

AGS (HK)

香港岩土及岩土環境工程專業協會

ASSOCIATION OF GEOTECHNICAL & GEOENVIRONMENTAL SPECIALISTS (HONG KONG)

AGS (HK) Newsletter

The Editorial

Welcome to the latest issue of the AGS (HK) Newsletter. This year the AGS (HK) has held a number of well-attended seminars and technical visits for our members. One of our major accomplishments is that in May 2013, the Association organized the Second AGS (HK) Final Year Research Project Competition for students from the local universities in Hong Kong. Further details about that competition can be found in the newsletter. The Association thanks the members of the previous Executive Committee for their hard work.

In November 2012, the Association published and circulated among the geotechnical community the Ground Investigation Guidelines (GIGs) on "Geology for Engineering Projects". This professional guideline is designed to provide the general engineering practitioners with an introduction to the key geological features in Hong Kong, and all aspects of the geological model and its limitations. The new GIGs on "Tunnel Instrumentation" and "Contaminated Land Management", as well as the new Tunnel Construction Guidelines (TCGs) on "Pre-excavation Grouting for Underground Construction in Hard Rock – Part 1 & 2" and "Rock Mass Classification" will be prepared for publication in late 2013.

The Association thanks Mr Barry SUM of AECOM Asia Co. Ltd. for his tenure as Chairman in 2012 and appreciates the hard work of Mr Simon PYLE of Furgo Geotechnical Services Ltd. who has just stepped down from the Executive Committee. Mr John Cowland of GeoSystems Ltd. is nominated to the Chairman-elect for 2013. Mr Chris LEE of C M Wong & Associates Ltd. and Dr Siew-wei LEE of Golder Associates (Hong Kong) Ltd. continue as Honorary Treasurer and Honorary Secretary respectively.

In addition, Mr Clayton CHAN of AECOM Asia Co. Ltd., Mr Raymond CHAN of Bachy Soletanche Ltd., Mr Stuart PUGSLEY of Furgo Geotechnical Services, Mr Timothy WONG of Fugro (Hong Kong) Ltd., Mr David WYLIE of Stanger, Mr Yun-cheung CHAN who recently retired as the Head of the Geotechnical Engineering Office, Mr Sandy MACKAY of Nishimatsu Construction Co. Ltd., and Mr Richard SUN of Dragages Hong Kong Ltd., have joined the Executive Committee and the Co-opted Committee, bringing invaluable skills and experiences and helping the Association to move forward.

Barry SUM is going to share with us his vision and plan for 2013 through the Chairman's address.

The AGS (HK) is deeply committed to promoting the interests of its member organisations. Please feel free to share with us how the Association can best serve the fast-growing geotechnical, geological and geoenvironmental professions. We always welcome volunteers in future activities of the AGS (HK).

We hope you enjoy the newsletter.

Suggestions

Please send your suggestions to:
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Chairman's Address and Plan for 2013

Dear Members,

Time flies! It has been a very exciting and busy journey since I took up the Chairman role in 2012. I would like to express my gratitude to all committee members, the co-opted members as well as the event organizers and helpers to organize various Association events. With the commitment from my fellow committee members and myself, we will keep up the momentum to revitalize our industry this year.

Since the AGS (HK) is an association of organizations having a common interest in the practice of geotechnical and related disciplines, the purpose of AGS (HK) is to promote and enhance the quality of the professional practice of Geotechnical Engineering in Hong Kong. We also aim to provide a platform for training up our young engineers and sharing of good & practical experience among our industry.

We will continue to organize seminars, ground forums, site visits and encourage continued professional development. The topics aim to be of particular relevance to the current and near future issues facing the industry. Apart from these events, we will continue to invite some well recognized practitioners to produce some good guidelines on the various subjects of ground investigation, underground works, tunnel construction, etc.

We also plan to reactivate our various Working Groups. This will allow our members to group together and focus on certain areas of interests. Initially, we plan to re-run the working groups for Ground Investigation, Tunnel & Underground Space, Geoenvironment this year.

Last but not least, the AGS (HK) will continue to support the local Universities by providing scholarships to those students showing particular interest in the disciplines of geotechnical engineering, underground works, engineering geology as well as environmental science. The objective of this award is to encourage more graduates to enter the geotechnical engineering field so that the industry will have a continue supply of new blood.

On behalf of the committee, we look forward to seeing you and having your support throughout the year.

Yours truly,
Barry SUM (Chairman)

New Faces

The Association warmly welcomes the following new faces to the Executive Committee and the Co-opted Committee:

Executive Committee

Mr Clayton CHAN (AECOM Asia Co. Ltd.)

Clayton Chan is a Principal Engineer of AECOM Asia Company Limited. He has joined AECOM for about 12 years. Since graduation in 1998, he was working for Tapbo Civil Engineering Co., Orica Hong Kong Ltd., and CHEC - CWF Joint Venture (CCJV). During his 14 years of experience in Civil and Geotechnical engineering fields, he has extensively been involved in the planning, design, construction supervision and project management of various large-scale civil infrastructures in particular tunnelling projects in Hong Kong, Australia, UAE and India. These projects comprise a number of major road, rail, stormwater, sewer and water tunnels, with different construction methods ranging from Drill-and-Break, Drill-and-Blast (D&B), Road Header, Tunnel Boring Machine (TBM), Pipe Jacking, Horizontal Directional Drilling (HDD), Soft Ground Tunnelling Excavation (NATM) to Cut-and-Cover. Clayton has also previously been involved in the design and supervision of shafts, site formation, slope works, foundation, deep excavation and ground treatments in various major civil infrastructure projects, including Route 8 – Section between Cheung Sha Wan and Sha Tin, Route 10 – Section between North Lantau to Tsing Lung Tau, CWB and Proposed Residential Redevelopment at No. 3 & 5 Gough Hill Path. Clayton is currently the Project Manager for XRL 822 project - Tse UK Tsuen to Shek Yam Tunnels, to manage and lead multi-disciplinary teams including tunnelling, geological, geotechnical, blasting, structural, building services, ventilation, traffic, drainage, utilities and environmental teams to provide the detailed design services for Leighton.



Co-opted Committee

Mr Raymond CHAN (Bachy Soletanche Ltd.)

Raymond is currently a Project Manager of Bachy Soletanche Limited. He has gained more than 30 years of experience in tendering, contractual management and site supervision in projects. He also involves in technical study, proposal and support for tenders and projects particularly in engineering geology. He completed his High Diploma in Civil Engineering at The Hong Kong Baptist College in 1980, and subsequently obtained the Master Degrees in Construction Management at The City University of Hong Kong and Applied Geosciences at The University of Hong Kong. He has worked on a wide variety of civil and geotechnical projects in Hong Kong, Singapore, China, Philippine and Vietnam in fields of ground investigation, directional drilling, instrumentation, piled foundation, ground anchor, slope greening, site formation, ground treatment by soil and rock grouting, vibro-flotation and soil lime stabilization. He is also an active Committee Member of Professional Branch of The Geological Society of Hong Kong, and on behalf of the Society, he has recently joined the Working Group of Civil Engineering and Development Department for updating the GEO Publication: Geoguide 4 – Guide to Cavern Engineering.



Mr Timothy WONG (Fugro Hong Kong Ltd.)

Timothy is an Associate Director with Fugro (Hong Kong) Limited. He has 20 years professional experience on projects in Hong Kong, Macau, China, Vietnam and Indonesia. His experience includes geological and geotechnical assessment and design of site formation, foundation, deep excavation, micro tunnel, slope upgrading and mitigation works for residential and commercial development for both private and government sectors. He also involves in contract management and providing geotechnical advice on maintenance and investigation study for potentially unstable slopes. Outside Hong Kong, he provides independent geotechnical review and advice on design of reclamation, deep excavation and foundation construction for projects of gas and oil facilities; cement plant and near-shore structures.



Mr Yun-cheung CHAN (Personal Member - Independent)

Yun-cheung was for a short while the Head of the Geotechnical Engineering Office. He has since retired and is enjoying his time in the search of knowledge and fun. Having been involved continually in learned-society activities since his graduation in 1975, he has found that helping out learned societies and trade associations is rewarding in both aspects, hence his return to AGS (HK) as a personal member.



Mr Sandy MACKAY (Personal Member – Nishimatsu Const. Co. Ltd.)

Sandy is a Chartered Civil and Mining Engineer with almost 28 years professional experience practicing in over 16 countries. He joined Nishimatsu Construction Company Ltd. as their Branch Office Geotechnical Manager early 2012 responsible for tender coordination and engineering support for their on-going Mass Transit Railway Corporation Ltd. (MTRCL) contracts. Prior to this he was the Acting Regional Manager/ Managing Director at Snowy Mountains Engineering Corporation (SMEC) Asia Ltd. overseeing a team of 60 multi-disciplinary professional staff, based mainly in the HKSAR and Mongolia, responsible for business development and maintaining profitability. During this period, he managed over 50 civil engineering projects, ranging from heavy haul railways, highways, site formations and sub-surface excavations with capital costs up to US\$ 2 Billion. Previously he was the Project Team Leader for the US\$ 23.5 Billion oil and gas pipeline installation across Sakhalin Island, East Russian Federation 2005 to 2007. Sandy has published over 40 technical papers and has been a committee representative for the Institute of Materials, Minerals and Mining, and the Geological Society of London in HKSAR during different periods for the past 10 years.



Mr Richard SUN (Personal Member – Dragages Hong Kong Ltd.)

Richard is a Design Manager in Dragages Hong Kong Ltd. and has devoted himself to the civil engineering and geotechnical field for 18 years. He has participated in numerous design and construction projects in Hong Kong, Taiwan, UK, USA and the Middle East. He has extensive experience in large scale deep excavation and tunnelling projects encountering various challenging soils. Richard is a member of the British Geotechnical Association and has been developing a special interest in EPB type TBM and ground freezing.



Seminar on the “Natural Terrain Hazard Mitigation Measures”

On Tuesday, October 16, 2012, the one-day AGS (HK) seminar on “Natural Terrain Hazard Mitigation Measures” was held at The YMCA Hong Kong in Tsim Sha Tsui. The seminar was well attended by almost 250 attendees from various government departments, business clients, consultants, contractors and universities. The seminar was delivered by 11 prominent engineers and geologists presenting local and overseas experiences on the natural terrain hazard study, the debris mobility modelling and the design of debris-resisting barriers. Mr Leslie SWANN of Jacobs China Ltd. (Hong Kong) and Dr Dick MARTIN of Geoconsult Hong Kong Ltd. chaired the morning and afternoon panel sessions, respectively.

The presentations were:

1. Keynote Lecture: The State and Practice of Natural Terrain Landslide Hazard Mitigation in Hong Kong at 2012, Y C Chan & S H Kwan (GEO).
2. Flume Modeling of Debris Flow Resisting Baffles, C W W Ng, C E Choi (HKUST), J H S Kwan, H Y K Shiu, K K S Ho & R C H Koo (GEO).
3. Protection against Debris Flows with 13 Flexible Barriers in the Millibach River (Canton Berne, Switzerland) and First Event Analysis, C Wendeler, B Haller & H Salzmann (Geobrugg, Switzerland).
4. Numerical Analysis and Design of Flexible Barriers Allowing for Sliding nodes and Large Deflection Effects, S L Chan, Z H Zhou & Y P Liu (HKPolyU).
5. The Derivation of a Design Event and Other Uncertainties related to Natural Terrain Hazard Mitigation, S Parry & J R Hart (GeoRisk).
6. Keynote Lecture: Hillslope Debris Flows: Full-scale Field Tests and Runout Modeling, B McArdeall, A Volkwein (WSL, Switzerland), C Wendeler (Geobrugg), P Bartelt (WSL) & T Egli (Egli).
7. Developments in Design Considerations and Use of Flexible Barriers as Mitigation Measures for Channelised Debris Flow and Open Hillslope Failures – A Case Study, A K L Ng, S J Williamson & A K T Chong (AECOM).
8. Landslide Mobility and Flexible Barrier Modelling using LS-DYNA 3D Analysis, J Yiu, Y L Huang, J Pappin, R Sturt (Ove Arup).
9. Hazard Mitigation and Slope Stabilization Measures for the June 2008 Natural Terrain Landslide Behind the Chow Yei Ching Building at University of Hong Kong, M J Lorimer, L H Swann, H Y Chong & M K Chiu (Jacobs).
10. Debris Flows in Korea and Risk Evaluation, K S Kim (Korea Expressway Corporation) & C Y Yune (Gangneung-Wonju National University).
11. The Development of Impact Barrier in Japan, Y Kimura & H Umezawa (Toa Grout, Japan).



Mr Leslie SWANN chaired the morning panel session in the seminar.



Dr Dick MARTIN chaired the afternoon panel session in the seminar.

The Second AGS (HK) Final Year Research Projects Competition

The Second AGS (HK) Final Year Research Projects Competition was held at The Hong Kong Productivity Council on the evening of 14 May 2013. The competition is aimed to recognise excellence in the research fields of geotechnical/ geological/ geo-environmental engineering at the final year undergraduate level and to provide a platform for graduating engineers/ geologists to polish their skills in presentation, and Question and Answer.

The presentations from the final year undergraduates of the local universities were (in a random order):

1. CHAM Fu Kwan (HKU). Discrete Element Method simulation of undrained biaxial response of soil under monotonic loading.
2. GUO Yi, Bruce (HKU). Evaluating liquefaction resistance by shear wave velocity.
3. LEE Kam Hang (PolyU). Experimental and numerical investigation of debris flow.
4. SZE Chun (CityU). Multi-particle crushing tests and normal load-deflection behaviour at the contacts of soil particles including the effects of shape descriptors and particle type.
5. WU Qihang (HKU Earth Science). Geochronological constraints on the polyphase deformation of Chinese Altai: Implications for tectonic evolution of the Central Asian Orogenic Belt.
6. WONG Lok Him & TSANG Mei Sze (HKUST). Quantitative risk assessment of debris flows and landslides along Province Road 303 in Sichuan, China.
7. MAN Ka Yan (PolyU). Study of cement-soil mixed pile and vertical drain for soft soil improvement in model tests.
8. LI Yan Hei, Martin (HKU Earth Science). ZIRCON U-PB Geochronology and geochemistry of the Tuen Mun Formation and tectonic implications.
9. YENG Ying Yung (HKUST). Ground improvement using interlock-able plastic bottles.

The judging panellists were:

Ir Raymond CHAN (Bachy Soletanche)
Ir Y C CHAN (formerly Head of Geotechnical Engineering Office)
Ir Dr Johnny CHEUK (AECOM)
Ir Dr C K LAU (Fong On Construction Ltd)
Ir Dr Axel NG (AECOM)
Ir Dr Samuel NG (Geotechnical Engineering Office)
Ir Dr Jack PAPPIN (Arup)

The Winner was SZE Chun (CityU), First runner-up WU Qihang (HKU Earth Science), and Second runner-up LI Yan Hei, Martin (HKU Earth Science).



Dr Jack PAPPIN (left) with students giving presentations

The AGS (HK)'s Book Prize

Young attendants of the AGS (HK)'s forums, seminars and technical visits are invited to submit a written report for the presentations, dialogues and observations that take place at these events. The objectives of the AGS (HK)'s Book Prize are to:

1. Encourage participation in the AGS (HK)'s events;
2. Promote interests in geotechnical and geo-environmental topics; and
3. Promote report writing skills.

The entry report shall be submitted to Dr Siew-wei LEE, the Honorary Secretary of the AGS (HK) by:
 Email: swlee@golder.com.hk; or
 Post to: c/o Golder Associates (Hong Kong) Ltd. – 20/F, Henan Building, 90 Jaffe Road, Wan Chai, Hong Kong.

Editorial Note

The following reports are reproduced from the winning Book Prize reports written by Mr Simon LEUNG, Mr Herman LAI, Ms Michelle KWAN, Ms Patricia POON, Ms Waiting CHENG and Mr Phil CAI. The winners received a book prize from the AGS (HK) including a book entitled "Geology of Site Investigation Boreholes from Hong Kong" by Prof. Chris FLETCHER and a book coupon to the value of HKD \$300.

Seminar on the "Horizontal Directional Coring (HDC)" – Mr Simon LEUNG

The AGS (HK) organized an evening seminar at Lecture Theatre 17, The City University of Hong Kong on August 14, 2012. In view of the increasing use of Horizontal Directional Coring (HDC) in tunnel projects in Hong Kong, AGS (HK) has published a guideline on the use of HDC. In this seminar, Ms Janice TAM and Mr Bruce CUNNINGHAM discussed aspects of HDC application, with emphasis on planning and using HDC to facilitate engineering geological assessment.

Janice first introduced the background of HDC, which was developed in late 80's in Norway, and is widely used in petroleum and mineral exploration industries. The main advantage of HDC is the capability to steer and obtain continuous core samples and geological information along proposed tunnel alignments, such that the need for interpolations of ground conditions between drillholes can be minimized. Another advantage is that the launch point of HDC for underwater tunnel can be based on land, therefore reducing the need for marine ground investigation works. However, despite the strength of HDC, Janice noted that vertical and inclined drillholes are still useful for purposes such as confirming rock head level.

Then, Janice discussed some factors to consider when planning for HDC. Firstly, to maximize the benefit of HDC, it is important to have the confirmed tunnel alignment and preliminary geological models ready beforehand. For example, comprehensive geological models enabled successful use of HDC in the HATS 2A project and Tseung Kwan O – Lam Tin tunnel project to study the major

geological faults and alteration zones along the proposed tunnel alignments. Secondly, the technical specifications of HDC equipment, for example size of works area, bending radius and diameter of core, should be understood. It is also important to define the tolerance of deviation from planned trajectory, because it affects the duration of the coring works. For example, given a 1200m coring length, the difference between 5m tolerance and 8m tolerance may result in 4 months difference in duration of the coring works.

Afterwards, with the help of illustrative figures and animations, Bruce first explained how the interaction of different components (such as electronic multi-shot instrument for measuring drillhole azimuth and inclination) made steerable HDC possible.

Then, Bruce discussed field tests that can be carried out with HDC, including water absorption test, groundwater inflow test and discontinuity survey. He noted that specialty equipment, such as special packers, are needed for effective execution of some of the tests, particularly for the first two tests.

During Q and A session, several questions were raised. When asked what is the main difference between directional coring in natural hillside and under water, Bruce noted that coring in hillside typically requires fewer casings and less coring capacity to be used in soft ground. When asked whether typical HDC trajectories go along the same elevation of the actual tunnel alignment, Bruce emphasized that it is important to specify the tolerance envelope above the actual tunnel alignment, such that the HDC drillhole will not become a channel for water inflow during construction stage.



From left: Mr Bruce CUNNINGHAM and Ms Janice TAM at the AGS (HK) seminar on "Horizontal Directional Coring (HDC)"

Technical Visit to the "MTRC Express Rail Link, Contract 822 – Tse Uk Tsuen to Shek Yam Tunnels" – Mr Herman LAI

On October 27, 2012, the Association of Geotechnical & Geo-environmental Specialists (Hong Kong), the AGS (HK) for short, organized a technical visit to construction site of Express Rail Link (XRL) Contract 822 – a 7.65-kilometre underground Tunnel between Tse Uk Tsuen and Shek Yam, one of the eight work contracts awarded in March 2010. The total construction period is expected to be 69 months, with scheduled completion in 2015.

The visit commenced with a brief introduction on the project background and on-going construction works by Mr Henry CHAN (Engineering Manager) from Leighton Contractors (Asia) Limited (LCAL) at the site office in Kwai Fong, followed by a safety workshop before the participants reached the actual site at Shek Yam. As for the scope of work, LCAL adopts the traditional drill-and-blast method to excavate and construct tunnels, a 120m deep 16m diameter ventilation and EAP shaft at Shing Mun, a 700m long Shek Yam Construction Adit, etc. In view of drained tunneling

approach, the inflow of groundwater into tunnel through the rock is the most critical issue to the entire process of work. A waterproof membrane together with a layer of geotextile is embedded in between the permanent tunnel lining and the excavated tunnel profile.

What inspired me most is the huge crusher plant at Shek Yam Crusher Adit for the process of rock crushing. The grading sample collected for laboratory tests will determine the drainage layer, a 300mm well-graded surface at the bottom of the tunnel invert slab in our case, through which the groundwater around the permanent tunnel lining is effectively driven and carried away along the alignment of railway. Added to that, the site staff from LCAL even highlighted the entire sequences and construction practices for drill-and-blast approach and the method of controlling groundwater inflow. It is the most interesting part I have ever enjoyed as this not only instantly refreshed my mind with further details during the construction stages but also brought a handful of thought provoking questions that motivated me to think out-of-the-box based on my own understanding.

Without much site experience, this makes me feel that it is definitely worth gaining more exposure to sites in future for better understanding about the actual site constraints as well as much more insights that I have never gained from work experience in consulting firms. That is why I strongly encourage all young engineers like me to seize every single opportunity, to get exposed to hands-on practices and to ask whatever you are not sure about so that we all stay technically competent for the upcoming challenges. Lastly, I deeply appreciate the AGS (HK) and LCAL so much for such a remarkable site visit.



A group photograph of the attendees and the Organizing Committee Members at the Shek Yam site

Seminar on the “Tunnels & Underground Construction” – Ms Michelle KWAN

On November 24, 2012, the Association of Geotechnical & Geo-environmental Specialists (Hong Kong) organized a 1-day seminar on Tunnels & Underground Construction. It covered a wide range of aspects from tunnel planning and design methodologies to construction challenges and risk management.

I learned that geology and prior development affected the construction method of deep tunnels, i.e. blast or non-blast method, and types of machine. Legislation restricted the working air pressure of a person inside a tunnel. In HK the limit was 50psi. This pressure limit value was introduced in 1970 and some countries had already reviewed and increased the pressure limit. It might be beneficial to the industry if the Hong Kong authority could review it as well.

Groundwater inflow could be controlled by pre-excavation grouting at the more fractured part, pre-excavation ground freezing at the most weathered part and post-excavation barrier construction in open mode with external bags for low flow (less than 80 l/s) while under pressurized conditions according to a specific sequence of

backfilling for high flow. Ground freezing was more expensive than pre-grouting but saved time. Significant groundwater inflow was possible in the construction of a deep tunnel, which pre-excavation grouting would be a principal measure to control the water inflow. As such, it might be beneficial to a contract if the cost of pre-excavation grouting was shared by the project owner. Imposing multiple groundwater inflow limits according to the local conditions avoided the potential for under or over grouting caused by imposing a single inflow limit. Water inflow test could be carried out through probe holes to determine the need and effectiveness of pre-excavation grouting.

For tunnel design, it might be worthwhile to consider and allow tunnel temporary supports as reinforced ground for the tunnel permanent supports, also to consider and allow some reduction in the rock boundary stresses as geotextile drainage layer surrounding the tunnel allowed ground movement/ relaxation. The Modified Barton Q Support Chart by Papworth provided energy absorption information of fibre reinforced shotcrete.

Excavation in blocky ground damaged the cutter head, belt conveyors and slurry circuit. Also, the process consumed much energy. Wear and tear of the cutter head could be reduced by rearranging the position and number of cutters which was a trial and error process on the site. Damages on belt conveyors system could be reduced by calibrating the cutter head opening and installing a block separating unit outside.

Spoil disposal through pipes instead of by trucks could mitigate the increased traffic load on the busy public road. Also, “Rotary All Round Casing Method” was used to remove the clashing piles. Roadheader was one of the options for excavation. It cut and might taper the cross section, minimize ground over break.

I gained not only valuable experience in tunnel design and construction shared by the presenters, but also built network with people working in the industry. I raised questions about polypropylene to a presenter, then after the end of the seminar, I was approached by a supplier who gave me more information on it.

Technical Visit to the “CEDD Contract No. CV/2007/03, Development at Anderson Road Site Formation & Infrastructure Works” – Ms Patricia POON

On 23 February 2013, the AGS (HK) organised a technical visit to CEDD Contract No. CV/2007/03 Development at Anderson Road Site Formation & Infrastructure Works. This CEDD project aims to address long-term public housing demand. The site area between Anderson Road and Sau Mau Ping Road has been earmarked for the development of public housing, schools, associated government institutions and community facilities. The Contract is being supervised by Ove Arup & Partners (Hong Kong) Limited and constructed by China State Construction Engineering (Hong Kong) Limited.

The site visit began with an informative presentation by Mr Michael WRIGHT of Arup who provided an overview of the project. The main elements of the project are the site formation to create about 20 hectares of platform area for mixed development use and the related civil infrastructure. Major geotechnical works include soil and rock slope formation, soil nailing, rock blasting & splitting, reinforced earth (RE) retaining walls, reinforced concrete (RC) retaining walls and bored pile walls. A wide variety of civil infrastructure works are also included in this project including road works and junction improvement works,

construction of vehicular bridges, footbridges and pedestrian subways, construction of drainage systems including an underground storm water storage tank and landscape works. Extensive environmental impact mitigation measures and environmental monitoring and audit are required to ensure minimal disturbance to the neighbouring residential areas.

After the presentation, visitors were guided by Arup and China State to view the works from a high vantage point overseeing the site. The hosts explained the safety measures for the blasting including blasting cages covered by the blasting mats and screens to reduce the noise and dust generated. Hydraulic breakers mounted on backhoes were used to break up oversize rocks into permissible size for disposal. Good quality rock suitable for use as aggregate is being sent to the adjacent Anderson Road Quarry Site for processing whilst other spoil is being disposed of via barges at Kai Tak. Visitors were also able to view other construction activities including retaining walls, slope works and civil infrastructure works.

Visitors gained an understanding of the construction methods and plant for a large-scale site formation and infrastructure project. Attendees also gained insights into the project planning and design. For example, the platform area was maximised by forming steep soil cut slopes with soil nails, rock cuttings and RE retaining walls. The final design solutions and chosen methods of construction required consideration to maximise reuse of on-site materials (e.g. fill materials for RE walls) and the proximity and potential impact to existing sensitive slopes.

Kind thanks go to CEDD, Arup and China State for allowing the AGS (HK) to visit their project and for providing such a valuable learning experience to all the attendees.



A group photograph of the attendees at the Anderson Road site

Seminar on the “Dismantling of Existing Sheung Wan Station Overrun Tunnel for MTR West Island Line Contract 703” – Ms Waiting CHENG

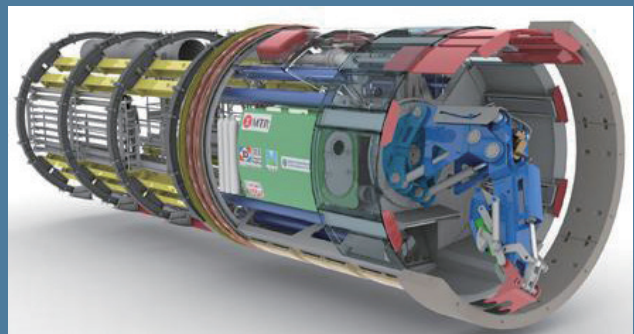
This technical seminar was jointly organised by AGS (HK) and ASCE Hong Kong Section on March 25, 2013. The speaker was Mr Stephane POLYCARPE, who presented the use of Tunnel Dismantling Machine (TDM) in the tunnel construction between Sheung Wan Station and Sai Ying Pun Station of the MTR West Island Line (Contract No. 703).

Dragages-Maeda-Bachy Soletanche Joint Venture has been engaged as the Contractor of this project. One of the major difficulties in this Contract is to connect the proposed tunnel route with an existing overrun tunnel. This connection requires preliminary removal of the linings of the existing overrun tunnel (made of cast iron/ reinforced concrete with a total length of about 130m) and backfilling of the tunnel by lean concrete. There are numerous buildings and skyscrapers above the overrun tunnel. Also, it has been built in alluvium, which is under about 30m water head. The difficult geotechnical and geological conditions make the removal works even harder. Furthermore, the machine used to dismantle the existing tunnel has to be

introduced through a very narrow shaft. Overall, the works demand meticulous planning and tight monitoring to ensure that every step does not cause detrimental impacts on the adjacent environment.

TDM stands for Tunnel Dismantling Machine, which is designed for removal of the tunnel lining segments. TDM basically consists of demolition arm, shotcreting system and man locks.

As TDM can help to remove the existing linings of the overrun tunnel, it allows the designer to renew the old tunnel and adjust the tunnelling direction for the new tunnel. Besides, man locks were provided inside the TDM. Thus, it can significantly reduce the exposure of workers to the compressed air condition. The use of TDM shotcreting pushes forward the concrete technology of shotcreting under high air pressure, as around 2.8 bar is applied inside the dismantling chamber.

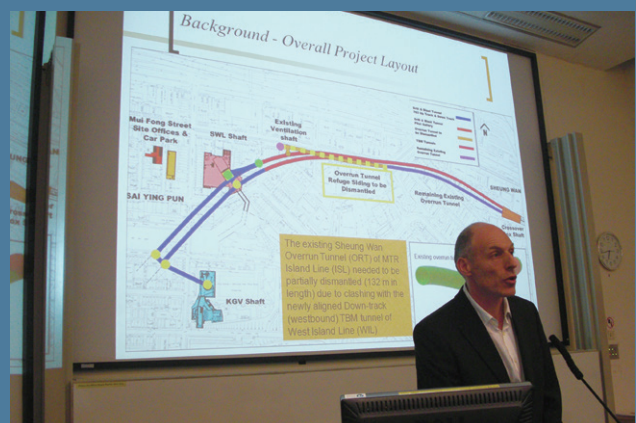


Isometric view of the TDM adopted in the MTR West Island Line Contract 703

Three main categories of problems encountered with the use of TDM in this project, namely high pressure, hot temperature and high humidity rate inside the demolition chamber.

The causes of hot temperature with the use of TDM come from many areas: air compression process, heat generated by shotcrete/ backfill and limited working space. Owing to the lack of a large shaft for efficient ventilation, it is easy for hot air to be trapped in the demolition chamber, yielding high tunnel and shaft temperature during the works. Compressed air environment, shotcrete curing process, surrounding humidity and the need for water usage in jet and spray inside the demolition chamber are major reasons for contributing to the high humidity. As high pressure is applied to the demolition chamber for the purpose of providing temporary support during the dismantling process, settlement may be induced during decompression should the concrete strength be not enough.

It is highly appreciated that the innovative TDM has been adopted, which pushes the forward of tunnel technology. Lastly, I would like to express my greatest attitude towards AGS (HK), ASCE Hong Kong Section, MTR and JV for organizing such a valuable learning technical seminar.



Mr Stephane POLYCARPE presenting on the TDM adopted in Contract 703

Seminar on the “Geotechnical Computer Modelling” - Mr Phil CAI

This 1-day seminar was jointly organised by the AGS (HK), the HKIE Geotechnical Division (Working Group on Application of Innovative Technology in Geotechnical Engineering - Geotechnical Computer Program Users Group) and the Department of Civil Engineering, the University of Hong Kong on Saturday, April 20, 2013. Thirteen experts from local and overseas gave fruitful lectures on various topics on numerical modelling in geotechnical engineering for both soft ground and hard ground.

Dr Mark CHAN from Geotechnical Engineering Office (GEO) gave the first presentation on the application and limitations of geotechnical computer programmes used in Hong Kong. He highlighted that limitations exist in modelling and all geotechnical computer programmes used in private and government projects have to obtain prior acceptance from the relevant authorities, e.g. The Standards and Testing Division of the GEO.

Dr Axel NG from AECOM then presented the fundamental concepts of numerical modelling, in particular, Finite Element Modelling (FEM). FEM basically divides the domain into elements and formulates the interaction of the elements with regard to their force and displacement. Solution will be obtained through Iteration – Prediction – Correction process until they converge. One of the major challenges for the modellers is non-linear governing equations (i.e. materials, therefore the constitutive model). The increase of non-linearity in advanced constitutive models requires substantial skills and understanding of modelling.

Subsequently Dr Gavin TOH from Lambeth/ Gammon brought in the third talk by a question “Is My Geotechnical Modeling Conservative or Aggressive?” on an Excavation and Lateral Support (ELS) project in the congested Tsim Sha Tsui area. It was found that even though the geotechnical model was developed on the basis of GI logs for the ground profile and well published Hong Kong literatures regarding the soil parameters, the comprehensive monitoring showed lower measured settlements, wall deflections and strut loads.

The fourth lecture on the Mohr Coulomb (MC) Model by Dr Ryan YAN from the University of Hong Kong refreshed the audiences with the principles of the MC Model. He explained in detail the derivation of the strength parameters in the MC Model from Triaxial tests and the influence of dilation angle of Dense Sand and Over Consolidated Clay on the predicted shear strength. The audience were led to think more on the “meaning” of the MC parameters and their implication on potential over-estimation of the shear strength by the MC model.

Mr Leslie SWANN from Jacobs closed the morning section by giving an informative talk on an existing tunnel formed using unbolted segmental tunnel linings in UK. The tunnel is located beneath a proposed deep excavation with a vertical separation of a few metres between the excavation bottom and the tunnel crown. 3D numerical models in conjunction with 2D models were developed to establish the initial condition and model the construction sequence. The 3D model showed advantages in design because the 2D model cannot truly represent the alignment and intersection of the existing structures. A conclusion was drawn that the structure response and ground movement were significantly

over-predicted by the 2D analysis, while 3D modelling gave a more realistic prediction.

In the afternoon session, Mr Les MACQUEEN and Dr Ardie PURWODIHARDJO started the seminar with a large span cavern design in Brisbane, Australia. They carried out kinematic analyses for block stability assessment and performed continuum and discontinuum finite element models for jointed rocks to design the temporary support of the cavern. Different rock failure mechanisms had been checked.

Mr Sandy MACKAY from Nishimatsu then gave a talk on the “Engineering Geological Considerations for Computer Analyses for Tunnel and Cavern Stability Assessment” from a contractor’s point of view. He gave two project examples in Aldinga, Australia and Hong Kong to illustrate the design and assessment of supports to underground caverns/ tunnels, emphasizing on the interpretation of geological conditions, rock strength and stiffness parameters and geological indices (e.g. GSI). More importantly, the geological and geotechnical conditions shall be incorporated in the numerical models before supports can be designed.

Subsequently, Mr Nigel PICKERING from URS Benaim shared his experiences from a designer’s point of view that a good understanding of the ground conditions and the knowledge of derivation of geotechnical parameters are more important than the numerical precision in modelling and design partial factors. Mr Jack YIU from Arup Hong Kong gave an impressive and informative talk on 3D modelling of debris mobility and flexible barrier structures. The LS-DYNA programme was used to set up the models for the flexible barrier and the flow of landslide debris. Through these modelling techniques, designers are able to assess the interaction of the debris and barrier structure.

Dr J P WANG from the HKUST presented an interesting topic on “Probabilistic Slope Stability Analysis and Seismic Hazard Assessment with Excel Applications”. A new algorithm was incorporated in Excel spreadsheets to calculate the slope stability and carry out seismic hazard assessment by means of probability analysis. The method can be performed by using Excel with significantly less time, achieving good accuracy.

Mr William TAI and Dr Angus MAXWELL from Maxwell Geosystems closed the seminar by giving a talk on the geotechnical instrumentation and monitoring system. The system developed by Maxwell Geosystems linked the monitoring points on site to a web-based database in a real-time manner. The data is readily downloadable any time for interpretation and plotting. It also automatically sends out the alert messages by SMS if trigger AAA levels are reached so that the designer and contractor can review the design, construction sequence and response of ground to construction activities.

It is appreciated that the local and overseas numerical experts have shared their valuable experiences in Hong Kong and worldwide. The seminar has been comprehensive and informative on the topics related to both design and construction works. Last but not least, I would like to express my greatest gratitude to the AGS (HK), the HKIE and the University of Hong Kong for organising such a valuable technical seminar for learning.

The AGS (HK) 2013 Year Plan for Seminars/ Conferences, Technical Site Visits and Publications

Months	Events	Dates	Venues
Mar	Evening talk on “Dismantling of existing Sheung Wan Station Overrun Tunnel for MTR WIL C703” by Stephane POLYCARPE	25 Mar 2013, 6:30pm – 8pm	LT2, CityU
Apr	1-day Seminar on “Geotechnical Computer Modelling” by various local and overseas speakers	20 Apr 2013, 9am – 5pm	MWT1, HKU
	Technical site visit to “SIL(E) Nam Fung Tunnel and ventilation buildings MTR Contract 902”	20 Apr 2013, 9:30am – 12:30pm	South HK Island
May	Second Final Year Research Projects Competition by various undergraduates	14 May 2013, 6:30pm – 9:30pm	HKPC
Jun	Technical site visit to “Central-Wan Chai Bypass & Island Eastern Corridor Link”	1 Jun 2013, 9:30am – 12:30pm	Central/ Wan Chai
	Publication of Geotechnical Investigation Guideline (GIG) on “Contaminated Land Management” by Paul KAU	19 Jun 2013	-
	Evening talk on “Challenges in environmental sampling and results interpretation” by Paul KAU and Michael NEUHAUS	19 Jun 2013, 6:30pm – 8pm	LT14, CityU
	Technical site visit to “MTRC Kwun Tong Line Extension, Contract 1001 – Yau Ma Tei to Whampoa Tunnels and Ho Man Tin Station”	29 Jun 2013, 9:30am – 12:30pm	Ho Man Tin
	Publication of AGS (HK) Newsletter No. 11	Tentative	-
Aug	Publication of Tunnel Construction Guideline (TCG) on “Tunnel Instrumentation”	Tentative	-
	Publication of TCG on “Pre-excavation grouting for underground construction in hard rock – Part 1: Principles & Design Elements & Part 2: Site Practices”	Tentative	-
Sep	Technical site visit to “HATS – Construction of sewage conveyance system from Ap Lei Chau to Aberdeen”	Tentative	-
	Evening talk on “Tunnel instrumentation” by Angus MAXWELL	Tentative	TBC
Oct	1-day Seminar on “Geotechnical Baseline Report” by various local and overseas speakers	5 Oct 2013	Graduate House, HKU
	Social event – Seafood dinner on Lamma Island	25 Oct 2013	Lamma Island
Nov	Technical site visit to “Hong Kong Boundary Crossing Facilities”	Tentative	-
	Evening talk on “Pre-excavation grouting for underground construction in hard rock” by Knut GARSHOL and Janice TAM	Tentative	TBC
Dec	Annual General Meeting	Tentative	TBC
2014	1-day Seminar on “Tunnels & Underground Space” by various speakers	Tentative	TBC