REGISTRATION FORM

20TH ANNIVERSARY OF IEM TUNNELLING AND UNDERGROUND SPACE TECHNICAL DIVISION (IEM TUSTD) & WORLD TUNNEL DAY

IEM ACADEMY SDN BHD (1016575-D)
1st Floor, Wisma IEM, No.21, Jalan Selangor,
P.O. Box 224 (Jalan Sultan), 46150 Petaling Jaya, Selangor Darul Ehsan
Tel: +603-7931 5296 Email: manager.iemasb@gmail.com Website: www.iemasb.com / https://iemasb.weebly.com/events.html

Name(s)	Mobile No.	Membership No. / Grade	Fees (MYR)
	Total Amount Payable		

Company:_____

Address:_____

Mobile:_____Tel(O):_____Fax:_____

E-mail:_____
(Please write clearly as the Confirmation & Update will be sent via email to participants)

Contact Person:_____ Designation:_____

Signature:_____ Date:_____

Terms & Conditions

- ✓ **We wish to remind that all registration fees must be FULLY paid before commencement of the course. IEM Academy Sdn. Bhd. reserves the right to refuse entry for participant(s) who have not paid their registration fees to attend the course. THIS REQUIREMENT WILL BE STRICTLY ENFORCED.**
- ✓ **Payment via CASH / CHEQUE / BANK-IN TRANSMISSION / BANK DRAFT / MONEY ORDER / POSTAL ORDER / LO / WALK -IN will be considered as NORMAL REGISTRATION**
- ✓ **FULL PAYMENT must be settled before commencement of the course, otherwise participants will not be allowed to enter the hall. If a place is reserved and the intended participants fail to attend the course, the fee is to be settled in full.**
- ✓ **Fee paid is not refundable. Registration fee includes lecture notes, refreshment.**
- ✓ **IEM Academy Sdn Bhd reserves the right to cancel, alter, or change the program due to unforeseen circumstances. Every effort will be made to inform the registered participants of any changes. In view of the limited places available, intending participants are advised to send their registrations as early as possible so as to avoid disappointment.**

PAYMENT METHOD

(a) Local cheque/Banker's cheque made payable to "IEM ACADEMY SDN BHD".
(b) Directly bank in or online transfer (Please forward soft copy of payment advice):-

Account Name: IEM ACADEMY SDN BHD
Account Number: 21403500139397
Bank Name: RHB Bank Berhad
Bank Address: No. 1, 3 & 5, Jln 52/18, PJ New Town Branch, 46050 Petaling Jaya, Selangor, Malaysia
Swift Code: RHBBMYKL

IEM The Institution of Engineers, Malaysia

Anniversary 20TH TUSTD 2000 - 2020

IEM ACADEMY SDN BHD

20TH ANNIVERSARY OF IEM TUNNELLING AND UNDERGROUND SPACE TECHNICAL DIVISION (IEM TUSTD) & WORLD TUNNEL DAY CELEBRATION

A Virtual Event using GoToWebinar Platform!

Organised by: Tunnelling and Underground Space Technical Division (TUSTD), IEM
Managed by: IEM Academy

Various Presenters

Event Date: 03 – 04 December 2020

Time: 08:30am – 18:00pm

HRDF CLAIMABLE

System Check for Attendee
Limited to 470 participants only (first come basis) and confirmation email will be sent for successful registration latest by 30 November 2020 @ 12:00nn.

REGISTRATION FEES (INCLUSIVE SST)
Closing Date: 30 November 2020

Grade	Online Rate	Offline Rate
IEM Member	RM 424.00	RM 477.00
Non-IEM Member	RM 636.00	RM 689.00

Target Participants:
Engineers, Technologists, Architects, Quantity Surveyors, Managers & Executives and any other individuals with few years of working experience.

BEM Approved CPD/PDP Hours: APPLYING
Ref. No.: APPLYING

TENTATIVE PROGRAMME

Day 1 – 03 December 2020

0830-0900	Scan-in Registration	
0900-0915	Welcome Address	Chairman of IEM TUSTD, Ir. Dr Ooi Teik Aun
Session 1:		
0915-1000	Mega Transport Projects and Politics: East Coast Rail Link, Malaysia	Ir. Dr Wang Hong Kok
1000-1045	Advancements and Achievements in Tunnelling and Underground Space Developments in Malaysia	Ir. Khoo Chee Min
1045-1115	Break	
Session 2:		
1115-1200	The Pursuit of an Autonomous Tunnel Boring Machine	John Lim Ji Xiong
1200-1245	Innovations in the Use of Fibre Reinforced Precast Segmental Tunnel Linings in Klang Valley Mass Rapid Transit Project	Mohd Yusri Bin Mustafha
1245-1400	Lunch Break	
Session 3:		
1400-1445	Assessment on Tunnel to Ensure Stability in Soft Ground Tunnelling	Dr Siti Norafida Binti Jusoh
1445-1530	Ground Improvement for Shallow Overburden of Bored Tunnels: Case Study of 8th Drive in Klang Valley MRT Line 2	Poon Xin Hui
1530-1600	Break	
Session 4:		
1600-1645	Prediction of Ground Movement Utilising 3D Numerical Analysis in Proximity to Deep Excavations in Urban Projects	Ir. Soo Wai Yee
1645-1730	Finite Element Evaluation of Tunnel-Piled Structure Interaction in Complex Ground Conditions	Ir. Frankie Cheah
1730-1800	End of Day 1 Event	

TENTATIVE PROGRAMME

Day 2 – 04 December 2020

0830-0900	Scan-in Registration	
Session 5:		
0900-0945	Numerical Tools in Geotechnical Engineering for Underground Works: Tunnelling, Engineering Geology and Recent Trends	Dr Boon Chia Weng
0945-1030	The Use of Polymer Fibre Reinforced Concrete in Underground Construction Projects in Asia	Mr. Isaac Ching
1030-1100	Break	
Session 6:		
1100-1145	Challenges and Innovations in the Deepest Underground Space Development in Restricted Urban Areas of Kuala Lumpur	Ir. Alexus Pong Vui Wei
1145-1230	3D Subsurface Profile Development Using IDW Method for Tunnel Design	Ir. Assoc. Prof. Dr Mohd Ashraf bin Mohamad Ismail
1230-1330	Q&A and End of Day 2 Event	

PROGRAMME ABSTRACTS & BIODATA OF PRESENTERS

Paper: Mega Transport Projects and Politics: East Coast Rail Link, Malaysia

Abstract: The East Coast Rail Link (ECRL) qualifies as a Mega Transport Project (MTP) since its original contract sum was a hefty RM65.5 Billion. This paper attempts to explore if the decision-making criteria adhered to "iron triangle law" at the early project appraisal stage, and also the related "cost-benefit analysis". Often, the "iron triangle" criteria is hardly applied by decision-makers in this special MTP class as they have to contend with social and economic benefits which are not easily quantifiable. Politics and political preferences tend to come into the play of decision-makers, consequently sidelining technical analysis.

Speaker: Ir. Dr Wang Hong Kok

Ir. Dr Wang graduated in Civil Engineering (NUS), earned two masters degrees, Master in Business (University of Newcastle, Australia), and Master in Real Estate (University Malaya). He obtained his Ph. D (University Malaya) in 2013 in Urban Land Economics. He is a Fellow of the Institution of Engineers, Malaysia (IEM), a registered Professional Engineer, and a Member of RICS, United Kingdom. Ir. Dr Wang spent 31 years working in the property industry. He then joined TAR University College from 2014-2020 as their Principal Lecturer. He retired in June 2020. He is a Vice President of IEM 2019-2021 Session.

Ir. Dr Teik Aun OOI graduated in Civil Engineering in 1966 from Auckland University, New Zealand and obtained his Master degree from the same University in 1968. He obtained his Doctor of Philosophy from Sheffield University in 1980. He is an Honorary Fellow of The Institution of Engineers, Malaysia (Hon. FIEM), Fellow of The Malaysian Institute of Arbitrators (FMIArb) and Fellow of The Institution of Civil Engineers, United Kingdom (CEng FICE), Fellow of the Society of Adjudicators Malaysia (FSAM), Fellow of the Asean Academy of Engineering & Technology (FAAET). He is an ASEAN Engineer, APEC Engineer, International Professional Engineer, ASEAN Chartered Professional Engineer, Professional Engineer with Practicing Certificate (PEPC) (Malaysia), Accredited Checker (Geotechnical Engineering) and Chartered Engineer (C.Eng.), United Kingdom. He is a Specialist Engineering Consultant, an Arbitrator, an Adjudicator, an Accredited Checker and Expert Witness.

Ir. Dr Ooi joined Public Works Department, Malaysia (PWD) in 1968 and held the post of Engineer, Senior Executive Engineer and Assistant Director respectively, in charge of the PWD Headquarters Soils and Materials Laboratories in the Design and Research Branch. He was involved in the design and construction of airports, buildings, highways, ports and Johor Causeway. He was also involved in slope investigations, design and rectifications, soils and materials investigations, building foundation designs as well as remedial works. In 1982, he left PWD to join Promet Construction Sdn Bhd, and was Project Manager for Wisma Saberkas in Kuching, Sarawak. He joined Pilecon Engineering Berhad in 1984 as an Operations Director in charge of Design and Construction of Geotechnical and Civil Engineering Projects. In 1989 he joined the Transfield Construction Group as a Director and General Manager for operations in Southeast Asia. In 2000, he established his consultancy services. Dr. Ooi has been an Arbitrator since 1994 and he is on the AIAC Panel of Arbitrators. He is also on the AIAC Panel of Adjudicators.

Ir. Dr Ooi is an active and a long serving member of IEM since 1970s. He was IEM Council Member in 1981 -1984, Vice President in 1988 - 1990 and is a Director of IEM Training Centre Sdn Bhd since 1991. He is currently Executive Director of IEM Academy Sdn Bhd. He has been ICE Country Representative for Malaysia since 2000 -2015.

He was President of the Southeast Asian Geotechnical Society (SEAGS) in 1993 – 1996 and re-elected for another two terms in 2010-2016. President of MIArb in 2008, Chairman of IEM Geotechnical Engineering Technical Division in 1991 - 1992. He was Founder Chairman of IEM Tunnelling and Underground Space Technical Division in 2000 - 2003 and Chairman in 2006 – 2009. He was the Organizing Chairman for the Annual Professor Chin Memorial Lecture 1995 – 2008, Organizing Chairman for the 12th SEAGC in 1996, 16th SEAGC in 2007, Co-Organising Chairman 19SEAGC. Organizing Chairman for the International Tunnelling Conferences in 2006 and 2011 and ICE International Conference in 2011. He was Chairman of Pro-Tem Committee to set up the Association of Geotechnical Societies in Southeast Asia (AGSSEA) and was Founder Chairman of AGSSEA from 2007 – 2010. He was also Chairman of Pro-Tem Committee to set up the IEM Engineering Consultancy Practice Special Interest Group (CESIG) and became its founding Chairman in 2009. He was Organizing Chairman for the 1st and 2nd International Green Workshop on Sustainable Infrastructures and Buildings held in 2010 and 2012 and 2015 respectively.

He was a member of the Technical Committee set up by the Government to investigate the collapse of the Highland Towers in 1993.

Ir. Dr Ooi lectured frequently at UPM, UNITEN and UNMC and conducted touring lectures in Thailand, Philippines, Vietnam, Cambodia, Laos and Myanmar. He is a principal interviewer for the IEM Professional Interview and conducts Chartered Professional Reviews for ICE in Hong Kong and India. He has formed ICE Student Chapters at the Universiti Tenaga Nasional (UNITEN), University of Nottingham Malaysia Campus (UNMC), University Tunku Abdul Rahman (UTAR) and UCSI University (UCSI).

Ir. Dr Ooi is Organising Chairman of the recent ITA-AITES World Tunnel Digital Congress 2020 (WTC2020). He and his Committee and the Secretariat fought against the COVID 19 Pandemic and had a successful World Tunnel Digital Congress and Exhibitions WTC2020 with over 1000 delegates, one Landmark Lecture, three Keynote Lectures, 263 technical papers and 80 Exhibitors from 54 countries globally.

Ir. Khoo Chee Min

Ir. Khoo Chee Min obtained his Bachelor's degree (1st Class Honours) and MSc in Civil Engineering from Universiti Teknologi Malaysia and Universiti Teknologi PETRONAS respectively. He has more than 18 years of work experience specialising in geotechnical engineering on the diverse building, infrastructure, and transportation projects. In recent years, he has actively involved in tunnelling and metro projects such as Klang Valley MRT SBK Line and SSP Line in Malaysia, MRT Thomson-East Coast Line and East-West Transmission Cable Tunnel in Singapore. He is holding the post of Assistant General Manager at MRT Corporation; co-leads a team in managing the geotechnical and tunnelling designs for the underground works of KVMRT - SSP Line. He is a Professional Engineer registered with the Board of Engineers Malaysia, a Chartered Professional Engineer registered with Engineers Australia, an International Professional Engineer registered under

APEC / EMF Registers as well as an ASEAN Chartered Professional Engineer. He is a Fellow of The Institution of Engineers, Malaysia (IEM) and was the Immediate Past Chairman of Tunnelling & Underground Space Technical Division as well as Deputy Organising Chairman of World Tunnel Congress 2020. He serves as Member Nation's representative to the International Tunnelling and Underground Space Association (ITA) Working Group 2 – Research and Working Group 11 – Immersed and Floating Tunnels. He has published more than 20 technical papers and currently pursuing his PhD research in tunnel engineering at Universiti Teknologi PETRONAS.

He is the co-author for a winning paper entitled "The Present & Future Sustainable Use of Underground Space in Malaysia" which was awarded the Tan Sri Ir. Hj. Yusoff Price 2019, the highest recognition for outstanding technical papers on engineering contributed by corporate members of IEM in the civil engineering discipline.

Paper: Advancements and Achievements in Tunnelling and Underground Space Developments in Malaysia

Abstract: The advancements and achievements in tunnelling and underground space developments in Malaysia have gone through a rising and flourishing time in the past two decades. Not only many tunnels have been successfully constructed for a large number of applications but the whole tunnelling and underground construction industry has made a great leap forward since the inception of the SMART project in early 2000s. The SMART tunnel, is the first of its kind in the world, an innovative dual-purposes tunnel engineered to provide unique solution to the Malaysian capital's long-term traffic and stormwater management problems. The tunnel is 9.7km long and is the longest storm water tunnel in Southeast Asia and the second longest in Asia. Construction started in 2003 and completed and operational in May 2007. The continuation of tunnelling works succeeded by the construction of Bukit Berapit and Larut tunnels in electrified double track railway project in 2008. The 3300m twin tube Bukit Berapit tunnel is the longest rail tunnel in Malaysia and believed to be the longest drill and blast rail tunnel in Southeast Asia. The construction of the interstate water transfer tunnel consisting of three tunnels measuring 44.6km makes it the world's 11th longest tunnel and the longest in Southeast Asia. Construction activity started in 2010 and the excavation works were completed by May 2014. Other notable underground space development includes underground sewage treatment plant (Pantai 2 STP), underground powerhouse of the hydropower projects, etc. as well as the conceptual underground city in Bandar Malaysia at the old airport site in Sungai Besi. Perhaps, the construction of the Klang Valley Mass Rapid Transit (KVMRT) in 2011 has changed the landscape of tunnelling in Malaysia significantly. The project has not only opened tremendous works and new frontier for tunnelling and underground engineering in Malaysia, but it also will generate a sustainable market for the tunnelling and underground construction industry for many years to come. The spin-off effects of the SMART tunnel to Malaysia and world-wide tunnelling community were too great to be ignored. Locally, the SMART project has far reaching effect on the technological advancements as is evidenced from the innovation of Variable Density Tunnel Boring Machine (VD-TBM), establishment of Tunnelling Training Academy (TTA) and the local TBM refurbishment plant as well as the latest local innovated tunnelling disrupter through the creation of Autonomous Tunnel Boring Machine (A-TBM). The presentation could be firstly approached from points of view how tunnelling and underground space developments in Malaysia are traditionally advanced from the past.

Herein the presentation continues with the review of recent past tunnelling activities for the last two decades from 2000 as well as the up-coming tunnelling projects. Lastly the various recent advancements in tunnel and tunnelling technology are outlined, including the development in risk management of underground construction locally. This golden era of tunnelling and underground space developments indeed has positioned Malaysia on the world map.

Ir. Khoo Chee Min

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Paper: The Pursuit of an Autonomous Tunnel Boring Machine

Abstract: The inexorable rise of autonomy in modern machines has disrupted many industries from transport to manufacturing, leading to a new revolution called Industry 4.0. Riding on this wave of technology, this paper presents the development of a technical innovation in the tunnelling industry called the Autonomous Tunnel Boring Machine (A-TBM).Sensor fusion is coupled with autonomous control algorithms (ACAs) to steer and operate the A-TBMs with minimal human intervention. The ACAs were implemented in four progressive phases starting with auto-steering, auto-advance, auto-excavation control and auto-slurry circuit control. Control strategies were derived from first principles and their performance is presented in this paper. The system was successfully deployed on KVMRT Line 2. The 13.5km underground alignment of KVMRT2 SSP presents various challenges and risks due to the varied geological formations including Karstic Limestone, Kenny Hill and granite. The A-TBMs have completed 5+ km of tunnels, traversing through these mixed ground conditions including critical crossings under 14-lane motorways and other sensitive structures. The A-TBMs demonstrated the ability to seamlessly adapt to the changing ground conditions and improved the consistency, safety and accuracy of the tunnel drives.

Speaker: John Lim Ji Xiong

John Lim Ji Xiong is a graduate with an M.Eng in Mechanical Engineering from the University of Bristol, UK in 2017. He is currently the Senior R&D Engineer with Gamuda on the KVMRT SSP Line 2 project in Kuala Lumpur. John is the lead programmer on the A-TBM and Tunnel-Insight projects. He is also 2x Google Certified Professional Cloud Architect and Professional Data Engineer. John has also spoken at various conferences highlighting the role of Python, Cloud and AI in today's engineering landscape.

Liew Kit Shen is a graduate with an M.Eng in Electrical and Electronic Engineering from the University of Birmingham, UK in 2015. He is currently the Assistant Electrical superintendent with Gamuda on the KVMRT SSP Line 2 project in Kuala Lumpur. Sam is the lead PLC developer on the A-TBM project and leading UI/UX on Tunnel-Insight. Sam has great passion in industrial automation technology. As lead PLC developer, he leads the effort to interface the A-TBM software with the PLC by developing state diagrams and safety controls for safe and reliable operation.

Russell Jon Batty left school aged 16 and began a 5-year apprenticeship with British Coal in the UK. He then progressed as an electrical foreman on various mining projects across the world. His journey has led him to experience various mining techniques including NATM, Stoping, shaft sinking and TBM tunnelling. He also worked with Herrenknecht, the leading TBM manufacturer, as PLC Electrician and subsequently Electrical Manager. Currently, he holds the role of Electrical Manager on the KVMRT SSP Line 2 with Gamuda. Russell was instrumental in the creation of the technical team to pursue the A-TBM project. With his wealth of experience and knowledge in the field, he provided the necessary technical and team leadership to achieve this feat.

Russell also leads the Tunnel Training Academy effort both in Kuala Lumpur and in Sydney, Australia as well as actively contributing to other TBM innovation initiatives. As a culmination to his 45-year career, he is actively giving back to the industry that has given him so much over the many years.

Justin Chin Jing Ho is a graduate with an M.Eng in Civil Engineering from Imperial College London. Justin began his tunnelling career 9 years ago on the KVMRT Line 1 project in Kuala Lumpur. He is currently serving as the General Manager for the Tunnel Department in Gamuda. Justin serves as the Product Owner and Project Lead for the A-TBM and Tunnel-Insight project. Justin's wealth of knowledge and experience from both the KVMRT Line 1 and Line 2 was instrumental in guiding the team's success. Justin is a notable speaker and has presented at various international conferences. He was also the key presenter for the A-TBM at the ITA and NCE award ceremonies in 2019.

Paper: Innovations in the Use of Fibre Reinforced Precast Segmental Tunnel Linings in Klang Valley Mass Rapid Transit Project

Abstract: Fibre reinforced concrete (FRC) has been used in Malaysia underground projects since the 1980's. The majority of FRC applications in underground projects in Malaysia has largely been in sprayed concrete for tunnel linings. FRC in sprayed concrete can be found in many hydropower, hydraulic and road tunnel projects in Malaysia. In 2011, FRC was finally adopted following design recommendations in FIB Model Code 2010, for use in precast segmental tunnel linings in Klang Valley MRT SBK Line and this continued into the SSP Line in 2016. In only 2 projects, there has been innovations developed in the use of FRC in precast segmental tunnel linings. Using improved medium-strength steel fibres, the steel fibre and polypropylene fibre dosages were reduced from 40kg/m^3 to 35kg/m^3 and 2kg/m^3 to 1.5kg/m^3 respectively while still achieving the required SFRC performance. The use of improved automation in dosing of steel and polypropylene fibres also contributed to reduction in material wastage. Wastage in terms of segment rejection was reduced from 3% to 1.5% with the use of SFRC.

Speaker: Mohd Yusri Bin Mustafha

Mohd Yusri is an Assistant Manager of Tunnel Precast Segment Department currently working with Gamuda Engineering. He obtained his Bachelor Degree in Civil Engineering from Universiti Sains Malaysia (USM). Results-driven and dedicated with wide-ranging experience more than 7 years (KVMRT SBK LINE 1 & KVMRT SSP LINE 2) in planning and leading operations involving small-to medium-sized of tunnel lining segment precast local factory (SPC Industries, Eastern Pretech, MDC Precast and KOM Technologies). Actively involved devising, evaluating, and implementing continuous process improvements of precast segment mix design to minimize waste while maximizing the quality and meet the TBM demand.

Paper: Assessment on Tunnel to Ensure Stability in Soft Ground Tunnelling

Abstract: Soft ground tunnelling is a complex problem. Ground only has little to no time gap to be left without any support, hence, tunnel lining is use to support the ground. A thick tunnel lining usually used to support the ground convergence but lead to heavy lifting and slow the construction progress. Reduction of tunnel lining thickness would shorten the time of lining installation (due to lightweight segment) and also help in reducing the cost of tunnel construction. However, as lining is ejected to place via jack thrust forces which induced from face pressure, the integrity of lining is questionable. Large jack forces may lead to lining failure and heave may occur in ground; but if the forces is too small, the TBM speed may be reduces considerably along with the collapse of the face pressure. Therefore, the effect of lining thickness and jack forces to ensure the stability of soft ground tunnelling will be discussed here in. Detailed of numerical modelling with staggered tunnel lining segments in soft ground model were carried out with ABAQUS software. In the findings, when the tunnel lining thickness is reduced, the settlement of the ground surface is increased. In addition, jack force is also found as one of the reasons of the tunnel to distort and the effect is more visible on the rings with reduced thickness compared to original thickness of the tunnel lining.

Speaker: Dr Siti Norafida binti Jusoh

WORK EXPERIENCE

Senior Lecturer

UNIVERSITI TEKNOLOGI MALAYSIA

JULY 2018 TO PRESENT

Administrative Experience

- Group Leader of Cooperative Learning, Future Ready Educators (Mac 2019 – present)
- Deputy Quality Manager, Civil Engineering Testing Unit (SAMM804) (July 2018 – present)
- Secretary, 11th International Conference on Geotechnical Engineering in Tropical Regions (11th GEOTROPIKA) and 1st International Conference on Highway and Transportation Engineering (1st ICHITRA) (GEOTROPIKA-ICHITRA) 2019
- Coordinator for Civil Engineering Laboratory I (2018 – 2020)
- Comittee Member of Jawatankuasa Kualiti Akademik (JKA), School of Civil Engineering (September 2018 – Nov 2020)
- Other administrative works such as organize talk, field visits and seminars

Teaching and Learning Experience and Achievements

- Teach Soil Mechanics, Geotechnis, Environmental Geotechnics, Tunnel Engineering, Advance Geotechnical Design and Analysis and Civil Engineering Laboratory I & II
- Seminars and Field Visit for Tunnel Engineering courses
- Committee Members in IKON Mahasiswa (2018 – now)
- Participates in NALI 2019 (2 Gold, 1 Bronze and 1 Silver Medal) and PicTL 2020 (3 Gold and 1 Bronze Medal)

Speakers

- Tunnelling in Soft Ground, Urban Tunnelling
- For non-profit organisation (Students development etc)

Paper: Ground Improvement for Shallow Overburden of Bored Tunnels: Case Study of 8th Drive in Klang Valley MRT Line 2

Abstract: Following the rising of underground spaces utilization in urban cities, it is inevitable to mine underneath public roads of heavy traffic flow. The 8th drive of SSP Line 2 includes a final stretch of 240m of shallow overburden which sits below East West Link Expressway that caters for high volume of traffic. Deep Soil Mixing (DSM) ground treatment method suitable to the local geological conditions is adopted for the purpose of controlling potential deformations and distortions of tunnel lining. In this paper, we discuss ground treatment methods adopted for this shallow overburden section, construction sequences, site operation challenges and solutions. The ground treatment works are divided into 5 stages, where 4 of the stages are preceded by traffic diversion to perform DSM works across the expressway. Challenges to the ground treatment works arise when construction waste and multiple boulder layers are found within the treatment area, adjacent to expressway in use.

Speaker: Hui Poon Xin

Paper: Prediction of Ground Movement Utilising 3D Numerical Analysis in Proximity to Deep Excavations in Urban Projects

Abstract: The compliance with strict requirements for serviceability is often of great importance for the design of urban structures. The design of tunnels/deep excavation requires a proper estimate of ground movements and settlements as well as structural forces particularly in the proximity to existing structures. This paper presents practical applications of 3D numerical models for solving geotechnical problems in underground work. The impact of excavation/tunnelling on existing structures was estimated by employing different groundwater conditions and loading conditions. Comparisons were made between the 2D approximation and the 3D staging model to demonstrate how 3D modelling can be utilised to achieve the safe and robust design and construction of deep excavation and tunnelling in challenging urban construction.

Speaker: Ir. Soo Wai Yee

Wai Yee is a Brisbane based geotechnical and tunnelling specialist currently working as an Associate Director in AECOM Australia & New Zealand (ANZ). She graduated from the University of Malaya (UM, Civil Engineering), and obtained Master of Science in Geotechnical Engineering from National University of Singapore (NUS). She is a registered Professional Engineer in Malaysia and Queensland (RPEQ), and Chartered Engineer with Engineers Australia.

Wai Yee has 18 years of experience in engineering consultancy, project management, and construction supervision, specialised in managing geotechnical projects throughout all phases from site investigation planning and interpretation of factual data to detailed design of tunnelling, earth retaining and foundation systems. She has worked with key clients in Malaysia, Singapore, Australia and New Zealand in a broad range of major infrastructures, including metro/railways, highways, cable tunnels, reclamation, and port and harbor structures. Her key expertise includes advanced numerical modelling for soil-structure interactions, design of tunnel support systems and ground improvement, and constructability evaluation. She has been serving as a design lead for the detailed design of underground structures at the Karangahape Road to Mount Eden Tunnel section in Auckland City Rail Link (CRL) as part of Link Alliance, and a design manager in AECOM Australia for Saudi Arabia NEOM Backbone (transport and utilities infrastructure) underground works: portal, shafts, tunnel caverns and adits.

Paper: Finite Element Evaluation of Tunnel-Piled Structure Interaction in Complex Ground Conditions

Abstract: Underground tunnelling works in densely populated urban environment can give rise to deformation of the surrounding ground. The ground deformations can cause potential damage to the adjacent structure foundation and lead to untoward structural distresses. In one of the locations of the recent tunnel construction for MRT development in Kuala Lumpur, Malaysia, the tunnel is expected to be constructed beneath an existing viaduct pier supporting the operating railway line. The viaduct pier founded on piles with tips partially located within more than one zone (30° and 45°) where a triangular zone above the tunnel is anticipated. The triangular zone identified is expected to be observed with a large pile settlement as per reported by Jacobsz et. al. (2001). Subsurface investigation revealed that TBM is envisaged to be driven through a mixed soil-rock face conditions over an inclined bedrock where the piles are toe-socketed. In the design stage of the tunnel works, finite element analysis (FEA) was carried out to evaluate the mechanisms of ground movement and tunnel-piled structure interaction for this complex ground conditions. The geotechnical challenges that are unique to this tunnelling interface owing to its geological features are identified. The ground deformations and structure responses in transverse direction are predicted using finite element modelling in order to investigate the effects on pile foundation as well as the viaduct structure due to differential movement between piles. Malaysia Railway Protection Act (1998) was used to assess the safety and integrity of the operating railway structure. The instrumentation strategy during the tunnelling work is also briefly discussed in this paper. The results of the instrumentation are compared with that of FEA predictions.

Speaker: Ir. Frankie Cheah

Ir. Frankie Cheah is an Associate Director of AECOM. He obtained Msc in geotechnical engineering from NTU Singapore. He is a qualified civil and geotechnical engineer with more than 15 years of experience. His experience covers deep foundation, underground earth retaining structures, for both top down and bottom up construction within Asia region. Beside core experiences in consultancy for various project around Asia region, Frankie able to gain vast skill to produce a competent geotechnical finite element design that incorporate safety and economic aspect. He also promote to enhance his skill and knowledge in technical write-up on his completed projects at PLAXIS USER Day Meeting and in Malaysia. He is the key geotechnical engineer for AECOM for both the Klang Valley MRT-Sungai Buloh-Kajang Line (Line2) and Klang Valley MRT-Sungai Buloh-Kajang Line (Line1). More recent projects that he is also involved as part of the geotechnical technical support team are Rapid Transit System (RTS) Link together with few other designs and built contract for Singapore Cross Island Line package with AECOM Singapore. Prior to technical competency, he also contributes in the engineering society by holding the position of Secretary/Treasurer for Tunnelling & Underground Space Technical Division, IEM Session 2020/2021.

Paper: Numerical Tools in Geotechnical Engineering for Underground Works: Tunnelling, Engineering Geology and Recent Trends

Abstract: The increasing development of underground space has resulted in a need to carry out designs more efficiently and accurately. Although there is a suite of numerical tools at the engineer's disposal, it is important that the engineer is able to review whether the results are realistic. The engineer should determine from his site observations whether the numerical technique adopted is appropriate, and whether more advanced checks are required. Some practical examples and numerical solutions are discussed. The presentation draws example related from tunnelling and engineering geology. These are underpinned by the quality of site investigation and also site observations, so that they can be reflected in the analysis.

Speaker: Dr Boon Chia Weng

Dr Boon is a member of TC103 Numerical Methods in Geomechanics of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE). He obtained his D.Phil. at Oxford University in 2013, and B. Eng. at Nanyang Technological University in 2009. He was awarded the Rocha Medal in 2016 by the International Society for Rock Mechanics and Rock Engineering (ISRM). He was a past recipient of the Lee Kuan Yew Gold Medal, Professional Engineers Board Gold Medal (Singapore) and the Yang di-Pertuan Agong Scholarship (Malaysia). He worked with MMC-Gamuda KVMRT (T) Sdn Bhd, at which he contributed to the construction of underground tunnels and stations in the 1st and 2nd Line of the underground mass rapid transit project in Kuala Lumpur. He was inducted as a Future Leader Member of the American Rock Mechanics Association (ARMA) in 2017 in San Francisco. He was recently awarded the Tan Sri Zainal Prize from the Institution of Engineers Malaysia (IEM) in 2019, and was elected as the Malaysian Representative for the International Tunnelling Association Young Member Group (ITAym).

Paper: The Use of Polymer Fibre Reinforced Concrete in Underground Construction Projects in Asia

Abstract: This paper discusses the rise in the use of polymer fibre reinforced concrete (PFRC) in underground construction projects in Asia. Historically, polymer fibres were mainly micro polymer fibres with tensile strengths of 200MPa to 400MPa. These micro polymer fibres were used in concrete to control cracks and prevent spalling of concrete during a fire in a tunnel. Polymer fibre producers experimenting with improved petroleum resins, production methods and different surface patterns have managed to produce higher strengths macro polymer fibres. Macro polymer fibres are now achieving tensile strengths above 550MPa. These higher strength macro polymer fibres are successfully replacing partially or completely the steel reinforcing bars and/or steel fibres in reinforced concrete used in underground structures in Asia. This evolution is further enhanced by the fact that many of these polymer fibres are produced locally in Asia thus resulting in reduced shipping costs. The use of polymer fibres in underground construction projects will further improve the efficient and sustainable usage of valuable raw materials and contribute to efforts in reducing our carbon footprint.

Speaker: Mr. Isaac Ching

Mr. Isaac Ching Ngew Hoe, is the Director of Mighty Shield Industries Sdn Bhd, a manufacturing company with 19 years in business located at Shah Alam, supplying to Construction industry with products in Traffic Management Safety, Debris Chutes, Water Tanks, and Polymer Fibres for local and export reinforcement concrete applications.
He participates in worldwide international technical conferences and trade shows within the related Construction industries.

Assistant Professor Dr Chuchai Sujivorakul, is attached to the Department of Civil & Technology Education and to the Institute for Scientific and Technological Research and Services (ISRTS) at King Mongkut's University of Technology Thonburi (KMUTT) Bangkok, Thailand.

He is the Advisor for Industry Services. A/Prof Dr Chuchai is part of the Editorial Committee of the Thailand Concrete Association. He has vast experience in testing and research of Polymer and Steel fibres for reinforcement of concrete and has published his findings in many international journals and conferences.

Paper: Challenges and Innovations in the Deepest Underground Space Development in Restricted Urban Areas of Kuala Lumpur

Abstract: The Damansara Town Centre (DTC) was constructed in 1983 to 1986. The 9 blocks of 8 to 10 storeys buildings were founded on bored piles and steel H-piles foundations. The site is located in Kuala Lumpur Kenny Hill Formation. The construction of 2 new MRT stations within its vicinity and the rapid development of the surrounding areas have created an urge to redevelop this plot of land of over 3.5ha with over 30 years old buildings inclusive of an existing bridge that need to be demolished. The new development will be a high density mixed development with 5 to 8 levels of basement carparks, 4 levels of podium for commercial, 9 blocks of 8 to 22 storeys office towers and 3 blocks of 48 to 54 storeys of residential towers with total build up area of 300,000m^2. The original development has existing retaining wall system of counterfort RC wall and the bored piles and H-piles are approximately 12m to 18m long below soffit of pile cap level. There are 7 MRT viaduct piers located literally next to the eastern boundary for the entire development.
These constraints have posted significant challenges to the design and construction sequence of the retaining wall and support system for the basement structure, as well as the foundation systems for the office towers and residential towers. This development also needs to comply with the regulatory requirements of Mass Rapid Transit Corporation due to close proximity, especially on railway protection in-line with the Railway Act and establishment of comprehensive instrumentation monitoring scheme to railway system along with the basement construction works. This paper will present the innovations in overcoming the complex challenges encountered.

Speaker: Ir. Alexus Pong Vui Wei

Ir. Alexus Pong Vui Wei received his Bachelor of Engineering with Honours BEng (Hons) First Class Honours from the University of Malaya Kuala Lumpur in 2007.

Upon graduation, he joined the firm where he served as a Design Engineer and later as a Senior Geotechnical Engineer in-charge of the Geotechnical section of the firm.

He now leads a team of nine Geotechnical Engineers working on the various aspects of the foundation works in limestone and other difficult ground conditions, hill slope development programs and soft ground for the firm project site. He has also conducted instrumentation and measurements on existing structures and those under construction. He then obtained his professional engineer status in year 2018 with Board of Engineers Malaysia.

His overseas experience includes the earthworks and foundation works for the British University (BUV) in Vietnam and mixed development in Shandong, China. He has also spent time in China working with Chinese Engineers on the foundation works for the projects in Danga Bay Johore. Alexus is also familiar with the analysis using various Geotechnical Engineering Programs and soft wares. The project that he has worked in Malaysia includes the RM300 Million foundation and basement works for the VELOCITY project in Kuala Lumpur, the foundation works in reclaimed land including conducting a series of load test program in the Danga Bay areas. He is currently working on Damansara Height Redevelopment project (OSHCIM Pilot Project 2019) with contract sum worth RM2 Billion and specialized on Top down Construction plus deep foundation works for 8 levels depth of basement.

He has co-authored various research papers published and to be published at international conferences listed such as South East Asia Geotechnical Conference (SEAGC) 2012 – Instrumented Bored Pile in Cavernous Limestone Formation in Southern Region of Kuala Lumpur, South East Asia Conference (SEAGC) 2016 – Challenges of Damansara Town Centre Redevelopment, South East Asia Geotechnical Conference (SEAGC) 2016 – Challenges of a Mixed Development in a Cavernous Limestone Formation in Congested Urban Region of Kuala Lumpur, World Tunneling Conference (WTC) 2020 - Challenges and Innovations in the Deepest Underground Space Development in Urban Areas of Kuala Lumpur and not limited to.

Paper: 3D Subsurface Profile Development Using IDW Method for Tunnel Design

Abstract: A subsurface profile is conventionally developed through a 2D cross section and manually interpreted by geotechnical engineers based on limited boreholes. However, the main drawback of this method is that it produces a large variation of results and is not supported by any deterministic interpolation method. This study aimed to eliminate this constraint by using a 3D subsurface model, which was generated using the inverse distance weighting (IDW) algorithm method. This algorithm successfully produced a reliable 3D subsurface model using RockWorks17 software. Besides the 3D soil lithology model, a standard penetration test value (SPT-N) and a pressuremeter modulus (E0 and Eur) were also modeled in this study. However, correlation of the E0 and Eur models with the SPT-N was required to develop reliable 3D models. A tunnel simulation was appended with these models and unique features to export the models to Google Earth, enhance the visualization of the models presented to the client, and assist in a geotechnical monitoring system for ground settlement in tunnel construction.

Speaker: Ir. Assoc. Prof. Dr Mohd Ashraf bin Mohamad Ismail

Ir. Dr Mohd Ashraf is an Associate Professor at the School of Civil Engineering, USM. He obtained his Bachelor of Civil Engineering from USM in 2004 and pursued his Master in Geological Engineering at Gadjah Mada University under the sponsorship of the AUNSEED Net JICA Project. In 2010, he obtained his Ph.D. in Geotechnical Engineering, mainly specialized in Underground Energy Storage and Hydrodynamic Containment for hydrocarbon storage cavern from Kyoto University under a JICA scholarship. He has researched in geotechnical and rock engineering, such as evaluating rock overstressing in hard rock tunnels, urban tunneling, slope stability analysis, geohazard, and geophysical civil and geological engineering applications.

Recently he has involved in aerial mapping and photogrammetry analysis using UAV for building maintenance, landslide forensic and landslide disasters evaluation, construction planning, and progress monitoring, including landfill and quarry assessment. He has been integrating UAV technology and reality modeling into his teaching and research interests since 2015. Since 2017, he has become a Rocscience Representative, one of the leading geotechnical software developers with over 8,000 customers and 450 universities in over 120 countries worldwide.

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