

10-12-2015

Guest of Honour Speech

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Recommended Citation

Er Chew Keat Chuan, "Guest of Honour Speech" in "Shotcrete for Underground Support XII", Professor Ming Lu, Nanyang Technological University Dr. Oskar Sigl, Geoconsult Asia Singapore PTE Ltd. Dr. GuoJun Li, Singapore Metro Consulting Eds, ECI Symposium Series, (2015). http://dc.engconfintl.org/shotcrete_xii/24

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**GOH SPEECH BY ER CHEW KEAT CHUAN, GROUP
DIRECTOR, BUILDING ENGINEERING GROUP, BCA AT
COMING INTERNATIONAL CONFERENCE ON SHOTCRETE
FOR UNDERGROUND ON 12 OCT 2015.**

Good Morning,

Distinguished speakers,

Ladies and gentlemen

1 I am pleased to welcome you to the International Conference on Shotcrete for Underground. To all our foreign guests, I would like to extend a warm welcome and wish you an enjoyable and memorable time in Singapore.

2 The mainland island of Singapore measures 50 km from east to west and 26 km from north to south. With a land area of 720 square kilometres housing a total population of 5.5million, Singapore is one of the world's most densely populated countries in the world. (7,600 pop/km²). To our foreign guests, rest be assured, Singapore is still an enjoyable and memorable place, all made possible with our extensive use of underground space.

3 Singapore's quest for underground space dates back more than 30 years ago, with the construction of transportation infrastructure such as the Mass Rapid Transit (MRT) lines and underground expressways. Till date about 12 km of expressways and nearly 80 km of MRT lines are already underground. With 2 new MRT lines under construction and 2 more new MRT lines to be commissioned, the volume of underground transportation infrastructure is set to double over the next few years.

4 Basements of shopping centres are also linked up to nearby train stations. In some cases, the basement is linked up to more than one station, offering visitors the option of selecting the MRT line that is the most convenient for them. This has allowed locals and visitors the comfort of a sheltered, air-conditioned environment while transiting between commercial buildings and transport facilities via such underground linkways.

5 To further harness our potential for underground developments, a national Geological Office was officially formed in Apr 2010 and housed within BCA, to manage geological information as well as conduct geological survey works. In addition, MND formed a high level Underground Master Plan Task Force (UMPTF) to drive this underground initiative, with participating members from the various

government agencies of Singapore. BCA is a member of UMPTF and work closely with our planners (i.e. URA) to support the Underground Space Plan (USP) by identifying potential sites for exploring underground developments.

6 Besides transportation and commercial use, Singapore has also developed underground space for industrial usage. JTC's Jurong Rock Caverns at Jurong Island is Singapore's and South-East Asia's first underground storage facility for liquid hydrocarbons storage. Using approximately 38 thousand cubic metres of shotcrete, the JRC has a storage capacity of up to 1.47million cubic metres of liquid hydrocarbon, which is equivalent to 600 Olympic-sized swimming pools. JTC's utilisation of subterranean storage spaces has translated to a saving of approximately 60 hectares of land and the land saved can house up to 6 petrochemical plants.

7 JTC has also carried out studies on the feasibility of a potential Underground Science City, to house up to 4,200 scientists, researchers, and professionals in Research and Development facilities and data centres, under Kent Ridge Park. The study was completed in March 2012 and some of the findings were presented at the 13th World Conference of the Associated Research Centres for the Urban

Underground Space (ACUUS 2012) held in Singapore in November 2012. JTC is conducting optimisation studies required to close the technological gaps to safely operate underground caverns housing working population and/or valuable merchandise cost-effectively. The studies are for fire safety, Air-Conditioning and Mechanical Ventilation (ACMV), reliable power systems designs, as well as, understanding the psychological, health and social impacts of working long term in underground space.

8 Singapore's national water agency, PUB, is currently conducting a underground study, which is slated for completion in end-2017. The study will include geological surveys to obtain detailed information on soil and rock properties, as well as look into the design options for an Underground Drainage and Reservoir System. This Underground Drainage and Reservoir System is expected to help the city deal better with the effects of climate change, which will bring about conditions such as more intense rainfalls and prolonged dry spells. The use of underground space will free up surface space while increasing Singapore's water storage capabilities

9 It can be seen from the previous cited projects that creating space underground also translate to land saving thus creating a win-win

situation. Depending on usage, this land saving can be very substantial. Making use of the inherent strength of the granite formation, the Underground Ammunition Facilities requires 90 per cent less land to be sterilised when compared to a traditional above-ground ammunition depot of similar capabilities. This has resulted about 300 hectares of land being freed up for other use.

10 The use of underground space is simply limitless and I hope that through this conference, participants will get to learn more about the state-of-the-art technology for underground space creation and be inspired with more creative ideas for use of underground space.

11 To conclude , I like to end with a quote from Deputy Prime Minister, Teo Chee Hean, during the commissioning ceremony of Underground Ammunitions Facilities: “Dare to dream, Think Deep and Break New Ground.”

With that, I wish you all an enriching and inspiring conference ahead.

Thank you.