jacobs Associates, San Francisco, USA*
- 14:30 Norwegian Method of Tunnelling - A Singapore Experience
S. Sekar¹, Y. Zhou¹, J. Zhao², ¹*Defence Science and Technology Agency, Singapore*, ²*École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland*

Session 6C

T12/14 Risk Assessments and Commercial Aspects

Room: 223, 224

Chaired by: B. Martin, Parsons Brinkerhoff
M. Smith, ITA Vice Animateur WG Contractual Prac

- 13:00 Tough Decisions for Mega-Projects - A Methodology for Decision Making on Time-relevant Measures at the Gotthard Base Tunnel
H. Ehrbar¹, P. Beeler², M. Neuenschwander², M. Bianchi³, ¹*AlpTransit Gotthard AG, Lucerne, Switzerland*, ²*Lombardi Ltd., Minusio, Switzerland*, ³*SISO Ltd, Minusio, Switzerland*
- 13:15 Evaluating the Design Risks for Deep Underground Excavations Using Information from Surface Based Drill Holes
C.D. Martin¹, R. Christiansson², ¹*University of Alberta, Edmonton, Alberta*, ²*Swedish Nuclear Fuel and Waste Management Co., Stockholm, Sweden*
- 13:30 Applicability of Classifications for Tunnelling - Valuable for Improving Insight, but Problematic for Contractual Support Definition or Final Design
T.G. Carter, *Golder Associates, Toronto, Canada*
- 13:45 "Management of Cost & Risk to Meet Budget & Schedule"
J.J. Reilly^{1,2,3}, D.A. Sangrey⁴, S. Warhoe^{5,6}, ¹*John Reilly Associates International, Framingham, USA*, ²*Past President American Underground Construction Association*, ³*Previously, Animateur ITA Working Groups 13 and 20*, ⁴*Consultant, Portland, USA*, ⁵*WSDOT, SR99 Deep Bore Tunnel, Seattle, USA*, ⁶*Past President - AACE International*
- 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"
M. Feroz¹, E. Moonin², J. Grayson³, ¹*Parsons Water Infrastructure, Las Vegas, USA*, ²*Southern Nevada Water Authority, Las Vegas, USA*, ³*Vegas Tunnel Constructors JV, (VTC), Las Vegas, USA*
- 14:15 Risk Control Strategy for Large Slurry Shield Crossing the Soil at Shallow Depth below Airport Taxiway
S.M. Liao¹, W. Shao¹, J. Li², J.S. Hu³, Y. Tan¹, ¹*Tongji University, Shanghai, China*, ²*Shanghai Construction Engineering Administration Co., Ltd. Shanghai, China*, ³*Shanghai Urban Construction Group Co., Ltd, Shanghai, China*
- 14:30 How to Build a Metro for Half-price or Less
D. Caiden, *Arup, New York, USA*

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. Bonin, 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, ^{1,2}*Ladkrabang Underground and Tunneling Innovation Center (LUTIC)*, ³*King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand*, ³*King 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. Cuadrado³, ¹*ADIF, Madrid, Spain*, ²*Geocontrol 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. John², A. Spiegel², ¹*CALTRANS, Pacifica, USA*, ²*ILF 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. Pollicchio, 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. Sciotti², R. Ginanneschi¹, M. D'Ambrosio¹, A. Ciamei¹, ¹*S.E.L.I. Spa, Rome, Italy*, ²*ItalyRoma Metropolitana Srl, Rome, Italy*
- 15:45 Sensitive Passages during Construction of the Norra Länken Road Tunnel System in Stockholm
T. Dalmalm, B. Terstad, *Swedish Road Administration, Stockholm, Sweden*
- 16:00 Slurry Shield Tunnelling through Partially Dewatered, Mixed Face Conditions in Singapore
J.N. Shirlaw¹, Y. Zhen², X.C. Xiao², ¹*Golder Associates, Singapore*, ²*Shanghai 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. Taki², H. Harada², S. Sakurai³, ¹*Taisei Corporation Marmaray Project, Istanbul, Turkey*, ²*Taisei Corporation, Tokyo, Japan*, ³*Construction 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 Tunnel Monitoring System - A Contribution for the Preparation of Guidelines
G. Lunardi, M. Gatti, *Rocksoil SpA, Milan, Italy*
- 15:45 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*
- 16:00 Settlement due to Two Bored Tunnels in Mixed Soil Conditions
G.V. Mathew, B.M. Lehane, *University of Western Australia, Perth, Australia*
- 16:15 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, ¹*Euro Geotecnica, S.A., Sant Cugat del Vallés, Spain*, ²*Generalitat de Catalunya, Barcelona, Spain*
- 16:30 Vibration Monitoring in Tunnelling - Two Examples from Europe
P. Althaus, *Associated Geosciences Ltd, Calgary, Vancouver, Canada and DMT GmbH&Co.KG, Essen, Germany*
- 16:45 Non Destructive Integrity Testing of Rock Reinforcement at the Sunrise Dam Mine in Western Australia
W. Hartman¹, L. Nienaber², B. Lecinq³, J. Higgs⁴, D. Tongue⁴, ¹*GEOHART Consultants Pty Ltd, Melbourne, Australia*, ²*Sunrise Dam Mine, Perth, Australia*, ³*Austress Freysinett, Sydney, Australia*, ⁴*Integrity Testing, Victoria, Australia*